UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10- K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2019
or
TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _______ to _______

Commission file number 1- 7416

Vishay Intertechnology, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**38- 1686453**
(State or other jurisdiction of incorporation or organization)	(IRS employer identification no.)

63 Lancaster Avenue
Malvern, Pennsylvania 19355- 2143
(Address of principal executive offices)

(610) 644- 1300
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading symbol	Name of exchange on which registered
Common Stock, par value $0.10 per share	VSH	New York Stock Exchange LLC

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well- known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No
Note – Checking the box above will not relieve any registrant required to file reports under Section 13 or 15(d) of the Exchange Act from their obligations under those Sections.

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S- T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non- accelerated filer, a smaller reporting company, or an emerging growth company. See definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b- 2 of the Exchange Act.

Large accelerated filer	**Accelerated filer**
Non- accelerated filer	**Smaller reporting company**
	Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by checkmark whether the registrant is a shell company (as defined in Rule 12b- 2 of the Act). Yes No

The aggregate market value of the voting stock held by non- affiliates computed by reference to the price at which the common equity was last sold as of the last business day of the registrant's most recently completed second fiscal quarter ($16.52 on June 29, 2019), assuming conversion of all of its Class B common stock held by non- affiliates into common stock of the registrant, was $2,194,000,000. There is no non- voting stock outstanding.

As of February 12, 2020, registrant had 132,451,299 shares of its common stock and 12,097,409 shares of its Class B common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement, which will be filed within 120 days of December 31, 2019, are incorporated by reference into Part III.

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Vishay Intertechnology, Inc.
Form 10- K for the year ended December 31, 2019

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PART I

Item 1. BUSINESS

Our Business

Vishay Intertechnology, Inc. ("Vishay," the "Company," "we," "us," or "our") is a leading global manufacturer and supplier of discrete semiconductors and passive components. Semiconductors include MOSFETs, diodes, and optoelectronic components. Passive components include resistors, inductors, and capacitors. Discrete semiconductors and passive components are essential elements of virtually every type of electronic circuit. We offer our customers "one- stop shop" access to one of the most comprehensive electronic component product lines of any manufacturer in the United States, Europe, and Asia.

Our semiconductor components are used for a wide variety of functions, including power control, power conversion, power management, signal switching, signal routing, signal blocking, signal amplification, two- way data transfer, one- way remote control, and circuit isolation. Our passive components are used to restrict current flow, suppress voltage increases, store and discharge energy, control alternating current ("AC") and voltage, filter out unwanted electrical signals, and perform other functions. Our components are used in virtually every type of product that contains electronic circuitry, in the industrial, computing, automotive, consumer, telecommunications, power supplies, military, aerospace, and medical markets.

The Vishay Story

In the 1950's, the late Dr. Felix Zandman, Vishay's founder, was issued patents for his PhotoStress® coatings and instruments, used to reveal and measure the distribution of stresses in structures such as airplanes and cars under live load conditions. His research in this area led him to develop Bulk Metal® foil resistors – ultra- precise, ultra- stable resistors with performance far beyond any other resistor available to date.

In 1962, Dr. Zandman, with a loan from the late Alfred P. Slaner, founded Vishay to develop and manufacture Bulk Metal foil resistors. Concurrently, J.E. Starr developed foil resistance strain gages, which also became part of Vishay. Throughout the 1960's and 1970's, Vishay established itself as a technical and market leader in foil resistors, PhotoStress products, and strain gages. These products were included with the measurements and foil resistor businesses that we spun off into an independent, publicly- traded company named Vishay Precision Group, Inc. ("Vishay Precision Group" or "VPG") through a tax- free stock dividend to our stockholders on July 6, 2010.

In 1985, Vishay began to expand its product line through various strategic acquisitions, including the resistor companies Dale Electronics, Draloric Electronic, and Sfernice. In the early 1990's, Vishay applied its acquisition strategy to the capacitor market, with the major acquisitions of Sprague Electric, Roederstein, and Vitramon. In 2002, Vishay acquired BCcomponents, the former passive components business of Philips Electronics and Beyschlag, which greatly enhanced Vishay's global market position in passive components. Over the years, we have made several smaller passive components acquisitions to gain market share, penetrate different geographic markets, enhance new product development, round out our product lines, grow our high margin niche businesses, or vertically integrate our supply chain. These include Electro- Films, Cera- Mite, and Spectrol in 2000; Tansitor and North American Capacitor Company (Mallory) in 2001; the thin film interconnect business of Aeroflex in 2004; Phoenix do Brasil in 2006; the wet tantalum capacitor business of KEMET Corporation in 2008; the resistor businesses of Huntington Electric in 2011; HiRel Systems in 2012; MCB Industrie in 2013; Holy Stone Polytech in 2014; UltraSource in 2018; and Bi- Metallix in 2019.

In the late 1990's, Vishay began expanding its product lines to include discrete semiconductors. In 1998, Vishay acquired the Semiconductor Business Group of TEMIC, which included Telefunken and an 80.4% interest in Siliconix, producers of MOSFETs, RF transistors, diodes, optoelectronics, and power and analog switching integrated circuits. Vishay's next semiconductor acquisition came in 2001, with the purchase of the infrared components business of Infineon Technologies, which was followed the same year by Vishay's acquisition of General Semiconductor, a leading global manufacturer of rectifiers and diodes. In 2005, Vishay made a successful tender offer for the minority interest in Siliconix. In 2007, Vishay acquired the Power Control Systems business of International Rectifier, further enhancing our product offerings. These

acquisitions propelled Vishay into the top ranks of discrete semiconductor manufacturers. In 2014, Vishay increased its position in optoelectronic sensors through its acquisition of Capella, a fabless IC design company specializing in optoelectronic components.

We continue to implement the vision, strategy, and culture articulated by Dr. Zandman as we continue to work tirelessly to enhance value for our stockholders.

Vishay was incorporated in Delaware in 1962 and maintains its principal executive offices at 63 Lancaster Avenue, Malvern, Pennsylvania 19355- 2143. Our telephone number is (610) 644- 1300.

Our Competitive Strengths

Global Technology Leader

We were founded based on the inventions of Dr. Felix Zandman and we continue to emphasize technological innovation as a driver of growth. Many of our products and manufacturing techniques, technologies, and packaging methods have been invented, designed, and developed by Dr. Zandman, our engineers, and our scientists. We are currently a worldwide technology and market leader in wirewound and other power resistors, leaded film resistors, thin film SMD resistors, wet and conformal- coated tantalum capacitors, capacitors for power electronics, power rectifiers, low- voltage power MOSFETs, and infrared components.

Research and Development Provides Customer- Driven Growth Solutions

We maintain strategically placed application and product support centers where proximity to customers and our manufacturing locations enables us to more easily gauge and satisfy the needs of local markets. The breadth of our product portfolio along with the proximity of our field application engineers to customers provides increased opportunities to have our components selected and designed into new end products by customers in all relevant market segments. We also maintain research and development personnel and promote programs at a number of our production facilities to develop new products and new applications of existing products, and to improve manufacturing processes and technologies. We plan to grow our business and increase earnings per share, in part, through accelerating the development of new products and technologies and increasing design- in opportunities by expanding our technical resources for providing solutions to customers.

Operational Excellence

We are a leading manufacturer in our industry, with a broad product portfolio, access to a wide range of end markets and sales channels, and geographic diversity. We have solid, well- established relationships with our customers and strong distribution channels. Our senior management team is highly experienced, with deep industry knowledge. Over the past two decades, our management team has successfully restructured our company and integrated several acquisitions. We can adapt our operations to changing economic conditions, as demonstrated by our ability to remain profitable and generate cash through the volatile economic cycle of the recent past.

Broad Market Penetration

We have one of the broadest product lines of discrete semiconductors and passive components among our competitors. Our broad product portfolio allows us to penetrate markets in all industry segments and all regions, which reduces our exposure to a particular end market or geographic location. We plan to grow our business and increase earnings per share, in part, through improving market penetration by expanding manufacturing facilities for our most successful products, increasing technical resources, and developing markets for specialty products in Asia. See Note 15 to our consolidated financial statements for net revenues by region and end market.

Strong Track Record of Growth through Acquisitions

Since 1985, we have expanded our product line through various strategic acquisitions, growing from a small manufacturer of precision resistors and resistance strain gages to one of the world's largest manufacturers and suppliers of a broad line of electronic components. We have successfully integrated the acquired companies within our existing management and operational structure, reducing selling, general, and administrative expenses through the integration or elimination of redundant sales and administrative functions, creating manufacturing synergies, while improving customer service. We plan to grow our business and increase earnings per share, in part, through targeted acquisitions. We have often targeted high margin niche business acquisitions. We also target strategic acquisitions of businesses with technology and engineering capabilities that we can use to grow our business.

Strong Free Cash Flow Generation

We refer to the amount of cash generated from operations in excess of our capital expenditure needs and net of proceeds from the sale of assets as “free cash” (see "Overview" included in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” for "free cash" definition and reconciliation to generally accepted accounting principles ("GAAP")). Due to our strong operational management, cost control measures, efficient capital expenditures, broad product portfolio, and strong market position, we have generated positive “free cash” in each of the past 23 years and “free cash” in excess of $80 million in each of the past 18 years. We expect the benefits of our restructuring and other cost cutting measures (see “Cost Management” included in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations”) to contribute to our “free cash” generation going forward.

Financial Strength and Flexibility

As of December 31, 2019, our cash and short- term investment balance exceeded our debt balance by $303.8 million. We also maintain a credit facility, which provides a revolving commitment of up to $750 million through June 5, 2024, which was all available as of December 31, 2019. Our net cash position and short- term investment balance, available revolving commitment, and strong “free cash” flow generation provide financial strength and flexibility and reduce our exposure to future economic uncertainties.

Our Key Challenges

Economic Environment

Our business and operating results have been and will continue to be impacted by the global economy and the local economies in which our customers operate. Our revenues are dependent on end markets that are impacted by fluctuating consumer and industrial demand, and our operating results can be adversely affected by reduced demand in those markets.

Competition

Our business is highly competitive worldwide, with low transportation costs and few import barriers. Our major competitors, some of which are larger than us, have significant financial resources and technological capabilities. To continue to grow our business successfully, we need to continually develop, introduce, and market new and innovative products, modify existing products, respond to technological change, and customize certain products to meet customer requirements.

Continuous Innovation and Protection of Intellectual Property

Our ability to compete effectively with other companies depends, in part, on our ability to maintain the proprietary nature of our technology. Although we have been awarded, have filed applications for, or have licenses to use, numerous patents in the United States and other countries, there can be no assurance concerning the degree of protection afforded by these patents or the likelihood that pending patents will be issued.

Continuing to Grow through Acquisitions

Our long- term historical growth in revenues and net earnings has resulted in large part from our strategy of growth through acquisitions. For this strategy to remain successful, we need to continue to identify attractive and available acquisition candidates, complete acquisitions on favorable terms, and integrate new businesses, manufacturing processes, employees, and logistical arrangements into our existing management and operating infrastructure.

For a more detailed discussion of the risks and uncertainties inherent in our business, which could materially and adversely affect our business, results of operations or financial condition, see “Risk Factors” in Item 1A.

Key Business Strategies

Since our first acquisition in 1985, we have pursued a business strategy that principally consists of the following elements:

Invest in Innovation to Drive Growth

We plan to continue to use our research and development ("R&D"), engineering, and product marketing resources to continually roll out new and innovative products. As part of our plan to foster intensified internal growth, we have increased our worldwide R&D and engineering technical staff, and increased our technical field sales force in Asia to increase opportunities to design- in our products in local markets. Our ability to react to changing customer needs and industry trends will continue to be key to our success. We intend to leverage our insights into customer demand to continually develop new innovative products within our existing lines and to modify our existing core products to make them more appealing, addressing changing customer needs and industry trends.

We are directing increased funding and are focusing on developing products to capitalize on the connectivity, mobility, and sustainability growth drivers of our business.

Cost Management

We place a strong emphasis on controlling our costs. We focus on controlling fixed costs and reducing variable costs. When our ongoing cost management activities are not adequate, we take actions to maintain our cost competitiveness including restructuring our business to improve efficiency and operating performance.

Growth through Strategic Acquisitions

We plan to continue to expand within the electronic components industry, through the acquisition of other manufacturers of electronic components that have established positions in major markets, reputations for product innovation, quality, and reliability, strong customer bases, and product lines with which we have substantial marketing and technical expertise.

Customer Service Excellence

We maintain significant production facilities in those regions where we market the bulk of our products in order to enhance the service and responsiveness that we provide to our customers. We aim to further strengthen our relationships with customers and strategic partners by providing broad product lines that allow us to provide "one- stop shop" service, whereby they can streamline their design and purchasing processes by ordering multiple types of products.

Our growth plan was designed based on the tenets of the key business strategies listed above.

Products

We design, manufacture, and market electronic components that cover a wide range of functions and technologies. Our product portfolio includes:

MOSFETs Segment
MOSFETs
• Low- Voltage TrenchFET® Power MOSFETs
• Medium- Voltage Power MOSFETs
• High- Voltage Planar MOSFETs
• High- Voltage Super Junction MOSFETs
• Automotive- Grade MOSFETs
ICs
• microBUCK® Voltage Regulators
• microBRICK™ DC/DC Regulator Module
• VRPower® DrMOS Integrated Power Stages
• Power Management and Power Control ICs
• Smart Load Switches
• Analog Switches and Multiplexers

Diodes Segment
Rectifiers
• Schottky Rectifiers
• Ultra- Fast Recovery Rectifiers
• Standard and Fast Recovery Rectifiers
• High- Power Rectifiers/Diodes
• Bridge Rectifiers
Small Signal Diodes
• Schottky and Switching Diodes
• Zener Diodes
• RF PIN Diodes
Protection Diodes
• TVS TransZorb® and PAR® Diodes (uni- directional, bi- directional)
• ESD Protection Diodes (including arrays)
Thyristors/SCRs
• Phase- Control Thyristors
• Fast Thyristors
Power Modules
• Input Modules (diodes and thyristors)
• Output & Switching Modules (contain MOSFETs, IGBTs, and diodes)
• Custom Modules

Optoelectronic Components Segment
Infrared Emitters and Detectors
Optical Sensors
• Proximity
• Ambient Light
• Light Index (RGBW, UV, IR)
• Humidity
• Quadrant Sensors
• Transmissive
• Reflective
Infrared Remote Control Receivers
Optocouplers
• Phototransistor, Photodarlington
• Linear
• Phototriac
• High Speed
• IGBT and MOSFET Drivers
Solid- State Relays
LEDs and 7- Segment Displays
Infrared Data Transceiver Modules
Custom Products

Resistors Segment

Resistors Segment, continued
Wirewound Resistors
• Vitreous, Cemented, and Housed Resistors
• Braking and Neutral Grounding Resistors
• Custom Load Banks
• Water cooled
Power Metal Plate™ Current Sense Resistors
Power Metal Strip® Resistors
Battery Management Shunts
Crowbar and Steel Blade Resistors
Thermo Fuses
Chip Fuses
Pyrotechnic Initiators / Igniters
Variable Resistors
• Cermet Variable Resistors
• Wirewound Variable Resistors
• Conductive Plastic Variable Resistors
• Contactless Potentiometers
• Hall Effect Position Sensors
• Precision Management Encoders
Networks/Arrays
RF and Microwave Resistors
High Voltage Resistors
Dividers
Non- Linear Resistors and Temperature Sensors
• NTC Thermistors
• PTC Thermistors
• Thin Film RTDs
• Varistors
• Platinum Chip Temperature Sensors

Inductors Segment
Inductors
• Power Inductors
• Power Chokes
• High Frequency RF Inductors
Transformers
• Medium and Low Power
• Planar
• Pulse
• SMD
Magnetics
• Actuators
• Antenna Coils
• Wireless Charging Coils
• Planar Chokes
• Custom Magnetics
Connectors

Capacitors Segment
Tantalum Capacitors
• Molded Chip Tantalum Capacitors
• Molded Chip Polymer Tantalum Capacitors
• Tantalum MAP Capacitors
• Polymer Tantalum MAP Capacitors
• Coated Chip Tantalum Capacitors
• Solid Through- Hole Tantalum Capacitors
• Wet Tantalum Capacitors
Ceramic Capacitors
• Multilayer Chip Capacitors

Film Resistors - Chip, MELF, Leaded, and Networks
• Metal Film Resistors
• Thin Film Resistors
• Thick Film Resistors
• Power Thick Film Resistors
• Metal Oxide Film Resistors
• Carbon Film Resistors

• Disc Capacitors
• Multilayer Chip RF Capacitors
• Chip Antennas
• Thin Film Capacitors
• RF Capacitors
Film Capacitors
Power Capacitors
Heavy- Current Capacitors
Aluminum Electrolytic Capacitors
ENYCAP™ Energy Storage Capacitors

We promote our ability to provide "one- stop shop" service to customers, whereby they can streamline their design and purchasing processes by ordering multiple types of products from Vishay. Our technical sales force consisting of field application engineers offers customers the complete breadth of the Vishay portfolio for their applications. We aim to use this broad portfolio to increase opportunities to have our components selected and "designed in" to new end products.

Product Segments

Our products can be divided into two general classes: semiconductors and passive components. Semiconductors are sometimes referred to as "active components" because they require power to function whereas passive components do not require power to function. Our semiconductor and passive components products are further categorized based on their functionality for financial reporting purposes.

Semiconductors

Our semiconductor products include metal oxide semiconductor field- effect transistors ("MOSFETs"), diodes, and optoelectronic components. Semiconductors are typically used to perform functions such as switching, amplifying, rectifying, routing, or transmitting electrical signals, power conversion, and power management.

MOSFETs Segment

MOSFETs function as solid state switches to control power. Our MOSFETs business includes both the commodity and non- commodity markets in which we believe that we enjoy a good reputation and strong brand recognition (Siliconix). MOSFETs applications include mobile phones, notebook and desktop computers, tablet computers, digital cameras, televisions, DC/DC and AC/DC switch mode power supplies, solar inverters, automotive and industrial systems. We are a leader in low- voltage TrenchFET MOSFETs and also offer high- voltage MOSFETs. Our MOSFETs product line includes low- and medium- voltage TrenchFET MOSFETs, high- voltage planar MOSFETs, high voltage Super Junction MOSFETs, power integrated circuits (power ICs), and integrated function power devices. We are one of the technology leaders in MOSFETs, with a tradition of innovation in wafer design, packaging, and performance.

Diodes Segment

Diodes route, regulate, and block radio frequency, analog, and power signals; protect systems from surges or electrostatic discharge damage; or provide electromagnetic interference filtering. Our Diodes business is a solid business with a strong market presence in both the commodity and non- commodity markets. The products that comprise our Diodes business represent our broadest product line and include rectifiers, small signal diodes, protection diodes, thyristors/SCRs and power modules. The primary application of rectifiers, found inside the power supplies of virtually all electronic equipment, is to derive DC power from the AC supply. Vishay is the worldwide leader in rectifiers, having a broad technology base and a good position in automotive, industrial, computing and consumer markets. Our rectifier innovations include TMBS® using Trench MOS barrier Schottky rectifier technology, which reduces power loss and improves the efficiency of end systems and eSMP®, the best in class high- current density surface mount packages. Our wide selection of small signal diodes consist of the following functions: switching, tuning, band- switching, RF attenuation and voltage regulation (Zener). They are available in various glass and plastic packaging options and generally are used in electronic circuits, where small currents and high frequencies are involved. Vishay is also one of the market leaders for TVS (transient voltage suppressor) diodes. The portfolio of protection diodes includes ESD protection and EMI filter. Our thyristors or SCR (silicon- controlled rectifiers) are very popular in the industrial high- voltage AC power control applications. The fast growing markets of solar inverter and HEV/EV are the focus of our power modules business (IGBT or MOSFET modules). These modules can be customized to fit in different customer design requirements.

Optoelectronic Components Segment

Optoelectronic components emit light, detect light, or do both. Our Optoelectronic Components business has a strong market presence in both the commodity and non- commodity markets. Our broad range of standard and customer specific optoelectronic components includes infrared ("IR") emitters and detectors, IR remote control receivers, optocouplers, solid-state relays, optical sensors, light- emitting diodes ("LEDs"), 7- segment displays, and IR data transceiver modules

(IrDA®). Our IR remote control receivers are designed for use in infrared remote control, data transmission, and light barrier applications in end products including televisions, set- top boxes, notebook computers, and audio systems. We are the leading manufacturer of IR remote control receivers. Our optocouplers electrically isolate input and output signals. Uses include switch- mode power supplies, consumer electronics, telecommunications equipment, solar inverters, and industrial systems. Our IR data transceiver modules are used for short range, two- way, high- speed, and secure wireless data transfer between electronic devices such as home medical appliances, mobile phones, industrial data loggers, and metering. Our optical sensors product line was considerably strengthened by our acquisition of Capella in 2014. Our optical sensors products include ambient light sensors, optical encoders, integrated photodiode and I/V amplifiers, proximity sensors, color sensors, and UV sensors. Applications include telecommunications, mobile phones, smartphone, handheld devices, digital cameras, laptops, desktop computers, LED backlighting, office automation equipment, household electrical appliance and automotive electronics. Our LEDs are designed for backlighting and illumination in automotive and other applications. Our LEDs include ultra- bright as well as small surface- mount packages, with products available in all standard colors including white.

Passive Components

Our passive components include resistors, inductors, and capacitors. Passive components are used to store electrical charges, to limit or resist electrical current, and to help in filtering, surge suppression, measurement, timing, and tuning applications.

Resistors Segment

Resistors impede electric current. Resistors are basic components used in all forms of electronic circuitry to adjust and regulate levels of voltage and current. Our Resistors business is our original business. We maintain the broadest portfolio of resistor products worldwide. Under current market conditions, the business is solid, predictable, and growing at relatively stable selling prices. We are a market leader with a strong technology base, many specialty products, and strong brand recognition (such as our Dale, Draloric, Beyschlag, and Sfernice brands). We focus on higher value markets in specialized industries, while maintaining a complete portfolio of commodity products. We do not aim to be the volume leader in commodity markets.

Resistors vary widely in precision and cost, and are manufactured from numerous materials and in many forms. Linear resistive components are classified as variable or fixed, depending on whether or not their resistance is adjustable. Non-linear resistors function by varying in resistance under influence of temperature (thermistors) or voltage (varistors). They can be used in temperature- measuring applications or as current or voltage- limiting devices. We manufacture virtually all types of fixed resistors, both in discrete and network forms, as well as many variable types.

Vishay resistor innovations include Power Metal Strip® technology. These resistors feature very low resistance and are used to measure changes in current flow (current sensing) or divert current flow (shunting).

Inductors Segment

Inductors also impede electric current. Inductors use an internal magnetic field to change alternating current phase and resist alternating current. While part of our traditional business, the inductors product line has grown significantly in recent years. We are a market leader with a strong technology base, many specialty products, and strong name recognition (such as our IHLP® and HiRel Systems brands). We focus on higher value markets in specialized industries, such as the industrial, automotive, military, and medical end markets.

Inductor applications include controlling AC current and voltage, filtering out unwanted electrical signals, and energy storage. Vishay inductor innovations include our patented IHLP low- profile, high- current inductor technology with industry- leading specifications. Our low- profile, high- current inductors save circuit board space and power in voltage regulator module (“VRM”) and DC to DC converter applications. In addition, we are a worldwide leader in custom magnetic solutions focusing on high performance and high reliability. This field has been substantially strengthened with the 2012 acquisition of HiRel Systems broadening our portfolio, customer, and market segment reach.

Capacitors Segment

Capacitors store energy and discharge it when needed. Our Capacitors business consists of a broad range of reliable, high-quality products. We have a strong presence worldwide in specialty markets based on our product performance and reliability and strong brand recognition (including our Sprague, Vitramon, Roederstein, BCcomponents, and ESTA brands). We focus on higher value markets in specialized industries, while maintaining a complete portfolio of commodity products. We do not aim to be the volume leader in commodity markets. Capacitors are used in almost all electronic circuits. They store energy and discharge it when needed. Important applications for capacitors include electronic filtering for linear and switching power supplies; decoupling and bypass of electronic signals for integrated circuits and circuit boards; and frequency control, timing and conditioning of electronic signals for a broad range of applications.

We manufacture products based on all major capacitor technologies: tantalum (molded chip tantalum, coated chip tantalum, solid through- hole tantalum, wet tantalum, and polymer), ceramic (multilayer chip and ceramic disc), film, power, heavy-current, and aluminum electrolytic. Our capacitors range from tiny surface- mount devices for hearing aids and mobile devices to large power correction capacitors used in renewable energy, heavy industry, and electrical power grids. We are a recognized technology leader in many product ranges, securing our strong position in military and medical markets, and in a

wide range of industrial and automotive applications. Our wet tantalum and MicroTan™ technologies are market leaders.

Military Qualifications

We have qualified certain of our products under various military specifications approved and monitored by United States government agencies, and under certain European military specifications. Qualification levels are based in part upon the rate of failure of products. In order to maintain the classification level of a product, we must continuously perform tests on the product and the results of these tests must be reported to the government agencies. If the product fails to meet the requirements for the applicable classification level, the product's classification may be reduced to a lower level. During the time that the classification level is reduced for a product with military application, net revenues and earnings attributable to that product may be adversely affected.

Manufacturing Operations

In order to better serve our customers, we maintain production facilities in locations where we market the bulk of our products, such as the United States, Germany, and Asia. To optimize production efficiencies, we have whenever practicable established manufacturing facilities in countries, such as India, Israel, Malaysia, Mexico, the People's Republic of China, and the Philippines, where we can benefit from lower labor costs and also benefit from various government incentives, including tax relief.

One of our most sophisticated manufacturing operations is the production of power semiconductor components. This manufacturing process involves two phases of production: wafer fabrication and assembly (or packaging). Wafer fabrication subjects silicon wafers to various thermal, metallurgical, and chemical process steps that change their electrical and physical properties. These process steps define cells or circuits within numerous individual devices (termed "dies" or "chips") on each wafer. Assembly is the sequence of production steps that divides the wafer into individual chips and encloses the chips in structures (termed "packages") that make them usable in a circuit. Both wafer fabrication and assembly phases incorporate wafer level and device level electrical testing to ensure that device design integrity has been achieved.

In the United States, our manufacturing facilities are located in California, Connecticut, Minnesota, Nebraska, New Hampshire, New York, Rhode Island, South Dakota, Vermont, and Wisconsin. In Asia, our main manufacturing facilities are located in the People's Republic of China, the Republic of China (Taiwan), India, and Malaysia. In Europe, our main manufacturing facilities are located in Germany, France, and the Czech Republic. We have substantial manufacturing facilities in Israel. We also have manufacturing facilities in Austria, Dominican Republic, Japan, Hungary, Italy, Mexico, Portugal, and the Philippines. Over the past several years, we have invested substantial resources to increase the efficiency of our plants, which we believe will further reduce production costs.

All of our manufacturing operations have received ISO 9001 certification. ISO 9001 is a comprehensive set of quality program standards developed by the International Standards Organization.

Sources of Supplies

Although most materials incorporated in our products are available from a number of sources, certain materials, including plastics and metals, are available only from a relatively limited number of suppliers or are subject to significant price volatility.

Silicon wafers are the most important raw material for the manufacturing of our semiconductor products. Silicon wafers are manufactured from high- purity silicon, a metalloid. There have at times been industry- wide shortages of high- purity silicon resulting primarily from growing demand of the electronic component and solar power industries, and limited growth in high- purity silicon manufacturing capacities. Shifts in demand for high- purity silicon and in turn, silicon wafers, have resulted in significant fluctuation in prices of silicon wafers.

We are a major consumer of the world's annual production of tantalum, a metal used in the manufacturing of tantalum capacitors. There are few suppliers that process tantalum ore into capacitor grade tantalum powder.

Certain materials, in addition to tantalum and including tin, tungsten, and gold are available only from a relatively limited number of suppliers, the source for which may be in the Democratic Republic of the Congo ("DRC") or an adjoining country. We are working to have a supply chain that is 100% certified conflict- free.

Palladium, a metal used to produce multi- layer ceramic capacitors, is currently found primarily in South Africa and Russia. Palladium is a commodity metal that is subject to price volatility. We periodically enter into short- term commitments to purchase palladium.

Certain metals used in the manufacture of our products, such as copper, are traded on active markets, and can be subject to significant price volatility. Our policy is to enter into short- term commitments to purchase defined portions of annual consumption of these metals if market prices decline below budget.

Inventory and Backlog

We manufacture both standardized products and those designed and produced to meet customer specifications. We maintain an inventory of standardized components and monitor the backlog of outstanding orders for our products.

We include in our backlog only open orders that we expect to ship in the next twelve months. Many of our customers encounter uncertain and changing demand for their products. They typically order products from us based on their forecasts. If demand falls below customers' forecasts, or if customers do not control their inventory effectively, they may cancel or reschedule the shipments included in our backlog, in many instances without the payment of any penalty. Therefore, our backlog at any point in time is not necessarily indicative of the results to be expected for future periods.

Customers and Marketing

We sell our products to original equipment manufacturers ("OEMs"), electronic manufacturing services ("EMS") companies, which manufacture for OEMs on an outsourcing basis, and independent distributors that maintain large inventories of electronic components for resale to OEMs and EMS companies. See Note 15 to our consolidated financial statements for net revenues by customer type.

Our sales organizations are regionally based. While our sales and support procedures are typically similar across all regions, we remain flexible in our ability to offer programs tailored to our customers' specific support requirements in each local area. The aim of our sales organizations is supporting our customers across all product lines, developing new design wins, negotiating contracts, and providing general commercial support as would normally be expected of a large multi- national sales force.

We have an established Strategic Global Account program, which provides each of our top customers with a dedicated Strategic Global Account Manager. Our Strategic Global Account Managers are typically highly experienced salesmen or saleswomen who are capable of providing key customers with the coordination and management visibility required in a complex multi- product business relationship. They typically coordinate the sales, pricing, contract, logistic, quality, and other aspects of the customer's business requirements. The Strategic Global Account Manager normally is the focal point of communication between Vishay and our main customers. We maintain a similar program for our strategic distributors as well.

We work with our customers so that our products are incorporated into the design of electronic equipment at the earliest stages of development and to provide technical and applications support. In addition to our staff of direct field sales personnel, independent manufacturers' representatives, and distributors, our Business Development group maintains teams of dedicated Field Application Engineers ("FAEs") to assist our customers in solving technical problems and in developing products to meet specific customer application needs using our entire product portfolio to provide support for our customers' engineering needs. Organized by market segment, our Business Development FAEs bring specific knowledge of component applications in their areas of expertise in the automotive, telecommunications, computer, consumer/entertainment, industrial, peripherals, digital consumer, and other market segments. With the ultimate goal of a Vishay "design- in" – the process by which our customers specify a Vishay component in their products – this program offers our customers enhanced access to all Vishay technologies while at the same time increasing design wins, and ultimately sales, for us. Most importantly, the process is closely monitored via a proprietary database developed by our Business Development group. Our database captures specific design activities and allows for real- time measurement of new business potential for our management team.

Our top 30 customers have been relatively stable despite not having long- term commitments to purchase our products. With selected customers, we have signed longer term (greater than one year) contracts for specific products. Net revenues from our top 30 customers represent approximately 70% of our total net revenues. Our largest customer, TTI, Inc., an electronics distributor, comprised 10% of our total net revenues in 2019. No other single customer comprises more than 10% of our total net revenues.

In certain areas we also work with sales representatives. The commission expense for these sales representatives is not material.

Research and Development

Many of our products and manufacturing techniques, technologies, and packaging methods have been invented, designed, and developed by Dr. Felix Zandman, our engineers, and our scientists. We maintain strategically placed design centers where proximity to customers enables us to more easily gauge and satisfy the needs of local markets. These design centers are located predominantly in the United States, Germany, Italy, Israel, the People’s Republic of China, France, and the Republic of China (Taiwan).

We also employ research and development personnel and promote programs at a number of our production facilities to develop new products and new applications of existing products and to improve manufacturing processes and technologies. This decentralized system encourages product development at individual manufacturing facilities, closer to our customers.

Competition

We face strong competition in various product lines from both domestic and foreign manufacturers. Our primary competitors by product type include:

·MOSFETs: Infineon, ON Semiconductor, Renesas, STMicroelectronics, Toshiba.

·Diodes: Diodes Inc., Nexperia, ON Semiconductor, Rohm, STMicroelectronics.

·Optoelectronic Components: Broadcom, ON Semiconductor, Renesas, Toshiba.

·Resistors: Bourns, KOA, Murata, Panasonic, Rohm, TDK- EPCOS, Yageo.

·Inductors: Bourns, Cyntec, Murata, Panasonic, Taiyo Yuden, TDK- EPCOS, Yageo.

·Capacitors: AVX, KEMET, Murata, Nichicon, Panasonic, Taiyo Yuden, TDK- EPCOS, Yageo.

There are many other companies that produce products in the markets in which we compete.

Our competitive position depends on our ability to maintain a competitive advantage on the basis of product quality, know-how, proprietary data, market knowledge, service capability, technological innovation, business reputation, and price competitiveness. Our sales and marketing programs aim to compete by offering our customers a broad range of world- class technologies and products, superior global sales and distribution support, and a secure and multi- location source of product supply.

Recently there has been a considerable amount of consolidation activity in the electronic component industry, some of which involved our primary competitors. We view the industry consolidation as an opportunity for us to gain business as an independent second- source supplier.

Patents and Licenses

We have made a significant investment in securing intellectual property protection for our technology and products. We seek to protect our technology by, among other things, filing patent applications for technology considered important to the development of our business. We also rely upon trade secrets, unpatented know- how, continuing technological innovation, and the aggressive pursuit of licensing opportunities to help develop and maintain our competitive position.

Our ability to compete effectively with other companies depends, in part, on our ability to maintain the proprietary nature of our technology. Although we have been awarded, have filed applications for, or have been licensed under, numerous patents in the United States and other countries, there can be no assurance concerning the degree of protection afforded by these patents or the likelihood that pending patents will be issued.

We require all of our technical, research and development, sales and marketing, and management employees and most consultants and other advisors to execute confidentiality agreements upon the commencement of employment or consulting relationships with us. These agreements provide that all confidential information developed or made known to the entity or individual during the course of the entity's or individual's relationship with us is to be kept confidential and not disclosed to third parties except in specific circumstances. Substantially all of our technical, research and development, sales and marketing, and management employees have entered into agreements providing for the assignment to us of rights to inventions made by them while employed by us.

When we believe other companies are misappropriating our intellectual property rights, we vigorously enforce those rights through legal action, and we intend to continue to do so. See Item 3, "Legal Proceedings."

Although we have numerous United States and foreign patents covering certain of our products and manufacturing processes, no particular patent is considered individually material to our business.

Employees

As of December 31, 2019, we employed approximately 22,400 full time employees, of whom approximately 90% were located outside the United States. Our future success is substantially dependent on our ability to attract and retain highly qualified technical and administrative personnel. Some of our employees outside the United States are members of trade unions, and employees at one U.S. facility are represented by a trade union. Our relationship with our employees is generally good. However, no assurance can be given that, if we continue to restructure our operations and/or reduce employee hours in response to changing economic conditions, labor unrest or strikes will not occur.

Environment, Health and Safety

We have adopted an Environmental Health and Safety Corporate Policy that commits us to achieve and maintain compliance with applicable environmental laws, to promote proper management of hazardous materials for the safety of our employees and the protection of the environment, and to minimize the hazardous materials generated in the course of our operations. This policy is implemented with accountability directly to the Board of Directors. In addition, our manufacturing operations are subject to various federal, state, and local laws restricting discharge of materials into the environment.

We are involved in environmental remediation programs at various sites currently or formerly owned by us and our subsidiaries both within and outside of the U.S., in addition to involvement as a potentially responsible party ("PRP") at Superfund sites. Certain obligations as a PRP have arisen in connection with business acquisitions. The remediation programs are on- going and the ultimate cost of site cleanup is difficult to predict given the uncertainties regarding the extent of the required cleanup, the interpretation of applicable laws and regulations and alternative cleanup methods. See Item 3, "Legal Proceedings."

We are not involved in any pending or threatened proceedings that would require curtailment of our operations. We continually expend funds to ensure that our facilities comply with applicable environmental regulations. While we believe that we are in material compliance with applicable environmental laws, we cannot accurately predict future developments and do not necessarily have knowledge of all past occurrences on sites that we currently occupy. More stringent environmental regulations may be enacted in the future, and we cannot determine the modifications, if any, in our operations that any such future regulations might require, or the cost of compliance with such regulations. Moreover, the risk of environmental liability and remediation costs is inherent in the nature of our business and, therefore, there can be no assurance that material environmental costs, including remediation costs, will not arise in the future.

With each acquisition, we attempt to identify potential environmental concerns and to minimize, or obtain indemnification for, the environmental matters we may be required to address. In addition, we establish reserves for specifically identified potential environmental liabilities. We believe that the reserves we have established are adequate. Nevertheless, we have in the past and may in the future inherit certain pre- existing environmental liabilities, generally based on successor liability doctrines. Although we have never been involved in any environmental matter that has had a material adverse impact on our overall operations, there can be no assurance that in connection with any past or future acquisition we will not be obligated to address environmental matters that could have a material adverse impact on our operations.

Company Information and Website

We file annual, quarterly, and current reports, proxy statements, and other documents with the Securities and Exchange Commission ("SEC") under the Securities Exchange Act of 1934. The SEC maintains an Internet website that contains reports, proxy and information statements, and other information regarding issuers, including us, that file electronically with the SEC. The public can obtain any documents that we file with the SEC at http://www.sec.gov.

In addition, our company website can be found on the Internet at www.vishay.com. The website contains information about us and our operations. Copies of each of our filings with the SEC on Form 10- K, Form 10- Q, and Form 8- K, and all amendments to those reports, can be viewed and downloaded free of charge as soon as reasonably practicable after the reports and amendments are electronically filed with or furnished to the SEC. To view the reports, access ir.vishay.com and click on "SEC Filings."

The following corporate governance related documents are also available on our website:

- Corporate Governance Principles
- Code of Business Conduct and Ethics
- Code of Ethics for Financial Officers
- Audit Committee Charter
- Nominating and Corporate Governance Committee Charter
- Compensation Committee Charter

- Clawback Policy
- Hedging- Pledging Policy
- Nominating and Corporate Governance Committee Policy Regarding Qualification of Directors
- Procedures for Securityholders' Submissions of Nominating Recommendations
- Related Party Transactions Policy
- Ethics Helpline

To view these documents, access ir.vishay.com and click on "Corporate Governance."

Any of the above documents can also be obtained in print by any stockholder upon request to our Investor Relations Department at the following address:

Corporate Investor Relations
Vishay Intertechnology, Inc.
63 Lancaster Avenue
Malvern, PA 19355- 2143

Item 1A. RISK FACTORS

From time to time, information provided by us, including but not limited to statements in this report, or other statements made by or on our behalf, may contain "forward- looking" information within the meaning of the Private Securities Litigation Reform Act of 1995. Such statements involve a number of risks, uncertainties, and contingencies, many of which are beyond our control, which may cause actual results, performance, or achievements to differ materially from those anticipated. Set forth below are important factors that could cause our results, performance, or achievements to differ materially from those in any forward- looking statements made by us or on our behalf. You should understand that it is not possible to predict or identify all such factors. Consequently, you should not consider the following to be a complete discussion of all potential risks or uncertainties.

Risks relating to our business generally

Our business is cyclical and future periods of decline and recovery are not predictable.

The electronic component industry is highly cyclical and experiences periods of decline from time to time. We and others in the electronic component industry are currently experiencing a decline in product demand and cannot predict when we may experience periods of recovery or downturns in the future. The current decline may continue and become more pronounced. Market conditions, such as during a decline in product demand on a global basis, could result in order cancellations and deferrals, lower average selling prices, and a material and adverse impact on our results of operations. These declines in demand are usually driven by market conditions in the end markets for our products, but may also result from distributors not appropriately managing their inventory levels. Changes in the demand mix, needed technologies, and these end markets may adversely affect our ability to match our products, inventory, and capacity to meet customer demand and could adversely affect our operating results and financial condition. A slowdown in demand or recessionary trends in the global economy makes it more difficult for us to predict our future sales and manage our operations, and could adversely impact our results of operations.

We may not have adequate manufacturing capacity to satisfy future increases in demand for our products.

Our business is cyclical and in periods of a rising economy, we may experience intense demand for our products. During such periods, we may have difficulty expanding our manufacturing capacity to satisfy demand. Factors which could limit such expansion include delays in procurement of manufacturing equipment, shortages of skilled personnel, and physical constraints on expansion of our facilities. If we are unable to meet our customers' requirements and our competitors sufficiently expand production, we could lose customers and/or market share. These losses could have an adverse effect on our financial condition and results of operations. Also, capacity that we add during upturns in the business cycle may result in excess capacity during periods when demand for our products recede, resulting in inefficient use of capital which could also adversely affect us.

We have incurred, and may in the future incur, restructuring costs and associated asset write- downs.

To remain competitive, particularly when business conditions are difficult, we sometimes attempt to reduce our cost structure by restructuring our existing businesses, where we seek to achieve synergies, eliminate redundant facilities and staff positions, and move operations, where possible, to jurisdictions with lower labor costs. In the third fiscal quarter of 2019, we announced global cost reduction and management rejuvenation programs as part of our continuous efforts to improve efficiency and operating performance. The programs are primarily designed to reduce manufacturing fixed costs and selling, general, and administrative costs company- wide, and provide management rejuvenation. We also incurred significant restructuring expenses from 2014 to 2017, including accelerated depreciation expenses related to assets that were no longer used after the implementation of the associated restructuring programs.

Additionally, our long- term strategy includes growing through the integration of acquired businesses, and GAAP requires plant closure and employee termination costs that we incur in connection with our acquisition activities to be recorded as expenses in our consolidated statement of operations, as such expenses are incurred. For this reason, we expect to have some level of future restructuring expenses due to acquisitions.

Our business is cyclical, and in periods of a rising economy we may experience intense demand for our products. If our restructuring activities result in us not being able to satisfy the intense demand from our customers during a rising economy and our competitors sufficiently expand production, we could lose customers and/or market share. These losses could have an adverse effect on our operations, financial condition, and results of operations.

Our business may be adversely affected by the widespread outbreak of diseases.

The widespread outbreak of certain diseases, such as the coronavirus that began in the People’s Republic of China, may adversely affect our business. Such impacts might include disruptions in our ability to manufacture products and disruptions in the operations of our customers and modes of shipping. Such impacts could result in a reduction in customer orders and sales to certain regions and end- markets.

In the past we have grown through successful integration of acquired businesses, but this may not continue.

Our long- term historical growth in revenues and net earnings has resulted in large part from our strategy of expansion through acquisitions. Despite our plan to continue to grow, in part, through targeted acquisitions, we may be unable to continue to identify, have the financial capabilities to acquire, or successfully complete transactions with suitable acquisition candidates. We are subject to various U.S. and foreign competition laws and regulations that may affect our ability to complete certain acquisitions. Also, if an acquired business fails to operate as anticipated, cannot be successfully integrated with our other businesses, or we cannot effectively mitigate the assumed, contingent, and unknown liabilities acquired, our results of operations, financial condition, enterprise value, market value, and prospects could all be materially adversely affected.

To remain successful, we must continue to innovate, and our investments in new technologies may not prove successful.

Our future operating results are dependent on our ability to continually develop, introduce, and market new and innovative products, to modify existing products, to respond to technological change, and to customize certain products to meet customer requirements. There are numerous risks inherent in this process, including the risks that we will be unable to anticipate the direction of technological change or that we will be unable to develop and market new products and applications in a timely fashion to satisfy customer demands. If this occurs, we could lose customers and experience adverse effects on our financial condition and results of operations.

In addition to our own research and development initiatives, we periodically invest in technology start- up enterprises, in which we may acquire a controlling or noncontrolling interest but whose technology would be available to be commercialized by us. There are numerous risks in investments of this nature including the limited operating history of such start- up entities, their need for capital, and their limited or absence of production experience, as well as the risk that their technologies may prove ineffective or fail to gain acceptance in the marketplace. Certain of our historical investments in start- up companies have not succeeded, and there can be no assurance that our current and future investments in start- up enterprises will prove successful.

Our results are sensitive to raw material availability, quality, and cost.

Many of our products require the use of raw materials that are produced in only a limited number of regions around the world or are available from only a limited number of suppliers. Our results of operations may be materially adversely affected if we have difficulty obtaining these raw materials, the quality of available raw materials deteriorates, or there are significant price increases for these raw materials. The determination that any of the raw materials used in our products are conflict minerals originating from the Democratic Republic of the Congo or adjoining countries could increase the probability that we will encounter the challenges noted above, incur additional expenses to comply with government regulations, and face public scrutiny. For periods in which the prices of these raw materials are rising, we may be unable to pass on the increased cost to our customers, which would result in decreased margins for the products in which they are used. For periods in which the prices are declining, we may be required to write down our inventory carrying cost of these raw materials, because we record our inventory at the lower of cost or market. Depending on the extent of the difference between market price and our carrying cost, this write- down could have a material adverse effect on our results of operations.

From time to time there have been short- term market shortages of certain raw materials used in our products. While these shortages have not historically adversely affected our ability to increase production of products containing these materials, they have historically resulted in higher raw material costs for us. We cannot make any assurances that any of these market shortages in the future would not adversely affect our ability to increase production, particularly during periods of growing demand for our products. To assure availability of raw materials in times of shortage, we may enter into long- term supply contracts for these materials, which may prove costly, unnecessary, and burdensome when the shortage abates.

Our ability to compete effectively with other companies depends, in part, on our ability to maintain the proprietary nature of our technology and to operate our business without infringing or violating the intellectual property rights of others.

