VEECO INSTRUMENTS INC
Form 10-K
February 21, 2018
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2017

OR

o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission file number 0-16244

VEECO INSTRUMENTS INC.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**11-2989601**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)
Terminal Drive **Plainview, New York**	**11803**
(Address of Principal Executive Offices)	(Zip Code)

Registrant s telephone number, including area code:

(516) 677-0200

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

(Title of each class)	(Name of each exchange on which registered)
Common Stock, par value $0.01 per share	**The NASDAQ Stock Market**

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 x No o

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 o No x

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 x No o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of Registrant s knowledge, in definitive proxy or information statements incorporated by references in Part III of this Form 10-K or any amendment to this Form 10-K. x

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the 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 x	Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company o
	Emerging growth company o

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. o

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Act). o Yes x No

The aggregate market value of the common stock held by non-affiliates of the registrant at June 30, 2017 (the last business day of the registrant s most recently completed second quarter) was $1,328,017,475 based on the closing price of $27.85 on the NASDAQ Stock Market on that date.

The number of shares of each of the registrant s classes of common stock outstanding on February 14, 2018 was 48,156,865 shares of common stock, par value $0.01 per share.

DOCUMENTS INCORPORATED BY REFERENCE

Certain portions of the definitive Proxy Statement to be used in connection with the Registrant s 2018 Annual Meeting of Stockholders are incorporated by reference into Part III of this Form 10-K.

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VEECO INSTRUMENTS INC.

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This Annual Report on Form 10-K (Form 10-K) contains certain forward-looking information relating to Veeco Instruments Inc. (together with its consolidated subsidiaries, Veeco, the Company, Registrant, we, our, or us, unless the context indicates otherwise) that is based on the b of, and assumptions made by, our management as well as information currently available to management. When used in this Form 10-K, the words believes, anticipates, expects, estimates, targets, plans, intends, will, and similar expressions relating to the future are intende forward-looking information. Discussions containing such forward-looking statements may be found in Part I, Items 1 and 3, Part II, Items 7 and 7A hereof, as well as within this Form 10-K generally. This forward-looking information reflects our current views with respect to future events and is subject to certain risks, uncertainties, and assumptions, some of which are described under the caption Risk Factors in Part I, Item 1A, and elsewhere in this Form 10-K. Should one or more of these risks or uncertainties occur, or should our assumptions prove incorrect, actual results may vary materially from the forward-looking information described in this Form 10-K as believed, anticipated, expected, estimated, targeted, planned, or similarly identified. We do not undertake any obligation to update any forward-looking statements to reflect future events or circumstances after the date of such statements.

PART I

Item 1. Business

Recent Developments

On May 26, 2017, we completed the acquisition of Ultratech, Inc. (Ultratech). Ultratech develops, manufactures, sells, and supports lithography, laser annealing, and inspection equipment for manufacturers of semiconductor devices, including front-end semiconductor manufacturing and advanced packaging. Ultratech also develops, manufactures, sells, and supports atomic layer deposition (ALD) equipment for scientific and industrial applications. Ultratech s customers are primarily located throughout the United States, Europe, China, Japan, Taiwan, Singapore, and Korea. With the addition of Ultratech, we establish ourselves as a leading equipment supplier in the advanced packaging market, forming a strong technology portfolio to address critical advanced packaging applications, as well as greatly increasing our critical mass in the front-end semiconductor market. The results of Ultratech s operations have been included in the consolidated financial statements since the date of acquisition.

Business Description and Overview

Headquartered in Plainview, New York, we were organized as a Delaware corporation in 1989. We develop, manufacture, sell, and support semiconductor process equipment to meet the demands of key global trends such as enhancing mobility, increasing connectivity, and improving energy efficiency. Our primary technologies include metal organic chemical vapor deposition, advanced packaging lithography, wet etch and clean, laser annealing, ion beam, molecular beam epitaxy, wafer inspection, and atomic layer deposition systems. These technologies play an integral role in producing Light Emitting Diodes (LEDs) for solid-state lighting and displays, and in the fabrication and packaging of advanced semiconductor devices. We have sales and service operations across the Asia-Pacific region, Europe, and North America to address our customers needs.

We are focused on:

- Providing differentiated semiconductor process equipment to address customers current production requirements and next generation product development roadmaps;

- Investing to win through focused research and development in markets that we believe provide significant growth opportunities or are at an inflection point in semiconductor process equipment requirements, including LED, power electronics, photonics, front-end semiconductor, and advanced packaging technologies;

- Leveraging our sales channel and local process applications support teams to build strong strategic relationships with technology leaders;

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- Expanding our services portfolio to improve the performance of our systems, including spare parts, upgrades, and consumables to drive growth, reduce our customers cost of ownership, and improve customer satisfaction;

- Cross-selling our product portfolio across our broad customer base and end markets to both maximize sales opportunities and diversify our business;

- Utilizing a combination of outsourced and internal manufacturing strategies to flex manufacturing capacity through industry investment cycles without compromising quality or performance; and

- Pursuing partnerships and acquisitions to expand our product portfolio into new and adjacent markets to drive sales growth.

Our products are sold to semiconductor and advanced packaging device manufacturers in the following four markets: Advanced Packaging, MEMS & RF Filters; LED Lighting, Display & Compound Semiconductor; Front-End Semiconductor; and Scientific & Industrial.

Markets

Our systems are used in the creation of a broad range of microelectronic components, including LEDs, micro-electro mechanical systems (MEMS), radio frequency (RF) filters, power electronics, thin film magnetic heads (TFMHs), laser diodes, 3D NAND logic, and other semiconductor devices. In addition to the creation of microelectronic components, our systems are used in the advanced packaging of such components in applications such as flip chip, Fan out Wafer Level Packaging (FOWLP), and other wafer level packaging approaches. Our customers who manufacture these devices invest in our systems to develop next generation products and deliver more efficient, cost effective, and advanced technological solutions. We operate in a cyclical business environment, and our customers buying patterns are dependent upon industry trends. Our products are sold into multiple markets, and the following discussion focuses on the trends that most influence our business within each of those markets.

Advanced Packaging, MEMS & RF Filters

Advanced Packaging includes a portfolio of wafer-level assembly technologies that enable the miniaturization and performance improvement of electronic products, such as smartphones, smartwatches, and other mobile applications.

Demand for higher performance, increased functionality, smaller form factors, and lower power consumption in mobile devices, consumer electronics, and high performance computing is driving the adoption of advanced packaging technologies. Semiconductor Foundries (Foundries), Independent Device Manufacturers (IDMs) and Outsourced Semiconductor Assembly and Test (OSAT) companies are implementing multiple advanced packaging approaches including FOWLP, recently deployed in high-volume manufacturing, and Through Silicon Via (TSV) to enable stacked memory, 2.5D, and 3D packaging devices. This increasing demand trend in Advanced Packaging is encouraging as our Lithography and Precision Surface Processing (PSP) products enable the process steps for Advanced Packaging.

MEMS devices are used for an increasing number of applications, including accelerometers for automobile airbags, pressure sensors for medical uses, and gyroscopes for a variety of consumer products, such as gaming consoles and mobile devices.

One of the fastest growing MEMS applications has been RF filters for mobile devices, driven by increasingly complex wireless standards, the exponential growth of mobile data, and carrier aggregation. In order to address these growing demands, the number of discrete RF filters in an average smartphone is expected to double from 50 to 100 by 2020. These trends are positive for us, particularly for our PSP products, where our technology is enabling some of the most challenging process steps, as well as our Ion Beam Etch (IBE) and Molecular Beam Epitaxy (MBE) products, which are used to create Bulk Acoustic Wave (BAW) and Surface Acoustic Wave (SAW) RF filters.

LED Lighting, Display & Compound Semiconductor

LED Lighting technology has existed for more than 50 years; however, commercial adoption of LEDs was limited to niche applications until the most recent decade. In the early 1990 s, researchers developed a process utilizing Gallium Nitride (GaN) that created a low cost blue LED to produce white light. With that breakthrough, the LED industry started, and the number of applications for LEDs began to expand.

Since that time, the LED industry has experienced multiple growth cycles brought on by the adoption of LED technology for consumer and commercial applications. The first wave of LED growth was driven by mobile phones, which implemented the use of LED technology for display backlighting. The LED industry experienced its second period of rapid growth as LEDs were adopted for TV display backlighting. The adoption of LEDs for solid state, general lighting gave rise to a third wave of demand. There is a broader fourth wave of compound semiconductor growth including LEDs, driven by ROY LED applications, optical communication and industrial applications requiring laser diodes, 3D sensing vertical-cavity surface emitting lasers (VCSELs), micro-LED displays, 5G RF infrastructure adoption, and power electronics.

Our metal organic chemical vapor deposition (MOCVD) technology is at the core of the manufacturing process for GaN-based LEDs. We have benefited with each growth cycle, as LED producers invest in MOCVD process equipment to capture share in these markets. Demand for our equipment has historically been cyclical in nature, influenced by multiple factors, including: macroeconomic conditions; prices for LED chips; supply and demand dynamics; and our customers manufacturing plans. However, we expect the ongoing adoption of LED lighting to be a major driver in the need for additional MOCVD capacity over the next several years.

MOCVD technology is equally important in the manufacturing of red, orange, and yellow (ROY) LEDs, which are used increasingly for fine-pitch digital signage and automotive lighting applications. For these applications, our MOCVD technology is used to deposit highly uniform Arsenic Phosphide (AsP) films which create amber and red hues. AsP MOCVD technology is also used to produce multiple other devices in the photonics market such as infrared LEDs and VCSELs used for optical data communication and 3D sensing. In addition to film deposition, photonics manufacturers also employ cleaning and etching process steps. Our PSP wet etch and clean technologies provide such cleaning and processing capabilities to photonics customers.

The Display market refers to LEDs or micro LEDs used directly for displays. Additionally, organic light emitting diode (OLED) displays are part of the Display market and are used in applications such as digital signage, smartphones,

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wearable and tablet displays, and TVs. Our MOCVD systems and MBE source technology is ideally suited for the display market.

The Compound Semiconductor market refers to GaN-on-Silicon based power electronic devices and radio frequency devices. Our MOCVD and PSP technologies are crucial in the manufacturing of GaN-on-Silicon based power electronic devices. Global demand is increasing for advanced power electronics with greater energy efficiency, smaller footprints, higher operating temperatures, faster switching capabilities, and greater reliability. These devices support many needs, including more efficient IT servers, electrical motors, electric vehicles, wind turbines, and photovoltaic power inverters. While silicon-based transistors are widely used in power electronic devices today, GaN-on-Silicon based power electronics developed on MOCVD tools can potentially deliver higher performance (e.g., smaller power supply form factors, higher efficiency, and faster switching speeds). In addition to depositing the critical GaN layer with our MOCVD products, our PSP products address multiple etch and clean steps required to manufacture these advanced power electronics devices. In recent years, global industry leaders in power electronics have focused on research and development programs to commercialize this new technology. Device manufacturers will likely begin to transition from development to production of these devices over the next couple of years; we can benefit from this transition as our customers invest in process equipment to support this production ramp-up.

The Radio Frequency device portion of the Compound Semiconductor market is driven by demand for RF power amplifiers in mobile devices. Our PSP products are used for process steps such as metal lift off and photo resist strip for RF devices such as heterojunction bipolar transistors (HBTs) used in smartphones.

Front-End Semiconductor

Front-End Semiconductor refers to early process steps where transistors are formed directly on silicon. There are many different process steps in forming integrated circuits, such as Deposition, Etching, Masking, and Doping, where the microchips are created but still remain on the silicon wafer. Our Laser Spike Anneal products are well suited to assist our customers in the doping process. Our IBE for front-end semiconductor applications has been demonstrated in Spin Torque Transfer Magnetic Random Access Memory (STT-MRAM) applications. MRAM has many benefits over traditional random access memory such as its non-volatility, speed, endurance, and power consumption. Our Ion Beam Deposition (IBD) products are well suited for the manufacture of Extreme Ultraviolet (EUV) mask blanks. Our ability to precisely deposit high quality films with extremely low particulate levels make our IBD technology ideal for manufacturing defect-free EUV photomask blanks. The front-end semiconductor industry is expected to adopt EUV lithography to meet future device requirements. Future growth will depend on overall adoption of EUV technology. And lastly, our 3D inspection products are used for shape inspection of 3D topographies in memory and logic applications, which helps our customers improve their lithography and deposition processes.

Scientific & Industrial

The Scientific and Industrial markets include advanced materials research and a broad range of manufacturing applications including high-power fiber lasers, infrared detectors, thin film magnetic heads on HDDs, and optical coatings.

Our MBE systems are used by scientific research organizations and universities to drive new discoveries in the areas of materials science. MBE enables precise epitaxial crystal growth for a wide variety of materials, which supports the development of new performance materials used for emerging technologies. MBE technology is also used in the

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manufacturing of products such as high-power lasers and infrared sensors. Our tools create highly uniform Gallium-Arsenide (GaAs) or Indium-Phosphide (InP) film layers, which are critical to the performance of these devices. Our PSP products are also used in the manufacture of infrared sensors.

Our Ion Beam Deposition, Ion Beam Etch, Physical Vapor Deposition (PVD), and lapping and dicing tools are used in data storage applications, including HDDs that will continue to provide significant value for mass storage and will remain an important part of large capacity storage applications. This is especially true for data center applications where large volumes of data storage are required to serve an increasingly mobile population. In addition, our IBD tools are used to produce high quality optical films for multiple applications including laser mirrors, optical filters, and anti-reflective coatings. Our tools deposit thin layers of advanced materials on various substrates to alter how light is reflected and transmitted.

Our ALD tools are sold into a variety of Scientific & Industrial market applications such as optical, semi/nano-electronics, MEMS, nanostructures, and biomedical.

System products

Metal Organic Chemical Vapor Deposition Systems

We are the world s leading supplier of MOCVD systems. MOCVD production systems are used to make GaN-based devices (such as blue and green LEDs) and AsP-based devices (such as ROY LEDs), which are used in television and computer display backlighting, general illumination, large area signage, specialty illumination, power electronics, and many other applications. Our TurboDisc® EPIK® line of MOCVD systems enables cost per wafer savings for our customers with a combined advantage of best operating uptime, low maintenance costs, and best-in-class wafer uniformity and yield. In 2016, we introduced the TurboDisc K475i AsP MOCVD system, which offers best-in-class productivity and yields for ROY LEDs, infra-red LEDs, and high-efficiency triple junction photovoltaic solar cell applications. Our Propel PowerGaN MOCVD System (Propel) enables the development of highly-efficient GaN-based power electronic devices that have the potential to accelerate the industry s transition from research and development to high volume production. The Propel system offers 200mm technology and incorporates single-wafer reactor technology for outstanding film uniformity, yield, and device performance.

Advanced Packaging Lithography

We have a leading position in the Advanced Packaging lithography equipment market. The Advanced Packaging market is driven by the need for improved performance, reduced power consumption, and smaller geometries for mobile and automotive applications. In turn, these applications continue to demand increasingly complex packaging techniques from IDMs, Foundries, and OSATs. Our Advanced Packaging tools are designed to optimize productivity for leading-edge 200mm and 300mm Advanced Packaging applications by enabling extremely reliable, cost-effective, high-volume manufacturing solutions. Our best-in-class yield coupled with outstanding resolution and depth of focus addresses all leading edge requirements for Advanced Packaging applications such as redistribution layers (RDLs), Copper Pillar, Micro-Bump, FOWLP, interposers, and TSVs to provide the lowest cost of ownership in the industry.

Precision Surface Processing Systems (Wet Etch and Clean)

Our PSP systems offer single wafer wet etch, clean, and surface preparation solutions which target high growth segments in advanced packaging, MEMS, LEDs, and compound semiconductor markets. The WaferStorm platform is based on PSP s unique ImmJET technology, which provides improved performance at a lower cost of ownership than conventional wet bench-only or spray-only approaches. This highly flexible platform targets solvent based cleaning applications that require a significant level of process control and flexibility. The WaferEtch® platform provides highly uniform, selective etching with onboard end point detection for improved process control and yield in bumping applications. In addition, PSP has developed a state-of-the-art solution with the WaferEtch platform to address the

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requirements of TSV reveal, in which the backside of a wafer is thinned to reveal the copper interconnects. PSP s TSV technology offers a significant cost of ownership reduction compared with dry etch processing by replacing up to four separate process steps.

Laser Annealing Systems

The progression of Moore s law has led semiconductor manufacturers to implement a variety of material and process changes to overcome the technical hurdles related to shrinking of feature sizes in integrated circuits. Along with new materials and smaller dimensions have come new process challenges. One such challenge has been new constraints on thermal annealing processes. One example is the thermal annealing of dopants for activation, in order to form the transistor junction, critical to the function and performance of a complementary metal-oxide semiconductor (CMOS) logic integrated circuit. In this and other thermal process steps, traditional lamp-based annealing techniques have challenges meeting the thermal budget (time/temperature regime) required by new materials and designs. Our Laser Spike Anneal (LSA) systems meet the industry demand for millisecond time-scale annealing, heating the wafer up to temperatures just below the Silicon melting point over a range of ultra-short timeframes (microseconds to milliseconds), enabling thermal annealing solutions at the 65nm technology node and below. This advanced annealing technology provides solutions to the difficult challenge of fabricating ultra-shallow junctions and highly activated source/drain contacts at these advanced logic nodes. In addition, our proprietary hardware design enables outstanding temperature uniformity across the wafer and die, by minimizing the pattern-density effect, thus reducing absorption variations.

We have also developed a next generation melt anneal technology targeted for annealing advanced logic devices at 7nm and below. As FinFET devices scale below the 10nm node, achieving the performance targets has become a challenge. To continue the roadmap, the industry is looking at new materials and the use of thermal processes that require nanosecond time-scale thermal annealing with temperatures exceeding the melting point. To help address this concern we have developed a unique (and patented) approach to nanosecond-scale thermal annealing. Our design utilizes two lasers; a millisecond laser as a low thermal budget localized preheat and a nanosecond laser on top of the millisecond laser to

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raise the peak temperature to the melt temperature of the material being processed beyond silicon melt. Similar to LSA, the melt system architecture is targeted to reduce pattern effects and increase the process window. It is believed that nanosecond annealing will be required to meet the device targets at 7nm and below; the initial application being explored by customers is contact annealing aimed to improve reduce source/drain contact resistance, which has become a performance bottleneck at the most advanced FinFET nodes, and as devices continue to scale, we see the application space for our melt product expanding.

Ion Beam Etch and Deposition Systems

Our NEXUS® IBD systems utilize ion beam technology to deposit precise layers of thin films. IBD systems deposit high purity thin film layers and provide excellent uniformity and repeatability. Our NEXUS IBE systems utilize a charged particle beam consisting of ions to etch precise, complex features. The NEXUS systems may be included on our cluster system platform to allow either parallel or sequential deposition/etch processes. These systems are used primarily by data storage, semiconductor, and telecommunications device manufacturers in the fabrication of discrete and integrated microelectronic devices.

