NOVA MEASURING INSTRUMENTS LTD
Form 20-F
February 28, 2019

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

Form 20-F

REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) or (g) OF THE SECURITIES EXCHANGE ACT OF 1934

OR

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

For the fiscal year ended December 31, 2018

OR

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

OR

SHELL COMPANY REPORT PURSUANT TO SECTION 13 or 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission
File
Number
000-30668

NOVA MEASURING INSTRUMENTS LTD.
(Exact name of Registrant as specified in its charter)

Nova Measuring Instruments Ltd.	Israel
(Translation of Registrant's name into English)	(Jurisdiction of incorporation or organization)

Weizmann Science Park, Einstein St., Building 22, 2nd Floor, Ness-Ziona, Israel
(Address of principal executive offices)

Dror David, +972-73-2295833, +972-8-9407776, P.O.B 266, Rehovot 7610201, Israel
(Name, Telephone, E-mail and/or Facsimile number and Address of the Registrant's Contact Person)

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

Title of each class	Name of each exchange on which registered
Ordinary Shares, nominal value NIS 0.01 per share	The Nasdaq Global Select Market

Securities registered or to be registered pursuant to Section 12(g) of the Act:

None

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act:

None

Indicate the number of outstanding shares of each of the issuer's classes of capital or common stock as of the close of the period covered by the annual report: 27,917,505 ordinary shares, NIS 0.01 nominal (par) value per share, as of December 31, 2018.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934.

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes No

Indicate by check mark whether the registrant has submitted electronically 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 (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files).

Yes No

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

Large accelerated filer Accelerated filer Non-accelerated filer
Emerging growth company

If an emerging growth company that prepares its financial statements in accordance with U.S. GAAP, 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 7(a)(2)(B) of the Securities Act.

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP

International Financing Reporting Standards as issued by the International Accounting Standards Board

Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow:

Item 17 Item 18

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).

Yes No

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Introduction

In this Annual Report, the “Company”, “Nova”, “we” or “our” refers to Nova Measuring Instruments Ltd. and its consolidated subsidiaries, when the context requires.

Our Functional Currency

Unless otherwise indicated, all amounts herein are expressed in United States dollars (“U.S. dollars”, “dollars”, “USD”, “US$” or “$”).

The currency of the primary economic environment in which we operate is the U.S. dollar, since substantially all our revenues to date have been denominated in U.S. dollars and over 50% of our expenses are in U.S. dollars or in New Israeli Shekels linked to the dollar. Transactions and balances denominated in dollars are presented at their original amounts. Non-dollar transactions and balances have been re-measured into dollars as required by the principles in ASC 830 Foreign Currency Matters. All exchange gains and losses from such re-measurement are included in the net financial income when they arise.

Cautionary Statement Regarding Forward-Looking Statements

Certain information contained herein, which does not relate to historical financial information, may be deemed to constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. The words or phrases “will likely result”, “are expected to”, “will continue”, “is anticipated”, “estimate”, “project”, “believe”, “ or similar expressions identify “forward looking statements”. Such statements, including without limitation, statements relating to our anticipated sales, revenues and expenses in 2018, our expectations with respect to our business and operations and our ability to gain market share are subject to certain risks and uncertainties that could cause actual results to differ materially from historical results and those presently anticipated or projected. We wish to caution readers not to place undue reliance on any such forward-looking statements, which speak only as of the date made. We cannot guarantee future results, levels of activity, performance or achievements. We also undertake no obligation to release publicly any revisions to these forward–looking statements to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events. Among the factors that could cause our actual results in the future to differ materially from any opinions or statements expressed with respect to future periods are competitive industry conditions and the ability to forecast the needs of the semiconductor industry with respect to the very cyclical nature of the industry and the very fast pace of technology evolutions and factors related to the conditions of the global markets and the global economy. Various other factors that could cause our actual results to differ materially are set forth in “Item 3D. Risk Factors” in this annual report on Form 20-F and elsewhere herein.

PART I

Item 1. Identity of Directors, Senior Management and Advisors

Not applicable.

Item 2. Offer Statistics and Expected Timetable

Not applicable.

Item 3. Key Information

3A. Selected Financial Data

The following selected consolidated financial data as of December 31, 2018 and 2017 and for the years ended December 31, 2018, 2017 and 2016 have been derived from our audited consolidated financial statements included elsewhere in this annual report. These financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"), and audited by our independent registered public accounting firm. The consolidated selected financial data as of December 31, 2016, 2015 and 2014 and for the years ended December 31, 2015 and December 31, 2014 have been derived from other consolidated financial statements not included in this Form 20-F that were also prepared in accordance with U.S. GAAP and audited by our independent registered public accounting firm. The selected consolidated financial data set forth below should be read in conjunction with and are qualified by reference to "Item 5. Operating and Financial Review and Prospects" and the consolidated financial statements and notes thereto and other financial information included elsewhere in this annual report on Form 20-F.