Protection of intellectual property often involves complex legal and factual issues. We will be able to protect our proprietary rights from unauthorized use by third parties only to the extent that our proprietary technologies are covered by valid and enforceable patents or are effectively maintained as trade secrets. We have applied, and will continue to apply, for patents covering our technologies and products, as we deem appropriate. However, our applications may not result in issued patents. Also, our existing patents and any future patents may not be sufficiently broad to prevent others from practicing our technologies or from developing competing products. Others may independently develop similar or alternative technologies, design around our patented technologies, or may challenge or seek to invalidate our patents. Also, the legal system in certain countries in which we operate may not provide or may not continue to provide sufficient, intellectual property legal protections and remedies.

Litigation regarding patent and other intellectual property rights is prevalent in the electronic components industry, particularly the discrete semiconductor sector. We have on occasion been notified that we may be infringing on patent and other intellectual property rights of others. In addition, customers purchasing components from us have rights to

indemnification under certain circumstances if such components violate the intellectual property rights of others. Further, we have observed that in the current business environment, electronic component and semiconductor companies have become more aggressive in asserting and defending patent claims against competitors. We will continue to vigorously defend our intellectual property rights, and may become party to disputes regarding patent licensing and cross patent licensing. Although licenses are generally offered in such situations and we have successfully resolved these situations in the past, there can be no assurance that we will not be subject to future litigation alleging intellectual property rights infringement, or that we will be able to obtain licenses on acceptable terms. An unfavorable outcome regarding one of these matters could have a material adverse effect on our business and results of operations.

We face intense competition in our business, and we market our products to an increasingly concentrated group of customers.

Our business is highly competitive worldwide, with low transportation costs and few import barriers. We compete principally on the bases of product quality and reliability, availability, customer service, technological innovation, timely delivery, and price. The electronic component industry has become increasingly concentrated and globalized in recent years as many of our primary competitors have been acquired. The acquiring companies, most of which are larger than us, have significant financial resources and technological capabilities.

Our customers have also become increasingly concentrated in recent years, and as a result, their buying power has increased and they have had greater ability to negotiate favorable pricing and terms. This trend has adversely affected our average selling prices, particularly for commodity components.

Our backlog is subject to customer cancellation.

Many of the orders that comprise our backlog may be canceled by our customers without penalty. Our customers may on occasion double and triple order components from multiple sources to ensure timely delivery when demand exceeds global supply. They often cancel orders when business is weak and inventories are excessive. Therefore, we cannot be certain that the amount of our backlog accurately reflects the level of orders that we will ultimately deliver. Our results of operations could be adversely impacted if customers cancel a material portion of orders in our backlog.

Future changes in our environmental liability and compliance obligations may harm our ability to operate or increase our costs.

Our operations, products and/or product packaging are subject to, among other matters, environmental laws and regulations governing, among other matters, air emissions, wastewater discharges, the handling, disposal and remediation of hazardous substances, wastes and certain chemicals used or generated in our manufacturing processes, employee health and safety labeling or other notifications with respect to the content or other aspects of our processes, products or packaging, restrictions on the use of certain materials in or on design aspects of our products or product packaging, and responsibility for disposal of products or product packaging. We establish reserves for specifically identified potential environmental liabilities. Nevertheless, we have in the past and may in the future inherit certain pre- existing environmental liabilities, generally based on successor liability doctrines, or otherwise incur environmental liabilities. We are involved in remediation programs and related litigation at various current and former properties and at third- party disposal sites both within and outside of the U.S., including involvement as a potentially responsible party at Superfund sites. Although we have never been involved in any environmental matter that has had a material adverse impact on our overall operations, there can be no assurance that in connection with any past or future acquisition, future developments, including related to our remediation programs, or otherwise, we will not be obligated to address environmental matters that could have a material adverse impact on our results of operations. In addition, more stringent environmental laws and regulations may be enacted in the future, and we cannot presently determine the modifications, if any, in our operations that any such future regulations might require, or the cost of compliance with current and future laws and regulations. In order to resolve liabilities at various sites, we have entered into various administrative orders and consent decrees, some of which may be, under certain conditions, reopened or subject to renegotiation.

Our products are sold to or used in goods sold to the U.S. government and other governments. By virtue of such sales, we are subject to various regulatory requirements and risks in the event of non- compliance.

We sell products under prime and subprime contracts with the U.S. government and other governments. Many of these products are used in military applications. Government contractors must comply with specific procurement regulations and other requirements. These requirements, although customary in government contracts, impact our performance and compliance costs. Failure to comply with these regulations and requirements could result in contract modifications or termination, and the assessment of penalties and fines, which could negatively impact our results of operations and financial condition. Our failure to comply with these regulations and requirements could also lead to suspension or debarment, for cause, from government contracting or subcontracting for a period of time. Among the causes for debarment are violations of various statutes, including those related to procurement integrity, export control, government security regulations, employment practices, protection of the environment, accuracy of records and the recording of costs, and foreign corruption. The termination of a government contract as a result of any of these acts could have a negative impact on our results of operations and financial condition and could have a negative impact on our reputation and ability to procure other government contracts in the future.

We have qualified certain of our products under various military specifications approved and monitored by the United States Defense Electronic Supply Center and under certain European military specifications. These products are assigned certain classification levels. In order to maintain the classification level of a product, we must continuously perform tests on the products and the results of these tests must be reported to governmental agencies. If a product fails to meet the requirements of the applicable classification level, its classification may be reduced to a lower level. A decrease in the classification level for a product with a military application could have an adverse impact on the net revenues and earnings attributable to that product.

Our future success is substantially dependent on our ability to attract and retain highly qualified technical, managerial, marketing, finance, and administrative personnel.

Rapid changes in technologies, frequent new product introductions, and declining average selling prices over product life cycles require us to attract and retain highly qualified personnel to develop and manufacture products that feature technological innovations and bring them to market on a timely basis. Our complex operations also require us to attract and retain highly qualified administrative personnel in functions such as legal, tax, accounting, financial reporting, auditing, and treasury. The market for personnel with such qualifications is highly competitive. While we have employment agreements with certain of our executives, we have not entered into employment agreements with all of our key personnel.

The loss of the services of or the failure to effectively recruit qualified personnel could have a material adverse effect on our business.

Interruptions in our information technology systems could adversely affect our business.

We rely on the efficient and uninterrupted operation of complex information technology systems and networks to operate our business. Any significant system or network disruption, including, but not limited to, new system implementations, computer viruses, security breaches, phishing, spoofing, cyberattacks, facility issues or energy blackouts could have a material adverse impact on our operations and results of operations. These incidents, which might be related to industrial or other espionage, include covertly introducing malware and spyware to our computers and networks (or to an electronic system operated by a third party for our benefit) and impersonating authorized users, among others. Such a network disruption could result in a loss of the confidentiality of our intellectual property or the release of sensitive competitive information or customer, supplier or employee personal data. Any loss of such information could harm our competitive position, result in a loss of customer confidence, and cause us to incur significant costs to remedy the damages caused by the disruptions or security breaches. We have implemented protective measures to prevent against and limit the effects of system or network disruptions, but there can be no assurance that such measures will be sufficient to prevent or limit the damage from any disruptions and any such disruption could have a material adverse impact on our business and results of operations.

Third- party service providers, such as foundries, subcontractors, distributors, and vendors have access to certain portions of our sensitive data. In the event that these service providers do not properly safeguard our data that they hold, security breaches and loss of our data could result. Any such loss of data by our third- party service providers could have a material adverse impact on our business and results of operations.

Significant fluctuations in interest rates could adversely affect our results of operations and financial position.

We are exposed to changes in interest rates as a result of our borrowing activities and our cash balances. Our credit facility bears interest at variable rates based on LIBOR. A significant increase in LIBOR would significantly increase our interest expense. A general increase in interest rates would be largely offset by an increase in interest income earned on our cash and short- term investment balances, which are currently greater than our debt balances. However, there can be no assurance that the interest rate earned on cash and short- term investments will move in tandem with the interest rate paid on our variable rate debt.

Our credit facility restricts our current and future operations and requires compliance with certain financial covenants.

Our credit facility includes restrictions on, among other things, incurring indebtedness, incurring liens on assets, making investments and acquisitions, making asset sales, and paying cash dividends and making other restricted payments. Our credit facility also requires us to comply with other covenants, including the maintenance of specific financial ratios. If we are not in compliance with all of such covenants, the credit facility could be terminated by the lenders, and all amounts outstanding pursuant to the credit facility could become immediately payable. Additionally, our convertible debt instruments have cross- default provisions that could accelerate repayment in the event the indebtedness under the credit facility is accelerated.

Future acquisitions could require us to issue additional indebtedness or equity.

If we were to undertake a substantial acquisition for cash, the acquisition would likely need to be financed in part through bank borrowings or the issuance of public or private debt. This acquisition financing would likely decrease our ratio of earnings to fixed charges and adversely affect other leverage criteria. Under our credit facility, we are required to obtain the lenders' consent for certain additional debt financing and to comply with other covenants including the application of specific financial ratios. We cannot make any assurances that the necessary acquisition financing would be available to us on acceptable terms if and when required. If we were to undertake an acquisition for equity, the acquisition may have a dilutive effect on the interests of the holders of our common stock.

Risks relating to Vishay's operations outside the United States

We are subject to the risks of political, economic, and military instability in countries outside the United States in which we operate.

We have substantial operations outside the United States, and approximately 73% of our revenues during 2019 were derived from sales to customers outside the United States. Certain of our assets are located, and certain of our products are produced, in countries which are subject to risks of social, political, economic, and military instability. This instability could result in wars, riots, nationalization of industry, currency fluctuation, and labor unrest. These conditions could have an adverse impact on our ability to operate in these regions and, depending on the extent and severity of these conditions, could materially and adversely affect our overall financial condition, results of operations, and our ability to access our liquidity.

Our business has been in operation in Israel for 49 years, where we have substantial manufacturing operations. Although we have never experienced any material interruption in our operations attributable to these factors, in spite of several Middle East crises, including wars, our financial condition and results of operations might be adversely affected if events were to occur in the Middle East that interfered with our operations in Israel.

Our global operations are subject to extensive anti- corruption laws and other regulations.

The U.S. Foreign Corrupt Practices Act and similar foreign anti- corruption laws generally prohibit companies and their intermediaries from making improper payments or providing anything of value to improperly influence foreign government officials for the purpose of obtaining or retaining business, or obtaining an unfair advantage. Recent years have seen a substantial increase in the global enforcement of anti- corruption laws. Our continued operation and expansion outside the United States, including in developing countries, could increase the risk of such violations or violations under other regulations relating to limitations on or licenses required for sales made to customers located in certain countries. Violations of these laws may result in severe criminal or civil sanctions, could disrupt our business, and result in a material adverse effect on our reputation, business and results of operations or financial condition.

We attempt to improve profitability by controlling labor costs, but these activities could result in labor unrest or considerable expense.

Historically, our primary labor cost controlling strategy was to transfer manufacturing operations to countries with lower production costs, such as the Dominican Republic, India, Malaysia, Mexico, the People’s Republic of China, and the Philippines. We believe that our manufacturing footprint is suitable to serve our customers and end markets, while maintaining lower manufacturing costs. We do not anticipate further transferring any significant existing operations to lower- labor- cost countries; however, acquired operations may be transferred to lower- labor- cost countries when integrated into Vishay. Currently, our primary labor cost controlling strategy involves reducing hours and limiting the use of subcontractors and foundries when demand for our products decreases. Shifting operations to lower- labor- cost countries, reducing hours, or limiting the use of subcontractors and foundries could result in production inefficiencies, higher costs, and/or strikes or other types of labor unrest.

We are subject to foreign currency exchange rate risks which may impact our results of operations.

We are exposed to foreign currency exchange rate risks, particularly due to market values of transactions in currencies other than the functional currencies of certain subsidiaries. From time to time, we utilize forward contracts to hedge a portion of projected cash flows from these exposures.

Our significant foreign subsidiaries are located in Germany, Israel, and Asia. We finance our operations in Europe and certain locations in Asia in local currencies. Our operations in Israel and most significant locations in Asia are largely financed in U.S. dollars, but these subsidiaries also have significant transactions in local currencies. Our exposure to foreign currency risk is mitigated to the extent that the costs incurred and the revenues earned in a particular currency offset one another. Our exposure to foreign currency risk is more pronounced in situations where, for example, production labor costs are predominantly paid in local currencies while the sales revenue for those products is denominated in U.S. dollars. This is particularly the case for products produced in Israel, the Czech Republic, and China.

A change in the mix of the currencies in which we transact our business could have a material effect on results of operations. Furthermore, the timing of cash receipts and disbursements could have a material effect on our results of operations, particularly if there are significant changes in exchange rates in a short period of time.

Most of our operating cash is generated by our non- U.S. subsidiaries, and our U.S. parent company and U.S. subsidiaries have significant payment obligations.

We generate a significant amount of cash and profits from our non- U.S. subsidiaries. We used substantially all of the amounts repatriated in 2018 and 2019 to significantly re- shape the capital structure of the Company. As of December 31, 2019, substantially all of our cash and cash equivalents and short- term investments were held by subsidiaries outside of the United States. Our unused revolving credit facility provides us with additional U.S. liquidity.

U.S. tax obligations, cash dividends to stockholders, share repurchases, additional convertible debt repurchases, and principal and interest payments on our debt instruments need to be paid by our U.S. parent company, Vishay Intertechnology, Inc. Our U.S. subsidiaries have other operating cash needs.

If our U.S. cash and cash equivalents and short- term investment and other liquidity sources are inadequate to satisfy these obligations, we may be required to repatriate additional cash to the United States. If we are unable to repatriate adequate cash to the United States to satisfy these obligations, it could materially and adversely affect our overall financial condition, results of operations and our liquidity.

Changes in U.S. trade policies, and related factors beyond our control, may adversely impact our business, financial condition, and results of operations.

Our business is subject to risks associated with U.S. and foreign legislation and regulations relating to imports, including quotas, duties, tariffs or taxes, and other import charges or restrictions, which could adversely affect our operations and our ability to import products. The U.S. has taken actions that impact U.S. trade with China, including imposing tariffs on certain goods manufactured in China and imported into the U.S., including certain of our products. Such actions may impact our competitiveness and adversely affect the demand for these products, or if those costs cannot be passed on to our customers, could adversely impact our results of operations for affected segments and the Company as a whole.

Further changes in U.S. trade policy could trigger additional retaliatory actions by affected countries. If these consequences are realized, it could result in a general economic downturn or otherwise have a material adverse effect on our business.

Risks related to our capital structure

The holders of our Class B common stock have effective voting control of our company, giving them the effective ability to prevent a change in control transaction.

We have two classes of common stock: common stock and Class B common stock. The holders of common stock are entitled to one vote for each share held, while the holders of Class B common stock are entitled to 10 votes for each share held. At December 31, 2019, the holders of Class B common stock held approximately 47.8% of the voting power of the Company. The ownership of Class B common stock is highly concentrated, and holders of Class B common stock effectively can cause the election of directors and approve other actions as stockholders. Mrs. Ruta Zandman (a member of our Board of Directors) controls the voting of, solely or on a shared basis with Marc Zandman (our Executive Chairman) and Ziv Shoshani (a member of our Board of Directors), approximately 89.7% of our Class B common stock and 42.9% of the total voting power of our capital stock as of December 31, 2019. Holders of our Class B common stock may act in ways that are contrary to, or not in the best interests of, holders of our common stock. The voting rights of the holders of our Class B common stock effectively give such holders the ability to prevent transactions that would result in a change in control of us, including transactions in which holders of our common stock might otherwise receive a premium for their shares over the then- current market price.

Our future growth could be impeded if our Board of Directors were reluctant to authorize the issuance of substantial additional shares.

Our overall long- term business strategy has historically included a strong focus on acquisitions financed alternatively through cash on hand or the incurrence of indebtedness. We may in the future be presented with attractive investment or strategic opportunities that, because of their size and our financial condition at the time, would require the issuance of substantial additional amounts of our common stock. If such opportunities were to arise, our Board of Directors may consider the potentially dilutive effect on the interests and voting power of our existing stockholders, including our Class B stockholders, and may therefore be reluctant to authorize the issuance of additional shares. Any such reluctance could impede our future growth.

Our outstanding convertible debt instruments may impact the trading price of our common stock.

We believe that many investors in, and potential purchasers of, convertible debt instruments employ, or seek to employ, a convertible arbitrage strategy with respect to these instruments. Investors that employ a convertible arbitrage strategy with respect to convertible debt instruments typically implement that strategy by selling short the common stock underlying the convertible instrument and dynamically adjusting their short position while they hold the instrument. The implementation of this strategy by investors in our convertible debentures, as well as related market regulatory actions, could have a significant impact on the trading prices of our common stock, and the trading prices and liquidity of our convertible debentures. The price of our common stock and our convertible debentures could also be affected by possible sales of our common stock by investors who view our convertible debentures as more attractive means of equity participation in us.

Anti- takeover defenses in our amended and restated certificate of incorporation, our amended and restated bylaws and under Delaware law may impede or discourage a merger, a takeover attempt or other business combinations, which could also reduce the market price of our common stock.

We are a Delaware corporation, and the anti- takeover provisions of Delaware law impose various impediments to the ability of a third party to acquire control of us, even if a change in control would be beneficial to our existing stockholders. Our amended and restated certificate of incorporation and amended and restated bylaws also contain provisions that could delay or prevent a change in control of our company. These provisions could also make it difficult for stockholders to elect directors that are not nominated by the current members of our board of directors or take other corporate actions, including effecting changes in our management. These provisions include:

- the provision that our Class B common stock is generally entitled to ten votes per share, while our common stock is entitled to one vote per share, enabling the holders of our Class B common stock to effectively control the outcome of substantially all matters submitted to a vote of our stockholders, including the election of directors and change of control transactions;

- the provision establishing a classified board of directors with three- year staggered terms and the provision that a director may be removed only for cause, each of which could delay the ability of stockholders to change the membership of a majority of our board of directors;
- the ability of our board of directors to issue shares of preferred stock and to determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- the right of our board of directors to elect a director to fill a vacancy created by the expansion of our board of directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our board of directors;
- the requirement that a special meeting of stockholders may be called only by the directors or by any officer instructed by the directors to call the meeting, which could delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- the ability of our board of directors, by majority vote, to amend the bylaws, which may allow our board of directors to take additional actions to prevent an unsolicited takeover and inhibit the ability of an acquirer to amend the bylaws to facilitate an unsolicited takeover attempt.

In addition, as a Delaware corporation, we are subject to Section 203 of the Delaware General Corporation Law. This statute prohibits a Delaware corporation listed on a national securities exchange from engaging in a business combination with an interested stockholder (generally a person who, together with its affiliates, owns or within the last three years has owned 15% or more of our voting stock subject to certain exceptions) for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. The application of Section 203 also could have the effect of delaying or preventing a change in control of us. Any of these provisions could, under certain circumstances, depress the market price of our common stock.

The ability of our board of directors or a committee thereof to create and issue a new series of preferred stock and certain provisions of Delaware law and our certificate of incorporation and bylaws could impede a merger, takeover attempt or other business combination involving us or discourage a potential acquirer from making a tender offer for our common stock, which, under certain circumstances, could reduce the market price of our common stock.

Risks related to the spin- off of the Vishay Precision Group

Vishay Precision Group is using the Vishay name under license from us, which could result in product and market confusion or the loss of certain of our rights to the Vishay name.

VPG has a worldwide, perpetual and royalty- free license from us to use the “Vishay” mark as part of its corporate name and in connection with the manufacture, sale, and marketing of the products and services that comprise its measurements and foil resistors businesses. The license of the Vishay name to VPG is important to VPG because the success of VPG depends on the reputation of the Vishay brand for these products and services built over many years. Nonetheless, there exists the risk that the use by VPG could cause confusion in the marketplace over the products of the two companies, that any negative publicity associated with a product or service of VPG following the spin- off could be mistakenly attributed to our company or that we could lose our own rights to the “Vishay” mark if we fail to impose sufficient controls on VPG’s use of the mark.

General Economic and Business Risks

In addition to the risks relating specifically to our business, a variety of other factors relating to general conditions could cause actual results, performance, or achievements to differ materially from those expressed in any of our forward- looking statements. These factors include:

- overall economic and business conditions;
- competitive factors in the industries in which we conduct our business;
- changes in governmental regulation;
- changes in tax requirements, including tax rate changes, new tax laws, and revised tax law interpretations;
- changes in GAAP or interpretations of GAAP by governmental agencies and self- regulatory groups;
- interest rate fluctuations, foreign currency rate fluctuations, and other capital market conditions; and
- economic and political conditions in international markets, including governmental changes and restrictions on the ability to transfer capital across borders.

Our common stock, traded on the New York Stock Exchange, has in the past experienced, and may continue to experience, significant fluctuations in price and volume. We believe that the financial performance and activities of other publicly traded companies in the electronic component industry could cause the price of our common stock to fluctuate substantially without regard to our operating performance.

We operate in a continually changing business environment, and new factors emerge from time to time. Other unknown and unpredictable factors also could have a material adverse effect on our future financial condition and results of operations.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. PROPERTIES

At December 31, 2019, our business had 53 manufacturing locations. Our manufacturing facilities include owned and leased locations. Some locations include both owned and leased facilities in the same location. The list of manufacturing facilities below excludes former manufacturing facilities that are not presently used for manufacturing activities due to our restructuring activities. See Note 4 to our consolidated financial statements for further information related to our restructuring efforts, as well as additional information in "Cost Management" included in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations."

In the opinion of management, our properties and equipment generally are in good operating condition and are adequate for our present needs. Owning many of our manufacturing facilities provides us meaningful financial and operating benefits, including long- term stability and a necessary buffer for economic downturns. We do not anticipate difficulty in renewing existing leases as they expire or in finding alternative facilities.

The principal locations of our owned manufacturing facilities, along with available space including administrative offices, are as follows:

Owned Locations	Business Segment	Approx. Available Space (Square Feet)
United States		
Columbus, NE	Resistors	199,000
Bennington, VT	Capacitors	64,000
Yankton, SD	Inductors	60,000
Warwick, RI	Resistors	56,000
Niagara Falls, NY	Resistors	34,000
Marshall, MN	Inductors	22,000
Non- U.S.		
Vocklabruck, Austria	Diodes	100,000
People's Republic of China		
Tianjin	Diodes	370,000
Shanghai	Diodes	195,000
Xi'an	MOSFETs and Diodes	121,000
Czech Republic		
Blatna	Resistors and Capacitors	276,000
Dolni Rychnov	Resistors and Capacitors	183,000
Prachatice	Capacitors	92,000
Volary	Resistors	35,000
France		
Nice	Resistors	221,000
Chateau Gontier	Resistors	82,000
Hyeres	Resistors	59,000
Germany		
Selb	Resistors and Capacitors	402,000
Heide	Resistors	234,000
Landshut	Capacitors	75,000
Fichtelberg	Resistors	36,000
Budapest, Hungary	Diodes	101,000
Loni, India	Resistors and Capacitors	395,000
Israel		

Dimona	Resistors and Capacitors	404,000
Migdal Ha'Emek	Capacitors	288,000
Be'er Sheva	Resistors, Inductors and Capacitors	276,000
Turin, Italy	Diodes	93,000
Miharu, Japan	Capacitors	165,000
Melaka, Malaysia	Optoelectronic Components	156,000
Juarez, Mexico	Resistors	60,000
Famalicao, Portugal	Capacitors	222,000
Republic of China (Taiwan)		
Taipei	Diodes	366,000
Kaohsiung	MOSFETs	63,000

The principal locations of our leased manufacturing facilities, along with available space including administrative offices, are as follows:

Leased Locations	Business Segment	Approx. Available Space (Square Feet)
United States		
Columbus, NE	Resistors	87,000
Milwaukee, WI	Resistors	42,000
Ontario, CA	Resistors	38,000
Dover, NH	Inductors	35,000
Hollis, NH	Resistors	25,000
Duluth, MN	Inductors	10,000
East Windsor, CT	Resistors	17,000
Non- U.S.		
Klagenfurt, Austria	Capacitors	150,000
People’s Republic of China		
Danshui	Capacitors, Inductors, and Resistors	446,000
Shanghai	MOSFETs	300,000
Shatian	Capacitors and Resistors	218,000
Zhuhai	Inductors	179,000
Long Xi	Resistors	36,000
Prestice, Czech Republic	Capacitors	15,000
Santo Domingo, Dominican Republic	Inductors	44,000
Germany		
Itzehoe	MOSFETs	199,000
Heilbronn	Diodes and Optoelectronic Components	139,000
Mumbai, India	Diodes	34,000
Mexico		
Juarez	Resistors	102,000
Mexicali	Resistors	15,000
Manila, Philippines	Optoelectronic Components	149,000
Kaohsiung, Republic of China (Taiwan)	Diodes	130,000

Item 3. LEGAL PROCEEDINGS

From time to time we are involved in routine litigation incidental to our business. Management believes that such matters, either individually or in the aggregate, should not have a material adverse effect on our business or financial condition.

Antitrust Class Action Complaints

Vishay Polytech Co., Ltd. ("VPC"), a subsidiary of Vishay which was purchased from Holy Stone Enterprises Co., Ltd. ("Holy Stone") in June 2014, is a named defendant, among other manufacturers, in antitrust class action complaints in the United States. The complaints allege restraints of trade in aluminum and tantalum electrolytic capacitors, and in some cases, film capacitors, and seek injunctive relief and unspecified joint and several treble damages. Vishay Intertechnology, Inc. and VPC are parties to similar cases, including with respect to resistors, filed in Canada.

Holy Stone has agreed to indemnify Vishay and VPC for losses, including penalties and expenses associated with the subject matter of the litigation described above. Notwithstanding this indemnity obligation, the Company and VPC intend to defend vigorously against the civil complaints.

Intellectual Property Matters

We are engaged in discussions with various parties regarding patent licensing and cross patent licensing issues. In addition, we have observed that in the current business environment, electronic component and semiconductor companies have become more aggressive in asserting and defending patent claims against competitors. We are a party to disputes alleging infringement of third- party patents. When we believe other companies are misappropriating our intellectual property rights, we vigorously enforce those rights through legal action, and we intend to continue to do so.

Environmental Matters

Vishay is involved in environmental remediation programs at various sites currently or formerly owned by Vishay and its subsidiaries both within and outside of the U.S., in addition to involvement as a potentially responsible party ("PRP") at Superfund sites. Certain obligations as a PRP have arisen in connection with business acquisitions. The remediation programs are on- going and the ultimate cost of site cleanup is difficult to predict given the uncertainties regarding the extent of the required cleanup, the interpretation of applicable laws and regulations, and alternative cleanup methods. See also Note 13 to our consolidated financial statements.

Item 4. MINE SAFETY DISCLOSURES

None.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

The following table sets forth certain information regarding our executive officers as of February 14, 2020:

Name	Age	Positions Held
Marc Zandman*	58	Executive Chairman of the Board, Chief Business Development Officer, and President, Vishay Israel Ltd.
Dr. Gerald Paul*	70	Chief Executive Officer, President, and Director
Lori Lipcaman	62	Executive Vice President and Chief Financial Officer
Johan Vandoorn	62	Executive Vice President and Chief Technical Officer
David Valletta	59	Executive Vice President Worldwide Sales
Joel Smejkal	53	Executive Vice President and Business Head Passive Components
Clarence Tse	61	Executive Vice President and Business Head Semiconductors
Werner Gebhardt	61	Executive Vice President Global Human Resources

* Member of the Executive Committee of the Board of Directors.

Marc Zandman was appointed Executive Chairman of the Board and Chief Business Development Officer effective June 5, 2011. Mr. Zandman has served as a Director of Vishay since 2001 and President of Vishay Israel Ltd. since 1998. Mr. Zandman previously was Vice Chairman of the Board from 2003 to June 2011, and Chief Administration Officer from 2007 to June 2011. Mr. Zandman was Group Vice President of Vishay Measurements Group from 2002 to 2004. Mr. Zandman has served in various other capacities with Vishay since 1984. He is the son of the late Dr. Felix Zandman, Vishay's Founder. Mr. Zandman controls, on a shared basis with Ruta Zandman and Ziv Shoshani, approximately 34.0% of the total voting power of our capital stock as of December 31, 2019. He also is non- executive Chairman of Vishay Precision Group, Inc., an independent, publicly- traded company spun- off from Vishay Intertechnology in 2010.

Dr. Gerald Paul was appointed Chief Executive Officer effective January 1, 2005. Dr. Paul has served as a Director of the Company since 1993, and has been President of the Company since March 1998. Dr. Paul also was Chief Operating Officer from 1996 to 2006. Dr. Paul previously was an Executive Vice President of the Company from 1996 to 1998, and President of Vishay Electronic Components, Europe from 1994 to 1996. Dr. Paul has been Managing Director of Vishay Electronic GmbH, a subsidiary of the Company, since 1991. Dr. Paul has been employed by Vishay and a predecessor company since 1978.

Lori Lipcaman was appointed Executive Vice President and Chief Financial Officer of the Company effective September 1, 2011. Ms. Lipcaman had been appointed Executive Vice President Finance and Chief Accounting Officer in September 2008. Previously, she served as Vishay's Corporate Senior Vice President, Operations Controller, from March 1998 to September 2008. Prior to that, she served in various positions of increasing responsibility in finance and controlling since joining the Company in May 1989.

Johan Vandoorn was appointed Executive Vice President and Chief Technical Officer effective August 1, 2011. Mr. Vandoorn is responsible for Vishay's technical development and internal growth programs. Mr. Vandoorn has held various positions of increasing responsibility since Vishay's acquisition of BCcomponents Holdings BV ("BCcomponents") in 2002, including Executive Vice President – Passive Components (2006 – 2012). Mr. Vandoorn had been Vice President – Global Operations of BCcomponents from 2000 until its acquisition by Vishay, and previously worked for Philips Components ("Philips") from 1980 until Philips sold the BCcomponents business to a private equity firm in 1998.

David Valletta serves as Vishay's Executive Vice President – Worldwide Sales, a position he has held since 2007. Mr. Valletta has held various positions of increasing responsibility since Vishay's acquisition of Vitramon in 1994. Prior to joining Vitramon, Mr. Valletta also worked for AVX Corporation. His experience with Vishay includes various positions within the Americas region in direct and distribution sales management and global sales responsibility for the Company's key strategic customers.

Joel Smejkal was appointed Executive Vice President and Business Head Passive Components effective January 1, 2017. Mr. Smejkal has held various positions of increasing responsibility since joining Vishay in 1990 including Senior Vice

President Global Distribution Sales (2012 - 2016). Mr. Smejkal's experience with Vishay includes worldwide and divisional leadership roles in engineering, marketing, operations and sales. He was a product developer of 18 U.S. Patents for the Power Metal Strip® resistor technology and brings significant business development, marketing and sales experience.

Clarence Tse was appointed Executive Vice President and Business Head Semiconductors effective January 1, 2017. Mr. Tse has held various positions of increasing responsibility since Vishay's acquisition of Siliconix/Telefunken in 1998, including Senior Vice President, Diodes Division (2008 - 2016), Senior Vice President, Power Diodes Division (2002 - 2008) and Vice President, Finance and Administration Asia (1998 - 2001). Mr. Tse was first hired by Siliconix in 1985.

Werner Gebhardt was appointed Executive Vice President Global Human Resources effective January 1, 2017. Mr. Gebhardt has held various positions of increasing responsibility since Vishay's acquisition of Draloric Electronic GmbH ("Draloric") in 1987, including Sr. Vice President Global Human Resources (2011 - 2014) and Administrative President Europe (2006 - 2011). Mr. Gebhardt's experience with Vishay includes leadership roles in Administration and Human Resources. Mr. Gebhardt had been employed by Draloric since 1975.

PART II

Item 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS, AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is listed on the New York Stock Exchange under the symbol VSH. The following table sets forth the high and low sales prices for our common stock as reported on the New York Stock Exchange composite tape for the indicated fiscal quarters. Holders of record of our common stock totaled approximately 1,000 at February 12, 2020. Because many of the shares of our common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of beneficial owners represented by these stockholders of record.

In 2014, the Company's Board of Directors instituted a quarterly cash dividend program and declared the first cash dividend in the history of Vishay. Quarterly cash dividends have been paid in each quarter since the first fiscal quarter of 2014. We expect to continue to pay quarterly dividends, although the amount and timing of any future dividends remains subject to authorization of our Board of Directors.

The following table sets forth, for the indicated periods, the high and low sales prices of our common stock and the quarterly cash dividends declared.

	Common stock price range				Dividends declared per share	
	2019		2018			
	High	Low	High	Low	2019	2018
Fourth quarter	$ 21.61	$ 16.29	$ 21.37	$ 16.73	$ 0.0950	$ 0.0850
Third quarter	$ 18.23	$ 14.36	$ 26.50	$ 20.08	$ 0.0950	$ 0.0850
Second quarter	$ 20.85	$ 15.06	$ 25.00	$ 17.51	$ 0.0950	$ 0.0850
First quarter	$ 22.94	$ 16.63	$ 23.85	$ 17.15	$ 0.0850	$ 0.0675

At February 12, 2020, we had outstanding 12,097,409 shares of Class B common stock, par value $.10 per share, each of which entitles the holder to ten votes. The Class B common stock generally is not transferable except in certain very limited instances, and there is no market for those shares. The Class B common stock is convertible, at the option of the holder, into common stock on a share for share basis. As a result of the passing of our founder and former Executive Chairman, Dr. Felix Zandman, Mrs. Ruta Zandman (a member of our Board of Directors) controls the voting of, solely or on a shared basis with Marc Zandman (our Executive Chairman) and Ziv Shoshani (a member of our Board of Directors) approximately 89.7% of our Class B common stock and 42.9% of the total voting power of our capital stock as of December 31, 2019.

Certain of our debt obligations contain restrictions as to the payment of cash dividends. See "Financial Condition, Liquidity, and Capital Resources" included in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations."

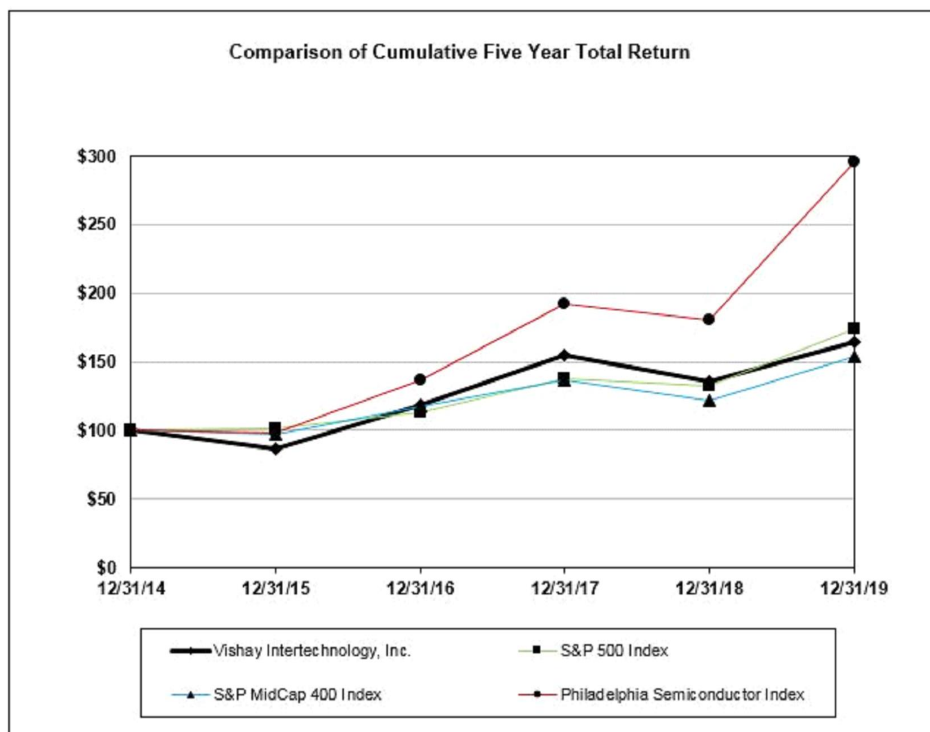
On November 19, 2019, the Company's Board of Directors authorized the Executive Committee of the Board to execute programs to repurchase up to $150 million of common stock on the open market and to repurchase all of the remaining outstanding convertible debentures due 2040 and due 2041 in open market repurchases or through privately negotiated transactions. Such transactions are subject to market and business conditions, legal requirements, and other factors. The programs implementing such authorization does not obligate us to acquire any shares of common stock or any particular amount of convertible debentures, and it may be terminated or suspended at any time at our discretion, in accordance with applicable laws and regulations.

In the fourth fiscal quarter of 2019, the Company repurchased $0.1 million and $3.9 million of the Company's convertible senior debentures due 2040 and due 2041, respectively. The aggregate purchase price for the repurchases was $5.2 million. The convertible senior debentures the Company repurchased in the fourth fiscal quarter had been convertible into 0.2 million shares of Vishay common stock, assuming physical settlement.

Stock Performance Graph

The line graph below compares the cumulative total stockholder return on Vishay's common stock over a 5- year period with the returns on the Standard & Poor's MidCap 400 Stock Index (of which Vishay is a component), the Standard & Poor's 500 Stock Index, and the Philadelphia Semiconductor Index. The line graph assumes that $100 had been invested at December 31, 2014 and assumes that all dividends were reinvested.

	Base Period	Years Ending December 31,				
Company Name / Index	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Vishay Intertechnology, Inc.	**100**	86.90	119.02	154.64	136.26	164.41
S&P 500 Index	**100**	101.38	113.51	138.29	132.23	173.86
S&P MidCap 400 Index	**100**	97.82	118.11	137.30	122.08	154.07
Philadelphia Semiconductor Index	**100**	98.41	137.10	192.69	181.04	295.57



Item 6. SELECTED FINANCIAL DATA

The following table sets forth selected consolidated financial information as of and for the fiscal years ended December 31, 2019, 2018, 2017, 2016, and 2015. This table should be read in conjunction with our consolidated financial statements and accompanying notes, filed herewith, commencing on page F- 1 of this report (table and notes in thousands, except per share amounts):

	As of and for the years ended December 31,				
	2019 (2)	2018 (3)	2017 (4)	2016 (5)	(1) 2015 (6)
Statement of Operations Data:					
Net revenues	$ 2,668,305	$ 3,034,689	$ 2,599,368	$ 2,317,328	$ 2,300,488
Costs of products sold	1,997,105	2,146,165	1,896,259	1,743,506	1,758,268
Gross profit	671,200	888,524	703,109	573,822	542,220
Selling, general, and administrative expenses	384,631	403,404	367,831	356,006	362,226
Restructuring and severance costs	24,139	-	11,273	19,199	19,215
Impairment of intangible assets	-	-	-	1,559	57,600
Impairment of goodwill	-	-	-	-	5,380
Operating income	262,430	485,120	324,005	197,058	97,799
Other income (expense)					
Interest expense	(33,683)	(36,680)	(27,850)	(25,623)	(25,685)
Other components of net periodic pension expense	(13,959)	(13,118)	(12,417)	(16,020)	-
Other	13,540	8,037	1,738	4,716	7,976
Loss on disposal of equity affiliate	-	-	(6,112)	-	-
Gain (loss) on early extinguishment of debt	(2,030)	(26,583)	-	4,597	-
U.S. pension settlement charges	-	-	-	(79,321)	-
Gain (loss) related to Tianjin explosion	-	-	-	8,809	(5,350)
Total other income (expense)	(36,132)	(68,344)	(44,641)	(102,842)	(23,059)
	226,298	416,776	279,364	94,216	74,740

Income before taxes and noncontrolling interest					
Income taxes	61,508	70,239	298,924	44,843	182,473
Net earnings (loss)	164,790	346,537	(19,560)	49,373	(107,733)
Noncontrolling interest	854	779	784	581	781
Net earnings (loss) attributable to Vishay stockholders	$ 163,936	$ 345,758	$ (20,344)	$ 48,792	$ (108,514)
Basic earnings (loss) per share attributable to Vishay stockholders:	$ 1.13	$ 2.39	$ (0.14)	$ 0.33	$ (0.73)
Diluted earnings (loss) per share attributable to Vishay stockholders:	$ 1.13	$ 2.24	$ (0.14)	$ 0.32	$ (0.73)
Weighted average shares outstanding – basic	144,608	144,370	145,633	147,152	147,700
Weighted average shares outstanding – diluted	145,136	154,622	145,633	150,697	147,700
Cash dividends per share	$ 0.3700	$ 0.3225	$ 0.2550	$ 0.2500	$ 0.2400
Balance Sheet Data:					
Total assets	$ 3,120,775	$ 3,106,198	$ 3,462,089	$ 3,080,701	$ 3,152,986
Long- term debt, less current portion	499,147	494,509	370,470	357,023	436,738
Working capital	1,183,688	1,139,780	1,632,655	1,410,522	1,429,768
Total Vishay stockholders' equity	1,485,149	1,382,384	1,430,367	1,567,727	1,622,476

(1) Does not include an adjustment to reflect the retrospective adoption of Financial Accounting Standards Board ASU No. 2014- 09, Revenue from Contracts with Customers (Topic 606), or ASU No. 2017- 07, Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. Effective January 1, 2018, we adopted two ASUs that required retrospective adoption to previously issued financial statements. We used a financial statement approach when adopting the ASUs and recorded a cumulative effect adjustment as of January 1, 2016. Periods prior to January 1, 2016 have not been adjusted to reflect the retrospective adoption of the ASUs.

(2) Includes the results of Bi- Metallix from January 3, 2019. Also includes $24,139 of restructuring and severance costs, $2,030 of loss on early extinguishment of debt, $1,601 net tax benefit due to the change in deferred taxes due to early extinguishment of debt, $7,554 net tax expense related to the a tax- basis foreign exchange gain on the settlement of an intercompany loan, $9,583 net tax benefit related to our repatriation of foreign earnings to the United States, and $2,831 net tax expense due to changes in uncertain tax positions. These items, net of their tax consequences, had a negative $0.13 effect on earnings per share attributable to Vishay stockholders. These items are more fully described in the notes to the consolidated financial statements.

(3) Includes the results of UltraSource from February 8, 2018 and EuroPower Holdings Ltd. from June 11, 2018. Also includes $26,583 of loss on early extinguishment of debt, $54,877 net tax benefit due to the change in deferred taxes due to early extinguishment of debt, $25,496 net tax expense related to the changes in estimates related to the enactment of the Tax Cuts and Jobs Act in the United States ("TCJA"), and $10,047 tax benefit related to our repatriation of foreign earnings to the United States plan. These items, net of their tax consequences, had a positive $0.12 effect on earnings per share attributable to Vishay stockholders. These items are more fully described in the notes to the consolidated financial statements.

(4) Includes $11,273 of restructuring and severance costs, $6,112 of loss on disposal of an equity affiliate, $234,855 net tax expense related to the enactment of the TCJA in the United States, $1,565 tax expense due to the effects of changes in uncertain tax positions, and $5,802 tax benefit related to our previous repatriation of foreign earnings to the United States plan. These items, net of their tax consequences, had a negative $1.57 effect on earnings (loss) per share attributable to Vishay stockholders. These items are more fully described in the notes to the consolidated financial statements.

(5) Includes the results of Sonntag Electronic GmbH from January 1, 2016. Also includes $19,199 of restructuring and severance costs, $1,559 of intangible asset impairment charges, a $4,597 gain on early extinguishment of debt, a $8,809 gain on the settlement of insurance claims related to the Tianjin explosion, $79,321 of non- cash pension settlement charges, $34,853 tax expense from accumulated other comprehensive income as a result of the pension settlement, $8,704 tax benefit due to the effects of changes in uncertain tax positions, and $3,553 tax benefit related to the planned repatriation of foreign earnings to the United States. These items, net of their tax consequences, had a negative $0.53 effect on earnings per share attributable to Vishay stockholders.

(6) Includes $19,215 of restructuring and severance costs, $57,600 of intangible asset impairment charges, $5,380 of goodwill impairment charges, a loss of $5,350 related to the Tianjin explosion, a $163,954 tax expense related to the planned repatriation of foreign earnings to the United States, a $8,888 tax benefit due to the effects of changes in valuation allowances, and a $2,629 tax benefit due to the effects of changes in uncertain tax positions. These items, net of their tax consequences, had a negative $1.45 effect on earnings (loss) per share attributable to Vishay stockholders.

Management believes that stating the impact on net earnings of items such as goodwill and intangible assets impairment charges, gains and losses on early extinguishment of debt, restructuring and severance costs, material pension settlement charges, material gains and losses on sales of property, special tax items, and other items is meaningful to investors because it provides insight with respect to intrinsic operating results of the Company.

Item 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

This Management's Discussion and Analysis ("MD&A") is intended to provide an understanding of Vishay's financial condition, results of operations and cash flows by focusing on changes in certain key measures from year to year. The MD&A should be read in conjunction with our Consolidated Financial Statements and accompanying Notes filed herewith, commencing on page F- 1 of this report. This discussion contains forward- looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward- looking statements as a result of various factors, including those discussed elsewhere in this Annual Report on Form 10- K, particularly in Item 1A. "Risk Factors."

Overview

Vishay Intertechnology, Inc. ("Vishay," "we," "us," or "our") is a leading global manufacturer and supplier of semiconductors and passive components, including MOSFETs, diodes, optoelectronic components, resistors, inductors, and capacitors. Discrete semiconductors and passive components manufactured by Vishay are used in virtually all types of electronic products, including those in the industrial, computing, automotive, consumer electronic products, telecommunications, power supplies, military/aerospace, and medical industries.