Our SPECTOR® Ion Beam Sputtering system was developed for high precision coatings and offers manufacturers state of the art optical thickness monitoring, improved productivity, and target material utilization, for cutting-edge optical interference coating applications. We also provide a broad array of ion beam sources. These technologies are applicable in the HDD industry as well as for optical coatings and other end markets.

Molecular Beam Epitaxy Systems

Molecular beam epitaxy is the process of precisely depositing epitaxially-aligned atomically-thin crystalline layers, or epilayers, of elemental materials onto a substrate in an ultra-high vacuum environment. We are the leading supplier of MBE systems worldwide.

Our MBE systems, sources, and components are used to develop and manufacture compound semiconductor devices in a wide variety of applications such as high-power fiber lasers, infrared detectors, mobile phones, radar systems, high efficiency solar cells, and basic materials science research. For many compound semiconductors, MBE is the critical step of the fabrication process, ultimately determining device functionality and overall performance. We offer a full complement of MBE systems customized for the specific end application depositing on single 3 substrates up to fully automated production systems that can deposit on seven 6 substrates simultaneously. The GENxplor® MBE system creates high quality epitaxial layers and is ideal for cutting-edge research on a wide variety of materials including gallium arsenide, antimonides, nitrides, and oxides. The GENxcel® MBE system extends the same performance of the GENxplor to 4 diameter substrates.

3D Wafer Inspection Systems

As the semiconductor industry continues its pursuit of increased productivity and performance by shrinking device dimensions along Moore s law, manufacturers are running into bottlenecks limited by fundamental materials properties and lithographic resolution. The industry has opted for 3D integration schemes to circumvent these limitations (e.g. Vertical NAND, HAR DRAM, Logic FinFET). The high volume manufacturing ramp of these 3D schemes requires low cost, high performance 3D wafer inspection systems. The Superfast 3D Wafer Inspection System is a Coherent Gradient Sensing (CGS) based 3D wafer inspection system that enables the wafer fab to inspect the patterned wafer at key processing steps, enabling statistical process control as well as advanced process control (APC) for topography, displacement, and stress.

Atomic Layer Deposition and Other Deposition Systems

ALD is a thin-film deposition method in which a film is deposited on a substrate uniformly with precise control down to the atomic scale. Veeco offers a full suite of ALD systems for non-semiconductor front-end production applications across a wide range of markets and applications such as energy, optical, electronics, MEMS, nanostructures, and biomedical.

Other deposition systems including Physical Vapor Deposition, Diamond-Like Carbon Deposition, and Chemical Vapor Deposition Systems. In addition, our Optium® products generally are used in back-end applications in data storage fabrication facilities where TFMHs or sliders are fabricated. This equipment includes lapping tools, which enable precise material removal within three nanometers, which is necessary for advanced TFMHs. We also manufacture dicing tools that cut wafers into row bars and TFMHs.

Sales and Service

We sell our products and services worldwide primarily through various strategically located facilities in the United States, Europe, and the Asia-Pacific region. We believe that our customer service organization is a significant factor in our success. We provide service and support on a warranty, service contract, and an individual service-call basis. We believe that offering timely support creates stronger relationships with customers and provides us with a significant competitive advantage. Revenue from the sales of parts, upgrades, service, and support represented approximately 27%, 28%, and 22% of our net sales for the years ended December 31, 2017, 2016, and 2015, respectively. Parts and upgrade sales represented approximately 22%, 22%, and 18% of our net sales for those years, respectively, and service and support sales were 5%, 6%, and 4% respectively.

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Customers

We sell our products to many of the world s LED, MEMS, OSAT, HDD, and semiconductor manufacturers, as well as research centers and universities. We rely on certain principal customers for a significant portion of our sales. Sales to OSRAM Opto Semiconductors accounted for more than 10% of our total net sales for both 2017 and 2016; sales to San an Optoelectronics Co. and KAISTAR Lighting (Xiamen) Co. each accounted for more than 10% of our total net sales in 2015. If any principal customer discontinues its relationship with us or suffers economic difficulties, our business prospects, financial condition, and operating results could be materially and adversely affected.

Research and Development

Our research and development functions are focused on the timely creation of new products and enhancements to existing products, both of which are necessary to maintain our competitive position. We collaborate with our customers to align our technology and product roadmaps to customer requirements. Our research and development activities take place at our facilities in San Jose, California; Waltham, Massachusetts; St. Paul, Minnesota; Somerset, New Jersey; Plainview, New York; Horsham, Pennsylvania; and Singapore.

Our research and development expenses were approximately $82.0 million, $81.0 million, and $78.5 million, or approximately 17%, 24%, and 16% of net sales for the years ended December 31, 2017, 2016, and 2015, respectively. These expenses consisted primarily of salaries, project materials, and other product development and enhancement costs.

Suppliers

We outsource certain functions to third parties, including the manufacturing of some of our MOCVD and Ultratech systems. While we primarily rely on one supplier for the manufacturing of these systems, we maintain a minimum level of internal manufacturing capability for these systems. Refer to Item 1A, Risk Factors, for a description of risks associated with our reliance on suppliers and outsourcing partners.

Backlog

Our backlog consists of orders for which we received a firm purchase order, a customer-confirmed shipment date within twelve months, and a deposit when required. Our backlog increased to $334.3 million at December 31, 2017 from $209.2 million at December 31, 2016. During the year ended December 31, 2017, we increased backlog by approximately $41.6 million relating to backlog acquired from Ultratech, while adjusting for a decrease in backlog of approximately $2.0 million relating to orders that no longer met our booking criteria.

Competition

In each of the markets that we serve, we face substantial competition from established competitors, some of which have greater financial, engineering, and marketing resources than we do, as well as from smaller competitors. In addition, many of our products face competition from alternative technologies, some of which are more established than those used in our products. Significant factors for customer selection of our tools include system performance, accuracy, repeatability, ease of use, reliability, cost of ownership, and technical service and support. None of our competitors compete with us across all of our product lines.

Our principal competitors include: Advanced Micro-Fabrication Equipment (AMEC); Aixtron; Canon Anelva; Grand Plastics Technology Corporation; Leybold Optics; Mattson Technology; Riber; Rudolph Technologies; Scientech; Screen Semiconductor Solutions; and Shanghai Micro Electronics Equipment.

Intellectual Property

Our success depends in part on our proprietary technology, and we have over 800 patents in the United States and other countries and have additional applications pending for new inventions.

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We have patents and exclusive and non-exclusive licenses to patents owned by others covering certain of our products, which we believe provide us with a competitive advantage. We have a policy of seeking patents on inventions concerning new products and improvements as part of our ongoing research, development, and manufacturing activities. We believe that there is no single patent or exclusive or non-exclusive license to patents owned by others that is critical to our operations, as the success of our business depends primarily on the technical expertise, innovation, customer satisfaction, and experience of our employees.

Refer to Item 1A, Risk Factors, for a description of risks associated with intellectual property.

Employees

At December 31, 2017 we had 1,014 employees, of which there were 280 in manufacturing and testing, 99 in sales and marketing, 214 in service and product support, 260 in engineering and research and development, and 161 in information technology, general administration, and finance. The success of our future operations depends on our ability to recruit and retain engineers, technicians, and other highly skilled professionals who are in considerable demand. We feel that we have adequate programs in place to attract, motivate, and retain our employees. We monitor industry practices to make sure that our compensation and employee benefits remain competitive. We believe that our employee relations are good. Refer to Item 1A, Risk Factors, for a description of risks associated with employee retention and recruitment.

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Financial Information about Segments and Geographic Areas

We operate as a single reportable segment and report our financial results in four geographic regions: the United States; China; Europe, Middle East, and Africa (EMEA); and Rest of World (ROW). Refer to Note 18, Segment Reporting and Geographic Information, in the Notes to the Consolidated Financial Statements for financial data pertaining to our geographic operations. Refer to Item 1A, Risk Factors, for a description of risks relating to our geographic operations.

Available Information

Our corporate website address is www.veeco.com. All filings we make with the Securities and Exchange Commission (SEC), including our Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q, our Current Reports on Form 8-K, our proxy statements and any amendments thereto filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available for free in the Investor Relations section of our website as soon as reasonably practicable after they are filed with or furnished to the SEC. Our SEC filings are available to be read or copied at the SEC s Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Information about the operation of the Public Reference Room can be obtained by calling the SEC at 1-800-SEC-0330. Our filings can also be obtained for free on the SEC s website at www.sec.gov. The reference to our website address does not constitute inclusion or incorporation by reference of the information contained on our website in this Form 10-K or other filings with the SEC, and the information contained on our website is not part of this document.

Item 1A. Risk Factors

Key Risk Factors That May Impact Future Results

Stockholders should carefully consider the risk factors described below. Any of these factors, many of which are beyond our control, could materially and adversely affect our business, financial condition, operating results, cash flow, and stock price.

Unfavorable market conditions may adversely affect our operating results.

Conditions of the markets in which we operate are volatile and have in the past, and may in the future, deteriorate significantly. We have experienced and may continue to experience customer rescheduling and, to a lesser extent, cancellations of orders for our products. Adverse market conditions relative to our products could result in:

- reduced demand for our products;

- rescheduling and cancellations of orders for our products, resulting in negative backlog adjustments;
- increased price competition leading to lower margin for our products;
- increased competition from sellers of used equipment or lower-priced alternatives to our products;
- increased inventory obsolescence;
- an increase in uncollectable amounts due from our customers resulting in increased reserves for doubtful accounts and write-offs of accounts receivable;
- disruptions in our supply chain as we reduce our purchasing volumes and limit our contract manufacturing operations; and
- higher operating costs as a percentage of revenues.

If the markets in which we participate experience deteriorations or downturns, this could negatively impact our sales and revenue generation, margins, operating expenses, and profitability.

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We are exposed to the risks of operating a global business.

Most of our sales are to customers located outside of the United States, and we expect sales from non-U.S. markets to continue to represent a significant portion of our sales in the future. Our non-U.S. sales and operations are subject to risks inherent in conducting business outside the United States, many of which are outside our control including:

- political and social attitudes, laws, rules, regulations, and policies within countries that favor local companies over U.S. companies, including government-supported efforts to promote the development and growth of local competitors;

- differing legal systems and standards of trade which may not honor our intellectual property rights and which may place us at a competitive disadvantage;

- pressures from foreign customers and foreign governments for us to increase our operations and sourcing in the foreign country;

- multiple conflicting and changing governmental laws and regulations, including varying labor laws, tax regulations, import/export controls, changes to trade treaties, possible trade wars, and other trade barriers and uncertainties;

- reliance on various information systems and information technology to conduct our business, which may be vulnerable to cyberattacks by third parties or breached due to employee error, misuse, or other causes that could result in business disruptions, loss of or damage to intellectual property, transaction errors, processing inefficiencies, or other adverse consequences should our security practices and procedures prove ineffective;

- regional economic downturns, varying foreign government support, and unstable political environments;

- difficulties in managing a global enterprise, including staffing, managing distributors and representatives, and repatriating cash;

- longer sales cycles and difficulties in collecting accounts receivable; and

- different customs and ways of doing business.

These challenges, many of which are associated with sales into the Asia-Pacific region, have had and may continue to have a material adverse effect on our business.

We may be unable to effectively enforce and protect our intellectual property rights.

Our success depends in part upon the protection of our intellectual property rights. We rely primarily on patent, copyright, trademark, and trade secret laws, as well as nondisclosure and confidentiality agreements and other methods, to protect our proprietary information, technologies, processes, and brand identity. We own various U.S. and international patents and have additional pending patent applications relating to certain of our products and technologies. The process of seeking patent protection is lengthy and expensive, and we cannot be certain that pending or future applications will actually result in issued patents or that issued patents will be of sufficient scope or strength to provide meaningful protection or commercial advantage. In addition, our intellectual property rights may be circumvented, invalidated, or rendered obsolete by the rapid pace of technological change, or through efforts by others to reverse engineer our products or design around patents that we own. Policing unauthorized use of our products and technologies is difficult and time consuming and the laws of other countries may not protect our proprietary rights as fully or as readily as U.S. laws. Given these limitations, our success will depend in part upon our ability to innovate ahead of our competitors.

In addition, our outsourcing strategy requires that we share certain portions of our technology with our outsourcing partners, which poses additional risks of infringement and trade secret misappropriation. Infringement of our rights by a third party, possibly for purposes of developing and selling competing products, could result in uncompensated lost market and revenue opportunities. Similar exposure could result in the event that former employees seek to compete with us through their unauthorized use of our intellectual property and proprietary information. We cannot be certain that the protective steps and measures we have taken will prevent the misappropriation or unauthorized use of our proprietary information and technologies, nor can we be certain that applicable intellectual property laws, regulations, and policies will not be changed in a manner detrimental to the sale or use of our products.

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Litigation may be required to enforce our intellectual property rights, protect our trade secrets, and to determine the validity and scope of proprietary rights of others. As a result of any such litigation, we could lose our ability to enforce one or more patents, incur substantial costs, and jeopardize relationships with current or prospective customers or suppliers. Any action we take to enforce or defend our intellectual property rights could absorb significant management time and attention, and could otherwise negatively impact our operating results.

We may be subject to claims of intellectual property infringement by others.

We receive communications from time to time from other parties asserting the existence of patent or other rights which they believe cover certain of our products. We also periodically receive notice from customers who believe that we are required to indemnify them for damages they may incur related to infringement claims made against these customers by third parties. Our customary practice is to evaluate such assertions and to consider the available alternatives, including whether to seek a license, if appropriate. However, we cannot ensure that licenses can be obtained or, if obtained, will be on acceptable terms or that costly litigation or other administrative proceedings will not occur. If we are not able to resolve a claim, negotiate a settlement of the matter, obtain necessary licenses on commercially reasonable terms, or successfully prosecute and defend our position, our business, financial condition and results of operations could be materially and adversely affected.

We may be unable to successfully integrate the Ultratech business and may not realize the anticipated benefits of the acquisition.

On May 26, 2017, we completed the acquisition of Ultratech, Inc., merging two companies that formerly operated as independent public companies. Significant management attention and resources have been devoted, and will need to be devoted, to integrating our respective business operations and practices. The success of our acquisition of Ultratech will depend in part on our ability to realize the anticipated benefits and revenue and cost synergies associated with this business combination, which is subject to the following risks, among others:

- whether the combined businesses will perform as expected;

- the possibility that we paid more for the acquisition of Ultratech than the value we will derive from the acquisition;

- complexities associated with managing the combined businesses, including difficulties addressing possible differences in corporate cultures and management philosophies and the challenge of integrating complex systems, technology, networks, and other assets of each of the companies in a seamless manner that minimizes any adverse impact on customers, suppliers, employees, and other business partners;

- the potential loss of customers and strategic partners who may not wish to continue their relationships with the combined company; and

- potential unknown liabilities and unforeseen or unanticipated costs.

In connection with the accounting for the Ultratech acquisition, we recorded goodwill and other intangible assets of approximately $539 million. Under U.S. generally accepted accounting principles, we must assess, at least annually and potentially more frequently, whether the value of the goodwill and other indefinite-lived intangible assets have been impaired. Finite-lived intangible assets will be assessed for impairment in the event of an impairment indicator. Any reduction or impairment in the value of goodwill and other intangible assets will result in a charge against earnings, which could materially and adversely affect our results of operations and financial performance.

The price of our common shares is volatile and could further decline.

The stock market in general and the market for technology stocks in particular has experienced significant volatility. The trading price of our common shares has declined, and could continue to decline, independent of the overall market, and shareholders could lose all or a substantial part of their investment. The market price of our common shares could fluctuate significantly in response to several factors, including among others:

- difficult macroeconomic conditions, unfavorable geopolitical events, and general stock market uncertainties, such as those occasioned by a global liquidity crisis and a failure of large financial institutions;

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- the emergence of competitors and competing technologies;
- receipt of large orders or cancellations of orders for our products;
- issues associated with the performance and reliability of our products;
- actual or anticipated variations in our results of operations;
- announcements of financial developments or technological innovations;
- our failure to meet the performance estimates of investment research analysts;
- changes in recommendations and financial estimates by investment research analysts;
- strategic transactions, such as acquisitions, divestitures, and spin-offs;
- the commencement of, and rulings on, litigation and legal proceedings;
- the dilutive impact of our Convertible Senior Notes; and
- the occurrence of major catastrophic events.

As with many technology companies, the price of our common shares has fluctuated significantly in the past and is likely to be volatile in the future. Securities class action litigation is often brought against a company following periods of volatility in the market price of its securities. If similar litigation were to be pursued against us, it could result in substantial costs and a diversion of management s attention and resources, which could materially and adversely affect our financial condition, results of operations, and liquidity.

We face significant competition.

We face significant competition throughout the world, which may increase as certain markets in which we operate continue to evolve. Some of our competitors have greater financial, engineering, manufacturing, and marketing resources than us. Other competitors are located in regions with lower labor costs and other reduced costs of operation. In addition, our ability to compete in foreign countries against local manufacturers may be hampered by nationalism, social attitudes, laws, regulations, and policies within such countries that favor local companies over U.S. companies or that are otherwise designed to promote the development and growth of local competitors. Furthermore, we face competition from smaller emerging equipment companies whose strategy is to provide a portion of the products and services we offer, with a focused approach on innovative technology for specialized markets. New product introductions or enhancements by us or our competitors could cause a decline in sales or loss of market acceptance of our existing or prior generation products. Increased competitive pressure could also lead to intensified price competition resulting in lower margins.

To remain competitive, we may enter into strategic alliances with customers, suppliers, and other third parties to explore new market opportunities and possible technological advancements. These alliances may require significant investments of capital and other resources and often involve the exchange of sensitive confidential information. The success of these alliances may depend on factors over which we have limited control and will likely require ongoing cooperation and good faith efforts from our strategic partners. Strategic alliances are inherently subject to significant risks, and the inability to effectively manage these risks could materially and adversely affect our business and operating results.

We operate in industries characterized by rapid technological change.

Each of the industries in which we operate is subject to rapid technological change. Our ability to remain competitive depends on our ability to enhance existing products and develop and manufacture new products in a timely and cost effective manner and to accurately predict technology transitions. New product development commitments must be made well in advance of sales, and we must anticipate the future demand for products when selecting which development programs to fund and pursue. Our financial results depend on the successful introduction of new products, many of which require the achievement of increasingly stringent technical specifications. We may not be successful in selecting, developing, manufacturing, and marketing new products and new technologies or in enhancing our existing products. Our performance may be adversely affected if we are unable to accurately predict evolving market trends and related customer needs and to effectively allocate our resources among new and existing products and technologies.