We operate in six segments based on product functionality: MOSFETs, Diodes, Optoelectronic Components, Resistors, Inductors, and Capacitors. The current six segment alignment reflects a change in reporting structure made during the fourth fiscal quarter of 2019. Prior periods have been recast to separately present Resistors and Inductors.

We are focused on enhancing stockholder value by growing our business and improving earnings per share. Since 1985, we have pursued a business strategy of growth through focused research and development and acquisitions. We plan to continue to grow our business through intensified internal growth supplemented by opportunistic acquisitions, while at the same time maintaining a prudent capital structure. To foster intensified internal growth, we have increased our worldwide R&D and engineering technical staff; we are expanding critical manufacturing capacities; we are increasing our technical field sales force in Asia to increase our market access to the industrial segment and increase the design- in of our products in local markets; and we are directing increased funding and focus on developing products to capitalize on the connectivity, mobility, and sustainability growth drivers of our business. In addition to our growth plan, we also have opportunistically repurchased our stock and, as further described below, reduced dilution risks by repurchasing a portion of our convertible senior debentures.

In 2014, our Board of Directors instituted a quarterly dividend payment program and declared the first cash dividend in the history of Vishay. We have paid dividends each quarter since the first fiscal quarter of 2014, and further increased the quarterly cash dividend by 12% to $0.095 per share in the second fiscal quarter of 2019.

During 2018 we reacted quickly to the opportunities created by the enactment of the U.S. Tax Cuts and Jobs Act ("TCJA") in December 2017. During 2018 we repatriated approximately $724.0 million of cash to the U.S., net of taxes, and further simplified our balance sheet by refinancing some of our debt. In June 2018, we used the net proceeds from issuing $600 million principal amount of new convertible senior notes to repurchase some of our outstanding convertible senior debentures, which had become less tax- efficient because of the TCJA. During the fourth quarter of 2018, we utilized repatriated cash to repurchase additional convertible senior debentures in open market and privately- negotiated transactions with holders. In 2019, we continued to repurchase convertible senior debentures in open market and privately- negotiated transactions with holders. As a result of these transactions, we reduced the principal amount of outstanding convertible senior debentures due 2040, 2041, and 2042 from $575 million to $17.2 million.

We continued to re- shape our capital structure in 2019. We replaced our existing credit agreement that was due to expire in December 2020 with a new agreement that will expire in June 2024. The new credit facility increases the aggregate commitment of revolving loans from $640 million to $750 million; provides us with the ability to request up to $300 million of incremental facilities, subject to the satisfaction of certain conditions, which could take the form of additional revolving commitments, incremental "term loan A" or "term loan B" facilities, or incremental equivalent debt; reduces the undrawn commitment fee while maintaining the same borrowing rates; and provides greater operating flexibility, including with respect to intercompany funding and other transactions, to enable us to continue to streamline our complex subsidiary

structure.

We repatriated $188.7 million to the United States, and paid withholding and foreign taxes of approximately $38.8 million during 2019. Substantially all of these amounts are being used to repay certain intercompany indebtedness, to repay the outstanding balance on the revolving credit facility, to pay the U.S. transition tax, and to fund capital expansion projects.

Our business and operating results have been and will continue to be impacted by worldwide economic conditions. Our revenues are dependent on end markets that are impacted by consumer and industrial demand, and our operating results can be adversely affected by reduced demand in those global markets. For several years, we implemented aggressive cost reduction programs. We continue to monitor the current economic environment and its potential effects on our customers and the end markets that we serve. Additionally, we continue to closely monitor our costs, inventory, and capital resources to respond to changing conditions and to ensure we have the management, business processes, and resources to meet our future needs. In the third fiscal quarter of 2019, we announced global cost reduction and management rejuvenation programs as part of our continuous efforts to improve efficiency and operating performance. Our cost reduction programs are more fully described in Note 4 to the consolidated financial statements and in "Cost Management" below. See additional information regarding our competitive strengths and key challenges as disclosed in Part 1.

We utilize several financial metrics, including net revenues, gross profit margin, segment operating income, end- of- period backlog, book- to- bill ratio, inventory turnover, change in average selling prices, net cash and short- term investments (debt), and free cash generation to evaluate the performance and assess the future direction of our business. See further discussion in “Financial Metrics” and “Financial Condition, Liquidity, and Capital Resources” below. We believe that supply, in general, caught up with market demand in the first fiscal quarter of 2019. The remainder of 2019 was significantly impacted by a substantial decrease in orders, particularly from distribution customers, as they reduced their inventory. This decrease has negatively impacted almost all key financial metrics, including net revenues.

Net revenues for the year ended December 31, 2019 were $2.668 billion, compared to net revenues of $3.035 billion and $2.599 billion for the years ended December 31, 2018 and 2017, respectively. Net earnings attributable to Vishay stockholders for the year ended December 31, 2019 were $163.9 million, or $1.13 per diluted share, compared to $345.8 million, or $2.24 per diluted share for the year ended December 31, 2018, and net loss attributable to Vishay stockholders of $(20.3) million, or $(0.14) per share, for the year ended December 31, 2017.

We define adjusted net earnings as net earnings determined in accordance with GAAP adjusted for various items that management believes are not indicative of the intrinsic operating performance of our business. We define free cash as the cash flows generated from continuing operations less capital expenditures plus net proceeds from the sale of property and equipment. The reconciliations below include certain financial measures which are not recognized in accordance with GAAP, including adjusted net earnings, adjusted earnings per share, and free cash. These non- GAAP measures should not be viewed as alternatives to GAAP measures of performance or liquidity. Non- GAAP measures such as adjusted net earnings, adjusted earnings per share, and free cash do not have uniform definitions. These measures, as calculated by Vishay, may not be comparable to similarly titled measures used by other companies. Management believes that adjusted net earnings and adjusted earnings per share are meaningful because they provide insight with respect to our intrinsic operating results. Management believes that free cash is a meaningful measure of our ability to fund acquisitions, repay debt, and otherwise enhance stockholder value through stock repurchases or dividends.

Net earnings (loss) attributable to Vishay stockholders for the years ended December 31, 2019, 2018, and 2017 include items affecting comparability. The items affecting comparability are (in thousands, except per share amounts):

	Years ended December 31,		
	2019	2018	2017
GAAP net earnings (loss) attributable to Vishay stockholders	$ 163,936	$ 345,758	$ (20,344)
Reconciling items affecting operating income:			
Restructuring and severance costs	$ 24,139	$ -	$ 11,273
Reconciling items affecting other income (expense):			
Loss on early extinguishment of debt	$ 2,030	$ 26,583	$ -
Loss on disposal of equity affiliate	-	-	6,112
Reconciling items affecting tax expense (benefit):			
Effects of tax- basis foreign exchange gain	$ 7,554	$ -	$ -
Enactment of TCJA	-	25,496	234,855
Effects of cash repatriation program	(9,583)	(10,047)	(5,802)
Change in deferred taxes due to early extinguishment of debt	(1,601)	(54,877)	-
Effects of changes in uncertain tax positions	2,831	-	1,565
Tax effects of pre- tax items above	(6,211)	(5,812)	(3,331)
Adjusted net earnings	$ 183,095	$ 327,101	$ 224,328
Adjusted weighted average diluted shares outstanding	145,136	154,622	157,010
Adjusted earnings per diluted share	$ 1.26	$ 2.12	$ 1.43

Although the term "free cash" is not defined in GAAP, each of the elements used to calculate free cash is presented as a line item on the face of our consolidated statements of cash flows prepared in accordance with GAAP.

	Years ended December 31,		
	2019	2018	2017
Net cash provided by continuing operating activities	$ 296,444	$ 258,506	$ 368,777
Proceeds from sale of property and equipment	577	55,561	1,685
Less: Capital expenditures	(156,641)	(229,899)	(170,432)
Free cash	$ 140,380	$ 84,168	$ 200,030

Our results for 2019 represent the effects of the normalization of demand that we began to experience in the fourth fiscal quarter of 2018 and accelerated through 2019 as supply, in general, caught up with demand, and customers, particularly distributors, significantly reduced their orders as they decreased their inventory. Our percentage of euro- based sales approximates our percentage of euro- based expenses so the foreign currency impact on revenues was substantially offset by the impact on expenses. Our pre- tax results were consistent with expectations based on our business model.

Our free cash results were significantly impacted by the payment of cash taxes related to the cash repatriated to the U.S. in 2019 and 2018 of $38.8 million and $156.8 million, respectively, and the installment payments of the U.S. transition tax of $14.8 million each in 2019 and 2018.

Financial Metrics

We utilize several financial metrics to evaluate the performance and assess the future direction of our business. These key financial measures and metrics include net revenues, gross profit margin, operating margin, segment operating income, end- of- period backlog, and the book- to- bill ratio. We also monitor changes in our inventory turnover and our or publicly available average selling prices ("ASP").

Gross profit margin is computed as gross profit as a percentage of net revenues. Gross profit is generally net revenues less costs of products sold, but also deducts certain other period costs, particularly losses on purchase commitments and inventory write- downs. Losses on purchase commitments and inventory write- downs have the impact of reducing gross profit margin in the period of the charge, but result in improved gross profit margins in subsequent periods by reducing costs of products sold as inventory is used. Gross profit margin is clearly a function of net revenues, but also reflects our cost management programs and our ability to contain fixed costs.

Operating margin is computed as gross profit less operating expenses as a percentage of net revenues. We evaluate business segment performance on segment operating margin. Only dedicated, direct selling, general, and administrative expenses of the segments are included in the calculation of segment operating income. Segment operating margin is computed as operating income less items such as restructuring and severance costs, asset write- downs, goodwill and indefinite- lived intangible asset impairments, inventory write- downs, gain or losses on purchase commitments, global operations, sales and marketing, information systems, finance and administrative groups, and other items, expressed as a percentage of net revenues. We believe that evaluating segment performance excluding such items is meaningful because it provides insight with respect to intrinsic operating results of the segment. Operating margin is clearly a function of net revenues, but also reflects our cost management programs and our ability to contain fixed costs.

End- of- period backlog is one indicator of future revenues. We include in our backlog only open orders that we expect to ship in the next twelve months. If demand falls below customers' forecasts, or if customers do not control their inventory effectively, they may cancel or reschedule the shipments that are included in our backlog, in many instances without the payment of any penalty. Therefore, the backlog is not necessarily indicative of the results to be expected for future periods.

An important indicator of demand in our industry is the book- to- bill ratio, which is the ratio of the amount of product ordered during a period as compared with the product that we ship during that period. A book- to- bill ratio that is greater than one indicates that our backlog is building and that we are likely to see increasing revenues in future periods. Conversely, a book- to- bill ratio that is less than one is an indicator of declining demand and may foretell declining revenues.

We focus on our inventory turnover as a measure of how well we are managing our inventory. We define inventory turnover for a financial reporting period as our costs of products sold for the four fiscal quarters ending on the last day of the reporting period divided by our average inventory (computed using each fiscal quarter- end balance) for this same period. A higher level of inventory turnover reflects more efficient use of our capital.

Pricing in our industry can be volatile. Using our and publicly available data, we analyze trends and changes in average selling prices to evaluate likely future pricing. The erosion of average selling prices of established products is typical for semiconductor products. We attempt to offset this deterioration with ongoing cost reduction activities and new product introductions. Our specialty passive components are more resistant to average selling price erosion. All pricing is subject to governing market conditions and is independently set by us.

The quarter- to- quarter trends in these financial metrics can also be an important indicator of the likely direction of our business. The following table shows net revenues, gross profit margin, operating margin, end- of- period backlog, book- to- bill ratio, inventory turnover, and changes in ASP for our business as a whole during the five fiscal quarters beginning with the fourth fiscal quarter of 2018 through the fourth fiscal quarter of 2019 (dollars in thousands):

	4th Quarter 2018	**1st Quarter 2019**	**2nd Quarter 2019**	**3rd Quarter 2019**	**4th Quarter 2019**
Net revenues	$ 775,892	$ 745,159	$ 685,240	$ 628,329	$ 609,577
Gross profit margin	28.3%	28.3%	25.5%	23.9%	22.2%
Operating margin (1)	15.4%	14.5%	11.6%	8.1%	4.0%
End- of- period backlog	$ 1,497,100	$ 1,331,800	$ 1,126,700	$ 935,400	$ 911,300
Book- to- bill ratio	0.94	0.79	0.69	0.72	0.94
Inventory turnover	4.5	4.3	4.3	4.1	4.3
Change in ASP vs. prior quarter	0.7%	- 0.4%	- 0.9%	- 1.1%	- 0.8%

(1) Operating margin for the third and fourth fiscal quarters of 2019 includes $7.3 million and $16.9 million, respectively, of restructuring and severance expenses (see Note 4 to our consolidated financial statements).

See "Financial Metrics by Segment" below for net revenues, book- to- bill ratio, and gross profit margin broken out by segment.

Revenues decreased versus the prior fiscal quarter and the fourth fiscal quarter of 2018. In periods where customers, particularly distributors, have high levels of inventory, backlog is less indicative of future revenues. Distributors, particularly of semiconductor products in Asia, began to normalize their backlogs in the third fiscal quarter of 2018 and we experienced a further normalization of demand throughout 2019. Inventory in the supply chain remains at a relatively high level, which continues to negatively impact orders. Average selling prices, particularly of commodity semiconductor products, have begun to decrease consistent with the decrease in demand.

Gross profit margin decreased versus the prior fiscal quarter and the fourth fiscal quarter of 2018. The decreases are primarily volume- driven, and include temporary manufacturing inefficiencies as we adapt manufacturing capacities.

The book- to- bill ratio increased to 0.94 in the fourth fiscal quarter of 2019 from 0.72 in the third fiscal quarter of 2019. The book- to- bill ratios for distributors and original equipment manufacturers ("OEM") were 0.94 and 0.95, respectively, versus ratios of 0.55 and 0.90, respectively, during the third fiscal quarter of 2019.

Financial Metrics by Segment

The following table shows net revenues, book- to- bill ratio, gross profit margin, and segment operating margin broken out by segment for the five fiscal quarters beginning with the fourth fiscal quarter of 2018 through the fourth fiscal quarter of 2019 (dollars in thousands):

	4th Quarter 2018	1st Quarter 2019	2nd Quarter 2019	3rd Quarter 2019	4th Quarter 2019
MOSFETs					
Net revenues	$ 139,318	$ 137,341	$ 128,842	$ 126,747	$ 116,215
Book- to- bill ratio	1.08	0.84	0.54	0.54	0.94
Gross profit margin	26.2%	26.3%	24.8%	24.1%	23.7%
Segment operating margin	18.9%	19.4%	17.5%	16.6%	16.1%
Diodes					
Net revenues	$ 176,961	$ 167,840	$ 142,042	$ 123,879	$ 123,382
Book- to- bill ratio	0.83	0.63	0.52	0.57	0.88
Gross profit margin	26.2%	25.9%	20.3%	17.1%	16.3%
Segment operating margin	23.3%	22.7%	16.9%	13.3%	12.6%
Optoelectronic Components					
Net revenues	$ 65,617	$ 60,562	$ 60,675	$ 50,702	$ 51,047
Book- to- bill ratio	0.75	0.83	0.70	0.86	1.11
Gross profit margin	28.8%	26.4%	26.8%	21.5%	20.2%
Segment operating margin	22.2%	19.3%	19.8%	13.7%	12.7%
Resistors					
Net revenues	$ 186,266	$ 188,831	$ 165,359	$ 155,119	$ 147,883
Book- to- bill ratio	0.91	0.89	0.81	0.82	0.95
Gross profit margin	32.6%	33.1%	28.3%	27.4%	23.5%
Segment operating margin	29.4%	29.8%	25.2%	23.8%	19.0%
Inductors					
Net revenues	$ 76,697	$ 71,640	$ 77,024	$ 73,458	$ 76,520
Book- to- bill ratio	1.01	0.97	1.01	0.95	1.05
Gross profit margin	32.5%	32.5%	31.9%	31.9%	33.5%
Segment operating margin	29.2%	28.8%	28.3%	28.3%	30.3%
Capacitors					

Net revenues	$ 131,033	$ 118,945	$ 111,298	$ 98,424	$ 94,530
Book- to- bill ratio	1.02	0.67	0.68	0.76	0.84
Gross profit margin	24.7%	25.0%	23.5%	22.0%	17.9%
Segment operating margin	20.4%	20.7%	19.0%	16.9%	12.3%

Acquisition Activity

As part of our growth strategy, we seek to expand through targeted acquisitions of other manufacturers of electronic components that have established positions in major markets, reputations for product quality and reliability, and product lines with which we have substantial marketing and technical expertise. This includes exploring opportunities to acquire targets to gain market share, penetrate different geographic markets, enhance new product development, round out our existing product lines, or grow our high margin niche market businesses. Acquisitions of passive components businesses would likely be made to strengthen and broaden our position as a specialty product supplier; acquisitions of discrete semiconductor businesses would be made to increase market share and to generate synergies. To limit our financial exposure, we have implemented a policy not to pursue acquisitions if our post- acquisition debt would exceed 2.5x our pro forma earnings before interest, taxes, depreciation, and amortization ("EBITDA"). For these purposes, we calculate pro forma EBITDA as the adjusted EBITDA of Vishay and the target for Vishay's four preceding fiscal quarters, with a pro forma adjustment for savings which management estimates would have been achieved had the target been acquired by Vishay at the beginning of the four fiscal quarter period.

On January 3, 2019, we acquired substantially all of the assets and liabilities of Bi- Metallix, Inc. ("Bi- Metallix"), a U.S.-based, privately- held provider of electron beam continuous strip welding services for $11.9 million. We were a major customer of Bi- Metallix, and the acquired business has been vertically integrated into our Resistors segment. The results and operations of this acquisition have been included in the Resistors segment since January 3, 2019. Bi- Metallix did not have a material impact on the Company's consolidated results for the year ended December 31, 2019.

On February 8, 2018, we acquired substantially all of the assets and liabilities of UltraSource, Inc. ("UltraSource"), a U.S.-based, privately- held thin film circuit and thin film interconnect manufacturer, for $13.6 million. The results and operations of this acquisition have been included in the Resistors segment since February 8, 2018. UltraSource contributed $17.4 million of net revenues to the year ended December 31, 2018.

On June 11, 2018, we acquired EuroPower Holdings Ltd. ("EuroPower"), a distributor of electronic components in the United Kingdom, for $2.9 million, net of cash acquired. The results and operations of this acquisition have been included in the Resistors segment since June 11, 2018. EuroPower did not have a material impact on the Company's consolidated results for the year ended December 31, 2018.

There is no assurance that we will be able to identify and acquire additional suitable acquisition candidates at price levels and on terms and conditions we consider acceptable.

Cost Management

We place a strong emphasis on controlling our costs, and use various measures and metrics to evaluate our cost structure.

We define variable costs as expenses that vary with respect to quantity produced. Fixed costs do not vary with respect to quantity produced over the relevant time period. Contributive margin is calculated as net revenue less variable costs. It may be expressed in dollars or as a percentage of net revenue. Management uses this measure to determine the amount of profit to be expected for any change in revenues. While these measures are typical cost accounting measures, none of these measures are recognized in accordance with GAAP. The classification of expenses as either variable or fixed is judgmental and other companies might classify such expenses differently. These measures, as calculated by Vishay, may not be comparable to similarly titled measures used by other companies.

We closely monitor variable costs and seek to achieve the contributive margin in our business model. Over a period of many years, we have generally maintained a contributive margin of between 45% - 47% of revenues. The erosion of average selling prices, particularly of our semiconductor products, that is typical of our industry, and inflation negatively impact contributive margin and drive us to continually seek ways to reduce our variable costs. Our variable cost reduction efforts include increasing the efficiency in our production facilities by expending capital for automation, reducing materials costs, materials substitution, increasing wafer size and shrinking dies to maximize efficiency in our semiconductor production processes, and other yield improvement activities.

Our cost management strategy also includes a focus on controlling fixed costs recorded as costs of products sold or selling, general, and administrative expenses and maintaining our break- even point (adjusted for acquisitions). We seek to limit increases in selling, general, and administrative expenses to the rate of inflation, excluding foreign currency exchange effects and substantially independent of sales volume changes. At constant fixed costs, we would expect each $1 million increase in revenues to increase our operating income by approximately $450,000 to $470,000. Sudden changes in the business conditions, however, may not allow us to quickly adapt our manufacturing capacity and cost structure.

Occasionally, our ongoing cost containment activities are not adequate and we must take actions to maintain our cost competitiveness. We incurred significant restructuring expenses in our past to reduce our cost structure. Historically, our primary cost reduction technique was through the transfer of production to the extent possible from high- labor- cost countries to lower- labor- cost countries. We believe that our manufacturing footprint is suitable to serve our customers and end markets, while maintaining lower manufacturing costs. Since 2013, our cost reduction programs have primarily focused on reducing fixed costs, including selling, general, and administrative expenses.

We continue to monitor the economic environment and its potential effects on our customers and the end markets that we serve.

In the third fiscal quarter of 2019, we announced global cost reduction and management rejuvenation programs as part of our continuous efforts to improve efficiency and operating performance. We incurred restructuring expense of $24.1 million related to this program in 2019.

The programs are primarily designed to reduce manufacturing fixed costs and selling, general, and administrative ("SG&A") costs company- wide, and provide management rejuvenation. The programs in total are expected to lower costs by approximately $15 million annually when fully implemented, of which approximately 50% is expected to be realized as reduced manufacturing fixed costs and 50% is expected to be realized as reduced SG&A expenses. We expect to incur costs (primarily cash severance expenses) of approximately $25 million related to the programs. The implementation of these programs will not impact planned research and development activities.

We first solicited volunteers to accept a voluntary separation / early retirement offer, which has been generally successful. The voluntary separation benefits vary by country and job classification, but generally offer a cash loyalty bonus. A limited number of involuntary terminations are necessary to achieve the cost reduction targets. We expect these cost reductions to be fully achieved by December 2020.

No manufacturing facility closures are currently expected pursuant to these programs. Except for these programs, we do not anticipate any other material restructuring activities in 2020. However, a continued sluggish business environment for the

electronics industry or a significant economic downturn may require us to implement additional restructuring initiatives.

See Note 4 to our consolidated financial statements for additional information.

In uncertain times, we focus on managing our production capacities in accordance with customer requirements, and maintain discipline in terms of our fixed costs and capital expenditures. Even as we seek to manage our costs, we remain cognizant of the future requirements of our demanding markets. We continue to pursue our growth plans through investing in capacities for strategic product lines, and through increasing our resources for R&D, technical marketing, and field application engineering; supplemented by opportunistic acquisitions of specialty businesses.

Our long- term strategy includes growth through the integration of acquired businesses, and GAAP requires plant closure and employee termination costs that we incur in connection with our acquisition activities to be recorded as expenses in our consolidated statement of operations, as such expenses are incurred. We have not incurred any material plant closure or employee termination costs related to any of the businesses acquired since 2011, but we expect to have some level of future restructuring expenses due to acquisitions.

Foreign Currency Translation

We are exposed to foreign currency exchange rate risks, particularly due to transactions in currencies other than the functional currencies of certain subsidiaries. We occasionally use forward exchange contracts to economically hedge a portion of our projected cash flows from these exposures.

GAAP requires that entities identify the "functional currency" of each of their subsidiaries and measure all elements of the financial statements in that functional currency. A subsidiary's functional currency is the currency of the primary economic environment in which it operates. In cases where a subsidiary is relatively self- contained within a particular country, the local currency is generally deemed to be the functional currency. However, a foreign subsidiary that is a direct and integral component or extension of the parent company's operations generally would have the parent company's currency as its functional currency. We have both situations among our subsidiaries.

Foreign Subsidiaries which use the Local Currency as the Functional Currency

We finance our operations in Europe and certain locations in Asia in local currencies, and accordingly, these subsidiaries utilize the local currency as their functional currency. For those subsidiaries where the local currency is the functional currency, assets and liabilities in the consolidated balance sheets have been translated at the rate of exchange as of the balance sheet date. Translation adjustments do not impact the results of operations and are reported as a separate component of stockholders' equity.

For those subsidiaries where the local currency is the functional currency, revenues and expenses are translated at the average exchange rate for the year. While the translation of revenues and expenses into U.S. dollars does not directly impact the consolidated statement of operations, the translation effectively increases or decreases the U.S. dollar equivalent of revenues generated and expenses incurred in those foreign currencies. The dollar was stronger during 2019 versus 2018, with the translation of foreign currency revenues and expenses into U.S. dollars decreasing reported revenues and expenses versus 2018, but weaker during 2018 versus 2017, with the translation of foreign currency revenues and expenses into U.S. dollars increasing reported revenues and expenses versus 2017.

Foreign Subsidiaries which use the U.S. Dollar as the Functional Currency

Our operations in Israel and most significant locations in Asia are largely financed in U.S. dollars, and accordingly, these subsidiaries utilize the U.S. dollar as their functional currency. For those foreign subsidiaries where the U.S. dollar is the functional currency, all foreign currency financial statement amounts are remeasured into U.S. dollars. Exchange gains and losses arising from remeasurement of foreign currency- denominated monetary assets and liabilities are included in the results of operations. While these subsidiaries transact most business in U.S. dollars, they may have significant costs, particularly payroll- related, which are incurred in the local currency. The cost of products sold and selling, general, and administrative expense for the year ended December 31, 2019 have been slightly favorably impacted (compared to the prior year) by local currency transactions of subsidiaries which use the U.S. dollar as their functional currency.

See Item 7A for additional discussion of foreign currency exchange risk.

Critical Accounting Policies and Estimates

Our significant accounting policies are summarized in Note 1 to our consolidated financial statements. We identify here a number of policies that entail significant judgments or estimates.

Revenue Recognition

Revenue is measured based on the consideration specified in contracts with customers, and excludes any sales incentives and amounts collected on behalf of third parties. We recognize revenue when we satisfy our performance obligations.

We have a broad line of products that we sell to original equipment manufacturers ("OEMs"), electronic manufacturing services ("EMS") companies, which manufacture for OEMs on an outsourcing basis, and independent distributors that maintain large inventories of electronic components for resale to OEMs and EMS companies.

We recognize revenue on sales to distributors when the distributor takes control of the products ("sold- to" model). We have agreements with distributors that allow distributors a limited credit for unsaleable products, which we refer to as a "scrap allowance." Consistent with industry practice, we also have a "stock, ship and debit" program whereby we consider requests by distributors for credits on previously purchased products that remain in distributors' inventory, to enable the distributors to offer more competitive pricing. In addition, we have contractual arrangements whereby we provide distributors with protection against price reductions initiated by us after product is sold by us to the distributor and prior to resale by the distributor.

We recognize the estimated variable consideration to be received as revenue and record a related accrued expense for the consideration not expected to be received, based upon an estimate of product returns, scrap allowances, "stock, ship and debit" credits, and price protection credits that will be attributable to sales recorded through the end of the period. We make these estimates based upon sales levels to our customers during the period, inventory levels at the distributors, current and projected market conditions, and historical experience under the programs. While we utilize a number of different methodologies to estimate the accruals, all of the methodologies take into account sales levels to customers during the relevant period, inventory levels at the distributors, current and projected market trends and conditions, recent and historical activity under the relevant programs, changes in program policies, and open requests for credits. These procedures require the exercise of significant judgments. We believe that we have a reasonable basis to estimate future credits under the programs.

See Notes 1 and 9 to our consolidated financial statements for further information.

Convertible Debt Instruments

We currently have three issuances of convertible debt instruments outstanding. GAAP requires us to separately account for the liability and equity components of convertible debt instruments in a manner that reflects our nonconvertible debt borrowing rate when interest costs are recognized in subsequent periods. The resulting discount on the debt is amortized as non- cash interest expense in future periods. Additionally, upon extinguishment of convertible debt instruments, GAAP requires the aggregate repurchase payment to be allocated between the liability and equity (including temporary equity) components of the convertible debt instruments, using our nonconvertible debt borrowing rate at the time of extinguishment. The estimated nonconvertible debt borrowing rate can significantly impact the accounting for convertible debt instruments. The estimation of our nonconvertible debt borrowing rate requires significant judgment. We employ a market approach and base our estimate on observed data from companies with similar capital structures and debt instruments as well as data obtained from third- party financial institutions. We believe we have a reasonable basis to estimate our nonconvertible debt borrowing rate.

See Notes 1 and 6 to our consolidated financial statements for further information.

Inventories

We value our inventories at the lower of cost or net realizable value, with cost determined under the first- in, first- out method. The valuation of our inventories requires our management to make market estimates. For work in process goods,

we are required to estimate the cost to completion of the products and the prices at which we will be able to sell the products. For finished goods, we must assess the prices at which we believe the inventory can be sold. Inventories are also adjusted for estimated obsolescence and written down to net realizable value based upon estimates of future demand, technology developments and market conditions.

Goodwill

See Note 1 to our consolidated financial statements for a description of our goodwill impairment tests.

The fair value of reporting units for goodwill impairment testing purposes is measured primarily using present value techniques based on projected cash flows from the reporting unit. The calculated results are evaluated for reasonableness using comparable company data. The determination of the fair value of the reporting units requires us to make significant estimates and assumptions. These estimates and assumptions primarily include, but are not limited to: the selection of appropriate peer group companies; control premiums appropriate for acquisitions in the industries in which we compete; the discount rate; terminal growth rates; and forecasts of revenue, operating income, depreciation and amortization, and capital expenditures.

Due to the inherent uncertainty involved in making these estimates, actual financial results could differ from those estimates. In addition, changes in assumptions concerning future financial results or other underlying assumptions could have a significant impact on the fair value of the reporting unit and the amount of the goodwill impairment charge.

Pension and Other Postretirement Benefits

Our defined benefit plans are concentrated in the United States, Germany, and the Republic of China (Taiwan). At December 31, 2019, our U.S. plans include various non- qualified plans. As further described below, our U.S. qualified plan was terminated and settled in 2016. The table below summarizes information about our pension and other postretirement benefit plans. This information should be read in conjunction with Note 11 to our consolidated financial statements (amounts in thousands):

	Benefit obligation	Plan assets	Funded position	Informally funded assets	Net position	Unrecognized actuarial items
U.S. non- qualified pension plans	$ 42,383	$ -	$ (42,383)	$ 27,617	$ (14,766)	$ 8,839
German pension plans	179,078	-	(179,078)	4,405	(174,673)	60,318
Taiwanese pension plans	61,797	45,210	(16,587)	-	(16,587)	15,341
Other pension plans	42,686	28,419	(14,267)	-	(14,267)	9,267
OPEB plans	15,798	-	(15,798)	-	(15,798)	1,999
Other retirement obligations	12,871	-	(12,871)	-	(12,871)	-
	$ 354,613	$ 73,629	$ (280,984)	$ 32,022	$ (248,962)	$ 95,764

Accounting for defined benefit pension and other postretirement plans involves numerous assumptions and estimates. The discount rate at which obligations could effectively be settled and the expected long- term rate of return on plan assets are two critical assumptions in measuring the cost and benefit obligations of our pension and other postretirement benefit plans. Other important assumptions include the anticipated rate of future increases in compensation levels, estimated mortality, and for certain postretirement medical plans, increases or trends in health care costs. Management reviews these assumptions at least annually. We use independent actuaries and investment advisers to assist us in formulating assumptions and making estimates. These assumptions are updated periodically to reflect the actual experience and expectations on a plan specific basis as appropriate.

In the U.S., we utilize published long- term high quality bonds to determine the discount rate at the measurement date. In Germany and the Republic of China (Taiwan), we utilize published long- term government bond rates to determine the discount rate at the measurement date. We utilize bond yields at various maturity dates that reflect the timing of expected future benefit payments. We believe the discount rates selected are the rates at which these obligations could effectively be settled.

Non- qualified plans in the U.S. are considered by law to be unfunded. However, the Company maintains assets in a rabbi trust to fund benefit payments under certain of these plans. Such assets would be subject to creditor claims under certain conditions. (See also Notes 11 and 18 to our consolidated financial statements.)

Many of our non- U.S. plans are unfunded based on local laws and customs. For those non- U.S. plans that do maintain investments, their asset holdings are primarily cash and fixed income securities, based on local laws and customs. Some non- U.S. plans also informally fund their plans by holding certain available- for- sale investments. Such assets would be subject to creditor claims under certain conditions. (See also Note 18 to our consolidated financial statements.)

We set the expected long- term rate of return based on the expected long- term average rates of return to be achieved by the underlying investment portfolios. In establishing this rate, we consider historical and expected returns for the asset classes in which the plans are invested, advice from pension consultants and investment advisors, and current economic and capital market conditions. The expected return on plan assets is incorporated into the computation of pension expense. The difference between this expected return and the actual return on plan assets is deferred. The net deferral of past asset losses (gains) affects the calculated value of plan assets and, ultimately, future pension expense (income).

We completed the termination and settlement of our principal U.S. defined benefit pension plan, the Vishay Retirement Plan, in December 2016. We continue to seek to de- risk our global pension exposures. Such actions could result in increased net periodic pension cost due to lower expected rates of return on plan assets and/or possible additional charges to recognize unamortized actuarial items if all or a portion of the obligations were to be settled.

We believe that the current assumptions used to estimate plan obligations and annual expenses are appropriate. However, if economic conditions change or if our investment strategy changes, we may be inclined to change some of our assumptions, and the resulting change could have a material impact on the consolidated statements of operations and on the consolidated balance sheet.

Income Taxes

We are subject to income taxes in the U.S. and numerous foreign jurisdictions. Significant judgment is required in evaluating our tax positions and determining our provision for income taxes. During the ordinary course of business, there are many transactions and calculations for which the ultimate tax determination is uncertain. We establish reserves for tax-related uncertainties based on estimates of whether, and the extent to which, additional taxes will be due. These reserves are established when we believe that certain positions might be challenged despite our belief that our tax return positions are fully supportable. We adjust these reserves in light of changing facts and circumstances and the provision for income taxes includes the impact of reserve provisions and changes to reserves that are considered appropriate.

These accruals for tax- related uncertainties are based on our best estimate of potential tax exposures. When particular matters arise, a number of years may elapse before such matters are audited by tax authorities and finally resolved. Favorable resolution of such matters could be recognized as a reduction to our effective tax rate in the year of resolution. Unfavorable resolution of any particular issue could increase the effective tax rate and may require the use of cash in the year of resolution.

Our U.S. federal income tax returns are generally subject to audit for years ending on or after December 31, 2016. The IRS may, however, ask for supporting documentation for net operating losses for the years ended December 31, 2013 - 2015, which were utilized in the year ended December 31, 2017. During 2019, the examinations of certain tax returns were concluded and certain statutes of limitations lapsed. Our tax provision for the year- ended December 31, 2019 includes tax benefits related to the resolution of these matters. The tax returns of significant non- U.S. subsidiaries which are currently under examination include India (2004 through 2016), Italy (2017), Germany (2013 through 2016), and Israel (2016 and 2017). We and our subsidiaries also file income tax returns in other taxing jurisdictions around the world, many of which are still open to examination.

See Notes 1 and 5 to consolidated financial statements for additional information.

Results of Operations

Statement of operations' captions as a percentage of net revenues and the effective tax rates were as follows:

	Years ended December 31, 2019	2018	2017
Costs of products sold	74.8%	70.7%	73.0%
Gross profit	25.2%	29.3%	27.0%
Selling, general, and administrative expenses	14.4%	13.3%	14.2%
Operating income	9.8%	16.0%	12.5%
Income before taxes and noncontrolling interest	8.5%	13.7%	10.7%
Net earnings (loss) attributable to Vishay stockholders	6.1%	11.4%	(0.8)%
Effective tax rate	27.2%	16.9%	107.0%

Net Revenues

Net revenues were as follows (dollars in thousands):

	2019	2018	2017
Net revenues	$ 2,668,305	$ 3,034,689	$ 2,599,368
Change versus prior year	$ (366,384)	$ 435,321	
Percentage change versus prior year	- 12.1%	16.7%	

Changes in net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
Change in volume	- 9.8%	13.5%
Change in average selling prices	- 1.1%	0.4%
Foreign currency effects	- 1.6%	1.6%
Acquisitions	0.1%	0.8%
Other	0.3%	0.4%
Net change	- 12.1%	16.7%

We experienced a substantial, broad- based increase in demand for our products beginning in the first fiscal quarter of 2017 that continued through the third fiscal quarter of 2018. Demand started to decrease in the fourth fiscal quarter of 2018 and the decrease accelerated through 2019 as customers, particularly distributors, reduced orders as they decreased their inventory. The decrease in demand resulted in decreased net revenues compared to the prior year periods.

Gross Profit and Margins

Gross profit margins for the year ended December 31, 2019 were 25.2%, as compared to 29.3% for the year ended December 31, 2018. The decrease is primarily due to decreased sales volume, temporary manufacturing inefficiencies, and the impact of tariffs on products imported from China. We were not able to completely offset the normal negative impacts of inflation and average selling price decline by cost reductions and innovation due to the negative impact of manufacturing inefficiencies caused by capacity adaptations. As a result, our contributive margin decreased in 2019.

Gross profit margins for the year ended December 31, 2018 were 29.3%, as compared to 27.0% for the year ended December 31, 2017. The increase is primarily due to increased sales volume. We were able to offset the negative impacts of inflation by cost reductions and innovation, and maintain our contributive margin.

Segments

Analysis of revenues and gross profit margins for our segments is provided below.

MOSFETs

Net revenues of the MOSFETs segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	**2018**	**2017**
Net revenues	$ 509,145	$ 547,643	$ 467,476
Change versus comparable prior year period	$ (38,498)	$ 80,167	
Percentage change versus comparable prior year period	- 7.0%	17.1%	

Changes in MOSFETs segment net revenues were attributable to the following:

	2019 vs. 2018	**2018 vs. 2017**
Change attributable to:		
Change in volume	- 3.3%	17.0%
Decrease in average selling prices	- 3.2%	- 0.3%
Foreign currency effects	- 0.9%	0.6%
Other	0.4%	- 0.2%
Net change	- 7.0%	17.1%

Gross profit margins for the MOSFETs segment were as follows:

	Years ended December 31,		
	2019	**2018**	**2017**
Gross profit margins	24.8%	26.6%	23.4%

The MOSFETs segment experienced a significant decrease in 2019 net revenues versus the prior year. Sales volume decreased with distribution customers in all regions and with end customers in Asia. The decreases in our biggest market, Asian distributors, were partially offset by increases in our integrated circuits products. The business with European and American end customers also increased significantly primarily due to dedicated products for the automotive end- market and the singularity of a last- time- buy business. Declining selling prices and a weaker euro currency also contributed to the revenue decrease.

The gross profit margin for 2019 decreased versus the prior year primarily due to lower sales volume and the returning pressure on our selling prices. Measures taken to adjust the costs to the lower sales volume offset cost increases particularly from inflation.

The reduced customer demand increased the pressure on pricing for our established MOSFETs products in 2019 but the decline was below our historical level. We experienced a moderate decrease in average selling prices versus the prior year. The price decline was partially offset by U.S. tariffs on imports from China which were partially passed- through to

customers.

We continue to invest to expand mid- and long- term manufacturing capacity for strategic product lines.

Diodes

Net revenues of the Diodes segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Net revenues	$ 557,143	$ 712,936	$ 619,958
Change versus comparable prior year period	$ (155,793)	$ 92,978	
Percentage change versus comparable prior year period	- 21.9%	15.0%	

Changes in Diodes segment net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
	-	
Change in volume	19.6%	10.9%
Change in average selling prices	- 2.0%	2.0%
Foreign currency effects	- 1.1%	1.3%
Other	0.8%	0.8%
	-	
Net change	21.9%	15.0%

Gross profit margins for the Diodes segment were as follows:

	Years ended December 31,		
	2019	2018	2017
Gross profit margins	20.4%	27.6%	26.6%

After two record years, net revenues of our Diodes segment decreased significantly in 2019 versus the prior year. The sales volume decreased in all regions, and particularly for distributors. A decline in the selling prices and a weaker euro currency also contributed to the decrease.

Gross profit margin decreased versus the prior year primarily due to decreases in volume and in average selling prices. Our cost reduction efforts could not fully offset the impact from cost inflation, the costs associated with the adaptation of direct labor to the lower sales volume, and the costs of establishing alternative capacities for products subject to U.S. tariffs on goods imported from China.

The low level of demand in 2019 increased the pressure on selling prices. As a result, we experienced a slight decrease in average selling prices versus the prior year. The price decline was partially offset by more U.S. tariffs on imports from China being passed- through to customers.

Optoelectronic Components

Net revenues of the Optoelectronic Components segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Net revenues	$ 222,986	$ 289,727	$ 284,429
Change versus comparable prior year period	$ (66,741)	$ 5,298	
Percentage change versus comparable prior year period	- 23.0%	1.9%	

Changes in Optoelectronic Components segment net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
Change in volume	- 19.3%	0.6%
Decrease in average selling prices	- 3.1%	- 1.3%
Foreign currency effects	- 1.7%	1.9%
Other	1.1%	0.7%
Net change	- 23.0%	1.9%

Gross profit margins for the Optoelectronic Components segment were as follows:

	Years ended December 31,		
	2019	2018	2017
Gross profit margin	24.0%	34.6%	34.5%

The Optoelectronic Components segment net revenues decreased significantly in 2019 versus the prior year. We experienced the decrease in all regions and sales channels. Declining selling prices and a weaker euro currency also contributed to the decrease.

The gross profit margin decreased versus the prior year. The decrease is primarily due to decreased volume. Lower average selling prices and cost inflation also contributed to the decrease.

The pricing pressure for our established Optoelectronic Components products has increased due to the low demand. We experienced a moderate price decline versus the prior year, consistent with our historical experience.

The Optoelectronic Components segment has been affected by high inventories at distribution resulting in a lower order rate and a general weakness in one of its main product lines. We expect the business to return to historical levels after this normalization phase.

Resistors

Net revenues of the Resistors segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Net revenues	$ 657,192	$ 716,394	$ 590,465
Change versus comparable prior year period	$ (59,202)	$ 125,929	
Percentage change versus comparable prior year period	(8.3)%	21.3%	

Changes in Resistors segment net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
Change in volume	- 7.0%	14.4%
Increase in average selling prices	0.2%	0.3%
Foreign currency effects	- 2.5%	2.5%
Acquisitions	0.5%	3.4%
Other	0.5%	0.7%
Net change	- 8.3%	21.3%

Gross profit margins for the Resistors segment were as follows:

	Years ended December 31,		
	2019	2018	2017
Gross profit margin	28.4%	33.3%	30.4%

Net revenues of the Resistors segment decreased significantly versus the prior year. All regions decreased. Distribution and the industrial end- market decreased significantly.

The gross profit margin decreased versus the prior year. The decrease is due to sales volume decrease, inefficiencies due to capacity adaptations, labor cost increases, negative impact of exchange rates, and increased fixed costs, which were partially offset by reduced variable costs, higher selling prices, and materials price savings.

Average selling prices increased slightly versus the prior year, in part, reflecting price increases for certain specialty resistor products.

Inductors

Net revenues of the Inductors segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Net revenues	$ 298,642	$ 301,892	$ 253,064
Change versus comparable prior year period	$ (3,250)	$ 48,828	
Percentage change versus comparable prior year period	(1.1)%	19.3%	

Changes in Inductors segment net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
Increase in volume	1.4%	19.1%
Decrease in average selling prices	- 1.6%	- 1.1%
Foreign currency effects	- 0.8%	1.5%
Other	- 0.1%	- 0.2%
Net change	- 1.1%	19.3%

Gross profit margins for the Inductors segment were as follows:

	Years ended December 31,		
	2019	2018	2017
Gross profit margin	32.4%	32.8%	28.6%

Net revenues of the Inductors segment decreased slightly versus the prior year. The decrease in Asia was partially offset by increases in Europe and the Americas. Distribution decreased significantly, while the automotive, military, and medical end- markets increased.

The gross profit margin decreased versus the prior year. The decrease is primarily due to the decrease in average selling prices and fixed costs increases, which were partially offset by increased sales volume, variable cost reductions, and manufacturing efficiencies.

Average selling prices decreased slightly versus the prior year.

Capital spending projects to expand capacity are underway to meet the increased demand in this growing segment.

Capacitors

Net revenues of the Capacitors segment were as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Net revenues	$ 423,197	$ 466,097	$ 383,976
Change versus comparable prior year period	$ (42,900)	$ 82,121	
Percentage change versus comparable prior year period	- 9.2%	21.4%	

Changes in Capacitors segment net revenues were attributable to the following:

	2019 vs. 2018	2018 vs. 2017
Change attributable to:		
Change in volume	- 8.8%	17.5%
Increase in average selling prices	2.3%	1.1%
Foreign currency effects	- 2.3%	2.0%
Other	- 0.4%	0.8%
Net change	- 9.2%	21.4%

Gross profit margins for the Capacitors segment were as follows:

	Years ended December 31,		
	2019	2018	2017
Gross profit margin	22.3%	23.3%	20.4%

Net revenues of the Capacitors segment decreased significantly versus the prior year. All regions decreased. Distribution contributed the most to the revenue decrease.

The gross profit margin decreased versus the prior year. The decrease is due to lower sales volume, manufacturing inefficiencies, increased labor costs, and higher material prices, which were partially offset by higher selling prices and fixed costs reductions.

Despite the lower sales volume, average selling prices have increased slightly versus the prior year. The increase is primarily due to increased prices for certain materials that were passed through to our customers.

Selling, General, and Administrative Expenses

Selling, general, and administrative ("SG&A") expenses are summarized as follows (dollars in thousands):

	Years ended December 31,		
	2019	2018	2017
Total SG&A expenses	$ 384,631	$ 403,404	$ 367,831
as a percentage of sales	14.4%	13.3%	14.2%

The overall decrease in SG&A expenses is primarily attributable to reductions to incentive compensation and favorable foreign currency exchange impacts. The overall increase in SG&A expenses in 2018 versus 2017 is primarily due to general salary and cost inflation, higher incentive compensation, increased R&D spending, and exchange rate impacts, which were partially offset by the effects of our restructuring programs.

Certain items included in SG&A expenses impact the comparability of these amounts, as summarized below (in thousands):

	Years ended December 31,		
	2019	2018	2017
Amortization of intangible assets	$ 8,476	$ 11,807	$ 14,263
Net loss (gain) on sale of assets	(157)	(2,216)	(265)

Certain intangible assets became fully amortized in the second fiscal quarter of 2017 and in the third fiscal quarter of 2018.

In the third fiscal quarter of 2019, we announced a restructuring program targeting SG&A expenses. See "Cost Management" above.

Other Income (Expense)

2019 Compared to 2018

Interest expense for the year ended December 31, 2019 decreased by $3.0 million versus the year ended December 31, 2018. The decrease is primarily attributable to reduced interest expense on the revolving credit facility and the convertible senior debentures as a result of using cash repatriated in 2018 to repay the balance of the credit facility in the third fiscal quarter of 2018 and to repurchase convertible senior debentures, partially offset by the issuance of convertible senior notes due 2025 in the second fiscal quarter of 2018.

We repurchased $19.4 million principal amount of convertible senior debentures in 2019. We recognized a $2.0 million loss on early extinguishment of the repurchased convertible debentures in 2019.

The following table analyzes the components of the line "Other" on the consolidated statements of operations (in thousands):

	Years ended December 31,		
	2019	2018	Change
Foreign exchange gain (loss)	$ (1,414)	$ (1,991)	$ 577
Interest income	8,445	11,940	(3,495)
Investment income (loss)	6,448	(1,646)	8,094
Other	61	(266)	327
	$ 13,540	$ 8,037	$ 5,503

2018 Compared to 2017

Interest expense for the year ended December 31, 2018 increased by $8.8 million versus the year ended December 31, 2017. The increase is primarily attributable to the issuance of convertible senior notes due 2025 in the second fiscal quarter of 2018. The increase is partially offset by reduced interest expense on the revolving credit facility and convertible senior debentures as a result of using cash repatriated in 2018 to reduce the outstanding balance of the revolving credit facility and to repurchase convertible senior debentures.

In June 2018, we issued $600 million principal amount of 2.25% senior convertible notes due 2025 to qualified institutional investors. We used the net proceeds from this offering to repurchase $289.1 million principal amounts of convertible senior debentures for $585.0 million. We used repatriated cash to repurchase an additional $249.4 million principal amount of convertible senior debentures in the fourth fiscal quarter of 2018 for $376.0 million. We recognized a $26.6 million loss on early extinguishment of the repurchased convertible debentures in 2018.

The following table analyzes the components of the line "Other" on the consolidated statements of operations (in thousands):

	Years ended December 31,		
	2018	2017	Change
Foreign exchange gain (loss)	$ (1,991)	$ (4,536)	$ 2,545
Interest income	11,940	6,482	5,458
Investment income (loss)†	(1,646)	-	(1,646)
Other	(266)	(208)	(58)
	$ 8,037	$ 1,738	$ 6,299

† Recognized in "Other" subsequent to the prospective adoption of ASU 2016- 01 on January 1, 2018. Previously recorded in accumulated other comprehensive income until realized.

Income Taxes

For the years ended December 31, 2019, 2018, and 2017, the effective tax rates were 27.2%, 16.9%, and 107.0%, respectively. With the reduction in the U.S. statutory rate to 21% beginning January 1, 2018, we expect that our effective tax rate will now be higher than the U.S. statutory rate, excluding unusual transactions. Historically, the effective tax rates were generally less than the U.S. statutory rate primarily because of earnings in foreign jurisdictions. Discrete tax items impacted our effective tax rate for each period presented. These items were $0.8 million (tax benefit) in 2019, $39.4 million (tax benefit) in 2018, and $230.6 million in 2017.

We recorded tax benefits of $9.6 million during the year ended December 31, 2019, due to adjustments to remeasure the deferred taxes related to our cash repatriation program, such as foreign currency effects, and to consider certain corporate reorganizational activities that impact repatriation. During 2019, we repatriated $188.7 million to the United States and paid withholding and foreign taxes of $38.8 million.

As part of our cash repatriation activity, we settled an intercompany loan, which previously had been accounted for at the historical foreign exchange rate (akin to an equity contribution) because the debtor entity did not have the intent or ability to repay such intercompany loan. Currency translation adjustments were recorded in accumulated other comprehensive income, and were not included in U.S. GAAP pre- tax income. Our cash repatriation activity resulted in the ability to repay such intercompany loan. Upon settlement of this intercompany loan, the foreign entity realized a taxable gain. Income tax expense for the year ended December 31, 2019 includes tax expense of $7.6 million related to this tax- basis foreign exchange gain.

The effective tax rate for the year ended December 31, 2019 was also impacted by the effect of the repurchase of convertible senior debentures. We recognized a tax benefit of $1.6 million, reflecting the reduction in deferred tax liabilities related to the special tax attributes of the extinguished debentures.

The effective tax rate for the year ended December 31, 2019 was also impacted by $2.8 million of net tax expense for changes in uncertain tax positions.

The effective tax rate for the years ended December 31, 2018 and 2017 was significantly impacted by the enactment of the Tax Cuts and Jobs Act ("TCJA"). As permitted by SAB No. 118, the net tax expense recorded in our financial statements for the fourth fiscal quarter of 2017 due to the enactment of the TCJA was considered “provisional,” based on reasonable estimates. The net tax expense recorded in 2017 was $234.9 million. We recorded adjustments of $25.5 million during the 2018 measurement period, as defined in SAB No. 118, as additional details were collected and analyzed.

The effective tax rate for the year ended December 31, 2018 was also significantly impacted by the effect of the repurchase of convertible senior debentures. We recognized a tax benefit of $54.9 million resulting from the extinguishments, reflecting the reduction in deferred tax liabilities related to the special tax attributes of the debentures. See Note 6 to our consolidated financial statements.

We also recorded a tax benefit of $10.0 million due to the remeasurement of the deferred tax liability related to our cash repatriation program during 2018. These types of remeasurement adjustments will continue until the amounts are repatriated. We repatriated $724 million to the U.S. pursuant to this program in 2018. As a result of the repatriations, we paid cash taxes of $156.8 million in 2018.

The effective tax rate for the year ended December 31, 2017 was also impacted by a $5.8 million tax benefit recorded for the periodic remeasurement related to the 2015 cash repatriation program, and $1.6 million of net tax expense for changes in uncertain tax positions.

We operate in a global environment with significant operations in various locations outside the United States. Accordingly, the consolidated income tax rate is a composite rate reflecting our earnings and the applicable tax rates in the various locations where we operate. Part of our historical strategy has been to achieve cost savings through the transfer and expansion of manufacturing operations to countries where we can take advantage of lower labor costs and available tax and

other government- sponsored incentives.

Additional information about income taxes is included in Note 5 to our consolidated financial statements.

Financial Condition, Liquidity, and Capital Resources

We focus on our ability to generate cash flows from operations. The cash generated from operations is used to fund our capital expenditure plans, and cash in excess of our capital expenditure needs is available to fund our acquisition strategy, to reduce debt levels, and to pay dividends and repurchase stock. We have generated cash flows from operations in excess of $200 million in each of the last 18 years, and cash flows from operations in excess of $100 million in each of the last 25 years.

Management uses a non- GAAP measure, "free cash," to evaluate our ability to fund acquisitions, repay debt, and otherwise enhance stockholder value through stock repurchases or dividends. See "Overview" above for "free cash" definition and reconciliation to GAAP. Vishay has generated positive "free cash" in each of the past 23 years, and "free cash" in excess of $80 million in each of the last 18 years. In this volatile economic environment, we continue to focus on the generation of free cash, including an emphasis on cost controls.

During 2018, we repatriated approximately $724 million to the United States, and paid cash taxes of $156.8 million related to the repatriations. We repatriated $188.7 million to the United States, and paid cash taxes of $38.8 million related to the repatriations in 2019. The payment of these cash taxes was recorded as an operating cash flow and any future cash taxes associated with the TCJA transition tax and related foreign taxes on repatriated cash will generally be recorded as operating cash flows. The payment of these cash taxes significantly impacted cash flows from operations and free cash for the years ended December 31, 2019 and 2018. We expect our business to continue to be a reliable generator of free cash, partially offset by such tax payments. There is no assurance, however, that we will be able to continue to generate cash flows from operations and free cash at the same levels, or at all, going forward if the current economic environment worsens.

In the second fiscal quarter of 2019, we entered into a new credit facility, which provides an aggregate commitment of $750 million of revolving loans available until June 5, 2024. The new credit facility replaces our previous credit agreement that provided for an aggregate commitment of $640 million, and that was scheduled to mature on December 10, 2020. The new credit facility also provides us the ability to request up to $300 million of incremental facilities, subject to the satisfaction of certain conditions, which could take the form of additional revolving commitments, incremental “term loan A” or “term loan B” facilities, or incremental equivalent debt. At December 31, 2019, we had no amounts outstanding under our credit facility.

The credit facility allows an unlimited amount of defined “Investments,” which include certain intercompany transactions and acquisitions, provided our pro forma leverage ratio is equal to or less than 2.75 to 1.00. If our pro forma leverage ratio is greater than 2.75 to 1.00, such Investments are subject to certain limitations.

The credit facility also allows an unlimited amount of defined "Restricted Payments," which include cash dividends and share repurchases, provided our pro forma leverage ratio is equal to or less than 2.50 to 1.00. If our pro forma leverage ratio is greater than 2.50 to 1.00, the credit facility allows such payments up to $100 million per annum (subject to a cap of $300 million for the term of the facility, with up to $25 million of any unused amount of the $100 million per annum base available for use in the next succeeding calendar year).

Borrowings under the credit facility bear interest at LIBOR plus an interest margin. The applicable interest margin is based on our leverage ratio. Based on our current leverage ratio, any new borrowings will bear interest at LIBOR plus 1.50%, the same as pursuant to the previous credit agreement. The interest rate on any borrowings increases to LIBOR plus 1.75% if our leverage ratio is between 1.50 to 1 and 2.50 to 1 and further increases to 2.00% if our leverage ratio equals or exceeds 2.50 to 1.

We also pay a commitment fee, also based on its leverage ratio, on undrawn amounts. The undrawn commitment fee, based on Vishay's current leverage ratio, is 0.25% per annum, an improvement of 5 basis points over the previous credit agreement. Such undrawn commitment fee increases to 0.30% per annum if our leverage ratio is between 1.50 to 1 and 2.50

to 1 and further increases to 0.35% per annum if our leverage ratio equals or exceeds 2.50 to 1.

Any borrowings under the credit facility are secured by a lien on substantially all assets, including accounts receivable, inventory, machinery and equipment, and general intangibles (but excluding real estate, intellectual property registered or licensed solely for use in, or arising solely under the laws of, any country other than the United States, assets located solely outside of the United States and deposit and securities accounts), of Vishay and certain significant subsidiaries located in the United States, and pledges of stock in certain significant domestic and foreign subsidiaries; and are guaranteed by certain significant subsidiaries.

The credit facility also limits or restricts us from, among other things, incurring indebtedness, incurring liens on our assets, making investments and acquisitions (assuming our pro forma leverage ratio is greater than 2.75 to 1.00), making asset sales, and paying cash dividends and making other restricted payments (assuming our pro forma leverage ratio is greater than 2.50 to 1.00), and requires us to comply with other covenants, including the maintenance of specific financial ratios.

The financial maintenance covenants include (a) an interest coverage ratio of not less than 2.00 to 1; and (b) a leverage ratio of not more than 3.25 to 1 (and a pro forma ratio of 3.00 to 1 on the date of incurrence of additional debt). The computation of these ratios is prescribed in Article VI of the Credit Agreement between Vishay Intertechnology, Inc. and JPMorgan Chase Bank, N.A., which has been filed with the SEC as Exhibit 10.1 to our current report on Form 8- K filed June 5, 2019.

We were in compliance with all financial covenants under the credit facility at December 31, 2019. Our interest coverage ratio and leverage ratio were 18.52 to 1 and 1.36 to 1, respectively. We expect to continue to be in compliance with these covenants based on current projections.

If we are not in compliance with all of the required financial covenants, the credit facility could be terminated by the lenders, and any amounts then outstanding pursuant to the credit facility could become immediately payable. Additionally, our convertible senior debentures due 2040 and due 2041 and our convertible senior notes due 2025 have cross- default provisions that could accelerate repayment in the event the indebtedness under the credit facility is accelerated.

We had no amounts outstanding on our revolving credit facility at December 31, 2018. We borrowed $42 million and repaid $42 million on the credit facility during the year ended December 31, 2019. The average outstanding balance on our credit facility calculated at fiscal month- ends was $6.1 million and the highest amount outstanding on our revolving credit facility at a fiscal month end was $28 million during the year ended December 31, 2019.

During 2018, we issued $600 million principal amount of 2.25% convertible senior notes due 2025 to qualified institutional investors and repatriated approximately $724 million to the United States. We used substantially all of the proceeds from the issuance and the repatriated amounts to reduce the outstanding balance of the credit facility to zero, to repay certain intercompany indebtedness, and to fund our 2018 repurchases of convertible senior debentures.

During 2019, we repurchased $1.0 million, $16.2 million, and the remaining $2.2 million principal amount of convertible senior debentures due 2040, due 2041, and due 2042, respectively, for $27.9 million. We used cash on hand, primarily repatriated cash, to fund the repurchases.

Subsequent to December 31, 2019, through February 12, 2020, we have repurchased an additional $14.25 million principal amount of convertible senior debentures due 2041 for $19.8 million.

During 2019, we repatriated $188.7 million to the United States, and paid withholding and foreign taxes of $38.8 million. Substantially all of these amounts are being used to repay certain intercompany indebtedness, repay the outstanding balance on our revolving credit facility, to pay the US transition tax, and to fund capital expansion projects.

After completing this phase of cash repatriation, there is approximately $100 million of unremitted foreign earnings that we have deemed not permanently reinvested and thus have accrued foreign withholding and other taxes. We continue to evaluate the timing of the reparation of these remaining amounts, and may decide to ultimately not repatriate some of these amounts.

We also continue to evaluate the TCJA's provisions and may further adjust our financial and capital structure and business practices accordingly.

As of December 31, 2019, substantially all of our cash and cash equivalents and short- term investment were held in countries outside of the United States. Our substantially undrawn credit facility provides us with significant operating liquidity in the United States. We expect to fund any future repurchases of convertible debentures, as well as other obligations required to be paid by the U.S. parent company, Vishay Intertechnology, Inc., including cash dividends to stockholders, share repurchases, and principal and interest payments on our debt instruments by borrowing under our revolving credit facility. Our U.S. subsidiaries also have operating cash needs.

Management expects to use the credit facility from time- to- time to meet certain short- term financing needs. We expect that cash on- hand and cash flows from operations will be sufficient to meet our longer- term financing needs related to normal operating requirements, regular dividend payments, and our research and development and capital expenditure plans. Additional acquisition activity, share repurchases, convertible debt repurchases, or conversion of our convertible debentures may require additional borrowing under our credit facility or may otherwise require us to incur additional debt. No principal payments on our debt are due before the maturity of our new revolving credit facility in June 2024.

Prior to three months before the maturity date, our convertible senior debentures are convertible by the holders under certain circumstances. The convertible senior debentures due 2040 and due 2041 and the convertible senior notes due 2025 are not currently convertible. At the direction of our Board of Directors, we intend, upon conversion, to repay the principal amount

of the any convertible debt instruments in cash and settle any additional amounts in shares of our common stock. We intend to finance the principal amount of any converted debentures using borrowings under our credit facility. No conversions have occurred to date.

We invest a portion of our excess cash in highly liquid, high- quality instruments with maturities greater than 90 days, but less than 1 year, which we classify as short- term investments on our consolidated balance sheets. As these investments were funded using a portion of excess cash and represent a significant aspect of our cash management strategy, we include the investments in the calculation of net cash and short- term investments (debt).

The interest rates on our short- term investments vary by location, but can be up to 150 bps higher than the interest rates on our cash accounts. The average interest rate on our short- term investments was 0.4% due to the low interest rate environment in Europe. Transactions related to these investments are classified as investing activities on our consolidated condensed statements of cash flows.

The amount of short- term investments at December 31, 2019 is lower than normal due to the recently completed cash repatriation activity.

The following table summarizes the components of net cash and short- term investments (debt) (in thousands):

	December 31, 2019	December 31, 2018
Credit Facility	$ -	$ -
Convertible senior notes, due 2025*	509,128	495,203
Convertible senior debentures, due 2040*	126	539
Convertible senior debentures, due 2041*	6,677	12,812
Convertible senior debentures, due 2042*	-	923
Deferred financing costs	(16,784)	(14,968)
Total debt	499,147	494,509
Cash and cash equivalents	694,133	686,032
Short- term investments	108,822	78,286
Net cash and short- term investments (debt)	$ 303,808	$ 269,809

*Represents the carrying amount of the convertible debentures, which is comprised of the principal amount of the instruments, net of the unamortized discount and the associated embedded derivative liability, when applicable.

"Net cash and short- term investments (debt)" does not have a uniform definition and is not recognized in accordance with GAAP. This measure should not be viewed as an alternative to GAAP measures of performance or liquidity. However, management believes that an analysis of "net cash and short- term investments (debt)" assists investors in understanding aspects of our cash and debt management. The measure, as calculated by us, may not be comparable to similarly titled measures used by other companies.

Our financial condition as of December 31, 2019 continued to be strong, with the current ratio (current assets to current liabilities) increasing to 3.3 to 1, from 2.8 to 1 as of December 31, 2018. The increase is primarily due to the decrease in trade accounts payable, other accrued expenses, and income taxes payable. Our ratio of total debt to Vishay stockholders' equity was 0.34 to 1 at December 31, 2019 as compared to a ratio of 0.36 to 1 at December 31, 2018. The decrease in the ratio is primarily due to increased retained earnings.

Cash flows provided by operating activities were $296.4 million for the year ended December 31, 2019, as compared to cash flows provided by operations of $258.5 million for the year ended December 31, 2018. The increase in operating cash flows is partially due to less repatriation cash taxes paid in 2019 versus 2018.

Cash paid for property and equipment for the year ended December 31, 2019 was $156.6 million, as compared to $229.9 million for the year ended December 31, 2018. We expect capital spending of approximately $140 million in 2020, in accordance with requirements of our markets.

Cash paid for dividends to our common and Class B common stockholders totalled $53.4 million and $46.5 million for the years ended December 31, 2019 and 2018, respectively. We expect dividend payments in 2020 to total approximately $55.0 million. However, any future dividend declaration and payment remains subject to authorization by our Board of Directors.

Contractual Commitments and Off- Balance Sheet Arrangements

As of December 31, 2019 we had contractual obligations as follows (in thousands):

		Payments due by period			
	Total	Year 1	Years 2- 3	Years 4- 5	More than 5
Long- term debt	$ 617,190	$ -	$ -	$ -	$ 617,190
Interest payments on long- term debt	90,260	15,762	31,524	30,456	12,518
Operating leases	127,753	20,649	32,494	24,871	49,739
Letters of credit	2,088	-	-	2,088	-
Expected pension and postretirement plan funding	209,707	18,845	45,778	40,975	104,109
Estimated costs to complete construction in progress	92,000	92,000	-	-	-
TCJA transition tax	154,953	14,757	29,514	64,563	46,119
Uncertain tax positions	37,996	342	-	-	37,654
Purchase commitments	59,448	38,945	18,943	1,560	-
Other long- term liabilities	62,553	-	-	-	62,553
Total contractual cash obligations	$ 1,453,948	$ 201,300	$ 158,253	$ 164,513	$ 929,882

Commitments for long- term debt are based on the amount required to settle the obligation. Accordingly, the discounts and capitalized deferred financing costs associated with our convertible debt instruments are excluded from the calculation of long- term debt commitments in the table above.

Commitments for interest payments on long- term debt are cash commitments based on the stated maturity dates of each agreement and include fees under our revolving credit facility, which expires on June 4, 2024. Commitments for interest payments on long- term debt exclude non- cash interest expense related to the amortization of the discount associated with our convertible debt instruments.

Various factors could have a material effect on the amount of future principal and interest payments. Among other things, we have $617.2 million of outstanding debt instruments that are convertible into common stock. Although we intend to net share settle our convertible debt instruments, we have the option to settle these instruments in shares of common stock pursuant to the indentures governing these instruments. Principal and interest commitments associated with our convertible debt instruments are based on the amounts outstanding as of December 31, 2019 and do not consider any future repurchases. Additionally, interest commitments for our revolving credit facility are based on the rate prevailing at December 31, 2019, but actual rates are variable and are certain to change over time.

The TCJA imposes a one- time transition tax on deferred foreign earnings of 15.5% for liquid assets and 8% for illiquid assets, payable in defined increments over eight years. As a result of this requirement, we expect to pay $184.5 million, net of estimated applicable foreign tax credits, and after utilization of net operating loss and R&D and FTC Credit carryforwards. As of December 31, 2019, $29.5 million has been paid.

Our consolidated balance sheet at December 31, 2019 includes liabilities associated with uncertain tax positions in multiple taxing jurisdictions where we conduct business. Due to the uncertain and complex application of tax regulations, combined with the difficulty in predicting when tax audits throughout the world may be concluded, we cannot make reliable estimates of the timing of the remaining cash outflows relating to these liabilities. Accordingly, we have classified the amount recorded as a current liability as payable within one year, and the remaining uncertain tax positions are classified as payments due after five years, although actual timing of payments may be sooner.

There are certain guarantees and indemnifications extended among Vishay and VPG in accordance with the terms of the Master Separation and Distribution Agreement and the Tax Matters Agreement. The guarantees primarily relate to certain contingent tax liabilities included in the Tax Matters Agreement. See Note 19 to our consolidated financial statements for further discussion of the Tax Matters Agreement. These obligations are included in the uncertain tax positions disclosed above, but were not material to us as of December 31, 2019.

Expected pension and postretirement plan funding is based on a projected schedule of benefit payments under the plans.

We maintain long- term foundry arrangements with subcontractors to ensure access to external front- end capacity for our semiconductor products. The purchase commitments in the table above represent the estimated minimum commitments for silicon wafers under these arrangements. Our actual purchases in future periods are expected to be greater than these minimum commitments.

Other long- term liabilities in the table above include obligations that are reflected on our consolidated balance sheets as of December 31, 2019. We include the current portion of the long- term liabilities in the table above. Other long- term liabilities for which we are unable to reasonably estimate the timing of the settlement are classified as payments due after five years in the table above, although actual timing of payments may be sooner.

For a further discussion of our long- term debt, pensions and other postretirement benefits, leases, uncertain tax positions, and purchase commitments, see Notes 3, 5, 6, 11, and 13 to our consolidated financial statements.

We do not participate in, nor have we created, any off- balance sheet variable interest entities or other off- balance sheet financing.

Inflation

Normally, inflation does not have a significant impact on our operations as our products are not generally sold on long- term contracts. Consequently, we can adjust our selling prices, to the extent permitted by competition and other market conditions, to reflect cost increases caused by inflation.

See also “Commodity Price Risk” included in Item 7A, “Quantitative and Qualitative Disclosures About Market Risk” for additional related information.

Recent Accounting Pronouncements

See Note 1 to our consolidated financial statements for information about recent accounting pronouncements.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk Disclosure

We are exposed to certain financial risks, including fluctuations in foreign currency exchange rates, interest rates, and commodity prices. We manage our exposure to these market risks through internally established policies and procedures and, when deemed appropriate, through the use of derivative financial instruments. Our policies do not allow speculation in derivative instruments for profit or execution of derivative instrument contracts for which there are no underlying exposures. We do not use financial instruments for trading purposes and we are not a party to any leveraged derivatives. We monitor our underlying market risk exposures on an ongoing basis and believe that we can modify or adapt our hedging strategies as needed.

Interest Rate Risk

We are exposed to changes in interest rates as a result of our borrowing activities and our cash balances. On a selective basis, we have in the past entered into interest rate swap or cap agreements to reduce the potential negative impact that increases in interest rates could have on our outstanding variable rate debt. As of December 31, 2019, 2018, and 2017 we did not have any outstanding interest rate swap or cap agreements.

The interest paid on our credit facility is based on a LIBOR spread. At December 31, 2019, we had no amounts outstanding under the revolving credit facility. Future borrowings under the revolving credit commitment will bear interest at LIBOR plus 1.50%.

Our convertible debt instruments bear interest at a fixed rate, and accordingly are not subject to interest rate fluctuation risks.

At December 31, 2019, we had $694.1 million of cash and cash equivalents and $108.8 million of short- term investments, which earn interest at various variable rates.

Based on the debt and cash positions at December 31, 2019, we would expect a 50 basis point increase or decrease in interest rates to increase or decrease our annualized net earnings by approximately $2.9 million.

See Note 6 to our consolidated financial statements for additional information about our long- term debt. Also see “Economic Outlook and Impact on Operations and Future Financial Results” included in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” for additional discussion of market risks.

Foreign Exchange Risk

We are exposed to foreign currency exchange rate risks, particularly due to market values of transactions in currencies other than the functional currencies of certain subsidiaries. We have in the past used forward exchange contracts to economically hedge a portion of these exposures. As of December 31, 2019 we did not have any outstanding forward exchange contracts.

Our significant foreign subsidiaries are located in Germany, Israel, and Asia. We finance our operations in Europe and certain locations in Asia in local currencies. Our operations in Israel and most significant locations in Asia are largely financed in U.S. dollars, but these subsidiaries also have significant transactions in local currencies. Our exposure to foreign currency risk is mitigated to the extent that the costs incurred and the revenues earned in a particular currency offset one another. Our exposure to foreign currency risk is more pronounced in Israel, the Czech Republic, and China because the percentage of expenses denominated in Israeli shekels, Czech koruna, and Chinese renminbi to total expenses is much greater than the percentage of sales denominated in Israeli shekels, Czech koruna, and Chinese renminbi to total sales. Therefore, if the Israeli shekel, Czech koruna, and Chinese renminbi strengthen against all or most of our other major currencies, our operating profit is reduced. Where possible, we maintain local currency denominated cash balances in these countries approximately equal to the local currency liabilities to naturally hedge our exposures. We also have a slightly higher percentage of euro- denominated sales than expenses. Therefore, when the euro strengthens against all or most of our other major currencies, our operating profit is slightly increased. Accordingly, we monitor several important cross-rates.

We have performed sensitivity analyses of our consolidated foreign exchange risk as of December 31, 2019 and 2018, using a model that measures the change in the values arising from a hypothetical 10% adverse movement in foreign currency exchange rates relative to the U.S. dollar, with all other variables held constant. The foreign currency exchange rates we used were based on market rates in effect at December 31, 2019 and 2018. The sensitivity analyses indicated that a hypothetical 10% adverse movement in foreign currency exchange rates would impact our net earnings by approximately $3.1 million and $14.5 million at December 31, 2019 and December 31, 2018, respectively, although individual line items in our consolidated statement of operations would be materially affected. For example, a 10% weakening in all foreign currencies would decrease the U.S. dollar equivalent of operating income generated in foreign currencies, which would be offset by foreign exchange gains of our foreign subsidiaries that have significant transactions in U.S. dollars or have the U.S. dollar as their functional currency.

A change in the mix of the currencies in which we transact our business could have a material effect on the estimated impact of the hypothetical 10% movement in the value of the U.S. dollar. Furthermore, the timing of cash receipts and disbursements could result in materially different actual results versus the hypothetical 10% movement in the value of the U.S. dollar, particularly if there are significant changes in exchange rates in a short period of time.

Commodity Price Risk

Although most materials incorporated in our products are available from a number of sources, certain materials are available only from a relatively limited number of suppliers or are subject to significant price volatility. Our results of operations may be materially and adversely affected if we have difficulty obtaining these raw materials, the quality of available raw materials deteriorates, or there are significant price changes for these raw materials. The determination that any of the raw materials used in our products are conflict minerals originating from the Democratic Republic of the Congo and adjoining countries could increase the probability that we will encounter the challenges noted above, incur additional expenses to comply with government regulations, and face public scrutiny. For periods in which the prices of these raw materials are rising, we may be unable to pass on the increased cost to our customers which would result in decreased margins for the products in which they are used. For periods in which the prices are declining, we may be required to write down our inventory carrying cost of these raw materials, since we record our inventory at the lower of cost or market. Depending on the extent of the difference between market price and our carrying cost, this write- down could have a material adverse effect on our net earnings. We also may need to record losses for adverse purchase commitments for these materials in periods of declining prices.

Silicon wafers are the most important raw material for the manufacturing of our semiconductor products. Silicon wafers are manufactured from high- purity silicon, a metalloid. There have at times been industry- wide shortages of high- purity silicon resulting primarily from growing demand of the electronic component and solar power industries, and limited growth in high- purity silicon manufacturing capacities. Shifts in demand for high- purity silicon and in turn, silicon wafers, have resulted in significant fluctuation in prices of silicon wafers.

We are a major consumer of the world's annual production of tantalum, a metal used in the manufacturing of tantalum capacitors. There are few suppliers that process tantalum ore into capacitor grade tantalum powder.

Palladium, a metal used to produce multi- layer ceramic capacitors, is currently found primarily in South Africa and Russia. Palladium is a commodity metal that is subject to price volatility. We periodically enter into short- term commitments to purchase palladium.

Certain metals used in the manufacture of our products, such as copper, are traded on active markets, and can be subject to significant price volatility. Our policy is to enter into short- term commitments to purchase defined portions of annual consumption of these metals if market prices decline below budget.

We estimate that a 10% increase or decrease in the costs of raw materials subject to commodity price risk would decrease or increase our net earnings by $6.4 million, assuming that such changes in our costs have no impact on the selling prices of our products and that we have no pending commitments to purchase metals at fixed prices.

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The financial statements required by this Item are filed herewith, commencing on page F- 1 of this report.

Item 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

Item 9A. CONTROLS AND PROCEDURES

Conclusion Regarding the Effectiveness of Disclosure Controls and Procedures

An evaluation was performed under the supervision and with the participation of our management, including the Chief Executive Officer (“CEO”) and Chief Financial Officer (“CFO”), of the effectiveness of the design and operation of our disclosure controls and procedures, as such term is defined under Rule 13a- 15(e) and Rule 15d- 15(e) promulgated under the Securities Exchange Act of 1934, as amended. Based on that evaluation, our CEO and CFO concluded that our disclosure controls and procedures were effective as of the end of the period covered by this annual report to ensure that information required to be disclosed in reports that we file or submit under the Exchange Act is: (1) recorded, processed, summarized, and reported within the time periods specified in the SEC’s rules and forms; and (2) accumulated and communicated to our management, including our CEO and CFO, as appropriate to allow timely decisions regarding required disclosure.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Certifications

The certifications of our CEO and CFO pursuant to Section 302 of the Sarbanes- Oxley Act of 2002 are filed as Exhibits 31.1 and 31.2 to this Annual Report on Form 10- K. We have also filed with the New York Stock Exchange the most recent Annual Certification as required by Section 303A.12(a) of the New York Stock Exchange Listed Company Manual.

Management’s Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a- 15(f) and 15d- 15(f). Under the supervision and with the participation of our management, including our CEO and CFO, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2019 based on the 2013 framework set forth in Internal Control – Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on that evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2019.

Ernst & Young LLP has issued an attestation report on the effectiveness of our internal control over financial reporting. Their report is set forth below.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Vishay Intertechnology, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Vishay Intertechnology, Inc.'s internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Vishay Intertechnology, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, and the related consolidated statements of operations, comprehensive income, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 14, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of the financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect material misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Philadelphia, Pennsylvania

Item 9B. OTHER INFORMATION

None.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS, AND CORPORATE GOVERNANCE

We have a code of ethics applicable to our Chief Executive Officer, Chief Financial Officer, Principal Accounting Officer or Controller, and financial managers. The text of this code has been posted on our website. To view the code, go to our website at ir.vishay.com and click on Corporate Governance. You can obtain a printed copy of this code, free of charge, by contacting us at the following address:

Corporate Investor Relations
Vishay Intertechnology, Inc.
63 Lancaster Avenue
Malvern, PA 19355- 2143

It is our intention to satisfy the disclosure requirement under Item 5.05 of Form 8- K regarding any amendment to, or any waiver from, a provision of this code by posting such information on our website, at the aforementioned address and location.

Certain information required under this Item with respect to our Executive Officers is set forth in Part I hereof under the caption “Executive Officers of the Registrant.”
Other information required under this Item will be contained in our definitive proxy statement, which will be filed within 120 days of December 31, 2019, our most recent fiscal year end, and is incorporated herein by reference.

Item 11. EXECUTIVE COMPENSATION

Information required under this Item will be contained in our definitive proxy statement, which will be filed within 120 days of December 31, 2019, our most recent fiscal year end, and is incorporated herein by reference.

Item 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Information required under this Item will be contained in our definitive proxy statement, which will be filed within 120 days of December 31, 2019, our most recent fiscal year end, and is incorporated herein by reference.

Item 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information required under this Item will be contained in our definitive proxy statement, which will be filed within 120 days of December 31, 2019, our most recent fiscal year end, and is incorporated herein by reference.

Item 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Information required under this Item will be contained in our definitive proxy statement, which will be filed within 120 days of December 31, 2019, our most recent fiscal year end, and is incorporated herein by reference.

PART IV

Item 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) Documents Filed as Part of Form 10- K

1. Financial Statements

The Consolidated Financial Statements for the year ended December 31, 2019 are filed herewith. See Index to the Consolidated Financial Statements on page F- 1 of this report.

2. Financial Statement Schedules

All financial statement schedules have been omitted because they are not applicable, not material, or the required information is shown in the consolidated financial statements or the notes thereto.

3. Exhibits

3.1	Corrected Amended and Restated Certificate of Incorporation of Vishay Intertechnology, Inc. dated June 5, 2012. Incorporated by reference to Exhibit 3.1 to our current report on Form 8- K filed June 5, 2012.
3.2	Amended and Restated Bylaws dated June 1, 2011. Incorporated by reference to Exhibit 3.2 to our current report on Form 8- K filed June 2, 2011.
3.3	First Amendment to Amended and Restated Bylaws. Incorporated by reference to Exhibit 3.1 to our Current Report on Form 8- K, filed on August 11, 2015.
4.1	Indenture, dated as of November 9, 2010, by and between Vishay Intertechnology, Inc. and Wilmington Trust Company, as Trustee. Incorporated by reference to Exhibit 4.1 to our current report on Form 8- K filed November 9, 2010.
4.2	Indenture, dated as of May 13, 2011, by and between Vishay Intertechnology, Inc. and Wilmington Trust Company, as Trustee. Incorporated by reference to Exhibit 4.1 to our current report on Form 8- K filed May 13, 2011.
4.3	Indenture, dated as of May 31, 2012, by and between Vishay Intertechnology, Inc. and Union Bank, N.A., as Trustee. Incorporated by reference to Exhibit 4.1 to our current report on Form 8- K filed May 31, 2012.
4.4	Indenture, dated as of June 12, 2018, by and between Vishay Intertechnology, Inc. and HSBC Bank USA, N.A., as Trustee. Incorporated by reference to Exhibit 4.1 to our current report on Form 8- K filed June 13, 2018.
4.5	Form of Global Note, representing Vishay Intertechnology, Inc.'s 2.25% Senior Convertible Notes due 2025 (included as Exhibit A to the Indenture filed as Exhibit 4.5). Incorporated by reference to Exhibit 4.2 to our current report on Form 8- K, filed on June 13, 2018.
4.6**	Description of Capital Stock.
10.1†	Amended and restated Vishay Intertechnology 162(m) Cash Bonus Plan. Incorporated by reference to Annex A to our Proxy Statement, dated March 31, 2017, for our 2017 Annual Meeting of Stockholders.
10.2†	Vishay Intertechnology, Inc. 2007 Stock Incentive Program. Incorporated by reference to Annex A to our Proxy Statement, dated April 5, 2013, for our 2013 Annual Meeting of Stockholders.
10.3†	Amended and Restated Vishay Intertechnology, Inc. 2007 Stock Incentive Program. Incorporated by reference to Annex A to our definitive proxy statement, dated April 4, 2014, for our 2014 Annual Meeting of Stockholders.
10.4†	Employment agreement, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.) and Dr. Gerald Paul. Incorporated by reference to Exhibit 10.3 to our quarterly report on Form 10- Q for the fiscal quarter ended October 2, 2004.
10.5†	Amendment to Employment Agreement, dated August 8, 2010, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.) and Dr. Gerald Paul. Incorporated by reference to Exhibit 10.5 to our quarterly report on Form 10- Q for the fiscal quarter ended July 3, 2010.
10.6†	Amendment to Employment Agreement, dated August 28, 2011, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.) and Dr. Gerald Paul. Incorporated by reference to Exhibit 10.3 to our quarterly report on Form 10- Q for the fiscal quarter ended October 1, 2011.
10.7†	Employment Agreement between Vishay Israel Ltd. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and Marc Zandman. Incorporated by reference to Exhibit 10.2 to our quarterly report on Form 10- Q for the fiscal quarter ended October 2, 2004.
10.8†	

	Amendment to Employment Agreement, dated August 8, 2010, between Vishay Israel Ltd. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and Marc Zandman. Incorporated by reference to Exhibit 10.6 to our quarterly report on Form 10- Q for the fiscal quarter ended July 3, 2010.
10.9†	Amendment to Employment Agreement, dated August 30, 2011, between Vishay Israel Ltd. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and Marc Zandman. Incorporated by reference to Exhibit 10.2 to our quarterly report on Form 10- Q for the fiscal quarter ended October 1, 2011.
10.10†	Compensation Matters Agreement, dated August 23, 2011, between Vishay Intertechnology, Inc. and Lori Lipcaman. Incorporated by reference to Exhibit 10.4 to our quarterly report on Form 10- Q for the fiscal quarter ended October 1, 2011.
10.11†	Amendment to Compensation Matters Agreement, dated March 4, 2014, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.) and Lori Lipcaman. Incorporated by reference to Exhibit 10.1 to our quarterly report on Form 10- Q for the fiscal quarter ended March 29, 2014.

10.12† Second Amendment to Compensation Matters Agreement, dated March 3, 2015, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.) and Lori Lipcaman. Incorporated by reference to Exhibit 10.2 to our quarterly report on Form 10- Q for the fiscal quarter ended April 4, 2015.

10.13† Employment Agreement, dated February 15, 2018, between Vishay Europe GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and Lori Lipcaman. Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K, filed on February 16, 2018.

10.14† Terms and Conditions of Johan Vandoorn Employment Agreement, dated January 16, 2012. Incorporated by reference to Exhibit 10.31 to our 2011 annual report on Form 10- K.

10.15† Amendment to Terms and Conditions of Johan Vandoorn Employment Agreement, dated March 4, 2014. Incorporated by reference to Exhibit 10.3 to our quarterly report on Form 10- Q for the fiscal quarter ended March 29, 2014.

10.16† Second Amendment to Terms and Conditions of Johan Vandoorn Employment Agreement, dated March 3, 2015. Incorporated by reference to Exhibit 10.4 to our quarterly report on Form 10- Q for the fiscal quarter ended April 4, 2015.

10.17† Third Amendment to Terms and Conditions of Johan Vandoorn Employment Agreement, dated February 15, 2018. Incorporated by reference to Exhibit 10.2 to our current report on Form 8- K, filed on February 16, 2018.

10.18† Employment Agreement between Vishay Americas, Inc. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and David Valletta dated November 21, 2011. Incorporated by reference to Exhibit 10.32 to our 2011 annual report on Form 10- K.

10.19† Amendment to Employment Agreement between Vishay Americas, Inc. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and David Valletta dated March 4, 2014. Incorporated by reference to Exhibit 10.4 to our quarterly report on Form 10- Q for the fiscal quarter ended March 29, 2014.

10.20† Second Amendment to Employment Agreement between Vishay Americas, Inc. (a wholly owned subsidiary of Vishay Intertechnology, Inc.) and David Valletta dated March 3, 2015. Incorporated by reference to Exhibit 10.5 to our quarterly report on Form 10- Q for the fiscal quarter ended April 4, 2015.

10.21† Employment Agreement, dated February 15, 2018, between Vishay Americas, Inc. (a wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and David Valletta. Incorporated by reference to Exhibit 10.3 to our current report on Form 8- K, filed on February 16, 2018.

10.22† Employment Agreement, dated February 15, 2018, between Vishay Singapore Pte. Ltd. (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and Clarence Tse. Incorporated by reference to Exhibit 10.4 to our current report on Form 8- K, filed on February 16, 2018.

10.23† Employment Agreement, dated February 15, 2018, between Vishay Americas, Inc. (a wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and Joel Smejkal. Incorporated by reference to Exhibit 10.5 to our current report on Form 8- K, filed on February 16, 2018.

10.24† Employment Agreement, dated February 15, 2018, between Vishay Electronic GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and Werner Gebhardt. Incorporated by reference to Exhibit 10.6 to our current report on Form 8- K, filed on February 16, 2018.

10.25† Amendment to Employment Agreement between Vishay Electronic GmbH (an indirect wholly owned subsidiary of Vishay Intertechnology, Inc.), Vishay Intertechnology, Inc., and Werner Gebhardt, dated February 22, 2019. Incorporated by reference to Exhibit 10.1 to our quarterly report on Form 10- Q for the fiscal quarter ended March 30, 2019.

10.26† Vishay Intertechnology, Inc. Key Employee Wealth Accumulation Plan (as amended and restated, effective January 1, 2017). Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K filed December 23, 2016.

10.27 Master Separation and Distribution Agreement, dated June 22, 2010, by and among Vishay Intertechnology, Inc. and Vishay Precision Group, Inc. Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K filed June 23, 2010.

10.28 Employee Matters Agreement, dated June 22, 2010, by and among Vishay Intertechnology, Inc. and Vishay Precision Group, Inc. Incorporated by reference to Exhibit 10.2 to our current report on Form 8- K filed June 23, 2010.

10.29 Tax Matters Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Intertechnology, Inc. Incorporated by reference to Exhibit 10.1 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.

10.30 Trademark License Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Intertechnology, Inc. Incorporated by reference to Exhibit 10.2 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.

10.31*	Supply Agreement, dated July 6, 2010, between Vishay Advanced Technology, Ltd. And Vishay Dale Electronics, Inc. Incorporated by reference to Exhibit 10.4 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.

10.32*	Patent License Agreement, dated July 6, 2010, between Vishay Precision Group, Inc. and Vishay Dale Electronics, Inc. Incorporated by reference to Exhibit 10.6 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.33*	Supply Agreement, dated July 6, 2010, between Vishay Dale Electronics, Inc. and Vishay Advanced Technology, Ltd. Incorporated by reference to Exhibit 10.8 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.34*	Supply Agreement, dated July 6, 2010, between Vishay Measurements Group, Inc. and Vishay S.A. Incorporated by reference to Exhibit 10.9 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.35*	Manufacturing Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Precision Foil GmbH. Incorporated by reference to Exhibit 10.10 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.36	Intellectual Property License Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Precision Foil GmbH. Incorporated by reference to Exhibit 10.11 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.37*	Supply Agreement, dated July 6, 2010, between Vishay Precision Foil GmbH and Vishay S.A. Incorporated by reference to Exhibit 10.12 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.38*	Intellectual Property License Agreement, dated July 6, 2010, between Vishay S.A. and Vishay Measurements Group, Inc. Incorporated by reference to Exhibit 10.13 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.39	Lease Agreement between Vishay Alpha Electronics Corporation and Vishay Japan Co., Ltd. Incorporated by reference to Exhibit 10.14 to Vishay Precision Group, Inc.'s current report on Form 8- K filed July 7, 2010.
10.40	Credit Agreement, dated as of December 1, 2010, as amended and restated as of August 8, 2013, as further amended and restated December 10, 2015, among Vishay Intertechnology, Inc. and JPMorgan Chase Bank, N.A., as administrative agent and the lenders and other parties thereto. Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K filed December 10, 2015.
10.41	Credit Agreement, dated as of June 5, 2019, among Vishay Intertechnology, Inc. and JPMorgan Chase Bank, N.A., as administrative agent and the lenders and other parties thereto. Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K filed June 5, 2019.
10.42	Amendment No. 1 to Credit Agreement, dated as of September 20, 2019, among Vishay Intertechnology, Inc. and JPMorgan Chase Bank, N.A., as administrative agent and the lenders and other parties thereto. Incorporated by reference to Exhibit 10.1 to our quarterly report on Form 10- Q for the fiscal quarter ended September 28, 2019.
10.43†	Vishay Intertechnology, Inc. Form of Executive Officer Restricted Stock Unit Agreement. Incorporated by reference to Exhibit 10.2 to our current report on Form 8- K, filed on May 21, 2014.
10.44†	Vishay Intertechnology, Inc. Form of Executive Officer Restricted Stock Unit Agreement. Incorporated by reference to Exhibit 10.1 to our current report on Form 8- K, filed on March 6, 2018.
10.45**†	Vishay Intertechnology, Inc. Form of Executive Officer Restricted Stock Unit Agreement.
10.46†	Vishay Intertechnology, Inc. Form of Non- Employee Director Restricted Stock Unit Agreement. Incorporated by reference to Exhibit 10.3 to our current report on Form 8- K, filed on May 21, 2014.
10.47†	Vishay Intertechnology, Inc. Form of Non- Employee Director Restricted Stock Unit Agreement. Incorporated by reference to Exhibit 10.2 to our current report on Form 8- K, filed on March 6, 2018.
10.48**†	Vishay Intertechnology, Inc. Form of Non- Employee Director Restricted Stock Unit Agreement.
10.49†	Vishay Intertechnology, Inc. Form of Executive Officer Phantom Stock Unit Agreement. Incorporated by reference to Exhibit 10.4 to our current report on Form 8- K, filed on May 21, 2014.
10.50**†	Vishay Intertechnology, Inc. Form of Executive Officer Phantom Stock Unit Agreement.
21**	Subsidiaries of the Registrant.
23.1**	Consent of Independent Registered Public Accounting Firm.