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We are also exposed to potential risks associated with unexpected product performance issues. Our product designs and manufacturing processes are complex and could contain unexpected product defects, especially when products are first introduced. Unexpected product performance issues could result in significant costs and damages, including increased service and warranty expenses, the need to provide product replacements or modifications, reimbursement for damages caused by our products, product recalls, related litigation, product write-offs, and disposal costs. These costs could be substantial and our reputation could be harmed, resulting in a reduced demand for our products and a negative effect on our business, financial condition, and results of operations.

Our sales to manufacturers are highly dependent on sales of consumer electronics applications, which can experience significant volatility due to seasonal and other factors.

The demand for LEDs, HDDs, semiconductors, and other devices is highly dependent on sales of consumer electronics, such as televisions, computers, tablets, digital video recorders, smartphones, cell phones, and other mobile devices. Manufacturers of LEDs are among our largest customers and account for a substantial portion of our revenue. Factors that could influence the levels of spending on consumer electronic products include consumer confidence, access to credit, volatility in fuel and other energy costs, conditions in the residential real estate and mortgage markets, labor and healthcare costs, and other macroeconomic factors affecting consumer spending behavior. These and other economic factors have had and could continue to have a material adverse effect on the demand for our customers products and, in turn, on our customers demand for our products and services. Furthermore, manufacturers of LEDs have in the past overestimated their potential for market share growth. If this growth is overestimated, we may experience cancellations of orders in backlog, rescheduling of customer deliveries, obsolete inventory, and liabilities to our suppliers for products no longer needed.

In addition, the demand for our customers products can be even more volatile and unpredictable due to the possibility of competing technologies, such as flash memory as an alternative to HDDs. Unpredictable fluctuations in demand for our customers products or rapid shifts in demand from our customers products to alternative technologies could materially and adversely impact our future results of operations.

We have a concentrated customer base, located primarily in a limited number of regions, which operate in highly concentrated industries.

Our customer base continues to be highly concentrated. Orders from a relatively limited number of customers have accounted for, and likely will continue to account for, a substantial portion of our net sales, which may lead customers to demand pricing and other terms less favorable to us. Customer consolidation activity involving some of our largest customers could result in an even greater concentration of our sales in the future. Management changes at key customer accounts could result in a loss of future sales due to vendor preferences or other reasons and may introduce new challenges in managing customer relationships.

If a principal customer discontinues its relationship with us or suffers economic setbacks, our business, financial condition, and operating results could be materially and adversely affected. Our ability to increase sales in the future will depend in part upon our ability to obtain orders from new customers and we cannot be certain that we will be successful in these efforts. In addition, because a relatively small number of large manufacturers, many of whom are our customers, dominate the industries in which they operate, it may be especially difficult for us to replace these customers if we lose their business. A significant portion of orders in our backlog are orders from our principal customers.

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In addition, a substantial investment is required by customers to install and integrate capital equipment into a production line. As a result, once a manufacturer has selected a particular vendor to supply capital equipment, the manufacturer will often attempt to consolidate its other capital equipment requirements with the same vendor. Accordingly, if a customer selects a competitor s product over ours, we could experience difficulty selling to that customer for a significant period of time.

Furthermore, we do not have long-term contracts with our customers. As a result, our agreements with our customers do not provide assurance of future sales, and we are exposed to competitive price pressures on new orders we attempt to obtain.

Our customer base is also highly concentrated in terms of geography, and the majority of our sales are to customers located in a limited number of countries. Dependence upon sales emanating from a limited number of regions increases our risk of exposure to local difficulties and challenges, such as those associated with regional economic downturns, political instability, fluctuating currency exchange rates, natural disasters, social unrest, pandemics, terrorism, and acts of war. Our reliance upon customer demand arising primarily from a limited number of countries could materially and adversely impact our future results of operations.

A further reduction or elimination of foreign government subsidies and economic incentives may adversely affect the future order rate for our MOCVD equipment.

We generate a significant portion of our revenue in China. In recent years, the Chinese government has provided various incentives to encourage the development of the LED industry, including subsidizing a portion of the purchase cost of MOCVD equipment. These subsidies have enabled and encouraged certain customers in this region to purchase more of our MOCVD equipment than these customers might have purchased without these subsidies. The availability and amount of these subsidies has been reduced over time and may end at some point in the future. A further reduction or elimination of these incentives may result in a reduction in future orders for our MOCVD equipment in this region, which could materially and adversely affect our business, financial condition, and results of operations. In addition, in an effort to promote Chinese competition, the Chinese government could impose restrictions on the receipt of these subsidies, including requirements that the purchased equipment be sourced locally.

A related risk pertains to the fact that many customers use or had planned to use Chinese government subsidies, in addition to other incentives from the Chinese government, to build new manufacturing facilities or to expand existing manufacturing facilities. Delays in the start-up of these facilities or the cancellation of construction plans altogether, together with other related issues pertaining to customer readiness, could adversely impact the timing of our revenue recognition, could result in order cancellations, a reduction in our order backlog, and could have other negative effects on our business, financial condition, and results of operations.

The cyclicality of the industries we serve directly affects our business.

Our business depends in large part upon the capital expenditures of manufacturers in the LED, mobile communication, data storage, and other device markets. We are subject to the business cycles of these industries, the timing, length, and volatility of which are difficult to predict. These industries have historically been highly cyclical and have experienced significant economic downturns in the last decade. As a capital equipment provider, our revenue depends in large part on the spending patterns of these customers, who often delay expenditures or cancel or reschedule orders in reaction to variations in their businesses or general economic conditions. In downturns, we must be able to quickly and effectively align our costs with prevailing market conditions, as well as motivate and retain key employees. However, because a portion of our costs are fixed, our ability to reduce expenses quickly in response to revenue shortfalls may be limited. Downturns in one or more of these industries have had and will likely have a material adverse effect on our business, financial condition, and operating results. Alternatively, during periods of rapid growth, we must be able to acquire and develop sufficient manufacturing capacity to meet customer demand and attract, hire, assimilate, and retain a sufficient number of qualified people. Our net sales and operating results may be negatively affected if our customers experience economic downturns or slowdowns in their businesses.

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The timing of our orders, shipments, and revenue recognition may cause our quarterly operating results to fluctuate significantly.

We derive a substantial portion of our net sales in any fiscal period from the sale of a relatively small number of high-priced systems. As a result, the timing of recognition of revenue for a single transaction could have a material effect on our sales and operating results for a particular fiscal period. As is typical in our industry, orders, shipments, and customer acceptances often occur during the last few weeks of a quarter. As a result, a delay of only a week or two can impact which period revenue is reported and can cause volatility in our revenue for a given reporting period. Our quarterly results have fluctuated significantly in the past and we expect this trend to continue. If our orders, shipments, net sales, or operating results in a particular quarter do not meet expectations, our stock price may be adversely affected as well.

Our sales cycle is long and unpredictable.

Historically, we have experienced long and unpredictable sales cycles (the period between our initial contact with a potential customer and the time that we recognize revenue for resulting sales to that customer). Our sales cycle can exceed twelve months. The timing of an order often depends on our customer s capital expenditure budget, over which we have no control. In addition, the time it takes us to build a product to customer specifications typically ranges from three to six months. When coupled with the fluctuating amount of time required for shipment, installation, and final acceptance, our sales cycles often vary widely, and these variations can cause fluctuations in our operating results. As a result of our lengthy sales cycles, we may incur significant research, development, selling, general, and administrative expenses before we generate revenue for these products. We may never generate the anticipated revenue if a customer cancels or otherwise changes its purchase plans, which could have an adverse effect on our business.

Our backlog is subject to customer cancellation or modification which could result in decreased sales, increased inventory obsolescence, and liabilities to our suppliers for products no longer needed.

Customer purchase orders may be cancelled or rescheduled by the customer, sometimes with limited or no penalties, which may result in increased or unrecoverable costs for the Company. We adjust our backlog for such cancellations, contract modifications, and delivery delays that result in a delivery period in excess of one year, among other items. A downturn in one or more of our businesses could result in an increase in order cancellations and postponements.

We write-off excess and obsolete inventory based on historical trends, future usage forecasts, and other factors including the amount of backlog we have on hand. If our backlog is canceled or modified, our estimates of future product demand may prove to be inaccurate, in which case we may have understated the write-off required for excess and obsolete inventory. In the future, if we determine that our inventory is overvalued, we will be required to recognize associated costs in our financial statements at the time of such determination. In addition, we place orders with our suppliers based on our customers orders. If our customers cancel their orders with us, we may not be able to cancel our orders with our suppliers. Any such charges could be materially adverse to our results of operations and financial condition.

Our failure to estimate customer demand accurately could result in inventory obsolescence, liabilities to our suppliers for products no longer needed, and manufacturing interruptions or delays which could affect our ability to meet customer demand.

The success of our business depends in part on our ability to accurately forecast and supply equipment and services that meet the rapidly changing technical and volume requirements of our customers. To meet these demands, we depend on the timely delivery of parts, components, and subassemblies from our suppliers. Uncertain worldwide economic conditions and market instabilities make it difficult for us (and our customers) to accurately forecast future product demand. If actual demand for our products is different than expected, we may purchase more or fewer parts than necessary or incur costs for canceling, postponing, or expediting delivery of parts. If we overestimate the demand for our products, excess inventory could result which could be subject to heavy price discounting, which could become obsolete, and which could subject us to liabilities to our suppliers for products no longer needed. Similarly, we may be harmed in the event that our competitors overestimate the demand for their products and engage in heavy price discounting practices as a result. In addition, the volatility of demand for capital equipment increases capital and other risks for companies in our supply chain.

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Furthermore, certain key parts may be subject to long lead-times or may be obtainable only from a single supplier or limited group of suppliers, and some sourcing and assembly is provided by suppliers located in countries other than the United States. We may experience significant interruptions in our manufacturing operations, delays in our ability to timely deliver products or services, increased costs, or customer order cancellations as a result of:

- the failure or inability of our suppliers to timely deliver quality parts;
- volatility in the availability and cost of materials;
- difficulties or delays in obtaining required import or export approvals;
- information technology or infrastructure failures;
- natural disasters such as earthquakes, tsunamis, floods, or storms; or
- other causes such as regional economic downturns, pandemics, political instability, terrorism, or acts of war, that could result in delayed deliveries, manufacturing inefficiencies, increased costs, or order cancellations.

In addition, in the event of an unanticipated increase in demand for our products, our need to rapidly increase our business and manufacturing capacity may be limited by working capital constraints of our suppliers, which may cause or exacerbate interruptions in our manufacturing and supply chain operations. Any or all of these factors could materially and adversely affect our business, financial condition, and results of operations.

Our failure to successfully manage our outsourcing activities or failure of our outsourcing partners to perform as anticipated could adversely affect our results of operations.

To better align our costs with market conditions, increase the percentage of variable costs relative to total costs, and to increase productivity and operational efficiency, we have outsourced certain functions to third parties, including the manufacture of several of our systems. While we maintain some level of internal manufacturing capability for these systems, we rely heavily on our outsourcing partners to perform their contracted functions to allow us flexibility to adapt to changing market conditions, including periods of significantly diminished order volumes. If our outsourcing partners do not perform as required, or if our outsourcing model does not allow us to realize the intended cost savings and flexibility, our results of operations (and those of our third party providers) may be adversely affected. Disputes and possibly litigation involving third party providers could result and we could suffer damage to our reputation. Dependence on contract manufacturing and outsourcing may also adversely affect our ability to bring new products to market. Although we attempt to select reputable providers, it is possible that one or more of these providers could fail to perform as we expect. If we do not effectively manage our outsourcing strategy or if third party providers do not perform as anticipated, we may not realize the benefits of productivity improvements and we may experience operational difficulties, increased costs, manufacturing and installation interruptions or delays, inefficiencies in the structure and operation of our supply chain, loss of intellectual property rights, quality issues, increased product time-to-market, and an inefficient allocation of our human resources, any or all of which could materially and adversely affect our business, financial condition, and results of operations.

We rely on a limited number of suppliers, some of whom are our sole source for particular components.

Certain of the parts, components, and sub-assemblies included in our products are obtained from a single source or a limited group of suppliers. Our inability to develop alternative sources, as necessary, could result in a prolonged interruption in our ability to supply related products, a failure on our part to meet the demands our customers, and a significant increase in the price of related products, which could adversely affect our business, financial condition, and results of operations.

Our inability to attract, retain, and motivate employees could have a material adverse effect on our business.

Our success depends in part upon our ability to attract, retain, and motivate employees, including those in executive, managerial, finance, engineering, and marketing positions, as well as highly skilled and qualified technical personnel. Attracting, retaining, and motivating such qualified personnel may be difficult due to challenging industry conditions, competition for such personnel by other technology companies, consolidations and relocations of operations, and workforce reductions, and there can be no assurance that we will be successful in recruiting or retaining key personnel. We have entered

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into employment agreements with certain key personnel but our inability to attract, retain, and motivate key personnel could have a material adverse effect on our business, financial condition, and results of operations.

We are exposed to risks associated with business combinations, acquisitions, and strategic investments.

We have completed several significant acquisitions and investments in the past and we will consider new opportunities in the future. Acquisitions and investments involve numerous risks, many of which are unpredictable and beyond our control, including the following:

- difficulties and increased costs in integrating the personnel, operations, technologies, and products of acquired companies;
- diversion of management s attention and disruption of ongoing businesses;
- the inability to complete proposed transactions as anticipated, resulting in obligations to pay professional and other expenses, including any applicable termination fees;
- potential loss of key employees of acquired companies, especially if a relocation or change in responsibilities is involved;
- difficulties in managing geographically dispersed operations in a cost effective manner;
- the failure to realize expected synergies;
- unknown, underestimated, and undisclosed commitments or liabilities;
- increased amortization expenses relating to intangible assets; and

- other adverse effects on our business, including the potential impairment and write-down of amounts capitalized as intangible assets and goodwill as part of the acquisition, as a result of such matters as technological advancements or worse-than-expected performance by the acquired company.

As discussed above with respect to our recent acquisition of Ultratech, our inability to effectively manage these risks could materially and adversely affect our business, financial condition, and results of operations. In addition, if we issue equity securities to pay for an acquisition or investment, the ownership percentage of our then-current shareholders would be reduced and the value of the shares held by these shareholders could be diluted, which could adversely affect the price of our stock. If we use cash to pay for an acquisition or investment, the payment could significantly reduce the cash that would be available to fund our operations or other purposes, which could have a negative effect on our business.

We may be unable to obtain required export licenses for the sale of our products.

Products which are either manufactured in the United States or based on U.S. technology are subject to the U.S. Export Administration Regulations (EAR) when exported to and re-exported from international jurisdictions, in addition to the local jurisdiction s export regulations applicable to individual shipments. Currently, our MOCVD, MBE, and certain other systems and products are controlled for export under the EAR. Licenses or proper license exceptions may be required for the shipment of our products to certain customers or countries. Obtaining an export license or determining whether an export license exception exists often requires considerable effort by us and cooperation from the customer, which can add time to the order fulfillment process. We may be unable to obtain required export licenses or unable to qualify for export license exceptions and, as a result, we may be unable to export products to our customers. The administrative processing, potential delay and risk of ultimately not obtaining required export approvals pose a particular disadvantage to us relative to our non-U.S. competitors who are not required to comply with U.S. export controls. Non-compliance with the EAR or other applicable export regulations could result in a wide range of penalties including the denial of export privileges, fines, criminal penalties, and the seizure of commodities. In the event that an export regulatory body determines that any of our shipments violate applicable export regulations, we could be fined significant sums and our export capabilities could be restricted, which could have a material adverse impact on our business.

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Our operating results may be adversely affected by tightening credit markets.

As a global company with worldwide operations, we are subject to volatility and adverse consequences associated with economic downturns in different parts of the world. In the event of a downturn, many of our customers may delay or further reduce their purchases of our products and services. If negative conditions in the credit markets prevent our customers from obtaining credit or necessary financing, product orders in these channels may decrease, which could result in lower revenue. In addition, we may experience cancellations of orders in backlog, rescheduling of customer deliveries, and attendant pricing pressures. If our suppliers face challenges in obtaining credit, in selling their products, or otherwise in operating their businesses, their ability to continue to supply materials to us may be negatively affected.

In addition, we finance some of our sales through trade credit. In addition to ongoing credit evaluations of our customers financial condition, we seek to mitigate our credit risk by obtaining deposits and letters of credit on certain of our sales arrangements. We could suffer significant losses if a customer whose accounts receivable we have not secured fails or is otherwise unable to pay us, or if financial institutions providing letters of credit become insolvent. A loss in collections on our accounts receivable would have a negative impact on our financial condition and results of operations.

We may be exposed to liabilities under the Foreign Corrupt Practices Act and other similar laws.

We are subject to the Foreign Corrupt Practices Act of 1977 (FCPA) and other laws that prohibit improper payments or offers of payments to foreign government officials, as defined by the statute, for the purpose of obtaining or retaining business. In addition, many of our customers have policies limiting or prohibiting us from providing certain types or amounts of entertainment, meals, or gifts to their employees. It is our policy to implement safeguards to discourage these practices by our employees and representatives. However, our safeguards may prove to be ineffective and our employees, consultants, sales agents, or distributors may engage in conduct for which we may be held responsible. In addition, we may acquire a company that has engaged in unlawful conduct in the past, and be held responsible for this conduct through successor liability principles. Violations of the FCPA or similar laws or similar customer policies may result in severe criminal or civil sanctions or the loss of supplier privileges to a customer and we may be subject to other liabilities, which could negatively affect our business, financial condition, and results of operations.

We are subject to internal control evaluations and attestation requirements of Section 404 of the Sarbanes-Oxley Act and any delays or difficulties in satisfying these requirements or negative reports concerning our internal controls could adversely affect our future results of operations and our stock price.

Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, we must include in our Annual Report on Form 10-K a report by management on the effectiveness of our internal control over financial reporting. Ongoing compliance with this requirement is complex, costly, time-consuming, and is subject to significant judgment. If our internal controls are ineffective or if our management does not timely assess the adequacy of such internal controls, our ability to file timely and accurate periodic reports may be impeded. Any delays in filing may cause us to face the following risks and concerns, among others:

- concern on the part of our customers, partners, investors, and employees about our financial condition and filing delay status, including the potential loss of business opportunities;

- significant time and expense required to complete delayed filings and the distraction of our senior management team and board of directors as we work to complete delayed filings;

- investigations by the SEC and other regulatory authorities of the Company and our management;

- limitations on our ability to raise capital;

- suspension or termination of our stock listing on The NASDAQ Stock Market and the removal of our stock as a component of certain stock market indices; and

- general reputational harm.

Any or all of the foregoing could result in the commencement of stockholder lawsuits against the Company. Any such litigation, as well as any proceedings that could arise as a result of a filing delay and the circumstances which gave rise to it, may be time consuming and expensive, may divert management attention from the conduct of our business, could have a material adverse effect on our business, financial condition, and results of operations, and may expose us to costly indemnification obligations to current or former officers, directors, or other personnel, regardless of the outcome of such matters, which may not be adequately covered by insurance.

Changes in accounting pronouncements or taxation rules or practices may adversely affect our financial results.

Changes in accounting pronouncements or taxation rules or practices can have a significant effect on our reported results. New accounting pronouncements and taxation rules can have a material impact on effective tax rates, results of operations, and our financial condition. On December 22, 2017, President Trump signed into law the statute commonly referred to as the Tax Cuts and Jobs Act (2017 Tax Act), which makes broad and complex changes to the U.S. tax code. As we collect and prepare necessary data, and interpret the 2017 Tax Act and any additional guidance issued by the IRS or other standard-setting bodies, we may make adjustments to the provisional amounts in accordance with Staff Accounting Bulletin No. 118 (SAB 118), which provides SEC staff guidance for the application of ASC 740 in the reporting period in which the 2017 Tax Act was signed into law. This change could materially affect our financial position and tax attributes carryforward. In addition, varying interpretations of accounting pronouncements or taxation practices, and the questioning of our current or past practices (such as those associated with our transfer pricing), may adversely affect our reported financial results.

Our income taxes may change.

We are subject to income tax on a jurisdictional or legal entity basis and significant judgment is required in certain instances to allocate our taxable income to a jurisdiction and to determine the related income tax expense and benefits. Losses in one jurisdiction generally may not be used to offset profits in other jurisdictions. As a result, changes in the mix of our earnings (or losses) between jurisdictions, among other factors, could alter our overall effective income tax rate, possibly resulting in significant tax rate increases.

We are regularly audited by various tax authorities. Income tax audit assessments or changes in tax laws, regulations, or other interpretations may result in increased tax provisions which could materially affect our operating results in the period or periods in which such determinations are made or changes occur.

In addition, our effective tax rate could increase if we determine that it is no longer more likely than not that we are able to realize our remaining net deferred tax assets, if we are unable to generate sufficient future taxable income in certain jurisdictions, or if we are otherwise required to increase our valuation allowances against our deferred tax assets.

We may be required to take additional impairment charges on assets.

We are required to assess goodwill and indefinite-lived intangible assets annually for impairment, or on an interim basis whenever certain events occur or circumstances change, such as an adverse change in business climate or a decline in the overall industry, that would more likely than not reduce the fair value below its carrying amount. We are also required to test our long-lived assets, including acquired intangible assets and property, plant, and equipment, for recoverability and impairment whenever there are indicators of impairment such as an adverse change in business climate.

As part of our long term strategy, we may pursue future acquisitions of other companies or assets which could potentially increase our assets. Adverse changes in business conditions could materially impact our estimates of future operations and result in impairment charges to these assets. A significant decline in the market price of our common stock could indicate a decline in the fair value of our reporting unit such that goodwill becomes impaired. If our assets are impaired, our financial condition and results of operations could be materially and adversely affected.

We have indebtedness in the form of convertible senior notes which could adversely affect our financial position, prevent us from implementing our strategy, and dilute the ownership interest of our existing shareholders.

In January of 2017, we issued $345 million of 2.70% Convertible Senior Notes due 2023 (Convertible Senior Notes). The Convertible Senior Notes are convertible into Company common stock at an initial conversion rate of 24.98 shares of Company common stock per $1,000 principal amount of the Convertible Senior Notes. The Company is obligated to repurchase the Convertible Senior Notes upon the occurrence of certain events described in the indenture relating to the Convertible Senior Notes. The degree to which we are leveraged could have negative consequences, including but not limited to the following:

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- we may be more vulnerable to economic downturns, less able to withstand competitive pressures, and less flexible in responding to changing business and economic conditions;

- our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions, general corporate, and other purposes may be limited;

- a substantial portion of our cash flows from operations in the future may be required for the payment of the principal amount of our existing indebtedness when it becomes due; and

- we may elect to make cash payments upon any conversion of the Convertible Senior Notes, which would reduce our cash on hand.

Our ability to meet our payment obligations under the Convertible Senior Notes depends on our ability to generate significant cash flow in the future. This, to some extent, is subject to general economic, financial, competitive, legislative, regulatory, and other factors that are beyond our control. There can be no assurance that our business will generate cash flow from operations, or that additional capital will be available to us, in an amount sufficient for us to meet our debt payment obligations and to fund other liquidity needs. If we are unable to generate sufficient cash flow to service our debt obligations, we may need to refinance or restructure our debt, sell assets, reduce or delay capital investments, or seek to raise additional capital. If we were unable to implement one or more of these alternatives, we may be unable to meet our debt payment obligations, which could have a material adverse effect on our business, results of operations, and financial condition.

Furthermore, if the Convertible Senior Notes are converted into shares of Company common stock, the issuance of additional shares of Company common stock would dilute the ownership interest of our existing shareholders and could have a dilutive effect on our net income per share to the extent that the price of our common stock exceeds the conversion price of the Convertible Senior Notes. In addition, any sales in the public market of our common stock issuable upon conversion of the Convertible Senior Notes could adversely affect prevailing market prices of our common stock.

The accounting method for convertible debt securities that may be settled in cash, such as the Convertible Senior Notes, could have a material effect on our reported financial results.

Under Accounting Standards Codification 470-20, Debt with Conversion and Other Options (ASC 470-20), an entity must separately account for the liability and equity components of certain convertible debt instruments (such as the Convertible Senior Notes) that may be settled entirely or partially in cash upon conversion in a manner that reflects the issuer s economic interest cost. The effect of ASC 470-20 on the accounting for the Convertible Senior Notes is that the equity component is required to be included in the additional paid-in capital section of stockholders equity on our consolidated balance sheet, and the value of the equity component would be treated as original issue discount for purposes of accounting for the debt component of the Convertible Senior Notes. As a result, we will be required to record a greater amount of non-cash interest expense in current periods presented as a result of the amortization of the discounted carrying value of the Convertible Senior Notes to their face amount over the term of the Convertible Senior Notes. We will report lower net income in our financial results because ASC 470-20 will require interest to include both the current period s amortization of the debt discount and the instrument s coupon interest, which could adversely affect our financial results, the trading price of our common stock, and the trading price of the Convertible Senior Notes.

In addition, under certain circumstances convertible debt instruments (such as the Convertible Senior Notes) that may be settled entirely or partly in cash can be accounted for utilizing the treasury stock method, the effect of which is that the shares issuable upon conversion of the Convertible Senior Notes are not included in the calculation of diluted earnings per share except to the extent that the conversion value of the Convertible Senior Notes exceeds their principal amount. Under the treasury stock method, for diluted earnings per share purposes, the transaction is accounted for as if the number of shares of common stock that would be necessary to settle such excess, if we elected to settle such excess in shares, are issued. We cannot be sure that the accounting standards in the future will continue to permit the use of the treasury stock method or that we will continue to expect to settle the principal balance in cash. If we are unable to use the treasury stock method in accounting for the shares issuable upon conversion of the Convertible Senior Notes, our diluted earnings per share could be adversely affected.

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We are subject to foreign currency exchange risks.

We are exposed to foreign currency exchange rate risks that are inherent in our anticipated sales, sales and purchase commitments, and assets and liabilities that are denominated in currencies other than the U.S. dollar. Although we attempt to mitigate our exposure to fluctuations in currency exchange rates, hedging activities may not always be available or adequate to mitigate the impact of our exchange rate exposure. Failure to sufficiently hedge or otherwise manage foreign currency risks properly could materially and adversely affect our financial condition, results of operations, and liquidity.

Our previously announced share repurchase program could affect the price of our common stock and increase volatility and may be suspended or terminated at any time, which may result in a decrease in the trading price of our common stock.

Repurchases pursuant to our share repurchase program could affect our stock price and increase its volatility. The existence of a share repurchase program could also cause our stock price to be higher than it would be in the absence of such a program and could potentially reduce the market liquidity for our stock. There can be no assurance that any share repurchases will enhance stockholder value because the market price of our common stock may decline below the levels at which we repurchased shares of common stock. Although our share repurchase program is intended to enhance long term stockholder value, short term stock price fluctuations could reduce the program s effectiveness. Furthermore, the program does not obligate the Company to repurchase any dollar amount or number of shares of common stock, and may be suspended or discontinued at any time and any suspension or discontinuation could cause the market price of our stock to decline.

If we are subject to cyber-attacks we could incur substantial costs and, if such attacks are successful, we could incur significant liabilities, reputational harm, and disruption to our operations.

We manage, store, and transmit proprietary information and sensitive data relating to our operations. We may be subject to breaches of the information technology systems we use for these purposes. Experienced computer programmers and hackers may be able to penetrate our network security and misappropriate and compromise our confidential information (and third party confidential information), create system disruptions, or cause shutdowns. Computer programmers and hackers also may be able to develop and deploy viruses, worms, and other malicious software programs that attack our systems or our products, or that otherwise exploit security vulnerabilities.

The costs to address the foregoing security problems and security vulnerabilities before or after a cyber-incident could be significant. Our remediation efforts may not be successful and could result in interruptions, delays, a cessation of service, and a loss of existing or potential customers, impeding our sales, manufacturing, distribution, and other critical functions. In addition, breaches of our security measures and the unapproved dissemination of proprietary information or sensitive data about us, our customers or other third parties, could expose us, our customers and others to a risk of loss or misuse of this information, result in litigation and potential liability for us, damage our reputation, and otherwise harm our business.

We have adopted certain measures that may have anti-takeover effects which may make an acquisition of our Company by another company more difficult.

We have adopted, and may in the future adopt, certain measures that may have the effect of delaying, deferring, or preventing a takeover or other change in control of our Company, which a holder of our common stock might not consider to be in the holder s best interest. These measures include:

- blank check preferred stock;
- a classified board of directors; and
- certain other certificate of incorporation and bylaws provisions.

Our board of directors has the authority to issue up to 500,000 shares of preferred stock and to fix the rights (including voting rights), preferences and privileges of these shares (blank check preferred). Such preferred stock may have rights, including economic rights, senior to our common stock. As a result, the issuance of the preferred stock could have a material adverse effect on the price of our common stock and could make it more difficult for a third party to acquire a majority of our outstanding common stock.

Our board of directors is divided into three classes with each class serving a staggered three-year term. The existence of a classified board makes it more difficult for our shareholders to change the composition of our board of directors, and therefore the Company s policies, in a relatively short period of time.

We have adopted certain certificate of incorporation and bylaws provisions which have anti-takeover effects. These include: (a) requiring certain actions to be taken at a meeting of shareholders rather than by written consent, (b) requiring a super-majority of shareholders to approve certain amendments to our bylaws, (c) limiting the maximum number of directors, and (d) providing that directors may be removed only for cause. These measures and those described above may have the effect of delaying, deferring, or preventing a takeover or other change in control of our Company that a holder of our common stock might consider to be in the holder s best interest.

In addition, we are subject to the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a Delaware corporation from engaging in any business combination, including mergers and asset sales, with an interested stockholder (generally, a 15% or greater 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. The operation of Section 203 may have anti-takeover effects, which could delay, defer, or prevent a takeover attempt that a holder of our common stock might consider to be in the holder s best interest.

Despite the above measures, an activist shareholder could undertake action to implement governance, strategic, or other changes to the Company which a holder of our common stock might not consider to be in the holder s best interest. Such activities could interfere with our ability to execute our strategic plans, be costly and time consuming, disrupt our operations, and divert the attention of management and our employees.

We are subject to risks of non-compliance with environmental, health, and safety regulations.

We are subject to environmental, health, and safety regulations in connection with our business operations, including but not limited to regulations related to the development, manufacture and use of our products, recycling and disposal of related materials, and the operation and use of our facilities and real property. Failure or inability to comply with existing or future environmental and safety regulations, which vary from jurisdiction to jurisdiction, could result in significant remediation liabilities, the imposition of fines, and the suspension or termination of research, development, or use of certain of our products, each of which could have a material adverse effect on our business, financial condition, and results of operations. In addition, some of our operations involve the storage, handling, and use of hazardous materials that may pose a risk of fire, explosion, or environmental release. Such events could result from acts of terrorism, natural disasters, or operational failures and may result in injury or loss of life to our employees and others, local environmental contamination, and property damage. These events might cause a temporary shutdown of an affected facility, or portion thereof, and we could be subject to penalties or claims as a result. Each of these events could have a material adverse effect on our business, financial condition, and results of operations.

Regulations related to conflict minerals will force us to incur additional expenses, may make our supply chain more complex, and may harm our relationships with customers.

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (the Dodd-Frank Act), the SEC adopted requirements for companies that manufacture products that contain certain minerals and metals, known as conflict minerals. These rules require public companies to perform diligence and to report annually to the SEC whether such minerals originate from the Democratic Republic of Congo and adjoining countries. The implementation of these requirements could adversely affect the sourcing, availability, and pricing of minerals we use in the manufacture of our products. In addition, we have incurred and will continue to incur additional costs to comply with the disclosure requirements, including costs related to determining the source of any of the relevant minerals used in our products. Given the complexity of our supply chain, we may not be able to ascertain the origins of these minerals used in our products through the due diligence procedures that we implement, which may harm our reputation. We may also face difficulties in satisfying customers who require that our products be certified as conflict mineral free, which could harm our relationships with these customers and lead to a loss of revenue. These requirements could limit the pool of suppliers that can provide conflict-free minerals, and we may be unable

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to obtain conflict-free minerals at competitive prices, which could increase our costs and adversely affect our manufacturing operations and our profitability.

We have significant operations in locations which could be materially and adversely impacted in the event of a natural disaster, an act of terrorism, or other significant disruption.

Our operations in the United States, in the Asia-Pacific region, and in other areas could be subject to natural disasters or other significant disruptions, including earthquakes, tsunamis, fires, hurricanes, floods, water shortages, other extreme weather conditions, medical epidemics, power shortages and blackouts, telecommunications failures, and other natural and manmade disasters or disruptions. In the event of such a natural disaster or other disruption, we could experience disruptions or interruptions to our operations and to the operations of our suppliers, distributors, resellers and customers, destruction of facilities and loss of life, all of which could materially increase our costs and expenses and materially and adversely affect our business, financial condition, and results of operations. In addition, various regions of the world in which we do business are subject to the threat of terrorism and acts of war. Any act of terrorism or war that affects the economy or the industries in which we operate could result in significant harm to us, including the loss of life and property, manufacturing and transportation delays, disruptions in our supply chain, the need to comply with enhanced security measures, and other increased costs.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our corporate headquarters and principal research and development, manufacturing, and sales and service facilities are:

Owned Facilities Location	**Approximate Size (sq. ft.)**	**Use**
Plainview, NY	80,000	Corporate Headquarters; R&D; Sales & Service; Administration
Somerset, NJ	80,000	R&D; Manufacturing; Sales & Service; Administration
St. Paul, MN	43,000	R&D; Manufacturing; Sales & Service; Administration
Somerset, NJ	38,000	R&D; Sales & Service; Administration

Leased Facilities Location	**Approximate Size (sq. ft.)**	**Use**	**Lease Expires**
San Jose, CA	100,000	R&D; Manufacturing; Sales & Service; Administration	2021
Somerset, NJ	57,000	Warehouse	2020
Kingston, NY (1)	52,000	Manufacturing	2018
Horsham, PA	49,000	R&D; Manufacturing; Sales & Service; Administration	2024
Singapore	23,000	R&D; Manufacturing; Sales & Service; Administration	2023

Waltham, MA	19,000	R&D; Sales & Service; Administration	2023
Hsinchu City, Taiwan	13,000	Sales & Service; Administration	2020
Shanghai, China	10,000	Sales & Service; Administration	2020

(1) Manufacturing site has been consolidated into Somerset, we expect to vacate this location during 2018.

In addition to the above, we lease a small office in Edina, Minnesota and Malta, New York for sales and service and our foreign sales and service subsidiaries lease office space in Germany, Japan, Malaysia, Philippines, South Korea, Thailand, and United Kingdom. We believe our facilities are adequate to meet our current needs.

Item 3. Legal Proceedings

On September 21, 2017, Blueblade Capital Opportunities LLC et al., on behalf of purported beneficial owners of 440,100 shares of Ultratech common stock, filed an action against Ultratech in Delaware Court of Chancery requesting an appraisal of the value of their Ultratech stock pursuant to 8 Del. C. §262. We believe that the merger price, which was the product of

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arms-length negotiations, was fair and reasonable, and intend to contest the appraisal claim. Discovery in the matter has commenced and a trial on the action is scheduled to begin in December 2018.

On April 12, 2017, we filed a patent infringement complaint in the U.S. District Court for the Eastern District of New York against SGL Carbon, LLC and SGL Carbon SE (collectively, SGL), alleging infringement of patents relating to wafer carrier technology used in MOCVD equipment. The complaint alleges that SGL infringes Veeco s patents by making and selling certain wafer carriers to Veeco s competitor, Advanced Micro-Fabrication Equipment, Inc. (AMEC). On November 2, 2017, the U.S. District Court granted our motion for a preliminary injunction prohibiting SGL from shipping wafer carriers using our patented technology without our express authorization.

On July 13, 2017, AMEC filed a patent infringement complaint against Veeco Instruments Shanghai Co., Ltd. (Veeco Shanghai) with the Fujian High Court in China, alleging that our MOCVD products infringed a Chinese utility model patent relating to the synchronous movement engagement mechanism in a chemical vapor deposition reactor and seeking injunctive relief and monetary damages against Veeco Shanghai. On December 7, 2017, without providing notice to us and without hearing our position on alleged infringement, the Fujian High Court issued a preliminary injunction, applicable in China, that requires Veeco Shanghai to stop importing, making, selling, and offering to sell Veeco EPIK 700 model MOCVD systems and to stop importing, selling, and offering to sell wafer carriers used as supplies for the EPIK 700 MOCVD system.

On February 8, 2018, Veeco, AMEC, and SGL announced that they had mutually agreed to settle the pending litigation among the parties and to amicably resolve all pending disputes, including AMEC s lawsuit against Veeco before the Fujian High Court in China and Veeco s lawsuit against SGL before the U.S. District Court for the Eastern District of New York. As part of the settlement, all legal actions worldwide (in court, patent offices, and otherwise), between Veeco, AMEC, and SGL, and their affiliates, will be dismissed and/or otherwise withdrawn. As a result, all business processes, including sales, service, and importation, will be continued.

We are involved in various other legal proceedings arising in the normal course of business. We do not believe that the ultimate resolution of these matters will have a material adverse effect on its consolidated financial position, results of operations, or cash flows.