31.1**	Certification pursuant to Rules 13a- 15(e) or 15d- 15(e) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes- Oxley Act of 2002 – Chief Executive Officer.
31.2**	Certification pursuant to Rules 13a- 15(e) or 15d- 15(e) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes- Oxley Act of 2002 – Chief Financial Officer.
32.1**	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 – Chief Executive Officer.
32.2**	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 – Chief Financial Officer.
101**	Interactive Data File (Annual Report on Form 10- K, for the year ended December 31, 2019, furnished in iXBRL (Inline eXtensible Business Reporting Language)).
104**	Cover Page Interactive Data File (formatted as Inline eXtensible Business Reporting Language and contained in Exhibit 101)

* Confidential treatment has been requested by, and accorded to, VPG with respect to certain portions of this Exhibit. Omitted portions have been filed separately by VPG with the Securities and Exchange Commission.
** Filed herewith.
† Denotes a management contract or compensatory plan, contract, or arrangement.

Item 16. Form 10- K Summary

Not applicable.

SIGNATURES

Pursuant to the requirement of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

VISHAY INTERTECHNOLOGY, INC.
By:/s/ Gerald Paul
Dr. Gerald Paul
President and Chief Executive Officer
February 14, 2020

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated below.

Signature	Title	Date
Principal Executive Officer:		
/s/ Gerald Paul Dr. Gerald Paul	President, Chief Executive Officer, and Director	February 14, 2020
Principal Financial and Accounting Officer:		
/s/ Lori Lipcaman Lori Lipcaman	Executive Vice President and Chief Financial Officer	February 14, 2020
Board of Directors:		
/s/ Marc Zandman Marc Zandman	Executive Chairman of the Board of Directors	February 14, 2020
/s/ Michael Cody Michael Cody	Director	February 14, 2020
/s/ Abraham Ludomirski Dr. Abraham Ludomirski	Director	February 14, 2020
/s/ Ronald M. Ruzic Ronald M. Ruzic	Director	February 14, 2020
/s/ Ziv Shoshani Ziv Shoshani	Director	February 14, 2020
/s/ Timothy V. Talbert Timothy V. Talbert	Director	February 14, 2020
/s/ Jeffrey H. Vanneste Jeffrey H. Vanneste	Director	February 14, 2020
/s/ Thomas C. Wertheimer Thomas C. Wertheimer	Director	February 14, 2020
/s/ Ruta Zandman Ruta Zandman	Director	February 14, 2020
/s/ Raanan Zilberman	Director	February 14, 2020

Vishay Intertechnology, Inc.

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Audited Consolidated Financial Statements

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Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Vishay Intertechnology, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Vishay Intertechnology, Inc. (the Company) as of December 31, 2019 and 2018, and the related consolidated statements of operations, comprehensive income, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 14, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the account or disclosure to which it relates.

Sales Returns and Allowances Accruals

Description of the Matter	At December 31, 2019, the Company's liability for sales returns and allowances was $40.5 million. As discussed in Note 1 of the consolidated financial statements, the Company recognizes the estimated variable consideration to be received as revenue from contracts with customers and recognizes a related accrued liability for estimated future credits that will be issued to its customers, primarily distributors, for product returns, scrap allowance, "stock, ship and debit" and price protection programs with those customers. Auditing management's sales returns and allowances accruals involved a high degree of subjectivity due to the significant judgment required in evaluating management's estimates of future credits that will be issued to customers for sales that were recognized during the period. In particular, the estimates were sensitive to significant assumptions such as projected market trends and conditions that drive expected demand and pricing of the Company's products to be sold from distributor inventories in the future, inventory levels at customer locations subject to future credits, and the amount of future credits that are expected to be provided to the customers.
How We Addressed the Matter in Our Audit	We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's sales returns and allowances review process. For example, we tested controls over management's review of the significant assumptions described above. To test the estimated sales returns and allowances accruals, we performed audit procedures that included, among others, assessing methodologies and testing the significant assumptions discussed above and the completeness and accuracy of the underlying data used by the Company in its analyses. We inspected contracts with customers in evaluating whether the assumptions used by management agreed with the terms and conditions of the contracts. In addition, we compared the significant assumptions used by management to current industry and economic trends that affect demand for the Company's products, pricing trends and actual historical credit experience. We also assessed the historical accuracy of management's estimates and performed sensitivity analyses of significant assumptions to evaluate the changes in the sales returns and allowances accruals that would result from changes in the significant assumptions.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1968

Philadelphia, Pennsylvania
February 14, 2020

VISHAY INTERTECHNOLOGY, INC.
Consolidated Balance Sheets
(In thousands, except share amounts)

	December 31, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	**$ 694,133**	$ 686,032
Short- term investments	**108,822**	78,286
Accounts receivable, net of allowances for doubtful accounts of $1,095 and $4,269, respectively	**328,187**	397,020
Inventories:		
Finished goods	**122,466**	138,112
Work in process	**187,354**	190,982
Raw materials	**121,860**	150,566
Total inventories	**431,680**	479,660
Prepaid expenses and other current assets	**141,294**	142,888
Total current assets	**1,704,116**	1,783,886
Property and equipment, at cost:		
Land	**75,011**	87,622
Buildings and improvements	**585,064**	619,445
Machinery and equipment	**2,606,355**	2,510,001
Construction in progress	**110,722**	125,109
Allowance for depreciation	**(2,425,627)**	(2,373,176)
Property and equipment, net	**951,525**	969,001
Right of use assets	**93,162**	-
Goodwill	**150,642**	147,480
Other intangible assets, net	**60,659**	65,688
Other assets	**160,671**	140,143
Total assets	**$ 3,120,775**	$ 3,106,198

Continues on following page.

VISHAY INTERTECHNOLOGY, INC.
Consolidated Balance Sheets (continued)
(In thousands, except share amounts)

	December 31, 2019	December 31, 2018
Liabilities, temporary equity, and equity		
Current liabilities:		
Notes payable to banks	**$ 2**	$ 18
Trade accounts payable	**173,915**	218,322
Payroll and related expenses	**122,100**	141,670
Lease liabilities	**20,217**	-
Other accrued expenses	**186,463**	229,660
Income taxes	**17,731**	54,436
Total current liabilities	**520,428**	644,106
Long- term debt, less current portion	**499,147**	494,509
U.S. transition tax payable	**140,196**	154,953
Deferred income taxes	**22,021**	85,471
Long- term lease liabilities	**78,511**	-
Other liabilities	**100,207**	79,489
Accrued pension and other postretirement costs	**272,402**	260,984
Total liabilities	**1,632,912**	1,719,512
Commitments and contingencies		
Redeemable convertible debentures	**174**	2,016
Stockholders' equity:		
Preferred stock, par value $1.00 per share: authorized - 1,000,000 shares; none issued	**-**	-
Common stock, par value $0.10 per share: authorized - 300,000,000 shares; 132,348,357 and 132,117,715 shares outstanding	**13,235**	13,212
Class B convertible common stock, par value $0.10 per share: authorized - 40,000,000 shares; 12,097,409 and 12,097,427 shares outstanding	**1,210**	1,210
Capital in excess of par value	**1,425,170**	1,436,011
Retained earnings (accumulated deficit)	**72,180**	(61,258)
Accumulated other comprehensive income (loss)	**(26,646)**	(6,791)
Total Vishay stockholders' equity	**1,485,149**	1,382,384
Noncontrolling interests	**2,540**	2,286
Total equity	**1,487,689**	1,384,670
Total liabilities, temporary equity, and equity	**$ 3,120,775**	$ 3,106,198

See accompanying notes.

VISHAY INTERTECHNOLOGY, INC.
Consolidated Statements of Operations
(In thousands, except per share amounts)

	Years ended December 31,		
	2019	**2018**	**2017**
Net revenues	**$ 2,668,305**	$ 3,034,689	$ 2,599,368
Costs of products sold	**1,997,105**	2,146,165	1,896,259
Gross profit	**671,200**	888,524	703,109
Selling, general, and administrative expenses	**384,631**	403,404	367,831
Restructuring and severance costs	**24,139**	-	11,273
Operating income	**262,430**	485,120	324,005
Other income (expense):			
Interest expense	**(33,683)**	(36,680)	(27,850)
Other components of net periodic pension cost	**(13,959)**	(13,118)	(12,417)
Other	**13,540**	8,037	1,738
Loss on early extinguishment of debt	**(2,030)**	(26,583)	-
Loss on disposal of equity affiliate	**-**	-	(6,112)
Total other income (expense)	**(36,132)**	(68,344)	(44,641)
Income before taxes	**226,298**	416,776	279,364
Income tax expense	**61,508**	70,239	298,924
Net earnings (loss)	**164,790**	346,537	(19,560)
Less: net earnings attributable to noncontrolling interests	**854**	779	784
Net earnings (loss) attributable to Vishay stockholders	**$ 163,936**	$ 345,758	$ (20,344)
Basic earnings (loss) per share attributable to Vishay stockholders:	**$ 1.13**	$ 2.39	$ (0.14)
Diluted earnings (loss) per share attributable to Vishay stockholders:	**$ 1.13**	$ 2.24	$ (0.14)
Weighted average shares outstanding - basic	**144,608**	144,370	145,633
Weighted average shares outstanding - diluted	**145,136**	154,622	145,633
Cash dividends per share	**$ 0.3700**	$ 0.3225	$ 0.2550

See accompanying notes.

VISHAY INTERTECHNOLOGY, INC.
Consolidated Statements of Comprehensive Income
(In thousands)

	Years ended December 31,		
	2019	**2018**	**2017**
Net earnings (loss)	**$ 164,790**	$ 346,537	$ (19,560)
Other comprehensive income (loss), net of tax			
Pension and other post- retirement actuarial items	**(9,729)**	10,750	(4,545)
Foreign currency translation adjustment	**(10,126)**	(41,454)	124,220
Unrealized gain (loss) on available- for- sale securities	**-**	-	691
Other comprehensive income (loss)	**(19,855)**	(30,704)	120,366
Comprehensive income	**144,935**	315,833	100,806
Less: comprehensive income attributable to noncontrolling interests	**854**	779	784
Comprehensive income attributable to Vishay stockholders	**$ 144,081**	$ 315,054	$ 100,022

See accompanying notes.

VISHAY INTERTECHNOLOGY, INC.
Consolidated Statements of Cash Flows
(In thousands)

	Years ended December 31,		
	2019	**2018**	**2017**
Operating activities			
Net earnings (loss)	**$ 164,790**	$ 346,537	$ (19,560)
Adjustments to reconcile net earnings (loss) to net cash provided by operating activities:			
Depreciation and amortization	**164,461**	161,863	163,146
(Gain) loss on disposal of property and equipment	**(157)**	(2,216)	(265)
Accretion of interest on convertible debt instruments	**14,146**	10,769	4,984
Inventory write- offs for obsolescence	**26,494**	23,872	17,771
Pensions and other postretirement benefits, net of contributions	**(552)**	(1,549)	(2,425)
Loss on disposal of equity affiliate	**-**	-	6,112
Loss on early extinguishment of debt	**2,030**	26,583	-
Deferred income taxes	**(23,009)**	(55,206)	52,377
Other	**13,341**	21,194	13,044
Change in U.S. transition tax liability	**(14,757)**	(14,757)	180,000
Change in repatriation tax liability	**(38,814)**	(156,767)	-
Net change in operating assets and liabilities, net of effects of businesses acquired	**(11,529)**	(101,817)	(46,407)
Net cash provided by operating activities	**296,444**	258,506	368,777
Investing activities			
Capital expenditures	**(156,641)**	(229,899)	(170,432)
Proceeds from sale of property and equipment	**577**	55,561	1,685
Purchase of businesses, net of cash acquired	**(11,862)**	(14,880)	-
Purchase of short- term investments	**(111,631)**	(175,403)	(749,600)
Maturity of short- term investments	**81,012**	636,108	887,729
Other investing activities	**3,587**	(2,058)	(4,189)
Net cash provided by (used in) investing activities	**(194,958)**	269,429	(34,807)
Financing activities			
Proceeds from long- term borrowings	**-**	600,000	-
Issuance costs	**(5,394)**	(15,621)	-
Repurchase of convertible debentures	**(27,863)**	(960,995)	-
Net proceeds (payments) on revolving credit lines	**-**	(150,000)	7,000
Common stock repurchases	**-**	-	(39,944)
Dividends paid to common stockholders	**(48,968)**	(42,608)	(33,956)
Dividends paid to Class B common stockholders	**(4,476)**	(3,901)	(3,093)
Net changes in short- term borrowings	**(16)**	15	1
Distributions to noncontrolling interests	**(600)**	(525)	(1,140)
Acquisition of noncontrolling interests	**-**	-	(4,100)
Proceeds from stock options exercised	**-**	-	1,260
Cash withholding taxes paid when shares withheld for vested equity awards	**(2,708)**	(2,297)	(1,971)
Other financing activities	**-**	-	(1,255)
Net cash used in financing activities	**(90,025)**	(575,932)	(77,198)
Effect of exchange rate changes on cash and cash equivalents	**(3,360)**	(14,003)	19,479
Net increase (decrease) in cash and cash equivalents	**8,101**	(62,000)	276,251
Cash and cash equivalents at beginning of year	**686,032**	748,032	471,781

Cash and cash equivalents at end of year	**$ 694,133**	$ 686,032	$ 748,032

See accompanying notes

VISHAY INTERTECHNOLOGY, INC.

Consolidated Statements of Stockholders' Equity

(In thousands, except share amounts)

	Common Stock	Class B Convertible Common Stock	Capital in Excess of Par Value	Retained Earnings (Accumulated Deficit)	Accumulated Other Comprehensive Income (Loss)	Total Vishay Stockholders' Equity	Noncontrolling Interests	Total Equity
Balance at December 31, 2016	$ 13,385	$ 1,213	$ 1,952,988	$ (305,207)	$ (94,652)	$ 1,567,727	$ 5,441	$ 1,573,168
Cumulative effect of accounting change for adoption of ASU 2016-09	-	-	-	386	-	386	-	386
Net earnings (loss)	-	-	-	(20,344)	-	(20,344)	784	(19,560)
Other comprehensive income	-	-	-	-	120,366	120,366	-	120,366
Distributions to noncontrolling interests	-	-	-	-	-	-	(1,140)	(1,140)
Acquisition of noncontrolling interests	-	-	(1,047)	-	-	(1,047)	(3,053)	(4,100)
Common stock repurchase (2,250,236 shares)	(225)	-	(39,719)	-	-	(39,944)	-	(39,944)
Temporary equity reclassifications	-	-	(163,411)	-	-	(163,411)	-	(163,411)
Issuance of stock and related tax withholdings for vested restricted stock units (200,688 shares)	20	-	(1,991)	-	-	(1,971)	-	(1,971)
Dividends declared ($0.2550 per share)	-	-	40	(37,089)	-	(37,049)	-	(37,049)
Stock compensation expense	-	-	4,394	-	-	4,394	-	4,394
Stock options exercised	8	-	1,252	-	-	1,260	-	1,260

(77,334 shares)								
Balance at December 31, 2017	$ 13,188	$ 1,213	$ 1,752,506	$ (362,254)	$ 25,714	$ 1,430,367	$ 2,032	$ 1,432,399
Cumulative effect of accounting change for adoption of ASU 2016-01	-	-	-	1,801	(1,801)	-	-	-
Net earnings	-	-	-	345,758	-	345,758	779	346,537
Other comprehensive income (loss)	-	-	-	-	(30,704)	(30,704)	-	(30,704)
Conversion of Class B shares (31,800 shares)	3	(3)	-	-	-	-	-	-
Distributions to noncontrolling interests	-	-	-	-	-	-	(525)	(525)
Temporary equity reclassification	-	-	2,330	-	-	2,330	-	2,330
Issuance of stock and related tax withholdings for vested restricted stock units (211,328 shares)	21	-	(2,318)	-	-	(2,297)	-	(2,297)
Dividends declared ($0.3225 per share)	-	-	54	(46,563)	-	(46,509)	-	(46,509)
Stock compensation expense	-	-	4,817	-	-	4,817	-	4,817
Issuance of convertible notes due 2025	-	-	85,262	-	-	85,262	-	85,262
Repurchase of convertible debentures	-	-	(406,640)	-	-	(406,640)	-	(406,640)
Balance at December 31, 2018	$ 13,212	$ 1,210	$ 1,436,011	$ (61,258)	$ (6,791)	$ 1,382,384	$ 2,286	$ 1,384,670
Cumulative effect of accounting change for adoption of ASU 2016-02 (see Note 1)	**-**	**-**	**-**	**23,013**	**-**	**23,013**	**-**	**23,013**
Net earnings	**-**	**-**	**-**	**163,936**	**-**	**163,936**	**854**	**164,790**
Other comprehensive income	**-**	**-**	**-**	**-**	**(19,855)**	**(19,855)**	**-**	**(19,855)**

Conversion of Class B shares (18 shares)	-	-	-	-	-	-	-	-
Distributions to noncontrolling interests	-	-	-	-	-	-	(600)	(600)
Temporary equity reclassification	-	-	35	-	-	35	-	35
Issuance of stock and related tax withholdings for vested restricted stock units (230,624 shares)	23	-	(2,731)	-	-	(2,708)	-	(2,708)
Dividends declared (0.3700 per share)	-	-	67	(53,511)	-	(53,444)	-	(53,444)
Stock compensation expense	-	-	6,108	-	-	6,108	-	6,108
Repurchase of convertible debentures	-	-	(14,320)	-	-	(14,320)	-	(14,320)
Balance at December 31, 2019	$ 13,235	$ 1,210	$ 1,425,170	$ 72,180	$ (26,646)	$ 1,485,149	$ 2,540	$ 1,487,689

See accompanying notes.

Vishay Intertechnology, Inc. (“Vishay” or the “Company”) is a global manufacturer and supplier of semiconductors and passive components, including power MOSFETs, power integrated circuits, transistors, diodes, optoelectronic components, resistors, inductors, and capacitors. Semiconductors and electronic components manufactured by the Company are used in virtually all types of electronic products, including those in the industrial, computing, automotive, consumer electronics products, telecommunications, power supplies, military/aerospace, and medical industries.

Note 1 – Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States (“GAAP”) requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. Actual results could differ significantly from those estimates.

Principles of Consolidation

The consolidated financial statements include the accounts of Vishay and all of its subsidiaries in which a controlling financial interest is maintained. For those consolidated subsidiaries in which the Company’s ownership is less than 100 percent, the outside stockholders’ interests are shown as noncontrolling interest in the accompanying consolidated balance sheets. Investments in affiliates over which the Company has significant influence but not a controlling interest are carried on the equity basis. Investments in affiliates over which the Company does not have significant influence are accounted for by the cost method. All intercompany transactions, accounts, and profits are eliminated.

Revenue Recognition

The Company recognizes revenue from contracts with customers when it satisfies the performance obligations within the contract. The Company has framework agreements with many of its customers that contain the terms and conditions of future sales, but do not create enforceable rights or obligations. For revenue recognition purposes, the Company considers the combined purchase orders and the terms and conditions contained within such framework agreements to be contracts.

Payment terms for the Company's sales are generally less than sixty days. Substantially all of the Company's receivables historically have been and are expected to continue to be collected within twelve months of the transfer of products to the customer and the Company expects this to continue going forward. Accordingly, the Company does not recognize a financing component of the transaction price.

Revenue is measured based on the consideration specified in contracts with customers, and excludes any sales incentives and amounts collected on behalf of third parties. The Company recognizes revenue when it satisfies its performance obligations. The Company analyzes its contracts to determine whether the promise in the contract to construct and transfer goods to the customer is a performance obligation that will be satisfied over time or at a point in time. When the Company's performance does not create an asset with an alternative use to the Company and the Company has an enforceable right to payment for performance completed to date, the Company transfers control of a good or service over time and, therefore, satisfies a performance obligation and recognizes revenue over time. The Company has a limited number of contracts for custom products that meet the criteria to recognize revenue over time.

The Company's contracts contain two performance obligations: delivery of products and warranty protection. The Company does not sell separate, enhanced, or extended warranty coverage, but through its customary business practices, the Company has created implied service- type warranties, which are accounted for as separate performance obligations. Revenue is allocated between these two performance obligations and recognized as the obligations are satisfied. The allocation of revenue to warranty protection is based on an estimate of expected cost plus margin. The delivery of products performance obligation is satisfied and product sales revenue is recognized when the customer takes control of the products. Warranty revenue is deferred and the warranty protection performance obligation is satisfied and revenue is recognized over the warranty period, which is typically less than twenty four months from sale to end customer. The warranty deferred revenue liability is recorded within Other Accrued Expenses and Other Liabilities on the accompanying consolidated balance sheets.

The deferred revenue balance associated with the service- type warranty performance obligations and the components that comprise the change in the deferred revenue balance are not significant.

The Company has a broad line of products that it sells to original equipment manufacturers ("OEMs"), electronic manufacturing services ("EMS") companies, which manufacture for OEMs on an outsourcing basis, and independent distributors that maintain large inventories of electronic components for resale to OEMs and EMS companies.

Note 1 – Summary of Significant Accounting Policies (continued)

The Company recognizes revenue on sales to distributors when the distributor takes control of the products ("sold- to" model). The Company has agreements with distributors that allow distributors a limited credit for unsaleable products, which it terms a "scrap allowance." Consistent with industry practice, the Company also has a "stock, ship and debit" program whereby it considers requests by distributors for credits on previously purchased products that remain in distributors' inventory, to enable the distributors to offer more competitive pricing. In addition, the Company has contractual arrangements whereby it provides distributors with protection against price reductions initiated by the Company after product is sold by the Company to the distributor and prior to resale by the distributor.

The Company recognizes the estimated variable consideration to be received as revenue and records a related accrued expense for the consideration not expected to be received, based upon its estimate of product returns, scrap allowances, "stock, ship and debit" credits, and price protection credits that will be attributable to sales recorded through the end of the period. The Company makes these estimates based upon sales levels to its distributors during the period, inventory levels at the distributors, current and projected market conditions, and historical experience under the programs. While the Company utilizes a number of different methodologies to estimate the accruals, all of the methodologies take into account sales levels to distributors during the relevant period, inventory levels at the distributors, current and projected market trends and conditions, recent and historical activity under the relevant programs, changes in program policies, and open requests for credits. These procedures require the exercise of significant judgments. The Company believes that it has a reasonable basis to estimate future credits under the programs. See sales returns and allowances accrual activity in Note 9.

The Company pays commissions to external sales representatives on a per- sale basis. Accordingly, these commissions are expensed as incurred because the future amortization period of the asset that the Company otherwise would have recognized is one year or less. Internal staff are not paid commissions.

The Company has elected to account for shipping and handling as activities to fulfill the promise to transfer the product even if the shipping and handling activities are performed after the customer obtains control. The Company does not evaluate whether shipping and handling activities are promised services to its customers. If control transfers and revenue is recognized for the related products before the shipping and handling activities occur, the related costs of those shipping and handling activities is accrued. The Company applies this accounting policy election consistently to similar types of transactions.

See disaggregated revenue information in Note 15.

Research and Development Expenses

Research and development costs are expensed as incurred. The amount charged to expense for research and development (exclusive of purchased in- process research and development) aggregated $69,827, $72,885, and $67,153, for the years ended December 31, 2019, 2018, and 2017, respectively. The Company spends additional amounts for the development of machinery and equipment for new processes and for cost reduction measures.

Income Taxes

The provision for income taxes is determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. The provision for income taxes represents income taxes paid or payable for the current year plus the change in deferred taxes during the year. Deferred taxes result from differences between the financial and tax bases of the Company's assets and liabilities and are adjusted for changes in tax rates and tax laws when changes are enacted. Valuation allowances have been established for deferred tax assets which the Company believes do not meet GAAP criteria of "more likely than not" to be realized. This criterion requires a level of judgment regarding future taxable income, which may be revised due to changes in market conditions, tax laws, or other factors. If the Company's assumptions and estimates change in the future, valuation allowances established may be increased, resulting in increased tax expense. Conversely, if the Company is ultimately able to utilize all or a portion of the deferred tax assets for which a

valuation allowance has been established, then the related portion of the valuation allowance can be released, resulting in decreased tax expense.

The Company and its subsidiaries are subject to income taxes in the U.S. and numerous foreign jurisdictions. Significant judgment is required in evaluating the Company's tax positions and determining its provision for income taxes. During the ordinary course of business, there are many transactions and calculations for which the ultimate tax determination is uncertain. The Company establishes reserves for tax- related uncertainties based on estimates of whether, and the extent to which, additional taxes will be due. These reserves are established when the Company believes that certain positions might be challenged despite the Company's belief that its tax return positions are fully supportable. The Company adjusts these reserves in light of changing facts and circumstances and the provision for income taxes includes the impact of reserve provisions and changes to reserves that are considered appropriate.

These accruals for tax- related uncertainties are based on management's best estimate of potential tax exposures. When particular matters arise, a number of years may elapse before such matters are audited by tax authorities and finally resolved. Favorable resolution of such matters could be recognized as a reduction to the Company's effective tax rate in the year of resolution. Unfavorable resolution of any particular issue could increase the effective tax rate and may require the use of cash in the year of resolution. The amount included in current liabilities on the accompanying consolidated balance sheets reflect only amounts expected to be settled in cash within one year.

See Note 5.

Note 1 – Summary of Significant Accounting Policies (continued)

Cash, Cash Equivalents, and Short- Term Investments

Cash and cash equivalents includes demand deposits and highly liquid investments with maturities of three months or less when purchased. Highly liquid investments with original maturities greater than three months, but less than one year are classified as short- term investments. At December 31, 2019 and 2018, the Company's short- term investments were comprised of time deposits with financial institutions whose original maturity exceeds three months, but less than one year.

Allowance for Doubtful Accounts

The Company maintains an allowance for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. The allowance is determined through an analysis of the aging of accounts receivable and assessments of risk that are based on historical trends and an evaluation of the impact of current economic conditions. The Company evaluates the past- due status of its trade receivables based on contractual terms of sale. If the financial condition of the Company's customers were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances may be required. Bad debt expense (income realized upon subsequent collection) was $(592), $2,570, and $301 for the years ended December 31, 2019, 2018, and 2017, respectively.

Inventories

Inventories are stated at the lower of cost, determined by the first- in, first- out method, or net realizable value. Inventories are adjusted for estimated obsolescence and written down to net realizable value based upon estimates of future demand, technology developments, and market conditions.

Property and Equipment

Property and equipment is carried at cost and is depreciated principally by the straight- line method based upon the estimated useful lives of the assets. Machinery and equipment are being depreciated over useful lives of seven years to ten years. Buildings and building improvements are being depreciated over useful lives of twenty years to forty years. Construction in progress is not depreciated until the assets are placed in service. The estimated cost to complete construction in progress at December 31, 2019 was approximately $92,000. Depreciation expense was $155,985, $150,056, and $148,883 for the years ended December 31, 2019, 2018, and 2017, respectively. Gains and losses on the disposal of assets which do not qualify for presentation as discontinued operations are included in the determination of operating margin (within selling, general, and administrative expenses). Individually material gains and losses on disposal are separately disclosed in the notes to the consolidated financial statements.

Goodwill and Other Intangible Assets

Goodwill represents the excess of the cost of a business acquired over the fair value of the related net assets at the date of acquisition. Certain intangible assets may be assigned indefinite useful lives. Goodwill and indefinite- lived intangible assets are not amortized but rather are tested for impairment at least annually. These tests are performed more frequently whenever events or changes in circumstances indicate that the assets might be impaired. The Company's business segments (see Note 15) represent its reporting units for goodwill impairment testing purposes. At December 31, 2019 and 2018, respectively, the Company has no recorded indefinite- lived intangible assets.

Definite- lived intangible assets are amortized over their estimated useful lives. Patents and acquired technology are being amortized over useful lives of seven years to twenty- five years. Capitalized software is amortized over periods of three years to ten years, primarily included in costs of products sold on the consolidated statements of operations. Customer relationships are amortized over useful lives of five years to twenty years. Noncompete agreements are amortized over periods of three years to ten years. The Company continually evaluates the reasonableness of the useful lives of these assets.

GAAP prescribes a quantitative method for determining goodwill impairment. The Company has the option of performing a qualitative assessment before performing the quantitative impairment test. If it is determined, on the basis of qualitative factors, that the fair value of the reporting unit is not more likely than not less than the carrying amount, the quantitative impairment test is not required. If it is determined that the fair value of the reporting unit is more likely than not less than the carrying amount, the quantitative impairment test is required.

The Company determines the fair value of the reporting unit and compares that fair value to the net book value of the reporting unit. The fair value of the reporting unit is determined using various valuation techniques, including a comparable companies market multiple approach and a discounted cash flow analysis (an income approach). If the net book value of the reporting unit were to exceed the fair value, the Company would recognize an impairment charge.

Note 1 – Summary of Significant Accounting Policies (continued)

Impairment of Long- Lived Assets

The carrying value of long- lived assets held- and- used, other than goodwill and indefinite- lived intangible assets, is evaluated when events or changes in circumstances indicate the carrying value may not be recoverable or the useful life has changed. The carrying value of a long- lived asset group is considered impaired when the total projected undiscounted cash flows from such asset group are separately identifiable and are less than the carrying value. In that event, a loss is recognized based on the amount by which the carrying value exceeds the fair market value of the long- lived asset group. Fair market value is determined primarily using present value techniques based on projected cash flows from the asset group. Losses on long- lived assets held- for- sale, other than goodwill and indefinite- lived intangible assets, are determined in a similar manner, except that fair market values are reduced for anticipated disposal costs.

Available- for- Sale Securities

Short- term investments and other assets reported on the accompanying consolidated balance sheets include time deposits with financial institutions whose original maturity exceeds three months, but less than one year that are classified as held- to- maturity instruments, and investments in marketable securities that are classified as available- for- sale instruments. The available- for- sale instruments include assets that are held in trust related to the Company’s non- qualified pension and deferred compensation plans (see Note 11) and assets that are intended to fund a portion of the Company’s other postretirement benefit obligations outside of the U.S. These assets are reported at fair value, based on quoted market prices as of the end of the reporting period. Beginning in 2018, unrealized gains and losses are reported, net of their related tax consequences, as Other Income (Expense) on the consolidated statements of operations. At the time of sale, the assets that are held in trust related to the Company’s non- qualified pension and deferred compensation plans, any gains (losses) calculated by the specific identification method are recognized as a reduction (increase) to benefits expense, within selling, general, and administrative expenses.

Financial Instruments

The Company uses financial instruments in the normal course of its business, including from time to time, derivative financial instruments. Additionally, from time to time, the Company enters into contracts that are not considered derivative financial instruments in their entirety, but that include embedded derivative features. The convertible senior debentures due 2040 and due 2041 contain embedded derivatives that are recorded at fair value on a recurring basis. At December 31, 2019 and 2018, outstanding derivative instruments were not material.

Other financial instruments include cash and cash equivalents, held- to- maturity short- term investments, accounts receivable, and notes payable. The carrying amounts of these financial instruments reported on the accompanying consolidated balance sheets approximate their fair values due to the short- term nature of these assets and liabilities.

Stock- Based Compensation

Compensation costs related to stock- based payment transactions are recognized in the consolidated financial statements. The amount of compensation cost is measured based on the grant- date fair value of the equity (or liability) instruments issued. Compensation cost is recognized over the period that an officer, employee, or non- employee director is required to provide service in exchange for the award. For awards subject to graded vesting, the Company recognizes expense over the service period for each separately vesting portion of the award as if the award was, in- substance, multiple awards. The Company recognizes compensation cost for restricted stock units (“RSUs”) that are expected to vest and records cumulative adjustments in the period that the expectation changes.

Note 1 – Summary of Significant Accounting Policies (continued)

Foreign Currency Translation

The Company has significant operations outside of the United States. The Company finances its operations in Europe and certain locations in Asia in local currencies, and accordingly, these subsidiaries utilize the local currency as their functional currency. The Company's operations in Israel and most significant locations in Asia are largely financed in U.S. dollars, and accordingly, these subsidiaries utilize the U.S. dollar as their functional currency.

For those subsidiaries where the local currency is the functional currency, assets and liabilities on the accompanying consolidated balance sheets have been translated at the rate of exchange as of the balance sheet date. Translation adjustments do not impact the consolidated results of operations and are reported as a separate component of stockholders' equity. Revenues and expenses are translated at the average exchange rate for the year. While the translation of revenues and expenses into U.S. dollars does not directly impact the statement of operations, the translation effectively increases or decreases the U.S. dollar equivalent of revenues generated and expenses incurred in those foreign currencies.

For those foreign subsidiaries where the U.S. dollar is the functional currency, all foreign currency financial statement amounts are remeasured into U.S. dollars. Exchange gains and losses arising from remeasurement of foreign currency-denominated monetary assets and liabilities are included in the consolidated results of operations.

Commitments and Contingencies

Liabilities for loss contingencies, including environmental remediation costs, arising from claims, assessments, litigation, fines, penalties, and other sources are recorded when it is probable that a liability has been incurred and the amount of the assessment and/or remediation can be reasonably estimated. The costs for a specific environmental remediation site are discounted if the aggregate amount of the obligation and the amount and timing of the cash payments for that site are fixed or reliably determinable based upon information derived from the remediation plan for that site. Accrued liabilities for environmental matters recorded at December 31, 2019 and 2018 do not include claims against third parties.

Restructuring and Severance Costs

Restructuring and severance costs reflect charges resulting from cost reduction programs implemented by the Company. Restructuring and severance costs include exit costs, severance benefits pursuant to an on- going arrangement, voluntary termination compensation under a defined program, and any related pension curtailment and settlement charges.

The Company recognizes expense for one- time benefits only after management has committed to a plan, the plan is sufficiently detailed to provide the number, classification, and location of employees to be terminated as well as the expected completion date, the plan has been sufficiently communicated to employees such that they are able to determine the type and amount of benefits they will receive if terminated, and it is unlikely that the plan will be significantly changed or withdrawn. If an employee is not required to render service beyond a minimum retention period, the Company recognizes expense once the aforementioned criteria have been met. If an employee is required to render service beyond a minimum retention period, the Company recognizes expense over the period that the employee is required to render future service.

The Company recognizes expense for on- going benefit arrangements when the liability is reasonably estimable and considered probable.

The Company recognizes expense for voluntary separation / early retirement when the employee delivers an irrevocable voluntary termination notice pursuant to a defined Company program.

The Company recognizes other exit costs as incurred.

Self- Insurance Programs

The Company uses a combination of insurance and self- insurance mechanisms to provide for the potential liabilities for workers' compensation, general liability, property damage, director and officers' liability, and vehicle liability.

As part of its self- insurance program for certain risks, the Company created a wholly- owned captive insurance entity in 2007. At December 31, 2019, the captive insurance entity provides only property and general liability insurance, although it is licensed to also provide casualty and directors' and officers' insurance. The captive insurance entity had no amounts accrued for outstanding claims at December 31, 2019 and 2018.

Certain investments held by the captive insurance entity are restricted primarily for the purpose of potential insurance claims. Such amounts are recorded in other noncurrent assets, and total $10,259 and $11,046 at December 31, 2019 and 2018, respectively, representing required statutory reserves of the captive insurance entity.

Note 1 – Summary of Significant Accounting Policies (continued)

Convertible Debt Instruments

The Company separately accounts for the liability and equity components of convertible debt instruments that may be settled in cash in a manner that reflects the Company's nonconvertible debt borrowing rate. The liability component at issuance is recognized at fair value, based on the fair value of a similar instrument that does not have a conversion feature. A discount is recorded if debt instruments are issued at a coupon rate which is below the rate of a similar instrument that did not have a conversion feature at issuance. The equity component is based on the excess of the principal amount of the debt instruments over the fair value of the liability component, after adjusting for an allocation of debt issuance costs and the deferred tax impact, and is recorded as capital in excess of par. Debt discounts are amortized as additional non- cash interest expense over the expected life of the debt.

Leases

As of January 1, 2019, the Company accounts for its leases in accordance with Accounting Standards Codification ("ASC") Topic 842, Leases. See Note 3.

Recent Accounting Pronouncements

Recent Accounting Guidance Not Yet Adopted

In June 2016, the Financial Accounting Standards Board ("FASB") issued ASU No. 2016- 13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments. The ASU replaces the incurred loss impairment methodology in current GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. The ASU is effective for the Company for interim and annual periods beginning on or after January 1, 2020. The Company will adopt the ASU effective January 1, 2020. Based on work performed to date, the Company expects to record the effect of transitioning from an incurred loss model to a current expected credit loss model for certain financial instruments as a cumulative- effect adjustment to January 1, 2020 retained earnings of approximately $1,070.

Recent Accounting Guidance Adopted

In February 2016, the FASB issued ASU No. 2016- 02, Leases (Topic 842). The ASU is the result of a project between the FASB and the International Accounting Standards Board to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. The guidance in ASU No. 2016- 02 and all related ASUs is codified in ASC Topic 842. The Company adopted ASC Topic 842 effective January 1, 2019. Upon adoption on January 1, 2019, the Company recognized right of use assets of $91,462 and lease liabilities of $95,784 on the consolidated balance sheet. The difference between the initial right of use asset and lease liability balances recognized upon adoption of ASC Topic 842 is primarily due to accrued lease incentive balances at December 31, 2018.

On December 20, 2018, the Company received sale proceeds of $45,500 from a third party buyer and concurrently leased-back its former manufacturing site in Santa Clara, California, under a short- term arrangement, to raze the buildings. Upon adoption of ASC Topic 842, the Company was required to reassess the accounting for these transactions. The transactions did not qualify as a completed sale and leaseback under previous GAAP. However, pursuant to ASC Topic 842's sale and leaseback guidance, the transaction qualifies as a completed sale. The Company recognized a cumulative- effect adjustment to retained earnings (accumulated deficit) of $23,013, to recognize the sale as of the date of adoption, and derecognized the land, building, and related deferred proceeds, which had been recorded in other accrued expenses.

The adoption of the ASU did not have a material impact on the Company's results of operations or cash flows. See Note 3.

Reclassifications

Certain prior year amounts have been reclassified. Such reclassifications had no effect on reported net earnings (loss) attributable to Vishay stockholders, total assets, stockholders' equity, or the statements of cash flows.

Note 2 - Acquisition and Divestiture Activities

As part of its growth strategy, the Company seeks to expand through targeted acquisitions of other manufacturers of electronic components that have established positions in major markets, reputations for product quality and reliability, and product lines with which the Company has substantial marketing and technical expertise.

Year ended December 31, 2019

On January 3, 2019, the Company acquired substantially all of the assets of Bi- Metallix, Inc. ("Bi- Metallix"), a U.S.- based, privately- held provider of electron beam continuous strip welding services for $11,862. The Company was a major customer of Bi- Metallix, and the acquired business has been vertically integrated into the Company's Resistors segment. Based on an estimate of their fair values, the Company allocated $2,900 of the purchase price to definite- lived intangible assets. After allocating the purchase price to the assets acquired and liabilities assumed based on an estimation of their fair values at the date of acquisition, the Company recorded goodwill of $3,324 related to this acquisition. The results and operations of this acquisition have been included in the Resistors segment since January 3, 2019. The inclusion of this acquisition did not have a material impact on the Company's consolidated results for the year ended December 31, 2019. The goodwill related to this acquisition is included in the Resistors reporting unit for goodwill impairment testing.

Year ended December 31, 2018

On February 8, 2018, the Company acquired substantially all of the assets and liabilities of UltraSource, Inc. ("UltraSource"), a U.S.- based, privately- held thin film circuit and thin film interconnect manufacturer, for $13,596. Based on an estimate of their fair values, the Company allocated $6,500 of the purchase price to definite- lived intangible assets. After allocating the purchase price to the assets acquired and liabilities assumed based on an estimation of their fair values at the date of acquisition, the Company recorded goodwill of $4,227 related to this acquisition. The results and operations of this acquisition have been included in the Resistors segment since February 8, 2018. The goodwill related to this acquisition is included in the Resistors reporting unit for goodwill impairment testing.

On June 11, 2018, the Company acquired EuroPower Holdings Ltd. ("EuroPower") for $2,939, net of cash acquired. EuroPower is a distributor of electronic components in the United Kingdom. After allocating the purchase price to the assets acquired and liabilities assumed based on an estimation of their fair values at the date of acquisition, the Company recorded goodwill of $1,068 related to this acquisition. The goodwill related to this acquisition is included in the Resistors reporting unit for goodwill impairment testing.

Had these acquisitions occurred as of the beginning of the periods presented in these consolidated financial statements, the pro forma statements of operations would not be materially different than the consolidated statements of operations presented.

Note 3 – Leases

The Company leases buildings and machinery and equipment used for manufacturing and/or sales and administrative purposes. The Company is also party to various service, warehousing, and other agreements that it evaluates for potential embedded leases. Substantially all of the Company's leases are structured and classified as operating leases. As of January 1, 2019, the Company accounts for its leases in accordance with ASC Topic 842.

The Company leases assets in each region in which it operates. The Company's leases are generally denominated in the currency of the leased assets' location, which may not be the functional currency of the subsidiary lessee. Accordingly, the Company remeasures its lease liability and recognizes a transactional gain/loss for leases denominated in currencies other than the functional currency of the subsidiary lessee.

The Company recognizes right of use assets and lease liabilities for leases greater than twelve months in duration based on the contract consideration for lease components through the term of the lease and the applicable discount rate. Leases with a duration less than or equal to twelve months are considered short- term leases. The Company does not recognize right of use assets or lease liabilities for short- term leases and classifies the expense as short- term lease expense. Variable lease payments based on an index or rate are included in the right of use assets and lease liabilities based on the effective rates at lease commencement. Changes in the rates or indices do not impact the right of use asset or lease liability and are recognized as a component of lease expense in the statement of operations. Variable lease payments not based on an index or rate are not included in the initial right of use asset and lease liability and are recognized when incurred as a component of lease expense in the statement of operations.

The Company has elected to not separate contract consideration for lease and non- lease components for its building leases. In addition to the noncancellable period of a lease, the Company includes periods covered by extension options it is reasonably certain to exercise, termination options that it is reasonably certain not to exercise, and extension and termination options controlled by the lessor in its determination of the lease term. The Company uses the rate implicit in the contract whenever possible when determining the applicable discount rate. When the implicit rate is not used, the Company employs a portfolio approach based on the duration of the lease. The portfolio lease rates are calculated monthly.

No individual lease is considered significant and there are no leases that have not yet commenced that are considered significant.

The net right of use assets and lease liabilities recognized on the consolidated condensed balance sheet for the Company's operating leases as of December 31, 2019 and the net right of use assets and lease liabilities recognized upon the adoption of ASC Topic 842 on January 1, 2019 are presented below:

	December 31, 2019	**January 1, 2019**
Right of use assets		
Operating Leases		
Buildings and improvements	**$ 87,689**	$ 86,058
Machinery and equipment	**5,473**	5,404
Total	**$ 93,162**	$ 91,462
Current lease liabilities		
Operating Leases		
Buildings and improvements	**$ 17,410**	$ 10,644
Machinery and equipment	**2,807**	3,317
Total	**$ 20,217**	$ 13,961
Long- term lease liabilities		
Operating Leases		
Buildings and improvements	**$ 75,877**	$ 79,000
Machinery and equipment	**2,634**	2,823

Total	**$ 78,511**	$ 81,823
Total lease liabilities	**$ 98,728**	$ 95,784

Note 3 – Leases (continued)

Lease expense is classified in the statements of operations based on asset use. Total lease cost recognized on the consolidated statements of operations is as follows:

	Year ended December 31, 2019
Lease expense	
Operating lease expense	**$ 22,271**
Short- term lease expense	**2,278**
Variable lease expense	**95**
Total lease expense	**$ 24,644**

The Company paid $21,552 for its operating leases during the year ended December 31, 2019, which are included in operating cash flows on the consolidated statement of cash flows. The weighted- average remaining lease term for the Company's operating leases is 8.9 years and the weighted- average discount rate is 6.1% as of December 31, 2019.

The undiscounted future lease payments for the Company's operating lease liabilities are as follows:

	December 31, 2019
2020	$ 20,649
2021	17,906
2022	14,588
2023	12,947
2024	11,924
Thereafter	49,739

The undiscounted future lease payments presented in the table above include payments through the term of the lease, which may include periods beyond the noncancellable term. The difference between the total payments above and the lease liability balance is due to the discount rate used to calculate lease liabilities.

The Company elected to use the package of practical expedients available in ASC Topic 842; and accordingly, did not reassess existing contracts for leases, the classification of existing leases, or initial direct costs for any existing leases. The Company also elected to use the practical expedient available in ASC Topic 842 for land easements.

The Company did not elect the practical expedient available in ASC Topic 842 to use hindsight in determining the lease term. Accordingly, the remaining lease term as of January 1, 2019 was used to calculate the initial right of use asset and lease liability.

Note 4 – Restructuring and Related Activities

The Company places a strong emphasis on controlling its costs and combats general price inflation by continuously improving its efficiency and operating performance. When the ongoing cost containment activities are not adequate, the Company takes actions to maintain its cost competitiveness.

The Company incurred significant restructuring costs in its past to reduce its cost structure. Historically, the Company's primary cost reduction technique was through the transfer of production from high- labor- cost countries to lower- labor- cost countries. Since 2013, the Company's cost reduction programs have primarily focused on reducing fixed costs, including selling, general, and administrative expenses.

In the third fiscal quarter of 2019, the Company announced global cost reduction and management rejuvenation programs as part of its continuous efforts to improve efficiency and operating performance.