Item 4. Mine Safety Disclosures

Not Applicable.

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PART II

Item 5. Market for Registrant s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Our common stock is quoted on The NASDAQ Stock Market under the symbol VECO. The 2017 and 2016 high and low closing bid prices by quarter are as follows:

	2017				2016			
	High		Low		High		Low	
First Quarter	$	30.05	$	24.85	$	20.64	$	16.89
Second Quarter		34.20		27.40		19.72		15.79
Third Quarter		32.95		18.60		20.98		15.91
Fourth Quarter		22.25		11.90		29.95		19.75

On February 14, 2018, the closing price for our common stock on The NASDAQ Stock Market was $18.70, and we had 124 shareholders of record.

We have not paid dividends on our common stock. The Board of Directors will determine future dividend policy based on our consolidated results of operations, financial condition, capital requirements, and other circumstances.

Issuer Purchases of Equity Securities

Share repurchase activity during the three months ended December 31, 2017 is as follows:

Period		Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares That May Yet Be Purchased Under the Plans or Programs
		(in thousands, except average price paid per share)			
October 2, 2017	October 29, 2017		$		$
October 30, 2017	December 3, 2017				
December 4, 2017	December 31, 2017	203	14.83	203	96,982

During fiscal year 2017, 2016, and 2015, we repurchased 0.2 million shares, 0.7 million shares, and 0.5 million shares of our common stock for $3.0 million, $13.1 million, and $9.2 million, respectively, through our share repurchase programs. On December 11, 2017, our Board of Directors authorized a program to repurchase up to $100 million of the Company s outstanding common stock to be completed through

December 11, 2019, after completion of the previous program on October 28, 2017. Repurchases may be made from time to time on the open market or in privately negotiated transactions in accordance with applicable federal securities laws. The timing and amount of future repurchases, if any, will depend upon market conditions, SEC regulations, and other factors. The repurchases would be funded using available cash balances and cash generated from operations. The program does not obligate us to acquire any particular amount of common stock and may be modified or suspended at any time at our discretion.

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Stock Performance Graph

ASSUMES $100 INVESTED ON DEC. 31, 2012

ASSUMES DIVIDENDS REINVESTED

FISCAL YEAR ENDING DEC. 31

2012	2013	2014	2015	2016	2017

Veeco Instruments Inc.	100.00	111.60	118.28	69.72	98.85	50.36
S&P Smallcap 600	100.00	141.31	149.45	146.50	185.40	209.94
RDG MidCap Technology	100.00	161.83	159.04	138.67	123.87	132.83

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Item 6. Selected Financial Data

The information set forth below should be read in conjunction with the Results of Operations section included in Item 7, Management s Discussion and Analysis of Financial Condition and Results of Operations.

	Year ended December 31, 2017 (1)	2016	2015	2014 (2)	2013
	(in thousands, except per share data)				
Statement of Operations Data:					
Net sales	$ 484,756	$ 332,451	$ 477,038	$ 392,873	$ 331,749
Operating income (loss)	(63,778)	(120,402)	(23,232)	(79,209)	(71,812)
Income (loss) from continuing operations, net of tax	(44,793)	(122,210)	(31,978)	(66,940)	(42,263)
Basic income (loss) per common share from continuing operations	(1.01)	(3.11)	(0.80)	(1.70)	(1.09)
Diluted income (loss) per common share from continuing operations	(1.01)	(3.11)	(0.80)	(1.70)	(1.09)

(1) During the second quarter of 2017, the Company acquired Ultratech. The results of operations of Ultratech have been included in the consolidated financial statements since that date.

(2) During the fourth quarter of 2014, the Company acquired PSP. The results of operations of PSP have been included in the consolidated financial statements since that date.

	December 31, 2017	2016	2015	2014	2013
	(in thousands)				
Balance Sheet Data:					
Cash and cash equivalents	$ 279,736	$ 277,444	$ 269,232	$ 270,811	$ 210,799
Short-term investments	47,780	66,787	116,050	120,572	281,538
Working capital	373,536	357,999	379,904	387,254	485,452
Total assets	1,387,287	758,532	890,789	929,455	947,969
Long-term debt (less current installments)	275,630	826	1,193	1,533	1,847
Total equity	840,713	594,595	714,615	738,932	780,230

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Item 7. Management s Discussion and Analysis of Financial Condition and Results of Operations

Executive Summary

On May 26, 2017, we completed the acquisition of Ultratech. Ultratech develops, manufactures, sells, and supports lithography, laser annealing, and inspection equipment for manufacturers of semiconductor devices, including front-end semiconductor manufacturing and advanced packaging. Ultratech also develops, manufactures, sells, and supports ALD equipment for scientific and industrial applications. Ultratech s customers are primarily located throughout the United States, Europe, China, Japan, Taiwan, Singapore, and Korea. With the addition of Ultratech, we establish ourselves as a leading equipment supplier in the advanced packaging market, forming a strong technology portfolio to address critical advanced packaging applications, as well as greatly increasing our critical mass in the front-end semiconductor market. The results of Ultratech s operations have been included in the consolidated financial statements since the date of acquisition.

We categorize our revenue by the key market segments into which we sell. Our four key markets are: Advanced Packaging, MEMS & RF Filters; LED Lighting, Display & Compound Semiconductor; Front-End Semiconductor; and Scientific & Industrial.

We are a technology company that develops, manufactures, sells, and supports semiconductor process equipment aligned to meet the demands of key global trends such as enhanced mobility, increased connectivity, and energy efficiency. Our primary technologies include metal organic chemical vapor deposition, advanced packaging lithography, wet etch and clean, laser annealing, ion beam, molecular beam epitaxy, wafer inspection, and atomic layer deposition systems. These technologies play an integral role in producing LEDs for solid-state lighting and displays, and in the fabrication and packaging of advanced semiconductor devices. With equipment designed to optimize performance, yield, and cost of ownership, we hold technology leadership positions in all of these served markets.

Sales in the Advanced Packaging, MEMS & RF Filter markets were driven by Lithography and PSP systems, as the market continues to be influenced by the mobility trend and increasing functionality in mobile devices. Advanced Packaging opportunities slowed in 2017 as customers temporarily delayed adoption of fan-out wafer level packaging (FOWLP) in favor of cheaper flip chip solutions. Our versatile PSP product architecture has allowed us to continue to generate solid business in the MEMS and RF Filter portion of this category. We remain well positioned for future growth in these markets, supported by trends such as mobile connectivity, automotive electronics, big data processing and 5G infrastructure deployment, as well as the longer term growth of FOWLP and other Advanced Packaging applications.

Sales in the LED Lighting, Display & Compound Semiconductor market were driven by the continued shipment of MOCVD and PSP systems to customers in China, Malaysia, and Europe. The largest applications for LEDs are solid state lighting, followed by TV displays. Over the past several quarters, demand has increased for larger LCD TV displays, which require relatively more LEDs to backlight than smaller display sizes. More recently, we have seen an increase in demand in non general-lighting applications such as 3D sensors, VCSELs, laser diodes, and RF devices. Our broad portfolio of MOCVD and PSP technologies have been developed to support these significant industry trends, driving an increase in demand for our MOCVD and PSP equipment. Our product mix in the LED market is expected to shift, and we expect to see a decline in gross margins in the first half of 2018. We expect margins in the second half of 2018 to be higher than the first half.

Sales in the Front-End Semiconductor market were primarily driven by Laser Annealing systems, an IBD Photomask system for EUV applications, and IBE systems sold into STT-MRAM applications. We see strong interest from customers for our laser melt anneal systems which are being qualified in 7nm and 5nm applications, as well as our 3D inspection systems which are being evaluated at several high volume manufacturing fabs.

Sales in the Scientific & Industrial markets were supported by shipments of Ion Beam systems for optical coatings and data storage applications, as well as shipments of MBE systems to universities and laboratories. While equipment demand from each individual market may fluctuate quarter to quarter, the diverse customer base has historically provided a relatively stable revenue stream for the Company.

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Results of Operations

Years Ended December 31, 2017 and 2016

The following table presents revenue and expense line items reported in our Consolidated Statements of Operations for 2017 and 2016 and the period-over-period dollar and percentage changes for those line items. Our results of operations are reported as one business segment, represented by our single operating segment, including the Ultratech business acquired.

			(dollars in thousands)			
Net sales	$ 484,756	100%	$ 332,451	100%	$ 152,305	46%
Cost of sales	300,438	62%	199,593	60%	100,845	51%
Gross profit	184,318	38%	132,858	40%	51,460	39%
Operating expenses, net:						
Research and development	81,987	17%	81,016	24%	971	1%
Selling, general, and administrative	100,250	21%	77,642	23%	22,608	29%
Amortization of intangible assets	35,475	7%	19,219	6%	16,256	85%
Restructuring	11,851	2%	5,640	2%	6,211	110%
Acquisition costs	17,786	4%		0%	17,786	*
Asset impairment	1,139	0%	69,520	21%	(68,381)	(98)%
Other, net	(392)	(0)%	223	0%	(615)	*
Total operating expenses, net	248,096	51%	253,260	76%	(5,164)	(2)%
Operating income (loss)	(63,778)	(13)%	(120,402)	(36)%	56,624	*
Interest income (expense), net	(17,122)	(4)%	958	0%	(18,080)	*
Income (loss) before income taxes	(80,900)	(17)%	(119,444)	(36)%	38,544	*
Income tax expense (benefit)	(36,107)	(7)%	2,766	1%	(38,873)	*
Net income (loss)	$ (44,793)	(9)%	$ (122,210)	(37)%	$ 77,417	*

* Not meaningful

Net Sales

The following is an analysis of sales by market and by region:

			(dollars in thousands)			
Sales by market						
	$ 253,785	52%	$ 144,675	44%	$ 109,110	75%

LED Lighting, Display & Compound Semiconductor								
Advanced Packaging, MEMS & RF Filters		69,353	14%		68,304	21%		1,049	2%
Scientific & Industrial		120,788	25%		111,198	33%		9,590	9%
Front-End Semiconductor		40,830	9%		8,274	2%		32,556	393%
Total	$	484,756	100%	$	332,451	100%	$	152,305	46%
Sales by geographic region									
United States	$	94,936	20%	$	85,637	26%	$	9,299	11%
China		107,844	22%		85,834	26%		22,010	26%
EMEA		76,636	16%		83,410	25%		(6,774)	(8)%
Rest of World		205,340	42%		77,570	23%		127,770	165%
Total	$	484,756	100%	$	332,451	100%	$	152,305	46%

Total sales increased across all market categories for the year ended December 31, 2017 against the comparable prior year period, driven by ongoing improvements in LED industry conditions, as well as additional sales of approximately $65.5 million from the Ultratech business acquired in May 2017, primarily in the Front-End Semiconductor and Advanced Packaging, MEMS, and RF Filters markets. Pricing was not a significant driver of the change in total sales. By geography, sales increased in the United States, China, and Rest of World regions, offset by a slight decrease in the EMEA region. The most significant increase occurred in the Rest of World region, which was attributable to the increased sales in the LED Lighting, Display & Compound Semiconductor market in Malaysia, as well as additional sales from the Ultratech business acquired. Sales into Malaysia for the year ended December 31, 2017 was approximately $78.2 million, compared to $6.6 million for the year ended December 31, 2016. Sales in China increased principally due to increased sales in the LED Lighting, Display, and Compound Semiconductor market. We expect there will continue to be year-to-year variations in our future sales distribution across markets and geographies.

Orders increased to $570.7 million in 2017, an increase of $196.5 million, or 53% compared with 2016. The LED Lighting, Display, and Compound Semiconductor and Scientific & Industrial markets increased 51% and 56%, respectively, driven by overall improvements in industry conditions. The Advanced Packaging, MEMS, and RF Filters and Front-End Semiconductor markets increased 52% and 49%, respectively, driven by the additional bookings from the Ultratech acquisition.

One of the performance measures we use as a leading indicator of the business is the book-to-bill ratio. The ratio is defined as orders recorded in a given period divided by revenue recognized in the same period. A ratio greater than one indicates we are adding orders faster than we are recognizing revenue. In 2017, the ratio was 1.2, a rise compared to the 2016 ratio of 1.1. Our backlog at December 31, 2017 was $334.3 million, which was higher than the ending backlog at December 31, 2016 of $209.2 million. During the year ended December 31, 2017, we increased backlog by approximately $41.6 million relating to backlog acquired from Ultratech, while adjusting for a decrease in backlog of approximately $2.0 million relating to orders that no longer met our bookings criteria. For certain sales arrangements, we require a deposit for a portion of the sales price prior to manufacturing a system for a customer. At December 31, 2017 and 2016, we had customer deposits of $41.5 million and $22.2 million, respectively.

Gross Profit

In 2017, gross profit increased compared to 2016 due to an increase in sales volume, including the acquisition of Ultratech, partially offset by decreased gross margins. Gross margins decreased principally due to an inventory fair value step-up that was recorded in connection with the purchase accounting relating to the Ultratech acquisition. Our product mix in the LED market is expected to shift, and we expect to see a decline in gross margins in the first half of 2018. We expect margins in the second half of 2018 to be higher than the first half.

Research and development

The markets we serve are characterized by continuous technological development and product innovation, and we invest in various research and development initiatives to maintain our competitive advantage and achieve our growth objectives. Research and development expenses remained relatively flat in 2017 compared to 2016, as the addition of the acquired Ultratech related research and development projects was offset by our decision to reduce investments in certain technology, as well as decreases in other personnel-related expenses and professional fees, as a result of our initiative to streamline operations, enhance efficiency, and reduce costs.

Selling, general, and administrative

Selling, general, and administrative expenses increased primarily due to the addition of the acquired Ultratech related selling, general, and administrative costs, as well as increased professional and legal fees.

Amortization expense

The increase in amortization expense is a result of the additional intangibles acquired as part of the acquisition of Ultratech, offset by the lower amortization resulting from the impairment of the certain technology assets in the prior year

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as well as certain other intangible assets becoming fully amortized during 2016.

Restructuring expense

During 2016, we undertook restructuring activities as part of our initiative to streamline operations, enhance efficiencies, and reduce costs, as well as reducing future investments in certain technology development, which together impacted approximately 75 employees. These activities were substantially completed in 2017. In addition, during 2017, we began the acquisition integration process to enhance efficiencies, resulting in additional employee terminations and other facility closing costs. Restructuring expense for the year ended December 31, 2017 included non-cash charges of $1.9 million related to accelerated share-based compensation for employee terminations.

Acquisition costs

Acquisition costs are non-recurring charges incurred in connection with the acquisition of the Ultratech business, which included $4.2 million of non-cash charges related to accelerated share-based compensation for employee terminations for the year ended December 31, 2017.

Asset impairment

During 2016, we recorded non-cash impairment charges of $57.6 million relating to our decision to reduce investments in certain technologies, $5.7 million relating to our assessments of the fair market value of assets held for sale, and $6.2 million relating to the disposal of certain lab equipment. Impairment charges for the year ended December 31, 2017, primarily relate to further reductions to the fair market value of assets held for sale upon disposal.

Interest Income (Expense)

For the year ended December 31, 2017, we recorded net interest expense of $17.1 million, including non-cash interest expense of $10.4 million, compared with net interest income of $1.0 million in the prior year period. The change primarily relates to the Convertible Senior Notes issued in January 2017.

Income Taxes

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (2017 Tax Act), which makes broad and complex changes to the U.S. tax code. Certain income tax effects of the 2017 Tax Act are reflected in our financial results in accordance with SAB 118. SAB 118 provides SEC staff guidance regarding the application of Accounting Standards Codification Topic 740 (ASC 740) *Income Taxes*, and the required disclosures due to the enactment of the 2017 Tax Act. The income tax effects of the 2017 Tax Act include a provisional $11.3 million income tax benefit related to the re-measurement of our deferred tax assets and liabilities at the reduced rate of 21 percent and a reduction in our U.S. valuation allowance attributable to indefinite lived intangibles becoming a source of future taxable income for certain deferred tax assets that are expected to have an indefinite life due to the 2017 Tax Act. Refer to Note 17, Income Taxes, in the Notes to the Consolidated Financial Statements for further information on the financial statement impact of the 2017 Tax Act.

The 2017 income tax benefit of $36.1 million is comprised of: (i) a $24.2 million income tax benefit related to domestic losses incurred during the year ended December 31, 2017, as the deferred tax liability created by the issuance of the Convertible Senior Notes and recorded as a component of APIC is treated as a source of income in fiscal 2017, (ii) a $11.3 million income tax benefit recorded in connection with the 2017 Tax Act, primarily due to the re-measurement of our deferred tax assets and liabilities at the new federal statutory rate of 21 percent, as well as a reduction in our valuation allowance attributable to deferred tax liabilities associated with indefinite-lived intangible assets that became available as a source of income to offset existing deferred tax assets, and (iii) $0.6 million income tax benefit from non-U.S. operations primarily attributable to a reduction in uncertain tax positions and the recognition of a deferred tax asset for certain non-U.S. net operating losses generated in prior years that have become realizable on a more-likely-than-not basis, offset by tax expense attributed to the profitable non-U.S. operations, as well as withholding taxes recorded as we now expect to repatriate certain foreign earnings as a result of changes in tax laws under the 2017 Tax Act.

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The 2016 income tax expense of $2.8 million is comprised of three components: (i) a $1.9 million tax expense related primarily to U.S. tax amortization of our indefinite-lived intangible assets that is not available to offset existing deferred tax assets and related valuation allowance, as well as state and local income taxes, (ii) a $0.4 million tax benefit associated with the termination of a pension plan, and (iii) $1.3 million in net tax expense related primarily to our profitable foreign operations. The current period non-U.S. tax expense is attributable to the profitable non-U.S. operations.

Years Ended December 31, 2016 and 2015

The following table presents revenue and expense line items reported in our Consolidated Statements of Operations for 2016 and 2015 and the period-over-period dollar and percentage changes for those line items. Our results of operations are reported as one business segment, represented by our single operating segment.

Net sales	$	332,451	100%	$	477,038	100%	$	(144,587)	(30)%
Cost of sales		199,593	60%		299,797	63%		(100,204)	(33)%
Gross profit		132,858	40%		177,241	37%		(44,383)	(25)%
Operating expenses, net:									
Research and development		81,016	24%		78,543	16%		2,473	3%
Selling, general, and administrative		77,642	23%		90,188	19%		(12,546)	(14)%
Amortization of intangible assets		19,219	6%		27,634	6%		(8,415)	(30)%
Restructuring		5,640	2%		4,679	1%		961	21%
Asset impairment		69,520	21%		126	0%		69,394	*
Other, net		223	0%		(697)	(0)%		920	*
Total operating expenses, net		253,260	76%		200,473	42%		52,787	26%
Operating income (loss)		(120,402)	(36)%		(23,232)	(5)%		(97,170)	*
Interest income (expense), net		958	0%		586	0%		372	63%
Income (loss) before income taxes		(119,444)	(36)%		(22,646)	(5)%		(96,798)	*
Income tax expense (benefit)		2,766	1%		9,332	2%		(6,566)	(70)%
Net income (loss)	$	(122,210)	(37)%	$	(31,978)	(7)%	$	(90,232)	*

* Not Meaningful

Net Sales

The following is an analysis of sales by market and by region:

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				(dollars in thousands)					
Sales by market									
LED Lighting, Display & Compound Semiconductor	$	144,675	44%	$	291,133	61%	$	(146,458)	(50)%
Advanced Packaging, MEMS & RF Filters		68,304	21%		61,935	13%		6,369	10%
Scientific & Industrial		111,198	33%		118,132	25%		(6,934)	(6)%
Front-End Semiconductor		8,274	2%		5,838	1%		2,436	42%
Total	$	332,451	100%	$	477,038	100%	$	(144,587)	(30)%
Sales by geographic region									
United States	$	85,637	26%	$	86,627	18%	$	(990)	(1)%
China		85,834	26%		242,442	51%		(156,608)	(65)%
EMEA		83,410	25%		64,019	13%		19,391	30%
Rest of World		77,570	23%		83,950	18%		(6,380)	(8)%
Total	$	332,451	100%	$	477,038	100%	$	(144,587)	(30)%

Total sales decreased in 2016 from 2015 primarily due to reduced sales in LED Lighting, Display & Compound Semiconductor driven by an oversupply of LED units in the market. Pricing was not a significant driver of the change in total sales. By geography, sales decreased in all regions, except EMEA. The largest sales decline was in China, which was attributable to the decline in LED Lighting, Display & Compound Semiconductor.

Between 2016 and 2015, orders decreased $10.2 million, or 3%, to $374.2 million. The decrease in orders was primarily attributable to a 43% decrease in orders in Advanced Packaging, MEMS & RF Filters as well as a 16% decrease in Scientific & Industrial. These decreases were offset by increases in LED Lighting, Display & Compound Semiconductor and Front-End Semiconductor. In the second half of 2016, we saw some improvements in LED industry conditions.

One of the performance measures we use as a leading indicator of the business is the book-to-bill ratio. The ratio is defined as orders recorded in a given period divided by revenue recognized in the same period. A ratio greater than one indicates we are adding orders faster than we are recognizing revenue. In 2016, the ratio was 1.1, a rise compared to 2015, when it was 0.8. Our backlog at December 31, 2016 was $209.2 million, which was higher than the ending backlog at December 31, 2015 of $186.0 million. During the year ended December 31, 2016, we recorded backlog adjustments of approximately $17.9 million primarily relating to a partial cancellation of a prior period customer order. For certain sales arrangements, we require a deposit for a portion of the sales price prior to manufacturing a system for a customer. At December 31, 2016 and 2015, we had customer deposits of $22.2 million and $28.2 million, respectively.

Gross Profit

Gross profit decreased compared to 2015 due to sharp decline in sales volume, partially offset by improved gross margins. Gross margins increased despite the decline in overall sales volume principally due to favorable product and region mix of sales in the period and from the benefits associated with ongoing cost reduction activities.

Research and development

R&D expenses increased in 2016 compared to 2015 as a result of a reduction in external funding used to offset the cost of R&D activities, as well as the additional use of third party contractors to accelerate the development of products for the LED Lighting, Display & Compound Semiconductor market. We also incurred increased depreciation of research and development-related property, plant, and equipment. These increases were partially offset by decreased personnel-related incentive compensation.

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Selling, general, and administrative

Selling, general, and administrative expenses decreased primarily due to reductions in sales commissions and incentive compensation as a result of the decline in our financial performance, as well as a decrease in personnel-related expenses as a result of our initiative to streamline operations, enhance efficiency, and reduce costs in response to market conditions.

Amortization expense

The decrease in amortization expense is a result of the impairment of certain technology assets as well as certain other intangible assets becoming fully amortized during 2016.

Restructuring expense

During 2016, additional accruals were recognized and payments made related to previous years restructuring initiatives. In addition, during 2016, we undertook additional restructuring activities as part of our initiative to streamline operations, enhance efficiencies, and reduce costs, as well as reducing future investments in certain technology development, which together impacted approximately 75 employees.

Asset impairment

During 2016, we recorded non-cash impairment charges of $57.6 million relating to our decision to reduce investments in certain technologies, $5.7 million relating to our assessments of the fair market value of assets held for sale, and $6.2 million relating to the disposal of certain lab equipment.

Income Taxes

The 2016 income tax expense is comprised of three components: (i) $1.9 million related primarily to U.S. tax amortization of our indefinite-lived intangible assets that is not available to offset existing deferred tax assets and related valuation allowance as well as state and local income taxes, (ii) a $0.4 million tax benefit associated with the termination of the pension plan, and (iii) $1.3 million in net tax expense related primarily to our profitable foreign operations. The 2015 income tax expense is comprised of two components: (i) $1.8 million related primarily to U.S. tax amortization of our indefinite-lived intangible assets that is not available to offset existing deferred tax assets and related valuation allowance and state and local income taxes and (ii) $7.5 million in tax expense relating to our profitable foreign operations. Our 2016 and 2015 effective tax rate is different than the statutory rate primarily due to our inability to recognize our U.S. deferred tax assets on a more-likely-than-not basis with respect to the pre-tax U.S. operating losses in those years.

Liquidity and Capital Resources

Our cash and cash equivalents, restricted cash, and short-term investments are as follows:

	December 31, 2017	December 31, 2016
	(in thousands)	
Cash and cash equivalents	$ 279,736	$ 277,444
Restricted cash	847	
Short-term investments	47,780	66,787
Total	$ 328,363	$ 344,231

A portion of our cash and cash equivalents is held by our subsidiaries throughout the world, frequently in each subsidiary s respective functional currency, which is typically the U.S. dollar. At December 31, 2017 and 2016, cash and cash equivalents of $214.3 million and $149.2 million, respectively, were held outside the United States. As of December 31, 2017, we had $155.8 million of accumulated undistributed earnings generated by our non-U.S. subsidiaries, of which approximately $140.2 million was subject to the one-time transition tax on foreign earnings required by the 2017 Tax Act. We do not expect to incur a current U.S. tax liability for the one-time transition tax due to the utilization of foreign tax

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credits and research and development credits. We expect to repatriate accumulated undistributed earnings from certain non-U.S. subsidiaries and have recognized applicable withholding taxes of $6.2 million. We believe that our projected cash flow from operations, combined with our cash and short term investments, will be sufficient to meet our projected working capital requirements, contractual obligations, and other cash flow needs for the next twelve months, including scheduled interest payments on our Convertible Senior Notes issued in January 2017.

A summary of the cash flow activity for the year ended December 31, 2017 and 2016 is as follows:

Cash Flows from Operating Activities

	For the year ended December 31, 2017		2016	
	(in thousands)			
Net income (loss)	$	(44,793)	$	(122,210)
Non-cash items:				
Depreciation and amortization		50,095		32,650
Non-cash interest expense		10,446		
Deferred income taxes		(33,875)		940
Share-based compensation expense		24,396		15,741
Asset impairment		1,139		69,520
Other		99		(259)
Changes in operating assets and liabilities		26,639		(20,226)
Net cash provided by (used in) operating activities	$	34,146	$	(23,844)

Net cash provided by operating activities was $34.1 million for the year ended December 31, 2017 and was due to the net loss of $44.8 million offset by adjustments for non-cash items of $52.3 million and an increase in cash flow from operating activities due to changes in operating assets and liabilities of $26.6 million. The changes in operating assets and liabilities were largely attributable to increases in accounts payable and accrued expenses and customer deposits and deferred revenue, decreases in accounts receivable and inventory and deferred cost of sales, partially offset by increases in prepaid expenses and other current and non-current assets, and decreases in income tax payables.

Net cash used in operating activities was $23.8 million in 2016 and was due to the net loss of $122.2 million plus a decline in cash flow from operating activities due to changes in operating assets and liabilities of $20.2 million, partially offset by adjustments for non-cash items of $118.6 million. The changes in operating assets and liabilities was largely attributable to a decrease in accounts payable and accrued expenses, an increase in accounts receivable, and an increase in inventories and deferred cost of sales, partially offset by a decrease in prepaid expenses and other current assets and an increase in customer deposits and deferred revenue.

Cash Flows from Investing Activities

	For the year ended December 31, 2017		2016	
	(in thousands)			
Acquisitions of businesses, net of cash acquired	$	(401,828)	$	

Capital expenditures		(24,272)		(11,479)
Changes in investments, net		65,980		48,907
Other		2,284		9,282
Net cash provided by (used in) investing activities	$	(357,836)	$	46,710

The net cash used in investing activities during the year ended December 31, 2017 was primarily attributable to the net cash used in the acquisition of Ultratech as well as capital expenditures, offset by the net changes in investments. In 2017, as part of our efforts to streamline operations, enhance efficiency, and reduce costs, we made certain investments in our facilities to support the consolidation activities. These activities were substantially completed in 2017. The cash provided by investing activities in 2016 was primarily attributable to net changes in investments and sales of property, plant, and equipment, partially offset by capital expenditures.

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Cash Flows from Financing Activities

	For the year ended December 31, 2017	2016
	(in thousands)	
Settlement of equity awards, net of withholding taxes	$ (5,749)	$ (945)
Purchases of common stock	(2,869)	(13,349)
Proceeds from long-term debt borrowings	335,752	
Repayments of long-term debt	(1,194)	(340)
Net cash provided by (used in) financing activities	$ 325,940	$ (14,634)

The cash provided by financing activities for the year ended December 31, 2017 was primarily related to the net cash proceeds received from the issuance of the Convertible Senior Notes in January 2017. The cash used in financing activities for 2016 was primarily related to the share repurchase program, which commenced in November 2015.

Convertible Senior Notes

On January 10, 2017, we issued $345.0 million of 2.70% Convertible Senior Notes. We received net proceeds, after deducting underwriting discounts and fees and expenses payable by the Company, of approximately $335.8 million. The Convertible Senior Notes bear interest at a rate of 2.70% per year, payable semiannually in arrears on January 15 and July 15 of each year, commencing on July 15, 2017. The Convertible Senior Notes mature on January 15, 2023, unless earlier purchased by the Company, redeemed, or converted. We believe that we have sufficient capital resources and cash flows from operations to support scheduled interest payments on this debt.

Business Combination

As discussed above, on May 26, 2017, the Company acquired 100% of Ultratech, Inc., a leading supplier of lithography, laser-processing, and inspection systems used to manufacture semiconductor devices and LEDs. The results of Ultratech s operations have been included in the consolidated financial statements since the date of acquisition.

Contractual Obligations and Commitments

We have commitments under certain contractual arrangements to make future payments for goods and services. These contractual arrangements secure the rights to various assets and services to be used in the future in the normal course of business. We expect to fund these contractual arrangements with cash generated from operations in the normal course of business.

The following table summarizes our contractual arrangements at December 31, 2017, and the timing and effect that those commitments are expected to have on our liquidity and cash flow in future periods. The effect of unrecognized tax benefits, which total $0.6 million at December 31, 2017, have been excluded from the table since we are unable to reasonably estimate the period of potential cash settlement, if any, with the respective tax authorities.

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	Total	Less than 1 year	Payments due by period 1 3 years (in thousands)	3 5 years	More than 5 years
Principal payments on long-term debt	$ 345,000	$	$	$	$ 345,000
Cash interest on debt	46,963	9,315	18,630	18,630	388
Operating leases	24,251	5,655	11,061	4,616	2,919
Bank guarantees	6,498	6,498			
Purchase commitments(1)	181,032	181,032			
Total	$ 603,744	$ 202,500	$ 29,691	$ 23,246	$ 348,307

(1) Purchase commitments are primarily for inventory used in manufacturing our products. We generally do not enter into purchase commitments extending beyond one year. We have $7.6 million of offsetting supplier deposits against these purchase commitments as of December 31, 2017.

In December 2017, we entered into a Receivable Purchase Agreement with a financial institution to sell certain of our trade receivables from customers without recourse, up to $23.0 million at any point in time for a term of one year. Under the terms of the agreement, we may offer to sell certain eligible accounts receivable (the Receivables) to the financial institution (the Purchaser), which may accept such offer, and purchase the offered Receivables. The Purchaser will assume credit risk of the Receivables purchased; provided, however, that we will service the Receivables, and as such servicer, collect and otherwise enforce the Receivables on behalf of the Purchaser. Pursuant to this agreement, we sold $15.0 million of Receivables during the year ended December 31, 2017 and maintained $8.0 million available under the agreement for additional sales of Receivables as of December 31, 2017. The net sale of accounts receivable, under the agreement is reflected as a reduction of accounts receivable in our Consolidated Balance Sheet at the time of sale and any fees for the sale of trade receivables were not material for the periods presented.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements that have, or are reasonably likely to have, a current or future material effect on our financial condition, changes in financial condition, expenses, results of operations, liquidity, capital expenditures, or capital resources other than operating leases, bank guarantees, and purchase commitments disclosed in the preceding Contractual Obligations and Commitments table.

Application of Critical Accounting Policies

Our discussion and analysis of our financial condition and results of operations are based upon our Consolidated Financial Statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements require a high degree of judgment, either in the application and interpretation of existing accounting literature or in the development of estimates that affect the reported amounts of assets, liabilities, revenues, and expenses. On an ongoing basis, we evaluate our estimates and judgments based on historical experience as well as other factors that we believe to be reasonable under the circumstances. The results of our evaluation form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. These estimates may change in the future if underlying assumptions or factors change, and actual results may differ from these estimates.

We consider the following significant accounting policies to be critical because of their complexity and the high degree of judgment involved in implementing them.

Revenue Recognition

We recognize revenue when persuasive evidence of an arrangement exists, delivery has occurred or services have been rendered, the selling price is fixed or determinable, collectability is reasonably assured, and, for system sales, we have received customer acceptance or we have otherwise objectively demonstrated that the delivered system meets all of the agreed-to customer specifications. Each sales arrangement may contain commercial terms that differ from other arrangements. In addition, we frequently enter into contracts that contain multiple deliverables. Judgment is required to properly identify the accounting units of the multiple deliverable transactions and to determine the manner in which

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revenue should be allocated among the accounting units. Moreover, judgment is used in interpreting the commercial terms and determining when all criteria have been met in order to recognize revenue in the appropriate accounting period. The maximum revenue we recognize on a delivered element is limited to the amount that is not contingent upon the delivery of additional items. While changes in the allocation of the estimated sales price between the units of accounting will not affect the amount of total revenue recognized for a particular sales arrangement, any material changes in these allocations could impact the timing of revenue recognition, which could have a material effect on our financial condition and results of operations. We generally recognize revenue related to sales of components and spare parts upon shipment. We generally recognize revenue related to maintenance and service contracts ratably over the applicable contract term. See Note 1, Significant Accounting Policies, in the Notes to the Consolidated Financial Statements for a description of our revenue recognition policy.

Inventory Valuation

Inventories are stated at the lower of cost or net realizable value, with cost determined on a first-in, first-out basis. Each quarter we assess the valuation and recoverability of all inventories: materials (raw materials, spare parts, and service inventory); work-in-process; and finished goods. Obsolete inventory or inventory in excess of our estimated usage requirements is written down to its estimated net realizable value if less than cost. We evaluate usage requirements by analyzing historical and anticipated demand, and anticipated demand is estimated based upon current economic conditions, utilization requirements related to current backlog, current sales trends, and other qualitative factors. Unanticipated changes in demand for our products may require a write down of inventory that could materially affect our operating results.

Goodwill and Intangible Assets

Goodwill is tested for impairment at least annually in the fourth quarter of our fiscal year. We may first perform a qualitative assessment of whether it is more likely than not that the reporting unit s fair value is less than its carrying amount, and, if so, we then quantitatively compare the fair value of our reporting unit to its carrying amount. If the fair value of the reporting unit exceeds its carrying amount, goodwill is not impaired. If the carrying amount of the reporting unit exceeds its fair value, we then record an impairment loss equal to the difference, up to the carrying value of goodwill.

We determine the fair value of our reporting unit based on a reconciliation of the aggregate fair value of our reporting unit to our adjusted market capitalization. The adjusted market capitalization is calculated by multiplying the average share price of our common stock for the last ten trading days prior to the measurement date by the number of outstanding common shares and adding a control premium.

The carrying values of identifiable intangible assets are reviewed for recoverability on a quarterly basis. The facts and circumstances considered include the recoverability of the cost of other intangible assets from future undiscounted cash flows to be derived from the use of the asset or asset group. It is not possible for us to predict the likelihood of any possible future impairments or, if such an impairment were to occur, the magnitude of any impairment.

Intangible assets with finite useful lives, including purchased technology, customer-related intangible assets, patents, trademarks, covenants not-to-compete, backlog, and software licenses, are subject to amortization over the expected period of economic benefit to us. We evaluate whether events or circumstances have occurred that warrant a revision to the remaining useful lives of intangible assets. In cases where a revision is deemed appropriate, the remaining carrying amounts of the intangible assets are amortized over the revised remaining useful life. Intangible assets related to IPR&D projects are considered to be indefinite-lived until the completion or abandonment of the associated R&D efforts. If and when development is complete, the associated assets would be deemed long-lived and would then be amortized based on their respective estimated useful lives at that point in time.

Accounting for Business Combinations

The allocation of the purchase price for acquisitions requires extensive use of accounting estimates and judgments to allocate the purchase price to the identifiable tangible and intangible assets acquired, including in-process research and development and liabilities assumed based on their respective fair values. The estimates we make include expected cash flows, expected cost savings, and the appropriate weighted average cost of capital. We complete these assessments as soon as practical after the acquisition closing dates. Any excess of the purchase price over the estimated fair values of the identifiable net assets acquired is recorded as goodwill.

Income Taxes

We estimate our income taxes in each of the jurisdictions in which we operate. Deferred income taxes reflect the net tax effect of temporary differences between the asset and liability balances recognized for financial reporting purposes and the balances used for income tax purposes, as well as the tax effect of carry forwards. We record a valuation allowance to reduce our deferred tax assets to the amount that is more likely than not to be realized. Realization of our net deferred tax assets is dependent on future taxable income.

We recognize the effect of income tax positions for only those positions which are estimated to more likely than not be sustained if challenged. We reflect changes in recognition or measurement in the period in which our change in judgment occurs. We record interest and penalties related to uncertain tax positions in income tax expense.