The Company also implemented restructuring programs during 2013 - 2017 ("Prior Year Programs"). These programs were substantially completed as of December 31, 2017, though certain amounts were settled in cash during 2018 and 2019.

The following table summarizes restructuring and related expenses which were recognized and reported on a separate line in the accompanying consolidated statements of operations:

	Years ended December 31,	
	2019	**2017**
2019 Global Cost Reduction & Management Rejuvenation Program	**$ 24,139**	$ -
Prior Year Programs	**-**	11,273
Total	**$ 24,139**	$ 11,273

2019 Global Cost Reduction and Management Rejuvenation Programs

The 2019 Global Cost Reduction and Management Rejuvenation Programs are primarily designed to reduce manufacturing fixed costs and selling, general, and administrative costs company- wide, and provide management rejuvenation. The Company expects to incur charges of approximately $25,000, primarily related to cash severance costs, to implement these programs. The Company expects these cost reductions to be fully achieved by December 2020.

The Company incurred $24,139 of restructuring expenses, primarily severance costs, during the year ended December 31, 2019. Cash paid for these programs was $1,330 during the year ended December 31, 2019. Severance benefits are generally paid in a lump sum at cessation of employment. The current portion of the liability is $18,841 and is included in other accrued expenses in the accompanying consolidated balance sheet. The non- current portion of the liability is $4,003 and is included in other liabilities in the accompanying consolidated balance sheet.

Prior Year Programs

The Company incurred $73,398 of restructuring expense, primarily severance, associated with the Prior Year Programs during the period 2013 - 2017, of which $11,273 was incurred in 2017. amounts were incurred during the years ended December 31, 2018 or 2019. These programs were substantially implemented as of December 31, 2017. As of December 31, 2019, the remaining amounts to be paid for the Prior Year Programs is immaterial.

Note 5 – Income Taxes

U.S. Tax Reform: Tax Cuts and Jobs Act

On December 22, 2017, the Tax Cuts and Jobs Act (the "TCJA") was enacted in the United States. The TCJA represents sweeping changes in U.S. tax law. Among the numerous changes in tax law, the TCJA permanently reduced the U.S. corporate income tax rate to 21% beginning in 2018; imposed a one- time transition tax on deferred foreign earnings; established a partial territorial tax system by allowing a 100% dividends received deduction on qualifying dividends paid by foreign subsidiaries; limited deductions for net interest expense; expanded the U.S. taxation of foreign earned income to include "global intangible low- taxed income" ("GILTI") of foreign subsidiaries; and imposed a base erosion anti- abuse minimum tax ("BEAT").

As permitted by SAB No. 118, the tax expense recorded in the fourth fiscal quarter of 2017 due to the enactment of the TCJA was considered "provisional," based on reasonable estimates. As further described below, after additional analysis was completed in 2018, the Company identified additional amounts available to be repatriated to the U.S. and additional information regarding the foreign taxes payable and recorded additional provisional tax expense to accrue the incremental foreign income taxes and withholding taxes payable to foreign jurisdiction. The Company collected and analyzed detailed information about the earnings and profits of its non- U.S. subsidiaries, the related taxes paid, the amounts which could be repatriated, the foreign taxes which may be incurred on repatriation, and the associated impact of these items under the TCJA, including under regulatory guidance issued in 2018, throughout the measurement period. The measurement period ended as of December 31, 2018.

The amount of net tax expense recorded provisionally by the Company in the fourth fiscal quarter of 2017 and adjustments recorded during the measurement period in 2018 that are directly and indirectly related to the enactment of the TCJA are summarized as follows:

		Years ended December 31,	
	Total	**2018**	**2017**
Remeasurement of net deferred tax liabilities	$ (76,027)	$ (1,211)	$ (74,816)
Transition tax on unremitted foreign earnings	222,983	7,425	215,558
Incremental foreign taxes on assumed repatriation	232,282	19,282	213,000
Reversal of deferred taxes due to cancellation of 2015 repatriation plan	(118,887)	-	(118,887)
Total tax expense related to the enactment of the TCJA	$ 260,351	$ 25,496	$ 234,855

As a result of the TCJA, the Company recognized a tax benefit of $76,027 to remeasure its net deferred tax liabilities at the lower, 21% rate.

The TCJA transitioned the U.S. from a worldwide tax system to a territorial tax system. Under previous law, companies could indefinitely defer U.S. income taxation on unremitted foreign earnings. The TCJA imposed a one- time transition tax on deferred foreign earnings of 15.5% for liquid assets and 8% for illiquid assets, payable in defined increments over eight years. As a result of this requirement, the Company recognized provisional tax expense of $215,558 in 2017, and provisionally expected to pay $180,000, net of estimated applicable foreign tax credits, and after utilization of net operating loss and R&D and FTC Credit carryforwards. As a result of additional analysis completed during the measurement period, the Company accrued additional tax expense of $7,425 in 2018 and now expects to pay $184,467. The first installments of $14,757 were paid in 2019 and 2018. These previously deferred foreign earnings may now be repatriated to the United States without additional U.S. federal taxation. However, any such repatriation could incur withholding and other foreign taxes in the source and intervening foreign jurisdictions, and certain U.S. state taxes.

Due to the changes in taxation of dividends received from foreign subsidiaries, and also because of the need to finance the payment of the transition tax, the Company made the determination during the fourth fiscal quarter of 2017 that certain unremitted foreign earnings in Israel, Germany, Austria, and France are no longer permanently reinvested, and recorded

provisional tax expense of $213,000 to accrue the incremental foreign income taxes and withholding taxes payable to foreign jurisdictions assuming the repatriation to the United States of these approximately $1,100,000 of available foreign earnings. As a result of additional analysis completed during the measurement period, the Company adjusted the amount of foreign unremitted earnings available from Israel, Germany, Austria, and France to approximately $1,200,000, identified additional information regarding foreign taxes payable, and accrued additional tax expense of $19,282.

The Company repatriated $188,742 and $724,000 to the United States, and paid withholding and foreign taxes of $38,814 and $156,767 in 2019 and 2018, respectively. Substantially all of the amounts repatriated in 2019 were used to repay certain intercompany indebtedness, to pay the U.S. transition tax, and to fund capital expansion projects. Substantially all of the amounts repatriated in 2018 were used to reduce the outstanding balance of the credit facility (see Note 6), to repay certain intercompany indebtedness, and to fund the repurchase of convertible senior debentures (see Note 6).

Note 5 – Income Taxes (continued)

After completing these phases of cash repatriation, there is approximately $100,000 of unremitted foreign earnings that the Company has deemed not permanently reinvested and thus has accrued foreign withholding and other taxes. The Company continues to evaluate the timing of the reparation of these remaining amounts, and may decide to ultimately not repatriate some of these amounts

There are additional amounts of unremitted foreign earnings in other countries, which continue to be reinvested indefinitely, and the Company has made no provision for incremental foreign income taxes and withholding taxes payable to foreign jurisdictions related to these amounts. Determination of the amount of the unrecognized deferred foreign tax liability for these amounts is not practicable because of the complexities associated with its hypothetical calculation.

During the fourth fiscal quarter of 2015, the Company recognized income tax, including U.S. federal and state income taxes, incremental foreign income taxes, and withholding taxes payable to foreign jurisdictions, on $300,000 of foreign earnings. This tax expense was recognized in 2015 following an evaluation of the Company's anticipated domestic cash needs over several years and the Company's most efficient use of liquidity, and with consideration of the amount of cash that could be repatriated to the U.S. efficiently with lesser withholding taxes in foreign jurisdictions. The Company repatriated $38,000 and $46,000 pursuant to this program in 2017 and 2016, respectively. Prior to the enactment of the TCJA, the related deferred tax liability for the 2015 repatriation plan was $118,887. The Company terminated the 2015 cash repatriation plan and recorded a provisional income tax benefit to reverse this deferred tax liability, which was replaced by the liability for the transition tax and foreign income and withholding taxes described above.

The deferred tax liability related to these unremitted foreign earnings is based on the available sources of cash, applicable tax rates, foreign currency exchange rates, and other factors and circumstances, as of each balance sheet date. Changes in these underlying facts and circumstances result in changes in the deferred tax liability balance, which are recorded as tax benefit or expense. Deferred taxes are also reevaluated and adjusted for the impact of certain corporate legal entity reorganization activities that impact repatriation.

Certain provisions of the TCJA had a significant impact on the Company's effective tax rate for the years ended December 31, 2019 and 2018, and are expected to have a significant impact in future periods. Because the various provisions of the TCJA are interrelated, and because of changes in the Company's operations and changes in the capital structure in response to the TCJA, the impact of any specific provision of the TCJA cannot be isolated. The Company recognized a significant amount of GILTI income in 2019 and 2018, but was able to utilize related foreign tax credits to reduce the impact on the effective tax rate. The Company has elected to account for GILTI tax in the period in which it is incurred and, therefore, does not provide any deferred taxes in the consolidated financial statements at December 31, 2019 or 2018. The inclusion of significant GILTI income was a contributing factor in allowing the Company to avoid a limitation on the deductibility of its U.S. interest expense in 2019 and 2018. The Company was subject to the BEAT minimum tax of $2,900 and $0 in 2019 and 2018, respectively. BEAT could increase the Company's future tax by disallowing certain otherwise deductible payments from the U.S. to non- U.S. subsidiaries and imposing a minimum tax if greater than the regular tax.

The Company's repurchase of outstanding convertible debentures in 2019 and 2018 (see Note 6) reduced the Company's tax rate.

Note 5 – Income Taxes (continued)

Income (loss) from continuing operations before taxes and noncontrolling interests consists of the following components:

	Years ended December 31,		
	2019	**2018**	**2017**
Domestic	**$ (10,992)**	$ (39,861)	$ (40,171)
Foreign	**237,290**	456,637	319,535
	$ 226,298	$ 416,776	$ 279,364

Significant components of income taxes are as follows:

	Years ended December 31,		
	2019	**2018**	**2017**
Current:			
Federal	**$ 9,137**	$ 18,756	$ 180,873
State and local	**415**	209	108
Foreign	**113,779**	263,247	65,566
	123,331	282,212	246,547
Deferred:			
Federal	**(13,731)**	(58,386)	(101,896)
State and local	**(802)**	(3,117)	1,538
Foreign	**(47,290)**	(150,470)	152,735
	(61,823)	(211,973)	52,377
Total income tax expense	**$ 61,508**	$ 70,239	$ 298,924

Note 5 – Income Taxes (continued)

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts for income tax purposes. Significant components of the Company's deferred tax assets and liabilities are as follows:

	December 31,	
	2019	**2018**
Deferred tax assets:		
Pension and other retiree obligations	**$ 48,434**	$ 43,238
Inventories	**19,318**	9,795
Property and equipment	**-**	5,888
Net operating loss carryforwards	**119,420**	128,177
Tax credit carryforwards	**76,140**	72,708
Other accruals and reserves	**29,273**	19,645
Total gross deferred tax assets	**292,585**	279,451
Less valuation allowance	**(194,797)**	(200,809)
	97,788	78,642
Deferred tax liabilities:		
Property and equipment	**(2,391)**	-
Earnings not permanently reinvested	**(16,448)**	(65,537)
Convertible debentures	**(25,219)**	(32,488)
Other - net	**(6,499)**	(7,370)
Total gross deferred tax liabilities	**(50,557)**	(105,395)
Net deferred tax assets (liabilities)	**$ 47,231**	$ (26,753)

The Company makes significant judgments regarding the realizability of its deferred tax assets (principally net operating losses and tax credits). The carrying value of deferred tax assets is based on the Company's assessment that it is more likely than not that the Company will realize these assets after consideration of all available positive and negative evidence. As of December 31, 2019, the Company has generated an excess U.S. foreign tax credit of $60,237. Because the Company does not anticipate sufficient U.S. foreign source income during the carryforward period, the Company has not recognized the benefit of the carryforward as of December 31, 2019.

A reconciliation of income tax expense at the U.S. federal statutory income tax rate to actual income tax provision is as follows:

	Years ended December 31,		
	2019	**2018**	**2017**
Tax at statutory rate	**$ 47,523**	$ 87,523	$ 97,777
State income taxes, net of U.S. federal tax benefit	**(301)**	(2,298)	1,070
Effect of foreign operations	**9,242**	5,736	(54,807)
Tax on earnings not permanently reinvested	**6,256**	9,304	88,311
Unrecognized tax benefits	**5,584**	2,669	5,887
Repurchase of senior convertible debentures	**(1,461)**	(52,312)	-
TCJA - remeasurement of net deferred tax liabilities	**-**	(1,211)	(74,816)
TCJA - transition tax on unremitted foreign earnings	**-**	7,425	215,558
Foreign income taxable in the U.S.	**6,090**	15,055	20,436
Deferred tax rate impact of corporate reorganization	**(12,121)**	-	-
Other	**696**	(1,652)	(492)
Total income tax expense	**$ 61,508**	$ 70,239	$ 298,924

Note 5 – Income Taxes (continued)

Income tax expense for the years ended December 31, 2019, 2018, and 2017 includes certain discrete tax items for changes in uncertain tax positions, valuation allowances, tax rates, and other related items. These items total $799 (tax benefit), $39,428 (tax benefit), and $230,618 in 2019, 2018, and 2017, respectively.

For the year ended December 31, 2019, the discrete items include $7,554 related to a tax- basis foreign exchange gain on the settlement of an intercompany loan, which previously had been accounted for at the historical foreign exchange rate (akin to an equity contribution) because the debtor entity did not have the intent or ability to repay such intercompany loan. Currency translation adjustments were recorded in accumulated other comprehensive income, and were not included in U.S. GAAP pre- tax income. The Company's cash repatriation activity resulted in the ability to repay such intercompany loan. Upon settlement of this intercompany loan, the foreign entity realized a taxable gain. Discrete tax items also include a tax benefit of $1,601 resulting from the early extinguishment of convertible senior debentures, reflecting the reduction in deferred tax liabilities related to the special tax attributes of the debentures, $9,583 (tax benefit) of adjustments to remeasure of deferred taxes related to the cash repatriation program described above, and $2,831 of tax expense for changes in uncertain tax positions.

For the year ended December 31, 2018, the discrete items include $25,496 related to the enactment of the TCJA, as previously described, a tax benefit of $54,877 resulting from the early extinguishment of convertible senior debentures, reflecting the reduction in deferred tax liabilities related to the special tax attributes of the debentures, and $10,047 (tax benefit) of adjustments to remeasure the deferred taxes related to the cash repatriation program described above.

For the year ended December 31, 2017, the discrete items include $234,855 related to the enactment of the TCJA, as previously described; $5,802 (tax benefit) for the periodic remeasurement of the deferred tax liability related to the 2015 cash repatriation program described above, and $1,565 of net tax expense for changes in uncertain tax positions.

At December 31, 2019, the Company had the following significant net operating loss carryforwards for tax purposes:

		Expires
Austria	$ 17,485	No expiration
Belgium	158,847	No expiration
Israel	10,707	No expiration
Italy	7,325	No expiration
Japan	7,675	2020 - 2029
Netherlands	12,159	2021 - 2026
The Republic of China (Taiwan)	19,130	2024- 2028
Pennsylvania	655,869	2020 - 2039

At December 31, 2019, the Company had the following significant tax credit carryforwards available:

Expires

U.S. Foreign Tax Credit	$ 60,237	2028 - 2029
California Research Credit	15,642	No expiration

Note 5 – Income Taxes (continued)

Net income taxes paid were $185,654, $248,958, and $76,900 for the years ended December 31, 2019, 2018, and 2017, respectively. Net income taxes paid for the years ended December 31, 2019 and 2018 include $38,814 and $156,767, respectively, for repatriation activity and $14,757 in each period for the TCJA transition tax.

See Note 19 for a discussion of the tax- related uncertainties for the pre- spin- off period of Vishay Precision Group, Inc. ("VPG"), which was spun off on July 6, 2010.

The following table summarizes changes in the liabilities associated with unrecognized tax benefits:

	Years ended December 31,		
	2019	**2018**	**2017**
Balance at beginning of year	**$ 21,241**	$ 17,056	$ 16,805
Addition based on tax positions related to the current year	**2,383**	4,332	3,911
Addition based on tax positions related to prior years	**16,190**	2,066	1,837
Currency translation adjustments	**1,211**	(984)	915
Reduction based on tax positions related to prior years	**-**	-	(1,473)
Reduction for settlements	**(3,121)**	(1,229)	(4,077)
Reduction for lapses of statute of limitation	**(1,036)**	-	(862)
Balance at end of year	**$ 36,868**	$ 21,241	$ 17,056

All of the unrecognized tax benefits of $36,868 and $21,241, as of December 31, 2019 and 2018, respectively, would reduce the effective tax rate if recognized.

The Company recognizes interest and penalties related to unrecognized tax benefits in income tax expense. At December 31, 2019 and 2018, the Company had accrued interest and penalties related to the unrecognized tax benefits of $3,561 and $2,887, respectively. During the years ended December 31, 2019, 2018, and 2017, the Company recognized $1,201, $1,470, and $2,479, respectively, in interest and penalties.

The Company and its subsidiaries file U.S. federal income tax returns, as well as tax returns in multiple states and foreign jurisdictions. The Company's U.S. federal income tax returns are generally subject to audit for years ending on or after December 31, 2016. The IRS may, however, ask for supporting documentation for net operating losses for the years ended December 31, 2013 - 2015, which were utilized in the year ended December 31, 2017. During the years ended December 31, 2019, 2018, and 2017, certain tax examinations were concluded and certain statutes of limitations lapsed. The tax provision for those years includes adjustments related to the resolution of these matters, as reflected in the table above. The tax returns of significant non- U.S. subsidiaries which are currently under examination include India (2004 through 2016), Italy (2017), Germany (2013 through 2016), and Israel (2016 and 2017). The Company and its subsidiaries also file income tax returns in other taxing jurisdictions in the U.S. and around the world, many of which are still open to examination.

The timing of the resolution of income tax examinations is highly uncertain, as are the amounts and timing of tax payments that result from such examinations. These events could cause large fluctuations in the balance sheet classification of current and non- current unrecognized tax benefits. The Company believes that in the next 12 months it is reasonably possible that certain income tax examinations will conclude or the statutes of limitation on certain income tax periods open to examination will expire, or both. Given the uncertainties described above, the Company can only determine an estimate of potential decreases in unrecognized tax benefits ranging from $322 to $4,085.

Note 6 – Long- Term Debt

Long- term debt consists of the following:

	December 31, 2019	December 31, 2018
Credit facility	**$ -**	$ -
Convertible senior notes, due 2025	**509,128**	495,203
Convertible senior debentures, due 2040	**126**	539
Convertible senior debentures, due 2041	**6,677**	12,812
Convertible senior debentures, due 2042	**-**	923
Deferred financing costs	**(16,784)**	(14,968)
	499,147	494,509
Less current portion	**-**	-
	$ 499,147	$ 494,509

Credit Facility

On June 5, 2019, the Company entered into a new credit agreement with a consortium of banks led by JPMorgan Chase Bank, N.A., as administrative agent, and the lenders (the "New Credit Facility"), which provides an aggregate commitment of $750,000 of revolving loans available until June 5, 2024. The New Credit Facility replaces Vishay's previous credit agreement that provided for an aggregate commitment of $640,000, and that was scheduled to mature on December 10, 2020. The New Credit Facility also provides for the ability of Vishay to request up to $300,000 of incremental facilities, subject to the satisfaction of certain conditions, which could take the form of additional revolving commitments, incremental "term loan A" or "term loan B" facilities, or incremental equivalent debt.

Borrowings under the New Credit Facility bear interest at LIBOR plus an interest margin. The applicable interest margin is based on the Company's leverage ratio. Based on the Company's current leverage ratio, borrowings bear interest at LIBOR plus 1.50%, the same as pursuant to the previous credit agreement. The Company also pays a commitment fee, also based on its leverage ratio, on undrawn amounts. The undrawn commitment fee, based on the Company's current leverage ratio, is 0.25% per annum, an improvement of 5 basis points over the previous credit agreement.

The New Credit Facility allows an unlimited amount of defined "Investments," which include certain intercompany transactions and acquisitions, provided the Company's pro forma leverage ratio is equal to or less than 2.75 to 1.00. If the Company's pro forma leverage ratio is greater than 2.75 to 1.00, such Investments are subject to certain limitations.

The New Credit Facility also allows an unlimited amount of defined "Restricted Payments," which include cash dividends and share repurchases, provided the Company's pro forma leverage ratio is equal to or less than 2.50 to 1.00. If the Company's pro forma leverage ratio is greater than 2.50 to 1.00, the New Credit Facility allows such payments up to $100,000 per annum (subject to a cap of $300,000 for the term of the facility, with up to $25,000 of any unused amount of the $100,000 per annum base available for use in the next succeeding calendar year).

Similar to the previous credit agreement, the borrowings under the New Credit Facility are secured by a lien on substantially all assets, including accounts receivable, inventory, machinery and equipment, and general intangibles (but excluding real estate, intellectual property registered or licensed solely for use in, or arising solely under the laws of, any country other than the United States, assets located solely outside of the United States and deposit and securities accounts), of the Company and certain significant subsidiaries located in the United States, and pledges of stock in certain significant domestic and foreign subsidiaries; and are guaranteed by certain significant subsidiaries.

The New Credit Facility continues to limit or restrict the Company and its subsidiaries, from, among other things, incurring indebtedness, incurring liens on its respective assets, making investments and acquisitions (assuming the Company's pro

forma leverage ratio is greater than 2.75 to 1.00), making asset sales, and paying cash dividends and making other restricted payments (assuming the Company's pro forma leverage ratio is greater than 2.50 to 1.00), and requires the Company to comply with other covenants, including the maintenance of specific financial ratios.

Similar to the previous credit agreement, the New Credit Facility also contains customary events of default, including, but not limited to, failure to pay principal or interest, failure to pay or default under other material debt, material misrepresentation or breach of warranty, violation of certain covenants, a change of control, the commencement of bankruptcy proceedings, the insolvency of the Company or certain of its significant subsidiaries, and the rendering of a judgment in excess of $50,000 against the Company or its subsidiaries. Upon the occurrence of an event of default under the New Credit Facility, the Company's obligations under the credit facility may be accelerated and the lending commitments under the credit facility may be terminated.

At December 31, 2019 and 2018, there was $747,912 and $636,211, respectively, available under the Credit Facility. Letters of credit totaling $2,088 and $3,789 were outstanding at December 31, 2019 and 2018, respectively.

Note 6 – Long- Term Debt (continued)

Convertible Debt Instruments

In June 2018, the Company issued $600,000 aggregate principal amount of 2.25% convertible senior notes due 2025 to qualified institutional investors.

The following table summarizes some key facts and terms regarding the outstanding convertible debt instruments as of December 31, 2019:

	Due 2025	Due 2040	Due 2041
Issuance date	June 12, 2018	November 9, 2010	May 13, 2011
Maturity date	June 15, 2025	November 15, 2040	May 15, 2041
Principal amount	$ 600,000	$ 300	$ 16,890
Cash coupon rate (per annum)	2.25%	2.25%	2.25%
Nonconvertible debt borrowing rate at issuance (per annum)	5.50%	8.00%	8.375%
Conversion rate effective December 12, 2019 (per $1 principal amount)	31.8083	80.0018	58.3812
Effective conversion price effective December 12, 2019 (per share)	$ 31.44	$ 12.50	$ 17.13
130% of the conversion price (per share)	$ 40.87	$ 16.25	$ 22.27
Call date	n/a	November 20, 2020	May 20, 2021

The terms of the convertible senior debentures due 2040 and due 2041 are generally congruent. The terms of the fully retired convertible senior debentures due 2042 were also generally congruent to the convertible senior debentures due 2040 and due 2041.

Prior to three months before the maturity date, the holders may convert their convertible senior debentures due 2040 and due 2041 only under the following circumstances: (1) during any fiscal quarter after the first full quarter subsequent to issuance, if the sale price of Vishay common stock reaches 130% of the conversion price for a specified period; (2) the trading price of the debentures falls below 98% of the product of the sale price of Vishay's common stock and the conversion rate for a specified period; (3) Vishay calls any or all of the debentures for redemption, at any time prior to the close of business on the third scheduled trading day immediately preceding the redemption date; or (4) upon the occurrence of specified corporate events. The convertible senior debentures due 2040 are currently convertible. The convertible senior debentures due 2041 are not currently convertible.

Prior to December 15, 2024, the holders of the convertible senior notes due 2025 may convert their notes only under the following circumstances: (1) during any fiscal quarter after the fiscal quarter ending September 29, 2018, if the sale price of Vishay common stock reaches 130% of the conversion price for a specified period; (2) the trading price of the notes falls below 98% of the product of the sale price of Vishay's common stock and the conversion rate for a specified period; or (3) upon the occurrence of specified corporate transactions. The convertible senior notes due 2025 are not currently convertible.

At the direction of its Board of Directors, the Company intends, upon future conversion of any of the convertible debt instruments, to repay the principal amounts of the convertible debt instruments in cash and settle any additional amounts in shares of Vishay common stock.

Vishay must provide additional shares upon conversion if there is a "fundamental change" in the business as defined in the indenture governing the debentures.

Vishay may not redeem the convertible senior debentures prior to the respective call dates. On or after the call date and prior to the maturity date, Vishay may redeem for cash all or part of the debentures at a redemption price equal to 100% of the principal amount of the debentures to be redeemed, plus accrued and unpaid interest to, but excluding, the redemption date, if the last reported sale price of Vishay's common stock has been at least 150% of the conversion price then in effect for at least 20 trading days during any 30 consecutive trading day period prior to the date on which Vishay provides notice of redemption.

The quarterly cash dividend program of the Company results in adjustments to the conversion rate and effective conversion price for the convertible debt instruments effective as of the ex- dividend date of each cash dividend. The conversion rate and effective conversion price for the convertible senior notes due 2025 is adjusted for quarterly cash dividends to the extent such dividends exceed $0.085 per share of common stock.

GAAP requires an issuer to separately account for the liability and equity components of the instrument in a manner that reflects the issuer's nonconvertible debt borrowing rate when interest costs are recognized in subsequent periods. The resulting discount on the debt is amortized as non- cash interest expense in future periods.

Note 6 - Long- Term Debt (continued)

The carrying values of the liability and equity components of the convertible debentures are reflected in the Company's accompanying consolidated balance sheets as follows:

	Principal amount of the convertible debt	Unamortized discount	Embedded derivative	Carrying value of liability component	Equity component (including temporary equity) - net carrying value
December 31, 2019					
Convertible senior notes due 2025	**$ 600,000**	**(90,872)**	**-**	**$ 509,128**	**$ 85,262**
Convertible senior debentures	**$ 17,190**	**(10,387)**	**-**	**$ 6,803**	**$ 7,129**
Total	**$ 617,190**	**$ (101,259)**	**$ -**	**$ 515,931**	**$ 92,391**
December 31, 2018					
Convertible senior notes due 2025	$ 600,000	(104,797)	-	$ 495,203	$ 85,262
Convertible senior debentures	$ 36,556	(22,352)	70	$ 14,274	$ 15,092
Total	$ 636,556	$ (127,149)	$ 70	$ 509,477	$ 100,354

Interest is payable on the convertible debt instruments semi- annually at the cash coupon rate; however, the remaining debt discount is being amortized as additional non- cash interest expense using an effective annual interest rate equal to the Company's estimated nonconvertible debt borrowing rate at the time of issuance. In addition to ordinary interest, contingent interest will accrue in certain circumstances relating to the trading price of the convertible senior debentures due 2040 and due 2041 and under certain other circumstances, beginning ten years subsequent to their respective issuance. The convertible senior notes due 2025 do not possess contingent interest features.

Interest expense related to the debentures is reflected on the accompanying consolidated statements of operations for the years ended December 31:

	Contractual coupon interest	Non- cash amortization of debt discount	Non- cash amortization of deferred financing costs	Non- cash change in value of derivative liability	Total interest expense related to the debentures
2019					
Convertible senior notes due 2025	**$ 13,500**	**13,925**	**1,816**	**-**	**$ 29,241**
Convertible senior debentures	**$ 498**	**221**	**7**	**(42)**	**$ 684**
Total	**$ 13,998**	**$ 14,146**	**$ 1,823**	**$ (42)**	**$ 29,925**
2018					
Convertible senior notes due 2025	$ 7,463	7,240	1,059	-	$ 15,762
Convertible senior debentures	$ 8,627	3,529	126	128	$ 12,410
Total	$ 16,090	$ 10,769	$ 1,185	$ 128	$ 28,172
2017					
Convertible senior debentures	$ 12,938	4,984	189	(316)	$ 17,795

Total	$ 12,938	$ 4,984	$ 189	$ (316)	$ 17,795

Note 6 – Long- Term Debt (continued)

The Company used substantially all of the net proceeds of the June 2018 issuance of convertible senior notes due 2025 to repurchase $220,000 and $69,060 principal amounts of convertible senior debentures due 2040 and due 2042, respectively. The net carrying value of the debentures repurchased were $89,276 and $29,037, respectively. In accordance with the authoritative accounting guidance for convertible debentures, the aggregate repurchase payment of $584,991 was allocated between the liability ($133,647) and equity (including temporary equity, $451,344) components of the convertible debentures, using the Company's nonconvertible debt borrowing rate at the time of the repurchases. As a result, the Company recognized a loss on extinguishment of convertible debentures of $17,309, including the write- off of a portion of unamortized debt issuance costs.

The Company used a substantial portion of the cash repatriated to the United States in 2018 (see Note 5) to repurchase $53,690, $116,922, and $78,772 principal amounts of convertible senior debentures due 2040, due 2041, and due 2042, respectively. The net carrying value of the debentures repurchased were $22,018, $45,157, and $33,466, respectively. In accordance with the authoritative accounting guidance for convertible debentures, the aggregate repurchase payment of $376,004 was allocated between the liability ($108,059) and equity (including temporary equity, $267,945) components of the convertible debentures, using the Company's nonconvertible debt borrowing rate at the time of the repurchases. As a result, the Company recognized a loss on extinguishment of convertible debentures of $9,274, including the write- off of a portion of unamortized debt issuance costs.

The Company used cash to repurchase $1,010, $16,188 and $2,168 principal amounts of convertible senior debentures due 2040, due 2041, and due 2042, respectively, in 2019. The net carrying value of the debentures repurchased were $417, $6,282, and $924, respectively. In accordance with the authoritative accounting guidance for convertible debentures, the aggregate repurchase payment of $27,863 was allocated between the liability ($9,568) and equity (including temporary equity, $18,295) components of the convertible debentures, using the Company's nonconvertible debt borrowing rate at the time of the repurchase. As a result, the Company recognized a loss on extinguishment of convertible debentures of $2,030, including the write- off of a portion of unamortized debt issuance costs. The convertible senior debentures due 2042 have been fully repurchased, and the trustee has confirmed that the Company has satisfied and discharged its obligations under the indenture governing the convertible senior debentures due 2042.

Other Borrowings Information

None of the Company's long- term debt matures in the next five years.

At December 31, 2019 and 2018, the Company had committed and uncommitted short- term credit lines with various U.S. and foreign banks aggregating approximately $6,000 and $7,000, respectively, with substantially no amounts borrowed.

Interest paid was $16,177, $23,859, and $21,216 for the years ended December 31, 2019, 2018, and 2017, respectively.

See Note 18 for further discussion on the fair value of the Company’s long- term debt.

Note 7 – Stockholders' Equity

The Company's Class B common stock carries 10 votes per share while the common stock carries 1 vote per share. Class B shares are transferable only to certain permitted transferees while the common stock is freely transferable. Class B shares are convertible on a one- for- one basis at any time into shares of common stock. Transfers of Class B shares other than to permitted transferees result in the automatic conversion of the Class B shares into common stock.

The Board of Directors may only declare dividends or other distributions with respect to the common stock or the Class B common stock if it grants such dividends or distributions in the same amount per share with respect to the other class of stock. Stock dividends or distributions on any class of stock are payable only in shares of stock of that class. Shares of either common stock or Class B common stock cannot be split, divided, or combined unless the other is also split, divided, or combined equally.

In 2014, the Company's Board of Directors approved the initiation of a quarterly cash dividend program. Cash dividends were paid quarterly in 2019 and 2018 as follows:

Record date	**Payment date**	**Amount (per share)**	**Record date**	**Payment date**	**Amount (per share)**
March 14, 2019	March 28, 2019	**$ 0.0850**	March 14, 2018	March 29, 2018	$ 0.0675
June 13, 2019	June 27, 2019	**$ 0.0950**	June 13, 2018	June 28, 2018	$ 0.0850
September 12, 2019	September 26, 2019	**$ 0.0950**	September 14, 2018	September 27, 2018	$ 0.0850
December 12, 2019	December 23, 2019	**$ 0.0950**	December 6, 2018	December 20, 2018	$ 0.0850

The New Credit Facility also allows an unlimited amount of defined "Restricted Payments," which include cash dividends and share repurchases, provided the Company's pro forma leverage ratio is equal to or less than 2.50 to 1.00. If the Company's pro forma leverage ratio is greater than 2.50 to 1.00, the New Credit Facility allows such payments up to $100,000 per annum (subject to a cap of $300,000 for the term of the facility, with up to $25,000 of any unused amount of the $100,000 per annum base available for use in the next succeeding calendar year).

At December 31, 2019, the Company had reserved shares of common stock for future issuance as follows:

Restricted stock units outstanding	842,000
Phantom stock units outstanding	183,000
2007 Stock Incentive Program - available to grant	2,580,000
Convertible senior debentures, due 2040*	26,988
Convertible senior debentures, due 2041*	1,108,803
Convertible senior notes, due 2025*	24,410,520
Conversion of Class B common stock	12,097,409
	41,248,720

*At December 31, 2019, the convertible senior debentures due 2040 and due 2041 are convertible into 24,001 and 986,058 shares, respectively, of Vishay common stock. The convertible senior notes due 2025 are convertible into 19,084,980 shares of Vishay common stock. The Company has reserved adequate shares to ensure it could issue the maximum amount of shares to be delivered upon a make- whole fundamental change as defined in the indentures governing the convertible debt instruments.

Note 8 – Other Income (Expense)

The caption "Other" on the accompanying consolidated statements of operations consists of the following:

	Years ended December 31,		
	2019	**2018**	**2017**
Foreign exchange gain (loss)	**$ (1,414)**	$ (1,991)	$ (4,536)
Interest income	**8,445**	11,940	6,482
Investment income (expense)†	**6,448**	(1,646)	-
Other	**61**	(266)	(208)
	$ 13,540	$ 8,037	$ 1,738

† Recognized in "Other" subsequent to the prospective adoption of ASU 2016- 01 on January 1, 2018. Previously recorded in accumulated other comprehensive income until realized.

In 2019, the Company used cash to repurchase $19,366 principal amounts of convertible senior debentures for $27,863. The Company recognized a $2,030 loss on early extinguishment of the repurchased convertible debentures in 2019.

In 2018, the Company issued $600,000 principal amount of 2.25% senior convertible notes due 2025 to qualified institutional investors. The Company used the net proceeds from this offering and cash repatriated to the United States (see Note 5) to repurchase $538,444 principal amounts of convertible senior debentures for $960,995. The Company recognized a $26,583 loss on early extinguishment of the repurchased convertible debentures in 2018.

In 2017, the Company sold its 50% interest in an investment accounted for using the equity method, and recorded a loss aggregating to $6,112. The $7,060 loss recorded in March 2017 included Vishay's proportionate share of the investee's accumulated other comprehensive loss of $1,110, recognized upon discontinuation of the equity investment, and the estimated cost of certain contingencies pending resolution related to the investee. In December 2017, the remaining contingencies related to the investee were favorably resolved and the Company reduced the loss by $948. The loss on disposal is not deductible for income tax purposes.

Note 9 – Other Accrued Expenses

Other accrued expenses consist of the following:

	December 31, 2019	December 31, 2018
Sales returns and allowances	**$ 40,508**	$ 42,663
Goods received, not yet invoiced	**30,515**	39,713
Accrued restructuring	**18,841**	2,538
Deferred proceeds - property sale (see Note 1)	**746**	45,500
Other	**95,853**	99,246
	$ 186,463	$ 229,660

Sales returns and allowances accrual activity is shown below:

	Years Ended December 31, 2019	2018	2017
Beginning balance	**$ 42,663**	$ 36,680	$ 34,479
Sales allowances	**107,806**	102,026	89,009
Credits issued	**(109,729)**	(95,521)	(87,403)
Foreign currency	**(232)**	(522)	595
Ending balance	**$ 40,508**	$ 42,663	$ 36,680

Note 10 – Accumulated Other Comprehensive Income (Loss)

The cumulative balance of each component of other comprehensive income (loss) and the income tax effects allocated to each component are as follows:

	Pension and other post-retirement actuarial items	Currency translation adjustment	Unrealized gain (loss) on available-for- sale securities	Total
Balance at January 1, 2017	$ (64,496)	$ (31,266)	$ 1,110	$ (94,652)
Other comprehensive income before reclassifications	(15,671)	124,220	1,881	$ 110,430
Tax effect	4,373	-	(659)	$ 3,714
Other comprehensive income before reclassifications, net of tax	(11,298)	124,220	1,222	$ 114,144
Amounts reclassified out of AOCI	9,147	-	(817)	$ 8,330
Tax effect	(2,394)	-	286	$ (2,108)
Amounts reclassified out of AOCI, net of tax	6,753	-	(531)	$ 6,222
Net comprehensive income (loss)	$ (4,545)	$ 124,220	$ 691	$ 120,366
Balance at December 31, 2017	$ (69,041)	$ 92,954	$ 1,801	$ 25,714
Cumulative effect of accounting for adoption of ASU 2016- 01	-	-	(1,801)	(1,801)
Other comprehensive income before reclassifications	5,617	(41,454)	-	$ (35,837)
Tax effect	(1,032)	-	-	$ (1,032)
Other comprehensive income before reclassifications, net of tax	4,585	(41,454)	-	$ (36,869)
Amounts reclassified out of AOCI	8,343	-	-	$ 8,343
Tax effect	(2,178)	-	-	$ (2,178)
Amounts reclassified out of AOCI, net of tax	6,165	-	-	$ 6,165
Net comprehensive income (loss)	$ 10,750	$ (41,454)	$ -	$ (30,704)
Balance at December 31, 2018	$ (58,291)	$ 51,500	$ -	$ (6,791)
Other comprehensive income before reclassifications	**(21,473)**	**(10,126)**	**-**	**$ (31,599)**
Tax effect	**5,219**	**-**	**-**	**$ 5,219**
Other comprehensive income before reclassifications, net of tax	**(16,254)**	**(10,126)**	**-**	**$ (26,380)**
Amounts reclassified out of AOCI	**8,694**	**-**	**-**	**$ 8,694**
Tax effect	**(2,169)**	**-**	**-**	**$ (2,169)**
Amounts reclassified out of AOCI, net of tax	**6,525**	**-**	**-**	**$ 6,525**
Net comprehensive income (loss)	**$ (9,729)**	**$ (10,126)**	**$ -**	**$ (19,855)**
Balance at December 31, 2019	**$ (68,020)**	**$ 41,374**	**$ -**	**$ (26,646)**

The Company recognized a cumulative- effect adjustment to retained earnings (accumulated deficit) of $1,801 for the cumulative change in fair value of available- for- sale equity investments previously recognized in other comprehensive income due to the adoption of ASU 2016- 01 on January 1, 2018.

The amount of unrealized gains (losses) on available- for- sale securities reclassified out of AOCI as a result of sales of securities held by the Company's rabbi trust used to fund a deferred compensation plan was $817 for the year ended December 31, 2017. The reclassification was recorded as a component of compensation expense within Selling, General, and Administrative expenses on the accompanying consolidated statement of operations. The pre- tax amount of unrealized gains (losses) on available- for- sale securities reclassified out of AOCI as a result of sales of available- for- sale securities was $0 for the year ended December 31, 2017.

Other comprehensive income (loss) includes Vishay's proportionate share of other comprehensive income (loss) of nonconsolidated subsidiaries accounted for under the equity method.

Note 11 – Pensions and Other Postretirement Benefits

The Company maintains various retirement benefit plans. GAAP requires employers to recognize the funded status of a benefit plan, measured as the difference between plan assets at fair value and the benefit obligation, in its balance sheet. The recognition of the funded status on the balance sheet requires employers to recognize actuarial items (such as actuarial gains and losses, prior service costs, and transition obligations) as a component of other comprehensive income, net of tax.

The following table summarizes amounts recorded on the accompanying consolidated balance sheets associated with these various retirement benefit plans:

	December 31,	
	2019	**2018**
Included in "Other assets":		
Non- U.S. pension plans	**$ 303**	$ 356
Total included in other assets	**$ 303**	$ 356
Included in "Payroll and related expenses":		
U.S. pension plans	**$ (35)**	$ (35)
Non- U.S. pension plans	**(7,362)**	(7,228)
U.S. other postretirement plans	**(872)**	(703)
Non- U.S. other postretirement plans	**(616)**	(181)
Total included in payroll and related expenses	**$ (8,885)**	$ (8,147)
Accrued pension and other postretirement costs:		
U.S. pension plans	**$ (42,348)**	$ (38,134)
Non- U.S. pension plans	**(202,873)**	(197,515)
U.S. other postretirement plans	**(6,817)**	(6,291)
Non- U.S. other postretirement plans	**(7,493)**	(7,772)
Other retirement obligations	**(12,871)**	(11,272)
Total accrued pension and other postretirement costs	**$ (272,402)**	$ (260,984)
Accumulated other comprehensive loss:		
U.S. pension plans	**$ 8,839**	$ 5,501
Non- U.S. pension plans	**84,926**	76,698
U.S. other postretirement plans	**(180)**	(1,257)
Non- U.S. other postretirement plans	**2,179**	2,044
Total accumulated other comprehensive loss*	**$ 95,764**	$ 82,986

* - Amounts included in accumulated other comprehensive loss are presented in this table pre- tax.

Defined Benefit Pension Plans

U.S. Pension Plans

The Company maintained several defined benefit pension plans which covered most full- time U.S. employees. These included pension plans which are “qualified” under the Employee Retirement Income Security Act of 1974 (“ERISA”) and the Internal Revenue Code, and “non- qualified” pension plans which provide defined benefits primarily to U.S. employees whose benefits under the qualified pension plan would be limited by ERISA and the Internal Revenue Code. The Company’s principal qualified U.S. pension plan (the Vishay Retirement Plan) was frozen effective January 1, 2009 and terminated in 2016.

Note 11 – Pensions and Other Postretirement Benefits (continued)

The Company's principal non- qualified U.S. pension plan (the Vishay Non- qualified Retirement Plan) was a contributory pension plan designed to provide similar defined benefits to covered U.S. employees whose benefits under the Vishay Retirement Plan were limited by the Internal Revenue Code. The Vishay Non- qualified Retirement Plan was similar in construction to the Vishay Retirement Plan, except that the plan is not qualified under the Internal Revenue Code.

The Vishay Non- qualified Retirement Plan, like all non- qualified plans, is considered to be unfunded. The Company maintains a non- qualified trust, referred to as a "rabbi" trust, to fund benefit payments under this plan. Rabbi trust assets are subject to creditor claims under certain conditions and are not the property of employees. Therefore, they are accounted for as other noncurrent assets. Assets held in trust related to the non- qualified pension plan were $27,012 and $22,409 at December 31, 2019 and 2018, respectively.

In 2008, the Company adopted amendments to the Vishay Non- Qualified Retirement Plan such that effective January 1, 2009, the plan was frozen. Pursuant to these amendments, no new employees may participate in the plans, no further participant contributions were required or permitted, and no further benefits shall accrue after December 31, 2008. Benefits accumulated as of December 31, 2008 will be paid to employees upon or following retirement, and the Company will likely need to make additional cash contributions to the rabbi trust to fund this accumulated benefit obligation.

The Company also maintains other pension plans which provide supplemental defined benefits primarily to former U.S. employees whose benefits under qualified pension plans were limited by the Internal Revenue Code. These non- qualified plans are all non- contributory plans, and are considered to be unfunded.

In 2004, the Company entered into an employment agreement with Dr. Felix Zandman, its Executive Chairman and then- Chief Executive Officer. Pursuant to this agreement, the Company is providing an annual retirement benefit of approximately $614 to his surviving spouse. The Company maintains a non- qualified trust, referred to as a "rabbi" trust, to fund benefit payments under this plan. Rabbi trust assets are subject to creditor claims under certain conditions and are not the property of employees. Therefore, they are accounted for as other noncurrent assets. Assets held in trust related to this non- qualified pension plan were $605 and $1,199 at December 31, 2019 and 2018, respectively.

Non- U.S. Pension Plans

The Company provides pension and similar benefits to employees of certain non- U.S. subsidiaries consistent with local practices. Pension benefits earned are generally based on years of service and compensation during active employment.

Note 11 – Pensions and Other Postretirement Benefits (continued)

The following table sets forth a reconciliation of the benefit obligation, plan assets, and funded status related to U.S. and non- U.S. pension plans:

	December 31, 2019		December 31, 2018	
	U.S. Plans	Non- U.S. Plans	U.S. Plans	Non- U.S. Plans
Change in benefit obligation:				
Benefit obligation at beginning of year	**$ 38,169**	**$ 275,207**	$ 39,917	$ 294,187
Service cost	**-**	**3,382**	-	3,822
Interest cost	**1,696**	**5,116**	1,484	4,793
Plan amendments	**-**	**-**	-	125
Actuarial (gains) losses	**4,309**	**20,115**	(1,431)	(1,311)
Benefits paid	**(1,791)**	**(18,985)**	(1,801)	(14,397)
Currency translation	**-**	**(1,274)**	-	(12,012)
Benefit obligation at end of year	**$ 42,383**	**$ 283,561**	$ 38,169	$ 275,207
Change in plan assets:				
Fair value of plan assets at beginning of year	**$ -**	**$ 70,820**	$ -	70,605
Actual return on plan assets	**-**	**4,614**	-	1,412
Company contributions	**1,791**	**15,443**	1,801	16,105
Benefits paid	**(1,791)**	**(18,985)**	(1,801)	(14,397)
Currency translation	**-**	**1,737**	-	(2,905)
Fair value of plan assets at end of year	**$ -**	**$ 73,629**	$ -	$ 70,820
Funded status at end of year	**$ (42,383)**	**$ (209,932)**	$ (38,169)	$ (204,387)

The plan assets are stated at fair value. See Note 18 for further discussion of the valuation of the plan assets.