Because of the complexity of the new global intangible low-taxed income (GILTI) rules, we are continuing to evaluate this provision of the 2017 Tax Act and the application of ASC 740. Under U.S. GAAP, we are allowed to make an accounting policy choice of either (1) treating taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (the period cost method) or (2) factoring such amounts into our measurement of our deferred taxes (the deferred method). Our selection of an accounting policy with respect to the new GILTI tax rules will depend, in part, on analyzing our global income to determine whether we expect to have future U.S. inclusions in taxable income related to GILTI, and if so, what the impact will be. This assessment depends not only on our current structure and estimated future results of global operations, but also on our intent and ability to modify our structure and/or our business. We are not yet able to reasonably estimate the effect of this provision of the 2017 Tax Act, and therefore we have not made any adjustments related to potential GILTI tax in our consolidated financial statements and have not made a policy decision regarding whether to record deferred taxes on GILTI.

Recent Accounting Pronouncements

The FASB issued ASU 2014-09, as amended: *Revenue from Contracts with Customers*, which has been codified as Accounting Standards Codification 606 (ASC 606). ASC 606 requires our revenue recognition to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which we expect to be entitled in exchange for those goods or services. ASC 606 outlines a five-step model to make the revenue recognition determination and requires new financial statement disclosures. Publicly-traded companies are required to adopt ASC 606 for reporting periods beginning after December 15, 2017. The most significant financial statement impacts of adopting ASC 606 will be the elimination of the constraint on revenue associated with the billing retention related to the receipt of customer final acceptance as well as the identification of installation services as a performance obligation. The elimination of the constraint on revenue related to customer final acceptance, which is usually about 10 percent of a system sale, will generally be recognized at the time we transfer control of the system to the customer, which is earlier than under our current revenue recognition model. The new performance obligation related to installation services under the new standard will generally be recognized as the installation services are performed, which is later than under our current revenue recognition model. Taken together, we do not believe these changes will have a material impact on the consolidated financial statements. We plan to adopt using the full retrospective method.

In January 2016, the FASB issued ASU 2016-01: *Financial Instruments Overall*, which requires certain equity investments to be measured at fair value, with changes in fair value recognized in net income. For equity investments without readily observable market prices, entities have the option to either measure these investments at fair value every quarter, or measure at cost adjusted for changes in observable prices minus impairment. Changes in measurement under either alternative must be recognized in net income. Publicly-traded companies are required to adopt the update for reporting periods beginning after December 15, 2017; early adoption is permitted. We do not expect this ASU will have a material impact on the consolidated financial statements upon adoption, and will monitor our cost method investments each reporting period for changes in observable market prices, if any, which may be material in future periods.

In February 2016, the FASB issued ASU 2016-02: *Leases*, which generally requires our operating lessee rights and obligations to be recognized as assets and liabilities on the balance sheet. In addition, interest on lease liabilities is to be

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recognized separately from the amortization of right-of-use assets in the Statement of Operations. Further, payments of the principal portion of lease liabilities are to be classified as financing activities while payments of interest on lease liabilities and variable lease payments are to be classified as operating activities in the Statement of Cash Flows. When the standard is adopted, we will be required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, with early application permitted. We are evaluating the anticipated impact of adopting the ASU on the consolidated financial statements.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows: Classification of Certain Cash Receipts and Cash Payments*, which provides guidance on eight specific cash flow issues, including debt prepayments or debt extinguishment costs. Publicly-traded companies are required to adopt the update for reporting periods beginning after December 15, 2017. We do not expect this ASU will have a material impact on the consolidated financial statements.

In October 2016, the FASB issued ASU 2016-16, *Income Taxes: Intra-Entity Transfers of Assets Other Than Inventory*, which requires that entities recognize the income tax consequences of an intra-entity transfer of an asset, other than inventory, when the transfer occurs. Publicly-traded companies are required to adopt the update for reporting periods beginning after December 15, 2017. We do not expect this ASU will have a material impact on the consolidated financial statements.

We are also evaluating other pronouncements recently issued but not yet adopted. The adoption of these pronouncements is not expected to have a material impact on our consolidated financial statements.

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Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Interest Rate Risk

Our exposure to market rate risk for changes in interest rates primarily relates to our investment portfolio. We centrally manage our investment portfolios considering investment opportunities and risks, tax consequences, and overall financing strategies. Our investment portfolio includes fixed-income securities with a fair value of approximately $47.8 million at December 31, 2017. These securities are subject to interest rate risk and, based on our investment portfolio at December 31, 2017, a 100 basis point increase in interest rates would result in a decrease in the fair value of the portfolio of $0.1 million. While an increase in interest rates may reduce the fair value of the investment portfolio, we will not realize the losses in the Consolidated Statements of Operations unless the individual fixed-income securities are sold prior to recovery or the loss is determined to be other-than-temporary.

Currency Exchange Risk

We conduct business on a worldwide basis and, as such, a portion of our revenues, earnings, and net investments in foreign affiliates is exposed to changes in currency exchange rates. The economic impact of currency exchange rate movements is complex because such changes are often linked to variability in real growth, inflation, interest rates, governmental actions, and other factors. These changes, if material, could cause us to adjust our financing and operating strategies. Consequently, isolating the effect of changes in currency does not incorporate these other important economic factors.

From time to time, we manage our risks and exposures to currency exchange rates through the use of derivative financial instruments (e.g., forward contracts). We mainly use derivative financial instruments in the context of hedging and generally do not use them for speculative purposes. During fiscal 2017, we had an immaterial amount of foreign exchange derivatives designated as hedges. During fiscal 2016, we did not designate foreign exchange derivatives as hedges. Accordingly, most foreign exchange derivatives are recorded in our Consolidated Balance Sheets at fair value and changes in fair value from these contracts are recorded in Other, net in our Consolidated Statements of Operations.

Our net sales to customers located outside of the United States represented approximately 80%, 74%, and 82% of our total net sales in 2017, 2016, and 2015, respectively. We expect that net sales to customers outside the United States will continue to represent a large percentage of our total net sales. Our net sales denominated in currencies other than the U.S. dollar represented approximately 1%, 4%, and 2% of total net sales in 2017, 2016, and 2015, respectively.

A 10% change in foreign exchange rates would have an immaterial impact on the consolidated results of operations since most of our sales outside the United States are denominated in U.S. dollars.

Item 8. Financial Statements and Supplementary Data

Our Consolidated Financial Statements are listed in the Index to Consolidated Financial Statements and Financial Statement Schedule filed as part of this Form 10-K.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Management s Report on Internal Control over Financial Reporting

Our principal executive and financial officers have evaluated and concluded that our disclosure controls and procedures are effective as of December 31, 2017. The disclosure controls and procedures are designed to ensure that the information required to be disclosed in this report filed under the Securities Exchange Act of 1934 is recorded, processed, summarized, and reported within the time periods specified in the Securities and Exchange Commission s rules and forms and is

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accumulated and communicated to our principal executive and financial officers as appropriate to allow timely decisions regarding required disclosure.

Our principal executive and financial officers are responsible for establishing and maintaining adequate internal control over financial reporting, which is a process designed and put into effect 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. Using the criteria established in the Internal Control Integrated Framework (2013) published by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), Management has evaluated, assessed, and concluded that internal control over financial reporting is effective as of December 31, 2017.

We acquired Ultratech, Inc. (Ultratech) on May 26, 2017, and the results of Ultratech from the acquisition date through December 31, 2017 are included in our 2017 consolidated financial statements. The results of Ultratech constituted 50 percent of total assets and 14 percent of net sales as of and for the year ended December 31, 2017. We have excluded Ultratech from our annual assessment of the effectiveness of our internal control over financial reporting.

KPMG LLP, an independent registered public accounting firm, has audited the consolidated financial statements included in this Annual Report on Form 10-K and, as part of their audit, has issued their report, included herein, on the effectiveness of our internal control over financial reporting.

Changes in Internal Control over Financial Reporting

During the quarter ended December 31, 2017, there were no changes in internal control that have materially affected or are reasonably likely to materially affect internal control over financial reporting.

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Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders of

Veeco Instruments Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Veeco Instrument Inc. s and subsidiaries (the Company) internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

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, 2017 and 2016, the related consolidated statements of operations, comprehensive income (loss), stockholders equity, and cash flows for each of the years in the three-year period ended December 31, 2017, and the related notes and financial statement Schedule II Valuation and Qualifying Accounts (collectively, the consolidated financial statements), and our report dated February 21, 2018 expressed an unqualified opinion on those consolidated financial statements.

The Company acquired Ultratech, Inc. (Ultratech) on May 26, 2017, and the results of Ultratech from the acquisition date through December 31, 2017 are included in the 2017 consolidated financial statements. The results of Ultratech constituted 50% of total assets and 14% of net sales as of and for the year ended December 31, 2017. Management has excluded Ultratech from its annual assessment of the effectiveness of the Company s internal control over financial reporting. Our audit of internal control over financial reporting of the Company also excluded an evaluation of the internal control over financial reporting of Ultratech.

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 of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included 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 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

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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 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/ KPMG LLP

Melville, New York
February 21, 2018

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Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Information required by this Item that will appear under the headings Governance, Executive Officers, and Section 16(a) Beneficial Ownership Reporting Compliance in the definitive proxy statement to be filed with the SEC relating to our 2018 Annual Meeting of Stockholders is incorporated herein by reference.

We have adopted a Code of Ethics for Senior Officers (the Code) which applies to our chief executive officer, principal financial officer, principal accounting officer, and persons performing similar functions. A copy of the Code can be found on our website (www.veeco.com). We intend to disclose on our website the nature of any future amendments to and waivers of the Code that apply to the chief executive officer, principal financial officer, principal accounting officer, or persons performing similar functions. We have also adopted a Code of Business Conduct which applies to all of our employees, including those listed above, as well as to our directors. A copy of the Code of Business Conduct can be found on our website (www.veeco.com). The website address above is intended to be an inactive, textual reference only. None of the material on this website is part of this report.

Item 11. Executive Compensation

Information required by this Item that will appear under the heading Compensation in the definitive proxy statement to be filed with the SEC relating to our 2018 Annual Meeting of Stockholders is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Information required by this Item that will appear under the headings Security Ownership of Certain Beneficial Owners and Management and Equity Compensation Plan Information in the definitive proxy statement to be filed with the SEC relating to our 2018 Annual Meeting of Stockholders is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Information required by this Item that will appear under the headings Certain Relationships and Related Transactions and Independence of Board in the definitive proxy statement to be filed with the SEC relating to our 2018 Annual Meeting of Stockholders is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services

Information required by this Item that will appear under the heading Proposal 4 Ratification of Appointment of KPMG in the definitive proxy statement to be filed with the SEC relating to our 2018 Annual Meeting of Stockholders is incorporated herein by reference.

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PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) (1) The Registrant s financial statements together with a separate table of contents are annexed hereto

(2) Financial Statement Schedules are listed in the separate table of contents annexed hereto.

(3) Exhibits

Unless otherwise indicated, each of the following exhibits has been previously filed with the Securities and Exchange Commission by the Company under File No. 0-16244.

Exhibit Number	Exhibit Description	Form	Incorporated by Reference Exhibit	Filing Date	Filed or Furnished Herewith
2.1	Agreement and Plan of Merger dated as of February 2, 2017 among Ultratech, Inc., Veeco Instruments Inc. and Ulysses Acquisition Subsidiary Corp.	8-K	2.1	2/3/2017	
2.2	Securities Purchase Agreement, dated December 4, 2014, by and among Solid State Equipment Holdings LLC, certain securityholders thereof, Veeco Instruments Inc. and certain other parties thereto.	10-K	2.1	2/24/2015	
2.3	Agreement and Plan of Merger, dated September 18, 2013, by and among Veeco, Veeco Wyoming Inc., Synos Technology, Inc., certain stockholders of Synos Technology, Inc., and Shareholder Representative Services LLC.	10-K	2.1	2/28/2014	
3.1	Amended and Restated Certificate of Incorporation of Veeco dated December 1, 1994, as amended June 2, 1997 and July 25, 1997.	10-Q	3.1	8/14/1997	
3.2	Amendment to Certificate of Incorporation of Veeco dated May 29, 1998.	10-K	3.2	3/14/2001	
3.3	Amendment to Certificate of Incorporation of Veeco dated May 5, 2000.	10-Q	3.1	8/14/2000	
3.4	Amendment to Certificate of Incorporation of Veeco dated May 16, 2002.	10-Q	3.1	10/26/2009	
3.5	Amendment to Certificate of Incorporation of Veeco dated May 18, 2010.	10-K	3.8	2/24/2011	
3.6	Fifth Amended and Restated Bylaws of Veeco effective February 5, 2016.	8-K	3.1	2/10/2016	
3.7	Certificate of Designation, Preferences, and Rights of Series A Junior Participating Preferred Stock of Veeco.	10-Q	3.1	5/9/2001	
4.1	Indenture, dated as of January 18, 2017, by and between Veeco Instruments Inc. and U.S. Bank National Association, as Trustee (relating to the 2.70% Convertible Notes due 2023).	8-K	4.1	1/18/2017	

4.2	First Supplemental Indenture, dated as of January 18, 2017, by and between Veeco Instruments Inc. and U.S. Bank National Association, as Trustee (relating to the 2.70% Convertible Notes due 2023).	8-K	4.2	1/18/2017
10.1	Loan Agreement dated as of December 15, 1999 between Applied Epi, Inc. and Jackson National Life Insurance Company.	10-Q	10.2	11/14/2001
10.2	Promissory Note dated as of December 15, 1999 issued by Applied Epi, Inc. to Jackson National Life Insurance Company.	10-Q	10.3	11/14/2001

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Exhibit Number	Exhibit Description	Incorporated by Reference Form	Exhibit	Filing Date	Filed or Furnished Herewith
10.3	Amendment to Loan Documents effective as of September 17, 2001 between Applied Epi, Inc. and Jackson National Life Insurance Company (executed in June 2002).	10-Q	10.2	8/14/2002	
10.4*	Veeco Amended and Restated 2000 Stock Incentive Plan, effective July 20, 2006.	10-Q	10.4	8/4/2006	
10.5*	Amendment No. 1 effective April 18, 2007 (ratified by the Board August 7, 2007) to Veeco Amended and Restated 2000 Stock Incentive Plan.	10-Q	10.1	8/7/2007	
10.6*	Amendment No. 2 dated January 22, 2009 to Veeco Amended and Restated 2000 Stock Incentive Plan.	10-K	10.41	3/2/2009	
10.7*	Veeco Amended and Restated 2010 Stock Incentive Plan, effective May 14, 2010.	Def 14A	Appendix A	11/4/2013	
10.8*	Veeco Amended and Restated 2010 Stock Incentive Plan, effective May 5, 2016.	S-8	10.1	6/2/2016	
10.9	Veeco Amended and Restated 2010 Stock Incentive Plan, effective March 3, 2017.	10-Q	10.1	11/3/2017	
10.10	Ultratech, Inc. 1993 Stock Option/Stock Issuance Plan (as Amended and Restated as of May 31, 2011).	S-8	10.1	5/26/2017	
10.11*	Form of Notice of Performance Share Award and related terms and conditions pursuant to the Veeco 2010 Stock Incentive Plan, effective June 2015.	10-Q	10.1	8/3/2015	
10.12*	Form of Notice of Performance Share Award and related terms and conditions pursuant to the Veeco 2010 Stock Incentive Plan, effective June 2016.	10-Q	10.1	11/1/2016	
10.13*	Form of Notice of Critical Priorities Performance Share Award and related terms and conditions pursuant to the Veeco 2010 Stock Incentive Plan, effective June 2016.	10-Q	10.2	11/1/2016	
10.14*	Veeco 2013 Inducement Stock Incentive Plan, effective September 26, 2013.	10-Q	10.1	11/4/2013	
10.15*	Veeco Instruments Inc. 2016 Employee Stock Purchase Plan.	S-8	10.9	6/2/2016	
10.16*	Form of Support Agreement (issued in connection with the Agreement and Plan of Merger with Ultratech, Inc. dated February 2, 2017).	8-K	10.1	2/3/2017	
10.17	Form of Amended and Restated Indemnification Agreement entered into between Veeco and each of its directors and executive officers (August 2017).	10-Q	10.2	8/3/2017	
10.18*	Veeco Amended and Restated Senior Executive Change in Control Policy, effective as of January 1, 2014.	10-K	10.22	2/28/2014	
10.19*	Employment Agreement effective as of July 1, 2007 between Veeco and John R. Peeler.	10-Q	10.3	8/7/2007	
10.20*	Amendment effective December 31, 2008 to Employment Agreement between Veeco and John R. Peeler.	10-K	10.38	3/2/2009	
10.21*	Second Amendment effective June 11, 2010 to Employment Agreement between Veeco and John R. Peeler.	10-Q	10.1	7/29/2010	
10.22*	Third Amendment effective April 25, 2012 to Employment Agreement between Veeco and John R. Peeler.	10-Q	10.2	5/9/2012	
10.23*	Amendment dated June 12, 2014 to Employment Agreement between Veeco and John R. Peeler.	10-Q	10.3	7/31/2014	
10.24	Amendment dated June 12, 2017 to Employment Agreement between Veeco and John R. Peeler.	10-Q	10.1	8/3/2017	
10.25*	Letter Agreement dated April 8, 2014 between Veeco and Shubham Maheshwari.	10-Q	10.1	7/31/2014	
10.26*	Letter Agreement dated January 30, 2012 between Veeco and Dr. William J. Miller.	10-K	10.30	2/22/2012	

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Exhibit Number	Exhibit Description	Form	Incorporated by Reference Exhibit	Filing Date	Filed or Furnished Herewith
10.27*	Letter dated December 22, 2015 from Veeco to Dr. William J. Miller.	10-K	10.21	2/25/2016	
10.28*	Letter Agreement dated January 21, 2004 between Veeco and John P. Kiernan.	10-K	10.38	3/12/2004	
10.29*	Amendment effective June 9, 2006 to Letter Agreement between Veeco and John P. Kiernan.	10-Q	10.3	8/4/2006	
10.30*	Amendment effective December 31, 2008 to Letter Agreement between Veeco and John P. Kiernan.	10-K	10.40	3/2/2009	
10.31*	Letter Agreement effective as of June 19, 2009 between Veeco and John P. Kiernan.	10-Q	10.2	7/30/2009	
21.1	Subsidiaries of the Registrant.				X
23.1	Consent of KPMG LLP.				X
31.1	Certification of Chief Executive Officer pursuant to Rule 13a 14(a) or Rule 15d 14(a) of the Securities and Exchange Act of 1934.				X
31.2	Certification of Chief Financial Officer pursuant to Rule 13a 14(a) or Rule 15d 14(a) of the Securities and Exchange Act of 1934.				X
32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes - Oxley Act of 2002.				X
32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes - Oxley Act of 2002.				X
101.INS	XBRL Instance.				**
101.XSD	XBRL Schema.				**
101.PRE	XBRL Presentation.				**
101.CAL	XBRL Calculation.				**
101.DEF	XBRL Definition.				**
101.LAB	XBRL Label.				**

* Indicates a management contract or compensatory plan or arrangement, as required by Item 15(a) (3) of Form 10-K.