Amounts recognized in the accompanying consolidated balance sheets consist of the following:

	December 31, 2019		December 31, 2018	
	U.S. Plans	Non- U.S. Plans	U.S. Plans	Non- U.S. Plans
Other assets	**$ -**	**$ 303**	$ -	$ 356
Accrued benefit liability - current	**(35)**	**(7,362)**	(35)	(7,228)
Accrued benefit liability - non- current	**(42,348)**	**(202,873)**	(38,134)	(197,515)
Accumulated other comprehensive loss	**8,839**	**84,926**	5,501	76,698
	$ (33,544)	**$ (125,006)**	$ (32,668)	$ (127,689)

Note 11 – Pensions and Other Postretirement Benefits (continued)

Actuarial items consist of the following:

	December 31, 2019		**December 31, 2018**	
	U.S. Plans	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**
Unrecognized net actuarial loss	**$ 8,199**	**$ 84,523**	$ 4,717	$ 76,254
Unamortized prior service cost	**640**	**403**	784	444
	$ 8,839	**$ 84,926**	$ 5,501	$ 76,698

The following table sets forth additional information regarding the projected and accumulated benefit obligations:

	December 31, 2019		**December 31, 2018**	
	U.S. Plans	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**
Accumulated benefit obligation, all plans	**$ 42,383**	**$ 264,723**	$ 38,169	$ 258,244
Plans for which the accumulated benefit obligation exceeds plan assets:				
Projected benefit obligation	**$ 42,383**	**$ 252,469**	$ 38,169	$ 247,066
Accumulated benefit obligation	**42,383**	**239,341**	38,169	235,167
Fair value of plan assets	**-**	**44,670**	-	45,818

The following table sets forth the components of net periodic pension cost:

	Years ended December 31,					
	2019		**2018**		**2017**	
	U.S. Plans	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**
Service cost net of employee contributions	**$ -**	**$ 3,382**	$ -	$ 3,822	$ -	$ 3,725
Interest cost	**1,696**	**5,116**	1,484	4,793	1,643	4,866
Expected return on plan assets	**-**	**(1,956)**	-	(1,889)	-	(2,072)
Amortization of actuarial losses	**827**	**5,374**	656	6,196	587	6,179
Amortization of prior service cost (credit)	**144**	**197**	144	318	144	150
Curtailment and settlement losses	**-**	**2,183**	-	1,111	-	1,360
Net periodic pension cost	**$ 2,667**	**$ 14,296**	$ 2,284	$ 14,351	$ 2,374	$ 14,208

Note 11 – Pensions and Other Postretirement Benefits (continued)

See Note 10 for the pretax, tax effect and after tax amounts included in other comprehensive income during the years ended December 31, 2019, 2018, and 2017. The estimated actuarial items for the defined benefit pensions plans that will be amortized from accumulated other comprehensive loss into net periodic pension cost during 2020 is $8,000.

The following weighted average assumptions were used to determine benefit obligations at December 31 of the respective years:

	2019		**2018**	
	U.S. Plans	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**
Discount rate	**3.25%**	**1.40%**	4.50%	1.96%
Rate of compensation increase	**0.00%**	**2.24%**	0.00%	2.17%

The following weighted average assumptions were used to determine the net periodic pension costs:

	Years ended December 31,			
	2019		**2018**	
	U.S. Plans	**Non-U.S. Plans**	**U.S. Plans**	**Non-U.S. Plans**
Discount rate	**4.50%**	**1.96%**	3.75%	1.80%
Rate of compensation increase	**0.00%**	**2.17%**	0.00%	2.10%
Expected return on plan assets	**0.00%**	**2.77%**	0.00%	2.95%

The plans' expected return on assets is based on management's expectations of long- term average rates of return to be achieved by the underlying investment portfolios. In establishing this assumption, management considers historical and expected returns for the asset classes in which the plans are invested, advice from pension consultants and investment advisors, and current economic and capital market conditions.

The investment mix between equity securities and fixed income securities is based upon achieving a desired return, balancing higher return, more volatile equity securities, and lower return, less volatile fixed income securities and is adjusted for the expected duration of the obligation and the funded status of the plan. Investment allocations are made across a range of securities, maturities and credit quality. The Company's non- U.S. defined benefit plan investments are based on local laws and customs. Most plans invest in cash and local government fixed income securities, although plans in certain countries have investments in equity securities. The plans do not invest in securities of Vishay or its subsidiaries. Negative investment returns could ultimately affect the funded status of the plans, requiring additional cash contributions. See Note 18 for further information on the fair value of the plan assets by asset category.

Estimated future benefit payments are as follows:

	U.S. Plans	**Non-U.S. Plans**
2020	$ 1,872	$ 15,485
2021	1,870	15,064
2022	8,311	18,071
2023	3,185	16,306
2024	3,183	16,154
2025- 2029	17,460	81,415

The Company's anticipated 2020 contributions for defined benefit pension plans will approximate the expected benefit payments disclosed above.

Note 11 – Pensions and Other Postretirement Benefits (continued)

Other Postretirement Benefits

In the U.S., the Company maintains unfunded non- pension postretirement plans, including medical benefits for certain executives and their surviving spouses, which are funded as costs are incurred. The Company also maintains two unfunded non- pension postretirement plans at two European subsidiaries.

The following table sets forth a reconciliation of the benefit obligation, plan assets, and accrued benefit cost related to U.S. and non- U.S. non- pension defined benefit postretirement plans:

	December 31, 2019		**December 31, 2018**	
	U.S. Plans	**Non- U.S. Plans**	**U.S. Plans**	**Non- U.S. Plans**
Change in benefit obligation:				
Benefit obligation at beginning of year	**$ 6,994**	**$ 7,953**	$ 7,633	$ 7,898
Service cost	**157**	**284**	137	288
Interest cost	**286**	**123**	273	114
Actuarial (gains) losses	**939**	**311**	(344)	327
Benefits paid	**(687)**	**(413)**	(705)	(303)
Currency translation	**-**	**(149)**	-	(371)
Benefit obligation at end of year	**$ 7,689**	**$ 8,109**	$ 6,994	$ 7,953
Fair value of plan assets at end of year	**$ -**	**$ -**	$ -	$ -
Funded status at end of year	**$ (7,689)**	**$ (8,109)**	$ (6,994)	$ (7,953)

Amounts recognized in the accompanying consolidated balance sheets consist of the following:

	December 31, 2019		**December 31, 2018**	
	U.S. Plans	**Non- U.S. Plans**	**U.S. Plans**	**Non- U.S. Plans**
Accrued benefit liability - current	**$ (872)**	**$ (616)**	$ (703)	$ (181)
Accrued benefit liability - non- current	**(6,817)**	**(7,493)**	(6,291)	(7,772)
Accumulated other comprehensive income	**(180)**	**2,179**	(1,257)	2,044
	$ (7,869)	**$ (5,930)**	$ (8,251)	$ (5,909)

Note 11 – Pensions and Other Postretirement Benefits (continued)

Actuarial items consist of the following:

	December 31, 2019		December 31, 2018	
	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans
Unrecognized net actuarial loss (gain)	**$ (180)**	**$ 2,179**	$ (1,257)	$ 2,044
	$ (180)	**$ 2,179**	$ (1,257)	$ 2,044

The following table sets forth the components of net periodic benefit cost:

	Years ended December 31,					
	2019		2018		2017	
	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans
Service cost	**$ 157**	**$ 284**	$ 137	$ 288	$ 131	$ 273
Interest cost	**286**	**123**	273	114	311	103
Amortization of actuarial (gains) losses	**(138)**	**107**	(39)	105	(93)	76
Amortization of prior service credit	**-**	**-**	(148)	-	(837)	-
Net periodic benefit cost (benefit)	**$ 305**	**$ 514**	$ 223	$ 507	$ (488)	$ 452

The estimated actuarial items for the other postretirement benefit plans that will be amortized from accumulated other comprehensive loss into net periodic benefit cost during 2020 are not material.

The following weighted average assumptions were used to determine benefit obligations at December 31 of the respective years:

	2019		2018	
	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans
Discount rate	**3.25%**	**0.81%**	4.50%	1.60%
Rate of compensation increase	**0.00%**	**2.87%**	0.00%	3.18%

The following weighted average assumptions were used to determine the net periodic benefit costs:

	Years ended December 31,			
	2019		2018	
	U.S. Plans	Non-U.S. Plans	U.S. Plans	Non-U.S. Plans
Discount rate	**4.50%**	**1.60%**	3.75%	1.50%
Rate of compensation increase	**0.00%**	**3.18%**	0.00%	2.88%

The impact of a one- percentage- point change in assumed health care cost trend rates on the net periodic benefit cost and postretirement benefit obligation is not material.

Note 11 – Pensions and Other Postretirement Benefits (continued)

Estimated future benefit payments are as follows:

	U.S. Plans	Non- U.S. Plans
2020	$ 872	$ 616
2021	839	251
2022	798	574
2023	721	266
2024	670	490
2025- 2029	2,440	2,794

As the plans are unfunded, the Company’s anticipated contributions for 2020 are equal to its estimated benefits payments.

Other Retirement Obligations

The Company participates in various other defined contribution and government- mandated retirement plans based on local law or custom. The Company periodically makes required contributions for certain of these plans, whereas other plans are unfunded retirement bonus plans which will be paid at the employee's retirement date. At December 31, 2019 and 2018, the accompanying consolidated balance sheets include $12,871 and $11,272, respectively, within accrued pension and other postretirement costs related to these plans.

The Company’s U.S. employees are eligible to participate in a 401(k) savings plan, which provides for Company matching contributions. The Company’s matching expense for the plans was $6,481, $6,353, and $5,843 for the years ended December 31, 2019, 2018, and 2017, respectively. No material amounts are included in the accompanying consolidated balance sheets at December 31, 2019 and 2018 related to unfunded 401(k) contributions.

Certain key employees participate in a deferred compensation plan. During the years ended December 31, 2019, 2018, and 2017, these employees could defer a portion of their compensation until retirement, or elect shorter deferral periods. The Company maintains a liability within other noncurrent liabilities on its consolidated balance sheets related to these deferrals. The Company maintains a non- qualified trust, referred to as a “rabbi” trust, to fund payments under this plan. Rabbi trust assets are subject to creditor claims under certain conditions and are not the property of employees. Therefore, they are accounted for as other noncurrent assets. Assets held in trust related to the deferred compensation plan at December 31, 2019 and 2018 were approximately $24,531 and $18,162, respectively.

Note 12 – Stock- Based Compensation

The Company has various stockholder- approved programs which allow for the grant of share- based compensation to officers, employees, and non- employee directors.

The amount of compensation cost related to stock- based payment transactions is measured based on the grant- date fair value of the equity instruments issued. The fair value of each option award is estimated on the date of grant using the Black- Scholes option- pricing model. The Company determines compensation cost for restricted stock units ("RSUs"), phantom stock units, and restricted stock based on the grant- date fair value of the underlying common stock adjusted for expected dividends paid over the required vesting period for non- participating awards. Compensation cost is recognized over the period that an officer, employee, or non- employee director provides service in exchange for the award.

The following table summarizes share- based compensation expense recognized:

	Years ended December 31,		
	2019	**2018**	**2017**
Restricted stock units	**$ 5,931**	$ 4,603	$ 4,231
Phantom stock units	**177**	214	163
Total	**$ 6,108**	$ 4,817	$ 4,394

The Company recognizes compensation cost for RSUs that are expected to vest and records cumulative adjustments in the period that the expectation changes.

The following table summarizes unrecognized compensation cost and the weighted average remaining amortization periods at December 31, 2019 (amortization periods in years):

	Unrecognized Compensation Cost	**Weighted Average Remaining Amortization Periods**
Restricted stock units	**$ 3,096**	**0.8**
Phantom stock units	**-**	**0.0**
Total	**$ 3,096**	

The Company currently expects all performance- based RSUs to vest and all of the associated unrecognized compensation cost for performance- based RSUs presented in the table above to be recognized.

Note 12 – Stock- Based Compensation (continued)

2007 Stock Incentive Program

The Company's 2007 Stock Incentive Program (the "2007 Program"), as amended and restated, was approved by Vishay's stockholders at Vishay's Annual Meeting of Stockholders on May 20, 2014. The 2007 Program permits the grant of up to 6,500,000 shares of restricted stock, unrestricted stock, RSUs, stock options, and phantom stock units, to officers, employees, and non- employee directors of the Company. Such instruments are available for grant until May 20, 2024.

At December 31, 2019, the Company has reserved 2,580,000 shares of common stock for future grants of equity awards pursuant to the 2007 Program. If any outstanding awards are forfeited by the holder or cancelled by the Company, the underlying shares would be available for regrant to others.

Restricted Stock Units

Each RSU entitles the recipient to receive a share of common stock when the RSU vests.

RSU activity is presented below (number of RSUs in thousands):

	Years ended December 31,					
	2019		2018		2017	
	Number of RSUs	Weighted Average Grant-date Fair Value	Number of RSUs	Weighted Average Grant-date Fair Value	Number of RSUs	Weighted Average Grant-date Fair Value
Outstanding:						
Beginning of year	**904**	**$ 14.77**	986	$ 13.34	1,004	$ 12.74
Granted	**314**	**19.85**	252	18.90	304	15.52
Vested*	**(361)**	**11.70**	(334)	13.67	(322)	13.54
Cancelled or forfeited	**(15)**	**17.71**	-	-	-	-
End of year	**842**	**$ 17.93**	904	$ 14.77	986	$ 13.34
Expected to vest	**842**		904		986	

* The number of RSUs vested includes shares that the Company withheld on behalf of employees to satisfy statutory tax withholding requirements.

The number of performance- based RSUs scheduled to vest increases ratably based on the achievement of defined performance criteria between the established target and maximum levels. RSUs with performance- based vesting criteria are expected to vest as follows (number of RSUs in thousands):

Vesting Date	Expected to Vest	Not Expected to Vest	Total
January 1, 2020**	167	-	167
January 1, 2021	141	-	141
January 1, 2022	174	-	174

** The performance vesting criteria for the performance- based RSUs with a vesting date of January 1, 2020 were achieved.

In the event of (i) any termination (other than for cause) after attaining retirement age (as defined in the respective executive's employment arrangement), the executive's outstanding RSUs shall immediately vest and the outstanding performance- based RSUs shall vest on their normal vesting date to the extent applicable performance criteria are realized; and (ii) a change of control of Vishay, all of such executive's outstanding RSUs and performance- based RSUs shall immediately vest. In the event of voluntary termination by the executive prior to attaining retirement age or termination for cause, the executive's outstanding RSUs and performance- based RSUs will be forfeited.

Note 12 – Stock- Based Compensation (continued)

Phantom Stock Units

The 2007 Program authorizes the grant of phantom stock units to the extent provided for in the Company's employment agreements with certain executives. Each phantom stock unit entitles the recipient to receive a share of common stock at the individual's termination of employment or any other future date specified in the applicable employment agreement. Phantom stock units participate in dividend distribution on the same basis as the Company's common stock and Class B common stock. Dividend equivalents are issued in the form of additional units of phantom stock. The phantom stock units are fully vested at all times.

The following table summarizes the Company's phantom stock units activity (number of phantom stock units in thousands):

	Years ended December 31,					
	2019		**2018**		**2017**	
	Number of Phantom Stock Units	**Grant-date Fair Value per Unit**	**Number of Phantom Stock Units**	**Grant-date Fair Value per Unit**	**Number of Phantom Stock Units**	**Grant-date Fair Value per Unit**
Outstanding:						
Beginning of year	**170**		157		145	
Granted	**10**	**$ 17.72**	10	$ 21.35	10	$ 16.25
Dividend equivalents issued	**3**		3		2	
End of year	**183**		170		157	

Note 13 – Commitments and Contingencies

Environmental Matters

The Company is subject to various federal, state, local, and foreign laws and regulations governing environmental matters, including the use, discharge, and disposal of hazardous materials. The Company's manufacturing facilities are believed to be in substantial compliance with current laws and regulations. Complying with current laws and regulations has not had a material adverse effect on the Company's financial condition.

The Company has engaged environmental consultants and attorneys to assist management in evaluating potential liabilities related to environmental matters. Management assesses the input from these consultants along with other information known to the Company in its effort to continually monitor these potential liabilities. Management assesses its environmental exposure on a site- by- site basis, including those sites where the Company has been named as a "potentially responsible party." Such assessments include the Company's share of remediation costs, information known to the Company concerning the size of the hazardous waste sites, their years of operation, and the number of past users and their financial viability.

The Company has accrued environmental liabilities of $12,126, of which $6,346 is included in other accrued liabilities on the accompanying consolidated balance sheet, and $5,780 is included in other noncurrent liabilities on the accompanying consolidated balance sheet.

While the ultimate outcome of these matters cannot be determined, management does not believe that the final disposition of these matters will have a material adverse effect on the Company's consolidated financial position, results of operations, or cash flows. The Company's present and past facilities have been in operation for many years. These facilities have used substances and have generated and disposed of wastes which are or might be considered hazardous. Therefore, it is possible that additional environmental issues may arise in the future, which the Company cannot now predict.

Litigation

The Company is a party to various claims and lawsuits arising in the normal course of business. The Company is of the opinion that these litigations or claims will not have a material negative effect on its consolidated financial position, results of operations, or cash flows.

Semiconductor Foundry Agreements

The Company's Siliconix subsidiary maintains long- term foundry agreements with subcontractors to ensure access to external front- end capacity.

Since 2004, Siliconix has maintained long- term foundry arrangements for semiconductor manufacturing with Tower Semiconductor, pursuant to which Siliconix transferred certain technology to Tower Semiconductor and committed to purchase a minimum amount of semiconductor wafers. The Company has minimum purchase commitments pursuant to its current arrangements with Tower Semiconductor and other foundry partners of $38,945, $17,383, $1,560, and $1,560 for the years 2020 through 2024, respectively. The minimum purchase commitments with Tower Semiconductor are based on a 18- month rolling forecast and, accordingly, the 2021 through 2024 minimum purchase commitments will likely increase. The Company has the option to purchase wafers in addition to the minimum commitment and, accordingly, actual purchases may be different than the amounts disclosed above. The Company's 2019 purchases pursuant to its arrangements were less than the minimum purchase commitment and it paid an immaterial penalty.

Product Quality Claims

The Company is a party to various product quality claims in the normal course of business. See Note 1 for further information on the Company's warranty obligations.

Executive Employment Agreements

The Company has employment agreements with certain of its senior executives. These employment agreements provide incremental compensation in the event of termination. The Company does not provide any severance or other benefits specifically upon a change in control.

Note 14 – Current Vulnerability Due to Certain Concentrations

Market Concentrations

The Company's largest customer, TTI, Inc., an electronics distributor, represented approximately 10% of consolidated net revenues in 2019 and 2018. The loss of this customer could have a material effect on the results of operations of the Company. No other customers represented greater than 10% of consolidated net revenue in 2019 or 2018.

A material portion of the Company's revenues are derived from the worldwide industrial, automotive, telecommunications, and computing markets. These markets have historically experienced wide variations in demand for end products. If demand for these end products should decrease, the producers thereof could reduce their purchases of the Company's products, which could have an adverse effect on the Company's results of operations and financial position.

Certain subsidiaries and product lines have customers which comprise greater than 10% of the subsidiary's or product line's net revenues. The loss of one of these customers could have a material effect on the results of operations of the subsidiary or product line and financial position of the subsidiary, which could result in an impairment charge which could be material to the Company's consolidated financial statements.

Credit Risk Concentrations

Financial instruments with potential credit risk consist principally of cash and cash equivalents, short- term investments, accounts receivable, and notes receivable. Concentrations of credit risk with respect to receivables are generally limited due to the Company’s large number of customers and their dispersion across many countries and industries. As of December 31, 2019, one customer comprised 19.4% of the Company’s accounts receivable balance. This customer comprised 15.9% of the Company’s accounts receivable balance as of December 31, 2018. No other customer comprised greater than 10% of the Company’s accounts receivable balance as of December 31, 2019 or December 31, 2018. The Company continually monitors the credit risks associated with its accounts receivable and adjusts the allowance for uncollectible accounts accordingly. The credit risk exposure associated with the accounts receivable is limited by the allowance and is not considered material to the financial statements.

The Company maintains cash and cash equivalents and short- term investments with various major financial institutions. The Company is exposed to credit risk related to the potential inability to access liquidity in financial institutions where its cash and cash equivalents and short- term investments are concentrated. As of December 31, 2019, the following financial institutions held over 10% of the Company’s combined cash and cash equivalents and short- term investments balance:

MUFG Bank Ltd.*	16.6%
HSBC*	16.0%
JPMorgan*	12.6%

*Participant in Credit Facility

Sources of Supplies

Many of the Company’s products require the use of raw materials that are produced in only a limited number of regions around the world or are available from only a limited number of suppliers. The Company’s consolidated results of operations may be materially and adversely affected if there are significant price increases for these raw materials, the Company has difficulty obtaining these raw materials, or the quality of available raw materials deteriorates. For periods in which the prices of these raw materials are rising, the Company may be unable to pass on the increased cost to the Company’s customers, which would result in decreased margins for the products in which they are used. For periods in which the prices are declining, the Company may be required to write down its inventory carrying cost of these raw materials which, depending on the extent of the difference between market price and its carrying cost, could have a material adverse effect on the Company’s net earnings.

Vishay is a major consumer of the world's annual production of tantalum. Tantalum, a metal purchased in powder or wire form, is the principal material used in the manufacture of tantalum capacitors. There are few suppliers that process tantalum ore into capacitor grade tantalum powder.

From time to time, there have been short- term market shortages of raw materials utilized by the Company. While these shortages have not historically adversely affected the Company's ability to increase production of products containing these raw materials, they have historically resulted in higher raw material costs for the Company. The Company cannot assure that any of these market shortages in the future would not adversely affect the Company's ability to increase production, particularly during periods of growing demand for the Company's products.

Note 14 – Current Vulnerability Due to Certain Concentrations (continued)

Certain raw materials used in the manufacture of the Company's products, such as gold, copper, palladium, and other metals, are traded on active markets and can be subject to significant price volatility. To ensure adequate supply and to provide cost certainty, the Company's policy is to enter into short- term commitments to purchase defined portions of annual consumption of the raw materials utilized by the Company if market prices decline below budget. If after entering into these commitments, the market prices for these raw materials decline, the Company must recognize losses on these adverse purchase commitments.

Recently enacted rules in the U.S. on conflict minerals, which include tantalum, tungsten, tin, and gold, all of which are used in the Company's products, could result in increased prices and decreased supply of conflict minerals, which could negatively affect the Company's consolidated results of operations.

Geographic Concentration

The Company has operations outside the United States, and approximately 73% of revenues earned during 2019 were derived from sales to customers outside the United States. Additionally, as of December 31, 2019, $793,660 of the Company's cash and cash equivalents and short- term investments were held by subsidiaries outside of the United States. Some of the Company's products are produced and cash and cash equivalents and short- term investments are held in countries which are subject to risks of political, economic, and military instability. This instability could result in wars, riots, nationalization of industry, currency fluctuations, and labor unrest. These conditions could have an adverse impact on the Company's ability to operate in these regions and, depending on the extent and severity of these conditions, could materially and adversely affect the Company's overall financial condition, operating results, and ability to access its liquidity when needed.

As of December 31, 2019 the Company's cash and cash equivalents and short- term investments were concentrated in the following countries:

Germany	21.5%
United States	20.2%
People's Republic of China	17.9%
Israel	13.5%
Singapore	11.1%
The Republic of China (Taiwan)	5.9%
Malaysia	3.3%
Other Asia	3.4%
Other Europe	1.7%
Other	1.5%

Certain of the Company's non- U.S. subsidiaries have cash and cash equivalents and short- term investments deposited in U.S. financial institutions.

Vishay has been in operation in Israel for 49 years. The Company has never experienced any material interruption in its operations attributable to these factors, in spite of several Middle East crises, including wars.

Note 15 – Segment and Geographic Data

Vishay is a global manufacturer and supplier of electronic components. Vishay operates, and its chief operating decision maker makes strategic and operating decisions with regards to assessing performance and allocating resources based on, six reporting segments: MOSFETs, Diodes, Optoelectronic Components, Resistors, Inductors, and Capacitors. These segments represent groupings of product lines based on their functionality:

Metal oxide semiconductor field effect transistors ("MOSFETs") function as solid state switches to control power.
Diodes route, regulate, and block radio frequency, analog, and power signals; protect systems from surges or electrostatic discharge damage; or provide electromagnetic interference filtering.
Optoelectronic components emit light, detect light, or do both.
Resistors are basic components used in all forms of electronic circuitry to adjust and regulate levels of voltage and current.
Inductors use an internal magnetic field to change alternating current phase and resist alternating current.
Capacitors store energy and discharge it when needed.

The current six segment alignment reflects a change in reporting structure made during the fourth fiscal quarter of 2019. Prior periods have been recast to separately present Resistors and Inductors.

Vishay's reporting segments generate substantially all of their revenue from product sales to the industrial, automotive, telecommunications, computing, consumer products, power supplies, military and aerospace, and medical end markets. An immaterial portion of revenues are from royalties.

The Company evaluates business segment performance on operating income, exclusive of certain items ("segment operating income"). Only dedicated, direct selling, general, and administrative expenses of the segments are included in the calculation of segment operating income. The Company's calculation of segment operating income excludes such selling, general, and administrative costs as global operations, sales and marketing, information systems, finance and administration groups, as well as restructuring and severance costs, goodwill and long- lived asset impairment charges, and other items. Management believes that evaluating segment performance excluding such items is meaningful because it provides insight with respect to intrinsic operating results of the Company. These items represent reconciling items between segment operating income and consolidated operating income. Business segment assets are the owned or allocated assets used by each business.

The Company also regularly evaluates gross profit by segment to assist in the analysis of consolidated gross profit. The Company considers segment operating income to be the more important metric because it more fully captures the business operations of the segments.

Note 15 – Segment and Geographic Data (continued)

The following tables set forth business segment information:

	MOSFETs	Diodes	Optoelectronic Components	Resistors	Inductors	Capacitors	Corporate / Other	Total
Year ended December 31, 2019:								
Net revenues	**$ 509,145**	**$ 557,143**	**$ 222,986**	**$ 657,192**	**$ 298,642**	**$ 423,197**	**$ -**	**$2,668,305**
Gross Profit	**126,026**	**113,647**	**53,463**	**186,707**	**96,893**	**94,464**	**-**	**$ 671,200**
Segment Operating Income	**88,994**	**94,130**	**37,145**	**162,969**	**86,395**	**74,063**	**-**	**$ 543,696**
Depreciation expense	**32,614**	**38,930**	**16,803**	**28,909**	**13,316**	**17,253**	**8,160**	**$ 155,985**
Capital expenditures	**35,131**	**38,242**	**12,448**	**34,395**	**17,836**	**9,916**	**8,673**	**$ 156,641**
Total Assets as of December 31, 2019:	**$ 404,412**	**$ 755,945**	**$ 328,871**	**$ 653,195**	**$ 334,791**	**$ 449,823**	**$ 193,738**	**$3,120,775**
Year ended December 31, 2018:								
Net revenues	$ 547,643	$ 712,936	$ 289,727	$ 716,394	$ 301,892	$ 466,097	$ -	$3,034,689
Gross Profit	145,923	196,702	100,219	238,356	98,912	108,412	-	$ 888,524
Segment Operating Income	106,955	175,752	82,681	214,347	89,224	86,929	-	$ 755,888
Depreciation expense	32,104	38,197	16,612	26,416	11,292	17,745	7,690	$ 150,056
Capital expenditures	49,557	57,756	19,935	50,978	29,884	12,200	9,589	$ 229,899
Total Assets as of December 31, 2018:	$ 444,356	$ 804,784	$ 342,656	$ 587,595	$ 287,240	$ 487,540	$ 152,027	$3,106,198
Year ended December 31, 2017:								
Net revenues	$ 467,476	$ 619,958	$ 284,429	$ 590,465	$ 253,064	$ 383,976	$ -	$2,599,368

Gross Profit	109,603	165,176	98,000	179,443	72,462	78,425	-	$ 703,109
Segment Operating Income	74,174	145,645	80,499	159,812	63,066	58,544	-	$ 581,740
Depreciation expense	34,731	37,396	16,871	23,853	10,230	17,736	8,066	$ 148,883
Capital expenditures	33,475	38,681	16,115	44,214	22,793	11,135	4,019	$ 170,432
Total Assets as of December 31, 2017:	$ 412,598	$ 792,610	$ 332,228	$ 664,609	$ 330,030	$ 568,113	$ 361,901	$3,462,089

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	Years ended December 31,		
	2019	**2018**	**2017**
Reconciliation:			
Segment Operating Income	**$ 543,696**	$ 755,888	$ 581,740
Restructuring and Severance Costs	**(24,139)**	-	(11,273)
Unallocated Selling, General, and Administrative Expenses	**(257,127)**	(270,768)	(246,462)
Consolidated Operating Income (Loss)	**$ 262,430**	$ 485,120	$ 324,005
Unallocated Other Income (Expense)	**(36,132)**	(68,344)	(44,641)
Consolidated Income Before Taxes	**$ 226,298**	$ 416,776	$ 279,364

The Company has a broad line of products that it sells to OEMs, EMS companies, and independent distributors. The distribution of sales by customer type is shown below:

	Years Ended December 31,		
	2019	**2018**	**2017**
Distributors	**$ 1,393,412**	$ 1,742,262	$ 1,484,276
OEMs	**1,082,701**	1,085,292	931,291
EMS companies	**192,192**	207,135	183,801
	$ 2,668,305	$ 3,034,689	$ 2,599,368

Note 15 – Segment and Geographic Data (continued)

Net revenues were attributable to customers in the following regions:

	Years Ended December 31,		
	2019	**2018**	**2017**
Asia	**$ 965,030**	$ 1,193,827	$ 1,091,107
Europe	**993,101**	1,081,073	902,357
Americas	**710,174**	759,789	605,904
	$ 2,668,305	$ 3,034,689	$ 2,599,368

The Company generates substantially all of its revenue from product sales to end customers in the industrial, automotive, telecommunications, computing, consumer products, power supplies, military and aerospace, and medical end markets. Sales by end market are presented below:

	Years Ended December 31,		
	2019	**2018**	**2017**
Industrial	**$ 946,118**	$ 1,139,880	$ 934,631
Automotive	**830,876**	861,436	727,220
Telecommunications	**170,088**	200,379	190,682
Computing	**182,781**	228,831	198,850
Consumer Products	**107,983**	168,884	145,243
Power Supplies	**119,361**	144,433	160,038
Military and Aerospace	**179,228**	162,921	132,898
Medical	**131,870**	127,925	109,806
	$ 2,668,305	$ 3,034,689	$ 2,599,368

The following table summarizes net revenues based on revenues generated by subsidiaries located within the identified geographic area:

	Years ended December 31,		
	2019	**2018**	**2017**
United States	**$ 686,985**	$ 743,647	$ 590,839
Germany	**910,509**	982,082	837,258
Other Europe	**113,473**	123,846	99,636
Israel	**17,787**	13,299	11,075
Asia	**939,551**	1,171,815	1,060,560
	$ 2,668,305	$ 3,034,689	$ 2,599,368

The following table summarizes property and equipment based on physical location:

	December 31,	
	2019	**2018**
United States	**$ 100,163**	$ 117,138
Germany	**179,218**	169,941
Other Europe	**116,883**	121,964
Israel	**92,636**	103,675
People's Republic of China	**215,139**	217,681
Republic of China (Taiwan)	**161,374**	145,644
Other Asia	**81,338**	88,864
Other	**4,774**	4,094

	$ 951,525	$ 969,001

Note 16 – Earnings Per Share

Basic earnings per share is computed using the weighted average number of common shares outstanding during the periods presented. Diluted earnings per share is computed using the weighted average number of common shares outstanding adjusted to include the potentially dilutive effect of stock options and restricted stock units (see Note 12), convertible debt instruments (see Note 6), and other potentially dilutive securities.

The following table sets forth the computation of basic and diluted earnings per share attributable to Vishay stockholders (shares in thousands):

	Years ended December 31,		
	2019	**2018**	**2017**
Numerator:			
Net earnings (loss) attributable to Vishay stockholders	**$ 163,936**	$ 345,758	$ (20,344)
Denominator:			
Denominator for basic earnings (loss) per share:			
Weighted average shares	**144,427**	144,202	145,478
Outstanding phantom stock units	**181**	168	155
Adjusted weighted average shares - basic	**144,608**	144,370	145,633
Effect of dilutive securities:			
Convertible debt instruments	**100**	9,707	-
Restricted stock units	**428**	545	-
Dilutive potential common shares	**528**	10,252	-
Denominator for diluted earnings (loss) per share:			
Adjusted weighted average shares - diluted	**145,136**	154,622	145,633
Basic earnings (loss) per share attributable to Vishay stockholders	**$ 1.13**	$ 2.39	$ (0.14)
Diluted earnings (loss) per share attributable to Vishay stockholders	**$ 1.13**	$ 2.24	$ (0.14)

Note 16 – Earnings Per Share (continued)

Diluted earnings per share for the years presented do not reflect the following weighted average potential common shares, as the effect would be antidilutive (in thousands):

	Years ended December 31,		
	2019	**2018**	**2017**
Convertible debt instruments:			
Convertible Senior Debentures, due 2040	**-**	-	21,184
Convertible Senior Debentures, due 2041	**301**	-	8,432
Convertible Senior Debentures, due 2042	**-**	-	13,586
Convertible Senior Notes, due 2025	**19,063**	10,468	-
Weighted average employee stock options	**-**	-	26
Weighted average other	**315**	266	981

The Company's convertible debt instruments are only convertible for specified periods upon the occurrence of certain events. The convertible debentures due 2040 became convertible subsequent to the December 31, 2019 evaluation of the conversion criteria. In periods that the debentures are not convertible, the certain conditions which could trigger conversion of the remaining debentures have been deemed to be non- substantive, and accordingly, the Company assumes the conversion of these instruments in its diluted earnings per share computation during periods in which they are dilutive.

At the direction of its Board of Directors, the Company intends, upon conversion, to repay the principal amounts of the convertible debt instruments in cash and settle any additional amounts in shares of Vishay common stock. Accordingly, the convertible instruments are included in the diluted earnings per share computation using the “treasury stock method” (similar to options and warrants) rather than the “if converted method” otherwise required for convertible debt. Under the “treasury stock method,” Vishay calculates the number of shares issuable under the terms of the convertible instruments based on the average market price of Vishay common stock during the period, and that number is included in the total diluted shares figure for the period. If the average market price is less than $12.50, no shares are included in the diluted earnings per share computation for the convertible senior debentures due 2040, if the average market price is less than $17.13, no shares are included in the diluted earnings per share computation for the convertible senior debentures due 2041, and if the average market price is less than $31.44 no shares are included in the diluted earnings per share computation for the convertible senior notes due 2025.

Note 17 – Additional Cash Flow Information

Changes in operating assets and liabilities, net of effects of businesses acquired consist of the following:

	Years ended December 31,		
	2019	**2018**	**2017**
Accounts receivable	**$ 66,158**	$ (62,433)	$ (51,152)
Inventories	**18,762**	(80,182)	(55,062)
Prepaid expenses and other current assets	**271**	(11,670)	(3,668)
Accounts payable	**(43,791)**	(2,277)	42,291
Other current liabilities	**(52,929)**	54,745	21,184
Net change in operating assets and liabilities	**$ (11,529)**	$ (101,817)	$ (46,407)

Note 18 – Fair Value Measurements

The fair value measurement accounting guidance establishes a valuation hierarchy of the inputs used to measure fair value. This hierarchy prioritizes the inputs to valuation techniques used to measure fair value into three broad levels. The following is a brief description of those three levels:

Level 1: Observable inputs such as quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2: Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly. These include quoted prices for similar assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.

Level 3: Unobservable inputs that reflect the Company's own assumptions.

An asset or liability's classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement.

The following table provides the financial assets and liabilities carried at fair value measured on a recurring basis:

	Total Fair Value	**Level 1**	**Level 2**	**Level 3**
December 31, 2019				
Assets:				
Assets held in rabbi trusts	**$ 52,148**	$ 34,280	$ 17,868	$ -
Available for sale securities	**$ 4,405**	4,405	-	-
Non - U.S. Defined Benefit Pension Plan Assets:				
Equity securities	**$ 10,534**	10,534	-	-
Fixed income securities	**$ 16,381**	16,381	-	-
Cash	**$ 46,714**	46,714	-	-
	$ 130,182	$ 112,314	$ 17,868	**$ -**
December 31, 2018				
Assets:				
Assets held in rabbi trusts	$ 41,770	$ 26,278	$ 15,492	$ -
Available for sale securities	$ 4,309	4,309	-	-
Non - U.S. Defined Benefit Pension Plan Assets:				
Equity securities	$ 9,344	9,344	-	-
Fixed income securities	$ 13,572	13,572	-	-
Cash	$ 47,904	47,904	-	-
	$ 116,899	$ 101,407	$ 15,492	$ -
Liabilities:				
Embedded derivative - convertible debentures due 2040	$ (1)	-	-	(1)
Embedded derivative - convertible debentures due 2041	$ (67)	-	-	(67)
Embedded derivative - convertible debentures due 2042	$ (2)	-	-	(2)
	$ (70)	$ -	$ -	$ (70)

As described in Note 6, the Company allocated the aggregate repurchase payment of convertible senior debentures between the associated liability and equity components of the repurchased convertible senior debentures based on a nonrecurring fair value measurement of the convertible senior debentures immediately prior to the repurchases. The nonrecurring fair value measurements are considered Level 3 measurements. See Note 6 for further information on the measurements and inputs.

Note 18 – Fair Value Measurements (continued)

The Company maintains non- qualified trusts, referred to as “rabbi” trusts, to fund payments under deferred compensation and non- qualified pension plans. Rabbi trust assets consist primarily of marketable securities, classified as available- for- sale, and company- owned life insurance assets. The marketable securities held in the rabbi trusts are valued using quoted market prices on the last business day of the year. The company- owned life insurance assets are valued in consultation with the Company’s insurance brokers using the value of underlying assets of the insurance contracts. The fair value measurement of the marketable securities held in the rabbi trust is considered a Level 1 measurement and the measurement of the company- owned life insurance assets is considered a Level 2 measurement within the fair value hierarchy.

The Company maintains defined benefit retirement plans in certain of its non- U.S. subsidiaries. The assets of the plans are measured at fair value.

Equity securities held by the non- U.S. defined benefit retirement plans consist of equity securities that are valued based on quoted market prices on the last business day of the year. The fair value measurement of the equity securities is considered a Level 1 measurement within the fair value hierarchy.

Fixed income securities held by the non- U.S. defined benefit retirement plans consist of government bonds in the Philippines and India and corporate notes that are valued based on quoted market prices on the last business day of the year. The fair value measurement of the fixed income securities is considered a Level 1 measurement within the fair value hierarchy.

Cash held by the non- U.S. defined benefit retirement plans consists of demand deposits on account in various financial institutions to fund current benefit payments. The carrying amount of the cash approximates its fair value.

The Company holds investments in debt securities that are intended to fund a portion of its pension and other postretirement benefit obligations outside of the U.S. The investments are valued based on quoted market prices on the last business day of the year. The fair value measurement of the investments is considered a Level 1 measurement within the fair value hierarchy.

The convertible senior debentures contain embedded derivative features that GAAP requires to be bifurcated and remeasured each reporting period. Each quarter, the change in the fair value of the embedded derivative features, if any, is recorded in the consolidated statements of operations. The Company uses a derivative valuation model to derive the value of the embedded derivative features. Key inputs into this valuation model are the Company’s current stock price, risk- free interest rates, the stock dividend yield, the stock volatility, and the debentures’ credit spread over London Interbank Offered Rate (LIBOR). The first three aforementioned inputs are based on observable market data and are considered Level 2 inputs while the last two aforementioned inputs are unobservable and thus require management’s judgment and are considered Level 3 inputs. The fair value measurement is considered a Level 3 measurement within the fair value hierarchy.

The fair value of the long- term debt, excluding the derivative liability and capitalized deferred financing costs, at December 31, 2019 and 2018 is approximately $632,200 and $577,200, respectively, compared to its carrying value, excluding the derivative liability and capitalized deferred financing costs, of $515,931 and $509,407, respectively. The Company estimates the fair value of its long- term debt using a combination of quoted market prices for similar financing arrangements and expected future payments discounted at risk- adjusted rates, which are considered level 2 inputs.

At December 31, 2019 and 2018, the Company’s short- term investments were comprised of time deposits with financial institutions that have maturities that exceed 90 days from the date of acquisition; however they all mature within one year from the respective balance sheet dates. The Company's short- term investments are accounted for as held- to- maturity debt instruments, at amortized cost, which approximates their fair value. The investments are funded with excess cash not expected to be needed for operations prior to maturity; therefore, the Company believes it has the intent and ability to hold the short- term investments until maturity. At each reporting date, the Company performs an evaluation to determine if any unrealized losses are other- than- temporary. No other- than- temporary impairments have been recognized on these

securities, and there are no unrecognized holding gains or losses for these securities during the periods presented. There have been no transfers to or from the held- to- maturity classification. All decreases in the account balance are due to returns of principal at the securities' maturity dates. Interest on the securities is recognized as interest income when earned.

At December 31, 2019 and 2018, the Company's cash and cash equivalents were comprised of demand deposits, time deposits with maturities of three months or less when purchased, and money market funds. The Company estimates the fair value of its cash, cash equivalents, and short- term investments using level 2 inputs. Based on the current interest rates for similar investments with comparable credit risk and time to maturity, the fair value of the Company's cash, cash equivalents, and held- to- maturity short- term investments approximate the carrying amounts reported in the accompanying consolidated balance sheets.

The Company's financial instruments also include accounts receivable, short- term notes payable, and accounts payable. The carrying amounts for these financial instruments reported in the accompanying consolidated balance sheets approximate their fair values.

Note 19 – Related Party Transactions

Vishay Precision Group, Inc.

On July 6, 2010, Vishay completed the spin- off of its measurements and foil resistors businesses into an independent, publicly- traded company, Vishay Precision Group, Inc. Vishay's common stockholders received 1 share of VPG common stock for every 14 shares of Vishay common stock they held on the record date, June 25, 2010, and Vishay's Class B common stockholders received 1 share of VPG Class B common stock for every 14 shares of Vishay Class B common stock they held on the record date.

Following the spin- off, VPG is an independent company and Vishay retains no ownership interest.

Relationship with VPG after Spin- off

Following the spin- off, VPG and Vishay operate separately, each as independent public companies. Vishay has no ownership interest in VPG. However, Ruta Zandman solely or on a shared basis with Marc Zandman and Ziv Shoshani, all of whom are members of Vishay's Board of Directors, control a large portion of the voting power of both Vishay and VPG. Marc Zandman, Vishay's Executive Chairman of the Board and an executive officer of Vishay, serves as the Chairman of VPG. Ziv Shoshani, CEO of VPG, serves as a director of Vishay. Additionally, Timothy V. Talbert, a member of Vishay's Board of Directors is also a member of the Board of Directors of VPG.

In connection with the completion of the spin- off, Vishay and its subsidiaries entered into several agreements with VPG and its subsidiaries that govern the relationship of the parties following the spin- off. Among the agreements entered into with VPG and its subsidiaries were a transition services agreement, several lease agreements, and supply agreements. None of the agreements have had nor are expected to have a material impact on Vishay's financial position, results of operations, or liquidity. Some of these agreements have expired and have not been renewed.

Vishay also entered into a trademark license agreement with VPG pursuant to which Vishay granted VPG the license to use certain trademarks, service marks, logos, trade names, entity names, and domain names which include the term "Vishay." The license granted VPG the limited, exclusive, royalty- free right and license to use certain marks and names incorporating the term "Vishay" in connection with the design, development, manufacture, marketing, provision and performance of certain VPG products that do not compete with any products within Vishay's product range as constituted immediately following the separation and certain services provided in connection with the products. The license cannot be terminated except as a result of willful misconduct or liquidation bankruptcy of VPG.

Until the spin- off, VPG was included in Vishay's consolidated federal income tax returns and with Vishay and/or certain of Vishay's subsidiaries in applicable combined or unitary state and local income tax returns. In conjunction with the spin- off, Vishay and VPG entered a tax matters agreement under which Vishay generally will be liable for all U.S. federal, state, local, and foreign income taxes attributable to VPG with respect to taxable periods ending on or before the distribution date except to the extent that VPG has a liability for such taxes on its books at the time of the spin- off. Vishay is also principally responsible for managing any income tax audits by the various tax jurisdictions for pre- spin- off periods. Vishay has fully indemnified VPG of tax exposures arising prior to the spin- off.

Note 20 – Goodwill and Other Intangible Assets

The Company performs its annual goodwill impairment test as of the first day of the fiscal fourth quarter. No impairment was identified as a result of the Company's annual impairment tests for 2019, 2018, and 2017.

The changes in the carrying amount of goodwill by segment for the years ended December 31, 2019 and 2018 were as follows:

	Optoelectronic Components	Resistors	Inductors	Total
Balance at January 1, 2018	$ 96,849	$ 20,078	$ 25,815	142,742
UltraSource acquisition	-	4,227	-	4,227
EuroPower acquisition	-	1,068	-	1,068
Exchange rate effects	-	(557)	-	(557)
Balance at December 31, 2018	$ 96,849	$ 24,816	$ 25,815	$ 147,480
Bi- Metallix acquisition	**-**	**3,324**	**-**	**3,324**
Exchange rate effects	**-**	**(162)**	**-**	**(162)**
Balance at December 31, 2019	**$ 96,849**	**$ 27,978**	**$ 25,815**	**$ 150,642**

Other intangible assets are as follows:

	December 31, 2019	December 31, 2018
Intangible assets subject to amortization:		
Patents and acquired technology	**$ 31,125**	$ 32,854
Capitalized software	**55,862**	53,218
Customer relationships	**59,603**	59,119
Tradenames	**22,510**	23,041
	169,100	168,232
Accumulated amortization:		
Patents and acquired technology	**(24,905)**	(26,469)
Capitalized software	**(50,976)**	(49,288)
Customer relationships	**(23,871)**	(19,958)
Tradenames	**(8,689)**	(6,829)
	(108,441)	(102,544)
Net Intangible Assets Subject to Amortization	**$ 60,659**	$ 65,688

Amortization expense (excluding capitalized software) was $8,476, $11,807, and $14,263, for the years ended December 31, 2019, 2018, and 2017, respectively.

Estimated annual amortization expense of intangible assets on the balance sheet at December 31, 2019 for each of the next five years is as follows:

2020	$ 7,886
2021	6,688
2022	6,044
2023	5,824
2024	5,507

Note 21 – Summary of Quarterly Financial Information (Unaudited)

	2019				2018			
	First	**Second**	**Third**	**Fourth**	**First**	**Second**	**Third**	**Fourth**
Statement of Operations data:								
Net revenues	**$ 745,159**	**$ 685,240**	**$ 628,329**	**$ 609,577**	$ 716,795	$ 761,030	$ 780,972	$ 775,892
Gross profit	**211,159**	**174,601**	**150,079**	**135,361**	205,300	227,238	236,296	219,690
Operating income	**107,735**	**79,489**	**51,028**	**24,178**	104,062	123,293	138,098	119,667
Net earnings	**75,641**	**44,735**	**30,265**	**14,149**	62,545	103,262	78,071	102,659
Net earnings attributable to noncontrolling interests	**182**	**258**	**227**	**187**	179	165	195	240
Net earnings attributable to Vishay stockholders	**75,459**	**44,477**	**30,038**	**13,962**	62,366	103,097	77,876	102,419
Per Share data:								
Basic earnings per share attributable to Vishay stockholders (a)	**$ 0.52**	**$ 0.31**	**$ 0.21**	**$ 0.10**	$ 0.43	$ 0.71	$ 0.54	$ 0.71
Diluted earnings per share attributable to Vishay stockholders (a)	**$ 0.52**	**$ 0.31**	**$ 0.21**	**$ 0.10**	$ 0.39	$ 0.65	$ 0.51	$ 0.69
Certain Items Recorded during the Quarters:								
Operating income:								
Restructuring and severance costs	**$ -**	**$ -**	**$ 7,255**	**$ 16,884**	$ -	$ -	$ -	$ -

Other income (expense):								
Loss on early extinguishment of debt	**$ (1,307)**	**$ -**	**$ -**	**$ (723)**	$ -	$ (17,309)	$ -	$ (9,274)
Income tax expense:								
Enactment of TCJA	**$ -**	**$ -**	**$ -**	**$ -**	$ -	$ 12,000	$ 13,496	$ -
Change in deferred taxes due to early extinguishment of debt	**(1,312)**	**-**	**-**	**(289)**	-	(33,963)	-	(20,914)
Effects of cash repatriation program	**(585)**	**(48)**	**2,604**	**(11,554)**	1,316	(9,006)	680	(3,037)
Effects of tax- basis foreign exchange gain	**-**	**7,554**	**-**	**-**	-	-	-	-
Effects of changes in uncertain tax positions	**-**	**-**	**-**	**2,831**	-	-	-	-
Quarter end date (b)	March 30	June 29	September 28	December 31	March 31	June 30	September 29	December 31

(a) May not add due to differences in weighted average share counts.

(b) The Company reports interim financial information for 13- week periods beginning on a Sunday and ending on a Saturday, except for the first fiscal quarter, which always begins on January 1, and the fourth fiscal quarter, which always ends on December 31.

Exhibit 4.6

Description of the Registrant's Securities
Registered Pursuant to Section 12 of the
Securities Exchange Act of 1934

The following description summarizes of certain provisions of the common stock of Vishay Intertechnology, Inc. This description does not purport to be complete and is qualified in its entirety by reference to our Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, as amended, each of which is incorporated by reference as an exhibit to the Annual Report on Form 10- K of which this exhibit is a part. We encourage you to read our Amended and Restated Certificate of Incorporation, our Amended and Restated Bylaws, as amended and the applicable provisions of Delaware law for additional information. Unless the context requires otherwise, all references to "we," "us," "our" and "Vishay" in this section refer solely to Vishay Intertechnology, Inc. and not to its subsidiaries.

The aggregate number of shares of capital stock which Vishay has authority to issue is 341,000,000 shares: 1,000,000 shares of preferred stock, par value $1.00 per share, 300,000,000 shares of common stock, par value $0.10 per share, and 40,000,000 shares of Class B common stock, par value $0.10 per share.

Common stock

After any required payment on shares of preferred stock, holders of common stock and Class B common stock are entitled to receive, and share ratably on a per share basis in, all dividends and other distributions declared by the board of directors of Vishay. In the event of a stock dividend or stock split, holders of common stock will receive shares of common stock and holders of Class B common stock will receive shares of Class B common stock. Neither the common stock nor the Class B common stock may be split, divided or combined unless the other is split, divided or combined equally.

The holders of common stock are entitled to one vote for each share held. Holders of Class B common stock are entitled to 10 votes for each share held. The common stock and the Class B common stock vote together as one class on all matters subject to stockholder approval, except as set forth in the following sentence. The approval of the holders of common stock and of Class B common stock, each voting separately as a class, is required to authorize issuances of additional shares of Class B common stock other than in connection with stock splits and stock dividends.

Shares of Class B common stock are convertible into shares of our common stock on a one- for- one basis at any time at the option of the holder thereof. The Class B common stock is not transferable except to the holder's spouse, certain of such holder's relatives, certain trusts established for the benefit of the holder, the holder's spouse or relatives, corporations and partnerships beneficially owned and controlled by such holder, such holder's spouse or relatives, charitable organizations and such holder's estate. Upon any transfer made in violation of those restrictions, shares of Class B common stock will be automatically converted into shares of our common stock on a one- for- one basis.

Neither the holders of common stock nor the holders of Class B common stock have any preemptive rights to subscribe for additional shares of capital stock of Vishay.

Our common stock is listed on The New York Stock Exchange. There is no public market for shares of our Class B common stock.

Preferred stock

Our board of directors is authorized, without further stockholder approval, to issue from time to time up to an aggregate of 1,000,000 shares of preferred stock in one or more series. The board of directors may fix or alter the designation, preferences, rights and any qualification, limitations, or restrictions of the shares of any series, including the dividend rights, dividend rates, conversion rights, voting rights, redemption terms and prices, liquidation preferences and the number of shares constituting any series. No shares of our preferred stock are currently outstanding.

Other matters

We have a staggered board of directors, divided into three classes, with one class of directors being elected each year. As a consequence, directors may not be removed other than for cause.

We are subject to Section 203 of the Delaware General Corporation Law which prohibits us from engaging in a "business combination" with an "interested stockholder" for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. Generally, an "interested stockholder" is a person who, together with affiliates and associates, owns or within three years did own, 15% or more of our voting stock.

We furnish to our stockholders annual reports containing consolidated financial statements prepared in accordance with U.S. generally accepted accounting principles and audited and reported on, with an opinion expressed, by an independent registered public accounting firm.

American Stock Transfer & Trust Company is the transfer agent and registrar of our common stock and Class B common stock.

Exhibit 10.47

Vishay Intertechnology, Inc.
Executive Officer Restricted Stock Unit Agreement

THIS AGREEMENT, made as of the Grant Date, between Vishay Intertechnology, Inc. (the "Company") and the Participant.

RECITALS

The Company has adopted and maintains the Vishay Intertechnology, Inc. 2007 Stock Incentive Program, as amended and restated, (the "Program") to enhance the long- term performance of the Company and to provide selected individuals with an incentive to improve the growth and profitability of the Company by acquiring a proprietary interest in the success of the Company.

The Program provides that the Compensation Committee (the "Committee") of the Company's Board of Directors shall administer the Program, including the authority to determine the persons to whom awards will be granted and the amount and type of such awards.

The Committee has determined that the purposes of the Program would be furthered by granting the Participant Restricted Stock Units as set forth in this Agreement.

The parties therefore agree as follows:

Grant Schedule. Certain terms of the grant of Restricted Stock Units are set forth on the Grant Schedule that is attached to, and is a part of, this Agreement.

Grant of Restricted Stock Units. Pursuant to, and subject to, the terms and conditions set forth herein and in the Program, the Committee hereby grants to the Participant the number of Restricted Stock Units set forth on the Grant Schedule.

Grant Date. The Grant Date of the Restricted Stock Units is set forth on the Grant Schedule.

Incorporation of Program. All terms, conditions and restrictions of the Program are incorporated herein and made part hereof as if stated herein. If there is any conflict between the terms and conditions of the Program and this Agreement or any applicable employment agreement, the terms and conditions of the employment agreement will govern over those of the Program or this Agreement, and the terms and conditions of this Agreement will govern over those of the Program. Except as otherwise provided herein, including the Grant Schedule, all capitalized terms used herein will have the meaning given to such terms in the Program.

Performance Target. The Grant Schedule sets forth a performance target applicable to a portion of the Restricted Stock Units (the "Performance Target").

Vesting.

Subject to the further provisions of this Agreement, the Restricted Stock Units will vest on the Vesting Date set forth on the Grant Schedule (the "Vesting Date"), provided the Participant remains in continuous service with the Company through that time and, in the case of the Restricted Stock Units described in Section 2(b) of the Grant Schedule, the Performance Target is achieved.

If a Change in Control occurs prior to the Vesting Date and the Participant remains in continuous service with the Company until the time immediately prior to that Change in Control, 100% of the Restricted Stock Units will then vest (without regard to whether the Performance Target is achieved). For avoidance of doubt, vesting in connection with a Change in Control will not alter the time that shares are issued in settlement of the Restricted Stock Units (which time is stated in Section 10 below).

Transferability. The Restricted Stock Units are not transferable or assignable otherwise than by will or by the laws of descent and distribution. Any attempt to transfer Restricted Stock Units, whether by transfer, pledge, hypothecation or otherwise and whether voluntary or involuntary, by operation of law or otherwise, will not vest the transferee with any interest or right in or with respect to such Restricted Stock Units.

Termination of Employment. Upon the Participant's Termination of Employment, all unvested Restricted Stock Units will vest, remain outstanding subject to the Performance Target or be forfeited according to the terms and conditions of the Participant's employment agreement.

Designation of Beneficiary. The Participant has the right to designate in writing from time to time a beneficiary or beneficiaries for any Award by filing a written notice of such designation with the Committee. If the Participant's beneficiary predeceases the Participant and no successor beneficiary is designated, or if no valid designation has been made, the Participant's beneficiary will be the Participant's estate. In such an event, no payment will be made unless the Committee will have been furnished with such evidence as the Committee may deem necessary to establish the validity of the payment.

Issuance of Shares.

With respect to the Restricted Stock Units described in Section 2(a) of the Grant Schedule, on the earlier of the Vesting Date or the Participant's separation from service (within the meaning of Treas. Reg. § 1.409A- 1(h) or any successor regulation), the Company shall issue to the Participant, whether by means of stock certificates or book entry registration, a number of shares of common stock of the Company ("Common Stock") equal to the number of such Restricted Stock Units that have vested as of such date (taking into account any acceleration of vesting contemplated by the Participant's employment agreement or Section 6 hereof). Any such Restricted Stock Units that have not vested as of the earlier of the Vesting Date or the Participant's separation from service will be forfeited as of that time.

With respect to the Restricted Stock Units described in Section 2(b) of the Grant Schedule, within 60 days following the Vesting Date the Company shall issue to the Participant, whether by means of stock certificates or book entry registration, a number of shares of common stock of the Company ("Common Stock") equal to the number of such Restricted Stock Units that have vested as of the Vesting Date (taking into account any acceleration of vesting contemplated by Section 6 hereof). Any such Restricted Stock Units that have not vested as of the Vesting Date will be forfeited as of that time.

This Award is subject to tax withholding in accordance with applicable law and Section 18 of the Program (and for this purpose, share withholding is authorized in the manner therein described).

The Participant will not be deemed for any purpose to be, or have rights as, a stockholder of the Company by virtue of the grant of Restricted Stock Units, until shares of Common Stock are issued in settlement of such Restricted Stock Units pursuant to Section 10(a) hereof. Upon the issuance of a stock certificate or the making of an appropriate book entry on the books of the transfer agent, the Participant will have all of the rights of a stockholder.

Notwithstanding any otherwise applicable provision of this Agreement, to the extent compliance with the requirements of Treasury Regulation § 1.409A- 3(i)(2) (or any successor provision) is necessary to avoid the application of an additional tax under section 409A of the Code to the issuance of shares to the Participant, then any issuance of shares to the Participant that would otherwise be made upon the Participant's separation from service will be deferred and delivered to the Participant immediately after the six- month period following that separation from service.

Company Policies. In consideration for the grant of this award of Restricted Stock Units, the Participant agrees to be subject to any policies of the Company and its affiliates regarding clawbacks, securities trading and hedging or pledging of securities that may be in effect from time to time, to the extent such policies are or become applicable to the Participant.

Securities Matters. The Company shall be under no obligation to effect the registration pursuant to the Securities Act of 1933, as amended (the "1933 Act") of any interests in the Program or any shares of Common Stock to be issued thereunder or to effect similar compliance under any state laws. The Company shall not be obligated to cause to be issued any shares, whether by means of stock certificates or appropriate book entries, unless and until the Company is advised by its counsel that the issuance of such shares is in compliance with all applicable laws, regulations of governmental authority and the requirements of any securities exchange on which shares of Common Stock are traded. The Committee may require, as a condition of the issuance of shares of Common Stock pursuant to the terms hereof, that the recipient of such shares make such covenants, agreements and representations, and that any certificates bear such legends and any book entries be subject to such electronic coding or stop order, as the Committee, in its sole discretion, deems necessary or desirable. The Participant specifically understands and agrees that the shares of Common Stock, if and when issued, may be "restricted securities," as that term is defined in Rule 144 under the 1933 Act and, accordingly, the Participant may be required to hold the shares indefinitely unless they are registered under such Act or an exemption from such registration is available.

Delays or Omissions. No delay or omission to exercise any right, power or remedy accruing to any party hereto upon any breach or default of any party under this Agreement, will impair any such right, power or remedy of such party, nor will it be construed to be a waiver of any such breach or default, or an acquiescence therein, or of or in any similar breach or default thereafter occurring, nor will any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Any waiver, permit, consent or approval of any kind or character on the part of any party of any breach or default under this Agreement, or any waiver on the part of any party or any provisions or conditions of this Agreement, must be in a writing signed by such party and will be effective only to the extent specifically set forth in such writing.

Right of Discharge Preserved. Nothing in this Agreement confers upon the Participant the right to continue in the employ or other service of the Company, or affect any right which the Company may have to terminate such employment or service.

Integration. The Program, this Agreement, including the Grant Schedule, and any applicable employment agreement contain the entire understanding of the parties with respect to its subject matter. There are no restrictions, agreements, promises, representations, warranties, covenants or undertakings with respect to the subject matter hereof other than those expressly set forth herein. Any applicable employment agreement and this Agreement, including, without limitation, the Program, supersede all prior agreements and understandings between the parties with respect to its subject matter.

Counterparts. This Agreement may be executed in two or more counterparts, each of which is deemed an original, but all of which constitute one and the same instrument.

Governing Law. This Agreement is governed by and construed and enforced in accordance with the laws of the State of Delaware, without regard to the provisions governing conflict of laws.

Participant Acknowledgment. The Participant hereby acknowledges receipt of a copy of the Program and has carefully read and understands this Agreement and the Program. The Participant hereby acknowledges that all decisions, determinations and interpretations of the Committee in respect of the Program, this Agreement and the Restricted Stock Units are final and conclusive.

The parties are signing this Agreement on the date indicated below.

VISHAY INTERTECHNOLOGY, INC.

By: _

Name:

Title:

_

Grant Schedule

Participant's name:
Grant Date:
1. Number of Restricted Stock Units granted:
2. Vesting Date:
(a) As to [______] Restricted Stock Units: [________________]

(b) As to [______] Restricted Stock Units: [________________], provided that 50% of such Restricted Stock Units shall vest if 80% of the Performance Target has been satisfied, and an additional 2.5% of such Restricted Stock Units shall vest for each additional full 1% (between 80% and 100%) of the Performance Target that has been satisfied.

Performance Target: Sum of cumulative adjusted net profit and cumulative adjusted free cash (each as measured by the Committee) for the 2020- 2022 period equal to $750 million.

3. HSR Compliance:

Notwithstanding any contrary provision of this Agreement: No shares will be delivered in respect of Restricted Stock Units subject to this Agreement unless and until the Participant has complied with all applicable provisions of the Hart- Scott- Rodino Antitrust Improvements Act of 1976, as amended (the "HSR Act") with respect to the delivery of those shares. If the delivery of shares pursuant to this Agreement is delayed pursuant to the preceding sentence, the delivery shall occur on the first day that the Participant has complied with all applicable provisions of the HSR Act; provided that if the Participant has not complied with all applicable provisions of the HSR Act by the last day of the calendar year in which such shares are otherwise deliverable, such shares and all rights of the Participant under this Agreement will then be forfeited.

__________________ __________________________
[________________] Vishay Intertechnology, Inc.

Dated: ____________________

Exhibit 10.48

Vishay Intertechnology, Inc.
Restricted Stock Unit Agreement

THIS AGREEMENT, made as of the Grant Date, between Vishay Intertechnology, Inc. (the "Company") and the Participant.

RECITALS

The Company has adopted and maintains the Vishay Intertechnology, Inc. 2007 Stock Incentive Program, as amended and restated, (the "Program") to enhance the long- term performance of the Company and to provide selected individuals with an incentive to improve the growth and profitability of the Company by acquiring a proprietary interest in the success of the Company.

The Program provides that, with respect to Awards to members of the Board of Directors (the "Board") who are not Employees of the Company, the Board shall administer the Program, including the authority to determine the persons to whom awards will be granted and the amount and type of such awards.

The Board has determined that the purposes of the Program would be furthered by granting the Participant Restricted Stock Units as set forth in this Agreement.

The parties therefore agree as follows:

Grant Schedule. Certain terms of the grant of Restricted Stock Units are set forth on the Grant Schedule that is attached to, and is a part of, this Agreement.

Grant of Restricted Stock Units. Pursuant to, and subject to, the terms and conditions set forth herein and in the Program, the Board hereby grants to the Participant the number of Restricted Stock Units set forth on the Grant Schedule.

Grant Date. The Grant Date of the Restricted Stock Units is set forth on the Grant Schedule.

Incorporation of Program. All terms, conditions and restrictions of the Program are incorporated herein and made part hereof as if stated herein. If there is any conflict between the terms and conditions of the Program and this Agreement, the terms and conditions of this Agreement will govern. Except as otherwise provided herein, including the Grant Schedule, all capitalized terms used herein will have the meaning given to such terms in the Program.

Vesting. Subject to the further provisions of this Agreement, the Restricted Stock Units will vest on the Vesting Date set forth on the Grant Schedule (the "Vesting Date") or if sooner, upon the occurrence of a Change in Control, provided in either case that the Participant remains in continuous service with the Company through that time. For avoidance of doubt, accelerated vesting upon a Change in Control will not change the time that shares are issued in settlement of the Restricted Stock Units (which time is stated in Section 9 below).

Transferability. The Restricted Stock Units are not transferable or assignable otherwise than by will or by the laws of descent and distribution. Any attempt to transfer Restricted Stock Units, whether by transfer, pledge, hypothecation or otherwise and whether voluntary or involuntary, by operation of law or otherwise, will not vest the transferee with any interest or right in or with respect to such Restricted Stock Units.

Termination of Membership on the Board. If:

the membership of the Participant on the Board is terminated prior to the Vesting Date and such termination of membership is a "separation from service" (within the meaning of Treas. Reg. § 1.409A- 1(h) or any successor provision); and

the Participant is not removed from membership on the Board for Cause;

the Restricted Stock Units will vest upon such termination, provided that (i) the number of Restricted Stock Units that vest will be reduced pro- rata to the extent of the vesting period not served by the Participant on the Board, and (ii) to the extent compliance with the requirements of Treasury Regulation § 1.409A- 3(i)(2) (or any successor provision) is necessary to avoid the application of an additional tax under Section 409A of the Code to the issuance of Shares to the Participant, then notwithstanding any contrary provision hereof, any issuance of Shares to the Participant that would otherwise be made during the six- month period beginning on the date of the Participant's termination of membership on the Board will be deferred and delivered to the Participant immediately following the lapse of such six- month period.

Except as set forth in this Section 7, all unvested Restricted Stock Units shall be forfeited as of termination.

Designation of Beneficiary. The Participant has the right to designate in writing from time to time a beneficiary or beneficiaries for any Award by filing a written notice of such designation with the Board. If the Participant's beneficiary predeceases the Participant and no successor beneficiary is designated, or if no valid designation has been made, the Participant's beneficiary will be the Participant's estate. In such an event, no payment will be made unless the Board will have been furnished with such evidence as the Board may deem necessary to establish the validity of the payment.

Issuance of Shares.

On the earlier of the Vesting Date or the Participant's "separation from service" (within the meaning of Treas. Reg. § 1.409A- 1(h) or any successor provision), the Company shall issue to the Participant, whether by means of stock certificates or book entry registration, a number of shares of common stock of the Company ("Common Stock") equal to the number of Restricted Stock Units granted hereunder that have vested as of such date.

To the extent required by law, this Award will be subject to tax withholding in accordance with Section 18 of the Program (and for this purpose, share withholding is authorized in the manner therein described).

The Participant will not be deemed for any purpose to be, or have rights as, a stockholder of the Company by virtue of the grant of Restricted Stock Units, until shares of Common Stock are issued in settlement of such Restricted Stock Units pursuant to Section 9(a) hereof. Upon the issuance of a stock certificate or the making of an appropriate book entry on the books of the transfer agent, the Participant will have all of the rights of a stockholder.

Company Policies. In consideration of the grant of Restricted Stock Units, the Participant agrees to be subject to any policies of the Company and its affiliates regarding clawbacks, securities trading and hedging or pledging of securities that may be in effect from time to time, to the extent such policies are or become applicable to the Participant.

Securities Matters. The Company shall be under no obligation to effect the registration pursuant to the Securities Act of 1933, as amended (the "1933 Act") of any interests in the Program or any shares of Common Stock to be issued thereunder or to effect similar compliance under any state laws. The Company shall not be obligated to cause to be issued any shares, whether by means of stock certificates or appropriate book entries, unless and until the Company is advised by its counsel that the issuance of such shares is in compliance with all applicable laws, regulations of governmental authority and the requirements of any securities exchange on which shares of Common Stock are traded. The Board may require, as a condition of the issuance of shares of Common Stock pursuant to the terms hereof, that the recipient of such shares make such covenants, agreements and representations, and that any certificates bear such legends and any book entries be subject to such electronic coding or stop order, as the Board, in its sole discretion, deems necessary or desirable. The Participant specifically understands and agrees that the shares of Common Stock, if and when issued, may be "restricted securities," as that term is defined in Rule 144 under the 1933 Act and, accordingly, the Participant may be required to hold the shares indefinitely unless they are registered under such Act or an exemption from such registration is available.

Delays or Omissions. No delay or omission to exercise any right, power or remedy accruing to any party hereto upon any breach or default of any party under this Agreement, will impair any such right, power or remedy of such party, nor will it be construed to be a waiver of any such breach or default, or an acquiescence therein, or of or in any similar breach or default thereafter occurring, nor will any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Any waiver, permit, consent or approval of any kind or character on the part of any party of any breach or default under this Agreement, or any waiver on the part of any party or any provisions or conditions of this Agreement, must be in a writing signed by such party and will be effective only to the extent specifically set forth in such writing.

Right of Discharge Preserved. Nothing in this Agreement confers upon the Participant the right to continue in the employ or other service of the Company, or affect any right which the Company may have to terminate such employment or service.

Integration. The Program and this Agreement, including the Grant Schedule, contains the entire understanding of the parties with respect to its subject matter. There are no restrictions, agreements, promises, representations, warranties, covenants or undertakings with respect to the subject matter hereof other than those expressly set forth herein. This Agreement, including, without limitation, the Program, supersedes all prior agreements and understandings between the parties with respect to its subject matter.

Counterparts. This Agreement may be executed in two or more counterparts, each of which is deemed an original, but all of which constitute one and the same instrument.

Governing Law. This Agreement is governed by and construed and enforced in accordance with the laws of the State of Delaware, without regard to the provisions governing conflict of laws.

Participant Acknowledgment. The Participant hereby acknowledges receipt of a copy of the Program and has carefully read and understands this Agreement and the Program. The Participant hereby acknowledges that all decisions, determinations and interpretations of the Compensation Committee in respect of the Program, and the Board with respect to this Agreement and the Restricted Stock Units, are final and conclusive.

The parties are signing this Agreement on the date stated in the introductory paragraph.

VISHAY INTERTECHNOLOGY, INC.

By: ____________________________
Name:
Title:

Participant

____

Grant Schedule

Participant's name:
Grant Date:
Number of Restricted Stock Units granted:
Vesting Date:

Notwithstanding any contrary provision of this Agreement: No shares will be delivered in respect of Restricted Stock Units subject to this Agreement unless and until the Participant has complied with all applicable provisions of the Hart- Scott-Rodino Antitrust Improvements Act of 1976, as amended (the "HSR Act") with respect to the delivery of those shares. If the delivery of shares pursuant to this Agreement is delayed pursuant to the preceding sentence, the delivery shall occur on the first day that the Participant has complied with all applicable provisions of the HSR Act; provided that if the Participant has not complied with all applicable provisions of the HSR Act by the last day of the calendar year in which such shares are otherwise deliverable, such shares and all rights of the Participant under this Agreement will then be forfeited.

VISHAY INTERTECHNOLOGY, INC.

By:__________________________________
Name:
Title:

Participant

____

Exhibit 10.50

Vishay Intertechnology, Inc.
Executive Officer Phantom Stock Unit Agreement

THIS AGREEMENT, made as of the Grant Date, between Vishay Intertechnology, Inc. (the "Company") and the Participant.

RECITALS

The Company has adopted and maintains the Vishay Intertechnology, Inc. 2007 Stock Incentive Program, as amended and restated, (the "Program") to enhance the long- term performance of the Company and to provide selected individuals with an incentive to improve the growth and profitability of the Company by acquiring a proprietary interest in the success of the Company.

The Program provides that the Compensation Committee (the "Committee") of the Company's Board of Directors shall administer the Program, including the authority to determine the persons to whom awards will be granted and the amount and type of such awards.

The Committee has determined that the purposes of the Program would be furthered by granting the Participant Phantom Stock Units as set forth in this Agreement.

The parties therefore agree as follows:

Grant Schedule. Certain terms of the grant of Phantom Stock Units are set forth on the Grant Schedule that is attached to, and is a part of, this Agreement.

Grant of Phantom Stock Units. Pursuant to, and subject to, the terms and conditions set forth herein and in the Program, the Committee hereby grants to the Participant the number of Phantom Stock Units set forth on the Grant Schedule. These Phantom Stock Units include an entitlement to dividend equivalent units in accordance with Section 12(c) of the Program.

Grant Date. The Grant Date of the Phantom Stock Units is set forth on the Grant Schedule.

Incorporation of Program. All terms, conditions and restrictions of the Program are incorporated herein and made part hereof as if stated herein. If there is any conflict between the terms and conditions of the Program and this Agreement or any applicable employment agreement, the terms and conditions of the employment agreement will govern over those of the Program or this Agreement, and the terms and conditions of this Agreement will govern over those of the Program. Except as otherwise provided herein, including the Grant Schedule, all capitalized terms used herein will have the meaning given to such terms in the Program.

Transferability. The Phantom Stock Units are not transferable or assignable otherwise than by will or by the laws of descent and distribution. Any attempt to transfer Phantom Stock Units, whether by transfer, pledge, hypothecation or otherwise and whether voluntary or involuntary, by operation of law or otherwise, will not vest the transferee with any interest or right in or with respect to such Phantom Stock Units.

Termination of Employment. In the event of the Participant's Termination of Employment that is a "separation from service" as described in Section 2(hh)(ii)(B) of the Program, Shares in respect of all Phantom Stock Units will be issued to the Participant within 30 days of such separation from service. However, to the extent compliance with the requirements of Treasury Regulation § 1.409A- 3(i)(2) (or any successor provision) is necessary to avoid the application of an additional tax under section 409A of the Code to the issuance of Shares to the Participant, then any issuance of Shares to the Participant that would otherwise be made pursuant to this paragraph during the six- month period beginning on the date of such Termination of Employment will be deferred and delivered to the Participant immediately following the lapse of such six-month period.

Designation of Beneficiary. The Participant has the right to designate in writing from time to time a beneficiary or beneficiaries for any Award by filing a written notice of such designation with the Committee. If the Participant's beneficiary predeceases the Participant and no successor beneficiary is designated, or if no valid designation has been made, the Participant's beneficiary will be the Participant's estate. In such an event, no payment will be made unless the Committee will have been furnished with such evidence as the Committee may deem necessary to establish the validity of the payment.

Issuance of Shares.

Shares in respect of Phantom Stock Units will be issued to the Participant on the earlier of (i) the time specified in Section 6, above, or (ii) the occurrence of a Change in Control that constitutes a "change in control event" within the meaning of Treas. Reg. § 1.409A- 3(i)(5). For avoidance of doubt, Section 15(b)(i)(B) of the Program will not apply to this Agreement. On the applicable date of issuance, the Company shall issue to the Participant, whether by means of stock certificates or book entry registration, a number of shares of common stock of the Company ("Common Stock") equal to the number of Phantom Stock Units subject this Agreement.

The Company may require as a condition of the issuance of shares of Common Stock, pursuant to Section 8(a) hereof, that the Participant remit to the Company an amount sufficient in the opinion of the Company to satisfy any federal, state and other governmental tax withholding requirements related to the issuance of such shares. The Committee, in its sole discretion, may permit the Participant to satisfy such obligation by delivering shares of Common Stock or by directing the Company to withhold from delivery shares of Common Stock, in either case valued at their Fair Market Value on the applicable date of delivery, with fractional shares being settled in cash.

The Participant will not be deemed for any purpose to be, or have rights as, a stockholder of the Company by virtue of the grant of Phantom Stock Units, until shares of Common Stock are issued in settlement of such Phantom Stock Units pursuant to Section 8(a) hereof. Upon the issuance of a stock certificate or the making of an appropriate book entry on the books of the transfer agent, the Participant will have all of the rights of a stockholder.

Company Policies. In consideration for the grant of this award of Phantom Stock Units, the Participant agrees to be subject to any policies of the Company and its affiliates regarding clawbacks, securities trading and hedging or pledging of securities that may be in effect from time to time, to the extent such policies are or become applicable to the Participant.

Securities Matters. The Company shall be under no obligation to effect the registration pursuant to the Securities Act of 1933, as amended (the "1933 Act") of any interests in the Program or any shares of Common Stock to be issued thereunder or to effect similar compliance under any state laws. The Company shall not be obligated to cause to be issued any shares, whether by means of stock certificates or appropriate book entries, unless and until the Company is advised by its counsel that the issuance of such shares is in compliance with all applicable laws, regulations of governmental authority and the requirements of any securities exchange on which shares of Common Stock are traded. The Committee may require, as a condition of the issuance of shares of Common Stock pursuant to the terms hereof, that the recipient of such shares make such covenants, agreements and representations, and that any certificates bear such legends and any book entries be subject to such electronic coding or stop order, as the Committee, in its sole discretion, deems necessary or desirable. The Participant specifically understands and agrees that the shares of Common Stock, if and when issued, may be "restricted securities," as that term is defined in Rule 144 under the 1933 Act and, accordingly, the Participant may be required to hold the shares indefinitely unless they are registered under such Act or an exemption from such registration is available.

Delays or Omissions. No delay or omission to exercise any right, power or remedy accruing to any party hereto upon any breach or default of any party under this Agreement, will impair any such right, power or remedy of such party, nor will it be construed to be a waiver of any such breach or default, or an acquiescence therein, or of or in any similar breach or default thereafter occurring, nor will any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. Any waiver, permit, consent or approval of any kind or character on the part of any party of any breach or default under this Agreement, or any waiver on the part of any party or any provisions or conditions of this Agreement, must be in a writing signed by such party and will be effective only to the extent specifically set forth in such writing.

Right of Discharge Preserved. Nothing in this Agreement confers upon the Participant the right to continue in the employ or other service of the Company, or affect any right which the Company may have to terminate such employment or service.

Integration. The Program, this Agreement, including the Grant Schedule, and any applicable employment agreement contain the entire understanding of the parties with respect to its subject matter. There are no restrictions, agreements, promises, representations, warranties, covenants or undertakings with respect to the subject matter hereof other than those expressly set forth herein. Any applicable employment agreement and this Agreement, including, without limitation, the Program, supersede all prior agreements and understandings between the parties with respect to its subject matter.

Counterparts. This Agreement may be executed in two or more counterparts, each of which is deemed an original, but all of which constitute one and the same instrument.

Governing Law. This Agreement is governed by and construed and enforced in accordance with the laws of the State of Delaware, without regard to the provisions governing conflict of laws.

Participant Acknowledgment. The Participant hereby acknowledges receipt of a copy of the Program and has carefully read and understands this Agreement and the Program. The Participant hereby acknowledges that all decisions, determinations and interpretations of the Committee in respect of the Program, this Agreement and the Phantom Stock Units are final and conclusive.

The parties are signing this Agreement on the date below indicated.

VISHAY INTERTECHNOLOGY, INC.

By:_
Name:
Title:

Dated:_

Grant Schedule

Participant's name:
Grant Date:

Number of Phantom Stock Units granted:

2. Issuance: Shares will be issued to the Participant in respect of the Phantom Stock Units subject to this Agreement in accordance with Section 8 of this Agreement.

Notwithstanding the foregoing, no shares will be delivered in respect of Phantom Stock Units subject to this Agreement unless and until the Participant has complied with all applicable provisions of the Hart- Scott- Rodino Antitrust Improvements Act of 1976, as amended (the "HSR Act") with respect to the delivery of those shares. If the delivery of shares pursuant to this Agreement is delayed pursuant to the preceding sentence, the delivery shall occur on the first day that the Participant has complied with all applicable provisions of the HSR Act; provided that if the Participant has not complied with all applicable provisions of the HSR Act by the last day of the calendar year in which such shares are otherwise deliverable, such shares and all rights of the Participant under this Agreement will then be forfeited.

VISHAY INTERTECHNOLOGY, INC.

By:_
Name:
Title:

_

Exhibit 21

SUBSIDIARIES OF THE REGISTRANT

Note: Names of Subsidiaries are indented under name of Parent. Subsidiaries are wholly owned unless otherwise noted. (Directors' or other shares required by statute in foreign jurisdictions and totaling less than 1% of equity are omitted.)

Subsidiary	Jurisdiction	Note
Vishay Americas, Inc.	Delaware	
Vishay Americas do Brasil, LTDA	Brazil	
Vishay Insurance, DAC	Ireland	
Vishay France Holdings SAS	France	
Vishay MCB Industrie S.A.S.	France	
Vishay Dale Electronics, LLC	Delaware	
Electronica Dale de Mexico S.A. de C.V.	Mexico	
Vishay HiRel Systems LLC	Delaware	
Vishay HiRel Systems International, LLC	Delaware	
Vishay Sprague, Inc.	Delaware	
Sprague Electric of Canada Limited	Canada	
Siliconix incorporated	Delaware	
Vishay Siliconix, LLC	Delaware	
Siliconix Semiconductor, LLC	Delaware	
Vishay Siliconix Electronic Co. Ltd.	The Republic of China (Taiwan)	
Vishay Siliconix Ireland Ltd.	Ireland	
Shanghai Simconix Electronic Company Ltd.	China	
Siliconix Technology C.V.	Netherlands	(a)
Vishay Semiconductor Italiana S.p.A.	Italy	
Vishay Siliconix Singapore Pte. Ltd.	Singapore	
Vishay Semiconductor India Pvt. Ltd.	India	
Siliconix Singapore Pte Ltd	Singapore	
Vishay GSI, Inc.	Delaware	
Vishay GSI Holdings, LLC	Delaware	
Vishay General Semiconductor, L.P.	Cayman Islands	(b)
Vishay General Semiconductor, LLC	Delaware	
Vishay General Semiconductor of Taiwan, Ltd.	The Republic of China (Taiwan)	
Vishay Capella Microsystems (Taiwan) Limited	The Republic of China (Taiwan)	
Vishay Asia GS Investments Pte., Ltd.	Singapore	
ATC Corp.	Delaware	
General Semiconductor Hong Kong Ltd.	Hong Kong	
Vishay BCcomponents Holdings Ltd.	Delaware	
Vishay BCcomponents B.V.	Netherlands	
Vishay Capacitors Belgium NV	Belgium	
Vishay Resistors Belgium BVBA	Belgium	
Vishay Components India Pvt. Ltd	India	(c)
Vishay BCcomponents Hong Kong Ltd.	Hong Kong	
Vishay Hong Kong Ltd.	Hong Kong	
Vishay Intertechnology Asia Pte Ltd.	Singapore	
BCcomponents China Ltd.	Hong Kong	
Vishay Japan Co. Ltd.	Japan	
Vishay Korea Co. Ltd.	Korea	
Vishay (Taiwan) Ltd.	The Republic of China (Taiwan)	
Vishay Malaysia Sdn. Bhd.	Malaysia	
Vishay Dutch Holdings B.V.	Netherlands	

Subsidiaries of the Registrant (continued)

Vishay Israel Limited	Israel	
Z.T.R. Electronics Ltd.	Israel	
ECOMAL Israel Ltd.	Israel	(d)
Vishay Polytech Co. Ltd.	Japan	
Vishay Europe GmbH	Germany	(e)
Vishay Europe Sales GmbH	Germany	
Vishay BCcomponents Austria GmbH	Austria	
Vishay Electronic GmbH	Germany	
Vishay Siliconix Itzehoe GmbH	Germany	
Vishay Electronica Portugal Lda.	Portugal	(f)
ECOMAL Europe GmbH	Germany	
ECOMAL Sweden AB	Sweden	
ECOMAL Schweiz A.G.	Switzerland	
ECOMAL Austria GmbH	Austria	
Vishay Components, S.A.	Spain	
ECOMAL Iberia S.A.U.	Spain	
ECOMAL Nederland BV	Netherlands	
ECOMAL Belgium BVBA	Belgium	
ECOMAL Ceska republika S.r.O.	Czech Republic	
ECOMAL Denmark A/S	Denmark	
ECOMAL Finland OY	Finland	
ECOMAL France S.A.S.	France	
ECOMAL UK Ltd.	United Kingdom	
Vishay Ltd.	United Kingdom	
ECOMAL Italy s.r.l.	Italy	
ECOMAL Elektronske Komponente d.o.o.	Slovenia	
Vishay Electronic SPOL SRO	Czech Republic	
Ecomal Poland Sp. Z.o.o.	Poland	
Ecomal Hungary Kft.	Hungary	
Vishay S.A.	France	(g)
Ultronix, Inc.	Delaware	
Vishay Semiconductor GmbH	Germany	
Vishay (Phils.) Inc.	Philippines	
Vishay Semiconductor Ges.mbH	Austria	(h)
Vishay Asia Semiconductor Investments Pte. Ltd.	Singapore	
Vishay Singapore Pte. Ltd.	Singapore	(i)
Shanghai Vishay Semiconductors Ltd.	China	
General Semiconductor (China) Co., Ltd.	China	
Vishay Xi'an Micro- Electronics Co. Ltd.	China	
Vishay China Co. Ltd.	China	
Vishay HiRel Systems Zhuhai Electronics Co Ltd	China	
Vishay Components (Huizhou) Co. Ltd.	China	(j)
Vishay Hungary Elektronikai KFT	Hungary	
Vishay Semiconductor Malaysia Sdn Bhd	Malaysia	
Vishay Beyschlag Holding GmbH	Germany	
Vishay BCcomponents Beyschlag GmbH	Germany	

Subsidiaries of the Registrant (continued)

(a) - Registrant's indirect ownership percentage in Siliconix Technology C.V. is 100%; 89% is owned by its wholly owned subsidiary Siliconix Incorporated, 10% is owned by its indirectly wholly owned subsidiary Siliconix Semiconductor, LLC, and 1% is owned by its indirect wholly owned subsidiary Vishay Siliconix LLC.

(b) - Registrant's indirect ownership percentage in Vishay General Semiconductor, L.P. is 100%; 1% is owned by its indirectly wholly owned subsidiary Vishay GSI Holdings, LLC, and 99% is owned by its wholly owned subsidiary Vishay GSI, Inc.

(c) - Registrant's indirect ownership percentage in Vishay Components India Pvt. Ltd. is 100%; 69% is owned directly and 31% is owned by its indirectly wholly owned subsidiary Vishay BCcomponents B.V.

(d) - Registrant's indirect ownership percentage in Ecomal Israel Ltd. is 66.7%.

(e) - Registrant's indirect ownership percentage in Vishay Europe GmbH is 100%; over 99.9% is owned directly or indirectly by its wholly owned subsidiary Vishay Israel Limited and its affiliates; and less than 0.1% is owned directly.

(f) - Registrant's indirect ownership percentage in Vishay Electronica Portugal Lda. is 100%; 70% is owned by its indirectly wholly owned subsidiary Vishay Europe GmbH and 30% is owned by its indirectly wholly owned subsidiary Vishay Electronic GmbH.

(g) - Registrant's indirect ownership percentage in Vishay S.A. is 99.9%.

(h) - Registrant's indirect ownership percentage in Vishay Semiconductor Ges.mbH is 100%, 54% is owned by its indirectly wholly owned subsidiary Sprague Electric of Canada and 46% is owned by its indirectly wholly owned subsidiary Vishay Semiconductor GmbH.

(i) - Registrant's indirect ownership percentage in Vishay Singapore Pte. Ltd. is 100%, 48% is owned by its indirectly wholly owned subsidiary Vishay Asia Semiconductor Investments Pte. Ltd., 26% is owned by its indirectly wholly owned subsidiary Vishay Asia Semiconductor GS Investments Pte. Ltd., and 26% is owned by its indirectly wholly owned subsidiary Siliconix Technology C.V.

(j) - Registrant's indirect ownership percentage in Vishay Components (Huizhou) Co. Ltd. is 100%; 36% is owned by its indirectly wholly owned subsidiary Vishay Hong Kong Ltd. and 64% is owned by its indirectly wholly owned subsidiary Vishay China Co. Ltd.

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements and in the related Prospectuses:

1) Registration Statement (Form S- 8 No. 333- 144466) pertaining to the 2007 Stock Incentive Program of Vishay Intertechnology, Inc.,

2) Registration Statement (Form S- 8 No. 333- 178895) pertaining to the Deferred Compensation Plan of Vishay Intertechnology, Inc., and

3) Registration Statement (Form S- 8 No. 333- 196143) pertaining to the 2007 Stock Incentive Program of Vishay Intertechnology, Inc.;

of our reports dated February 14, 2020, with respect to the consolidated financial statements of Vishay Intertechnology, Inc. and the effectiveness of internal control over financial reporting of Vishay Intertechnology, Inc. included in this Annual Report (Form 10- K) of Vishay Intertechnology, Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Philadelphia, Pennsylvania
February 14, 2020

Exhibit 31.1

CERTIFICATIONS

I, Dr. Gerald Paul, certify that:

1. I have reviewed this Annual Report on Form 10- K of Vishay Intertechnology, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a- 15(e) and 15d- 15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a- 15(f) and 15d- 15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 14, 2020

/s/ Gerald Paul
Dr. Gerald Paul
Chief Executive Officer

Exhibit 31.2

CERTIFICATIONS

I, Lori Lipcaman, certify that:

1. I have reviewed this Annual Report on Form 10- K of Vishay Intertechnology, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a- 15(e) and 15d- 15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a- 15(f) and 15d- 15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 14, 2020

/s/ Lori Lipcaman
Lori Lipcaman
Chief Financial Officer

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES- OXLEY ACT OF 2002

In connection with the Annual Report of Vishay Intertechnology, Inc. (the "Company") on Form 10- K for the year ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Dr. Gerald Paul, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. section 1350, as adopted pursuant to section 906 of the Sarbanes- Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Gerald Paul
Dr. Gerald Paul
Chief Executive Officer
February 14, 2020

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES- OXLEY ACT OF 2002

In connection with the Annual Report of Vishay Intertechnology, Inc. (the "Company") on Form 10- K for the year ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Lori Lipcaman, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. section 1350, as adopted pursuant to section 906 of the Sarbanes- Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Lori Lipcaman
Lori Lipcaman
Chief Financial Officer
February 14, 2020