** Filed herewith electronically

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on February 21, 2018.

Veeco Instruments Inc.

By: /S/ JOHN R. PEELER
John R. Peeler
Chairman and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report has been signed below by the following persons on behalf of the Registrant and in the capacities indicated, on February 21, 2018.

Signature	Title
/s/ JOHN R. PEELER John R. Peeler	Chairman and Chief Executive Officer (principal executive officer)
/s/ SHUBHAM MAHESHWARI Shubham Maheshwari	Executive Vice President and Chief Financial Officer (principal financial officer)
/s/ JOHN P. KIERNAN John P. Kiernan	Senior Vice President, Finance, Chief Accounting Officer, and Treasurer (principal accounting officer)
/s/ KATHLEEN A. BAYLESS Kathleen A. Bayless	Director
/s/ RICHARD A. D AMORE Richard A. D Amore	Director
/s/ GORDON HUNTER Gordon Hunter	Director
/s/ KEITH D. JACKSON Keith D. Jackson	Director
/s/ PETER J. SIMONE Peter J. Simone	Director
/s/ THOMAS ST. DENNIS Thomas St. Dennis	Director

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Veeco Instruments Inc. and Subsidiaries

Index to Consolidated Financial Statements and Financial Statement Schedule

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Stockholders of

Veeco Instruments Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Veeco Instruments Inc. and subsidiaries (the Company) as of December 31, 2017 and 2016, the related consolidated statements of operations, comprehensive income (loss), stockholders equity, and cash flows for each of the years in the three-year period ended December 31, 2017, and the related notes and financial statement Schedule II Valuation and Qualifying Accounts (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2017, 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, 2017, based on criteria established in Internal Control Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission , and our report dated February 21, 2018 expressed an unqualified opinion on the effectiveness of the Company s internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company s management. Our responsibility is to express an opinion on these consolidated 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 consolidated 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 consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

We have served as the Company s auditor since 2015.

Melville, New York
February 21, 2018

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Veeco Instruments Inc. and Subsidiaries

Consolidated Balance Sheets

(in thousands, except share amounts)

	December 31, 2017	December 31, 2016
Assets		
Current assets:		
Cash and cash equivalents	$ 279,736	$ 277,444
Restricted cash	847	
Short-term investments	47,780	66,787
Accounts receivable, net	98,866	58,020
Inventories	120,266	77,063
Deferred cost of sales	16,060	6,160
Prepaid expenses and other current assets	33,437	16,034
Total current assets	596,992	501,508
Property, plant, and equipment, net	85,058	60,646
Intangible assets, net	369,843	58,378
Goodwill	307,131	114,908
Deferred income taxes	2,953	2,045
Other assets	25,310	21,047
Total assets	$ 1,387,287	$ 758,532
Liabilities and stockholders equity		
Current liabilities:		
Accounts payable	$ 50,318	$ 22,607
Accrued expenses and other current liabilities	60,339	33,201
Customer deposits and deferred revenue	108,953	85,022
Income taxes payable	3,846	2,311
Current portion of long-term debt		368
Total current liabilities	223,456	143,509
Deferred income taxes	36,845	13,199
Long-term debt	275,630	826
Other liabilities	10,643	6,403
Total liabilities	546,574	163,937
Stockholders equity:		
Preferred stock, $0.01 par value; 500,000 shares authorized; no shares issued and outstanding.		
Common stock, $0.01 par value; 120,000,000 shares authorized; 48,229,251 and 40,714,790 shares issued at December 31, 2017 and December 31, 2016, respectively; 48,144,416 and 40,588,194 shares outstanding at December 31, 2017 and December 31, 2016, respectively.	482	407
Additional paid-in capital	1,053,079	763,303
Accumulated deficit	(213,376)	(168,583)
Accumulated other comprehensive income	1,812	1,777
Treasury stock, at cost, 84,835 and 126,596 shares at December 31, 2017 and 2016, respectively.	(1,284)	(2,309)
Total stockholders equity	840,713	594,595
Total liabilities and stockholders equity	$ 1,387,287	$ 758,532

See accompanying Notes to the Consolidated Financial Statements.

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Veeco Instruments Inc. and Subsidiaries

Consolidated Statements of Operations

(in thousands, except per share amounts)

	For the year ended December 31, 2017	2016	2015
Net sales	$ 484,756	$ 332,451	$ 477,038
Cost of sales	300,438	199,593	299,797
Gross profit	184,318	132,858	177,241
Operating expenses, net:			
Research and development	81,987	81,016	78,543
Selling, general, and administrative	100,250	77,642	90,188
Amortization of intangible assets	35,475	19,219	27,634
Restructuring	11,851	5,640	4,679
Acquisition costs	17,786		
Asset impairment	1,139	69,520	126
Other, net	(392)	223	(697)
Total operating expenses, net	248,096	253,260	200,473
Operating income (loss)	(63,778)	(120,402)	(23,232)
Interest income	2,335	1,180	1,050
Interest expense	(19,457)	(222)	(464)
Income (loss) before income taxes	(80,900)	(119,444)	(22,646)
Income tax expense (benefit)	(36,107)	2,766	9,332
Net income (loss)	$ (44,793)	$ (122,210)	$ (31,978)
Income (loss) per common share:			
Basic	$ (1.01)	$ (3.11)	$ (0.80)
Diluted	$ (1.01)	$ (3.11)	$ (0.80)
Weighted average number of shares:			
Basic	44,174	39,340	39,742
Diluted	44,174	39,340	39,742

See accompanying Notes to the Consolidated Financial Statements.

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Veeco Instruments Inc. and Subsidiaries

Consolidated Statements of Comprehensive Income (Loss)

(in thousands)

	For the year ended December 31, 2017	2016	2015
Net income (loss)	$ (44,793)	$ (122,210)	$ (31,978)
Other comprehensive income (loss), net of tax:			
Available-for-sale securities:			
Change in net unrealized gains or losses	(7)	(6)	(49)
Reclassification adjustments for net (gains) losses included in net loss		18	
Net unrealized gain (loss) on available-for-sale securities	(7)	12	(49)
Minimum pension liability:			
Change in minimum pension liability			15
Reclassification adjustments for net (gains) losses included in net loss		866	
Net changes related to minimum pension liability		866	15
Currency translation adjustments:			
Change in currency translation adjustments	42	(19)	(87)
Reclassification adjustments for net (gains) losses included in net loss		(430)	
Net changes related to currency translation adjustments	42	(449)	(87)
Other comprehensive income (loss), net of tax	35	429	(121)
Total comprehensive income (loss)	$ (44,758)	$ (121,781)	$ (32,099)

See accompanying Notes to the Consolidated Financial Statements.

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Veeco Instruments Inc. and Subsidiaries

Consolidated Statements of Stockholders Equity

(in thousands)

	Common Stock Shares	Common Stock Amount	Treasury Stock Shares	Treasury Stock Amount	Additional Paid-in Capital	Retained Earnings (Accumulated Deficit)	Accumulated Other Comprehensive Income	Total
Balance at December 31, 2014	40,360	$ 404		$	$ 750,139	$ (13,080)	$ 1,469	$ 738,932
Net loss						(31,978)		(31,978)
Other comprehensive loss, net of tax							(121)	(121)
Share-based compensation expense					17,986			17,986
Net issuance under employee stock plans	636	6			(988)			(982)
Purchases of common stock			469	(9,222)				(9,222)
Balance at December 31, 2015	40,996	410	469	(9,222)	767,137	(45,058)	1,348	714,615
Cumulative effect of change in accounting principle - adoption of ASU 2016-09					1,315	(1,315)		
Net loss						(122,210)		(122,210)
Other comprehensive income, net of tax							429	429
Share-based compensation expense					15,741			15,741
Net issuance under employee stock plans	(281)	(3)	(1,072)	19,948	(20,890)			(945)
Purchases of common stock			730	(13,035)				(13,035)
Balance at December 31, 2016	40,715	407	127	(2,309)	763,303	(168,583)	1,777	594,595
Net loss						(44,793)		(44,793)
Other comprehensive income, net of tax							35	35
Share-based compensation expense					24,396			24,396
Net issuance under employee stock plans	313	3	(245)	4,043	(9,795)			(5,749)
Stock issuance for business acquisition	7,201	72			228,800			228,872
Convertible Senior Notes, equity component					46,375			46,375
Purchases of common stock			203	(3,018)				(3,018)
Balance at December 31, 2017	48,229	$ 482	85	$ (1,284)	$ 1,053,079	$ (213,376)	$ 1,812	$ 840,713

See accompanying Notes to the Consolidated Financial Statements.

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Veeco Instruments Inc. and Subsidiaries

Consolidated Statements of Cash Flows

(in thousands)

	For the year ended December 31, 2017	2016	2015
Cash Flows from Operating Activities			
Net income (loss)	$ (44,793)	$ (122,210)	$ (31,978)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	50,095	32,650	39,850
Non-cash interest expense	10,446		
Deferred income taxes	(33,875)	940	2,648
Share-based compensation expense	24,396	15,741	17,986
Asset impairment	1,139	69,520	126
Provision for bad debts	99	171	43
Gain on sale of lab tools			(1,261)
Gain on cumulative translation adjustment		(430)	
Changes in operating assets and liabilities:			
Accounts receivable	4,520	(8,667)	10,715
Inventories and deferred cost of sales	6,336	(5,389)	(12,312)
Prepaid expenses and other current assets	(10,204)	6,726	(39)
Accounts payable and accrued expenses	12,197	(24,202)	9,470
Customer deposits and deferred revenue	19,096	8,807	(20,738)
Income taxes receivable and payable, net	775	547	759
Long-term income tax liability	(4,877)		
Other, net	(1,204)	1,952	520
Net cash provided by (used in) operating activities	34,146	(23,844)	15,789
Cash Flows from Investing Activities			
Acquisitions of businesses, net of cash acquired	(401,828)		(68)
Capital expenditures	(24,272)	(11,479)	(13,887)
Proceeds from the sale of investments	348,927	152,301	88,647
Payments for purchases of investments	(282,947)	(103,394)	(85,838)
Proceeds from held for sale assets	2,284	9,512	3,068
Other		(230)	1,000
Net cash provided by (used in) investing activities	(357,836)	46,710	(7,078)
Cash Flows from Financing Activities			
Proceeds (net of tax withholdings) from option exercises and employee stock purchase plan	2,992	1,656	2,233
Restricted stock tax withholdings	(8,741)	(2,601)	(3,215)
Purchases of common stock	(2,869)	(13,349)	(8,907)
Proceeds from long-term debt borrowings	335,752		
Principal payments on long-term debt	(1,194)	(340)	(314)
Net cash provided by (used in) financing activities	325,940	(14,634)	(10,203)
Effect of exchange rate changes on cash and cash equivalents	42	(20)	(87)
Net increase (decrease) in cash and cash equivalents	2,292	8,212	(1,579)
Cash and cash equivalents - beginning of period	277,444	269,232	270,811
Cash and cash equivalents - end of period	$ 279,736	$ 277,444	$ 269,232

Supplemental Disclosure of Cash Flow Information						
Interest paid	$	4,675	$	225	$	485
Income taxes paid		1,939		1,669		7,091
Non-cash operating and financing activities						
Net transfer of inventory to property, plant and equipment		(97)		1,827		

See accompanying Notes to the Consolidated Financial Statements.

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Veeco Instruments Inc. and Subsidiaries

Notes to Consolidated Financial Statements

Note 1 Significant Accounting Policies

(a) Description of Business

Veeco Instruments Inc. (together with its consolidated subsidiaries, Veeco, or the Company) operates in a single segment: the development, manufacture, sales, and support of semiconductor process equipment primarily sold to make electronic devices.

(b) Basis of Presentation

The accompanying audited Consolidated Financial Statements of the Company have been prepared in accordance with United States generally accepted accounting principles (GAAP). The Company reports interim quarters on a 13-week basis ending on the last Sunday of each period, which is determined at the start of each year. The Company s fourth quarter always ends on the last day of the calendar year, December 31. During 2017 the interim quarters ended on April 2, July 2, and October 1, and during 2016 the interim quarters ended on April 3, July 3, and October 2. The Company reports these interim quarters as March 31, June 30, and September 30 in its interim consolidated financial statements.

(c) Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Although these estimates are based on management s knowledge of current events and actions it may undertake in the future, these estimates may ultimately differ from actual results. Significant items subject to such estimates and assumptions include: (i) the best estimate of selling price for the Company s products and services; (ii) allowances for doubtful accounts; (iii) inventory obsolescence; (iv) the useful lives and expected future cash flows of property, plant, and equipment and identifiable intangible assets; (v) the fair value of the Company s reporting unit and related goodwill; (vi) the fair value, less cost to sell, of assets held for sale; (vii) investment valuations and the valuation of derivatives, deferred tax assets, and assets acquired in business combinations; (viii) the recoverability of long-lived assets; (ix) liabilities for product warranty and legal contingencies; (x) share-based compensation; and (xi) income tax uncertainties. Actual results could differ from those estimates.

(d) Principles of Consolidation

The Consolidated Financial Statements include the accounts of the Company and its subsidiaries. Intercompany balances and transactions have been eliminated in consolidation. Companies acquired during each reporting period are reflected in the results of the Company effective from their respective dates of acquisition through the end of the reporting period.

(e) Foreign Currencies

Assets and liabilities of the Company s foreign subsidiaries that operate using local functional currencies are translated using the exchange rates in effect at the balance sheet date. Results of operations are translated using monthly average exchange rates. Adjustments arising from the translation of the foreign currency financial statements of the Company s subsidiaries into U.S. dollars, including intercompany transactions of a long-term nature, are reported as currency translation adjustments in Accumulated other comprehensive income in the Consolidated Balance Sheets. Foreign currency transaction gains or losses are included in Other, net in the Consolidated Statements of Operations.

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Veeco Instruments Inc. and Subsidiaries

Notes to Consolidated Financial Statements (Continued)

(f) Revenue Recognition

The Company recognizes revenue when all of the following criteria have been met: persuasive evidence of an arrangement exists with a customer; delivery of the specified products has occurred or services have been rendered; prices are contractually fixed or determinable; and collectability is reasonably assured. Revenue is recorded including shipping and handling costs and excluding applicable taxes related to sales.

Contracts with customers frequently contain multiple deliverables, such as systems, upgrades, components, spare parts, maintenance, and service plans. Judgment is required to properly identify the accounting units of the multiple-element arrangements and to determine how the revenue should be allocated among the accounting units. The Company also evaluates whether multiple transactions with the same customer or related parties should be considered part of a single, multiple-element arrangement based on an assessment of whether the contracts or agreements are negotiated or executed within a short time frame of each other or if there are indicators that the contracts are negotiated in contemplation of one another. Moreover, judgment is used in interpreting the commercial terms and determining when all criteria have been met in order to recognize revenue in the appropriate accounting period.

When there are separate units of accounting, the Company allocates revenue to each element based on the following selling price hierarchy: vendor-specific objective evidence (VSOE) if available; third party evidence (TPE) if VSOE is not available; or the best estimate of selling price (BESP) if neither VSOE nor TPE is available. The Company uses BESP for the elements in its arrangements. The maximum revenue recognized on a delivered element is limited to the amount that is not contingent upon the delivery of additional items.

The Company considers many facts when evaluating each of its sales arrangements to determine the timing of revenue recognition including its contractual obligations, the customer s creditworthiness, and the nature of the customer s post-delivery acceptance provisions. The Company s system sales arrangements, including certain upgrades, generally include field acceptance provisions that may include functional or mechanical test procedures. For the majority of the arrangements, a customer source inspection of the system is performed in the Company s facility or test data is sent to the customer documenting that the system is functioning to the agreed upon specifications prior to delivery. Historically, such source inspection or test data replicates the field acceptance provisions that are performed at the customer s site prior to final acceptance of the system. When the Company objectively demonstrates that the criteria specified in the contractual acceptance provisions are achieved prior to delivery, revenue is recognized upon system delivery since there is no substantive contingency remaining related to the acceptance provisions at that date, subject to the retention amount constraint described below for certain contracts. For new products, new applications of existing products, or for products with substantive customer acceptance provisions where the Company cannot objectively demonstrate that the criteria specified in the contractual acceptance provisions have been achieved prior to delivery, revenue and the associated costs are deferred and fully recognized upon the receipt of final customer acceptance, assuming all other revenue recognition criteria have been met.

The Company s system sales arrangements, including certain upgrades, generally do not contain provisions for the right of return, forfeiture, refund, or other purchase price concession. In the rare instances where such provisions are included, all revenue is deferred until such rights expire. The sales arrangements generally include installation. The installation process is not deemed essential to the functionality of the equipment since it is not complex; it does not require significant changes to the features or capabilities of the equipment or involve constructing elaborate interfaces or connections subsequent to factory acceptance. The Company has a demonstrated history of consistently completing installations in a timely manner and can reliably estimate the costs of such activities. Most customers engage the Company to perform the installation services, although there are other third-party providers with sufficient knowledge who could complete these services. Based on these factors, installation is deemed to be inconsequential or perfunctory relative to the system sale as a whole, and as a result, installation service is not considered a separate element of the arrangement. As such, the Company records the cost of the installation at the earlier of the time of revenue recognition for the system or when installation services are performed.

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Veeco Instruments Inc. and Subsidiaries

Notes to Consolidated Financial Statements (Continued)

In certain cases the Company s products are sold with a billing retention, typically 10% of the sales price, which is billed by the Company and payable by the customer when field acceptance provisions are completed. The amount of revenue recognized upon delivery of a system or upgrade, if any, is limited to the lower of i) the amount billed that is not contingent upon acceptance provisions or ii) the value of the arrangement consideration allocated to the delivered elements, if such sale is part of a multiple-element arrangement.

The Company recognizes revenue related to maintenance and service contracts ratably over the applicable contract term. The Company recognizes revenue from the sales of components, spare parts, and specified service engagements at the time of delivery in accordance with the terms of the applicable sales arrangement.

Incremental direct costs incurred related to the acquisition of a customer contract, such as sales commissions, are expensed as incurred, even if the related revenue is deferred in accordance with the above policy.

(g) Warranty Costs

The Company typically provides standard warranty coverage on its systems for one year from the date of final acceptance by providing labor and parts necessary to repair the systems during the warranty period. The Company accounts for the estimated warranty cost when revenue is recognized on the related system. Warranty cost is included in Cost of sales in the Consolidated Statements of Operations. The estimated warranty cost is based on the Company s historical experience with its systems and regional labor costs. The Company calculates the average service hours by region and parts expense per