Summary of Consolidated Financial Data

	Year ended December 31,				
	2014	2015	2016	2017	2018
	(in thousands, except per share data)				
Consolidated Statement of Operations Data:					
Revenues	$120,618	$148,514	$163,903	$221,992	$251,134
Cost of revenues	57,005	71,434	88,623	90,805	105,900
Gross profit	63,613	77,080	75,280	131,187	145,234
Operating expenses:					
Research and development expenses, net	29,498	39,703	34,998	38,956	45,451
Sales and marketing expenses	12,747	15,967	21,523	24,554	28,847
General and administrative expenses	4,457	8,511	6,835	8,100	8,735
Amortization of intangible assets		1,318	1,758	1,758	1,759
Total operating expenses	46,702	65,499	65,114	73,368	84,792
Operating profit	16,911	11,581	10,166	57,819	60,442
Financing income, net	563	643	1,216	2,276	2,984
Income before income taxes	17,474	12,224	11,382	60,095	63,426
Income taxes expenses (benefit)	(1,178)	(3,501)	1,738	13,636	9,051
Net income for the year	$18,652	$15,725	$9,644	$46,459	$54,375
Earnings per share:					
Basic	$0.68	$0.58	$0.35	$1.68	$1.94
Diluted	$0.67	$0.57	$0.35	$1.63	$1.89

Shares used in calculation of net earnings per share:					
Basic	27,447	27,185	27,175	27,696	28,022
Diluted	27,807	27,510	27,503	28,524	28,765

	December 31,				
	2014	2015	2016	2017	2018
	(in thousands)				
Consolidated Balance Sheet Data:					
Working capital	$130,480	$112,819	$128,872	$179,782	$233,499
Total assets	173,279	207,269	218,593	283,285	333,430
Capital stock (including additional paid-in capital)	119,058	113,022	117,102	122,500	122,386
Shareholders' equity	143,582	161,060	174,717	226,736	280,740

3B. Capitalization and Indebtedness

Not applicable.

3C. Reasons for the Offer and Use of Proceeds

Not applicable.

3D. Risk Factors

Risks Related to Our Business and Our Industry

Because substantially most of our current sales are dependent on three specific product lines, factors that adversely affect the pricing and demand for these product lines could substantially reduce our sales.

We are currently dependent on three process control product lines. We expect revenues from these product lines to continue to account for a substantial portion of our revenues in the coming years. As a result, factors adversely affecting the pricing of, or demand for, these product lines, such as competition and technological change, could significantly reduce our sales.

We depend on a small number of large customers, and the loss of one or more of them could significantly lower our revenues.

Like our peers serving the semiconductor market, our customer base is highly concentrated among a limited number of large customers. We anticipate that our revenues will continue to depend on a limited number of major customers, although the companies considered to be our major customers and the percentage of our revenue represented by each major customer may vary from period to period. As a result of our customer concentration, our financial performance may fluctuate significantly from period to period based, among others, on exogenous circumstances related to our clients. For example, it is possible that any of our major customers could terminate its purchasing relationship with us or significantly reduce or delay the amount of our products that it orders, purchase products from our competitors, or develop its own products internally. The loss of any one of our major customers would adversely affect our revenues. Furthermore, if any of our customers become insolvent or have difficulties meeting their financial obligations to us for any reason, we may suffer losses. For more information regarding our sales by major customers as percentage of our total sales, see Note 11 to our consolidated financial statements contained elsewhere in this report.

The markets we target are cyclical and it is difficult to predict the length and strength of any downturn or expansion period.

The semiconductor capital equipment market and industries, which are cyclical, experienced a steep downturns and upturns between the years 2008 and 2018. In recent years, we have seen a more stable overall capital investment patterns, yet we cannot predict the length and strength of potential future downturns or expansions.

Our inability to significantly reduce spending during a protracted slowdown in the semiconductor industry could reduce our prospects of achieving continued profitability.

Historically, we have derived all our revenues, and we expect to continue to derive practically all of our revenues, from sales of our products and related services to the semiconductor industry. Our business depends in large part upon capital expenditures by semiconductor manufacturers, which in turn depend upon the current and anticipated demand for semiconductors. The semiconductor industry has experienced severe and protracted cyclical downturns and upturns. During cyclical downturns, as those we have experienced in the past, and are likely to experience in the future material reductions in the demand for the type of capital equipment and process technology that we offer may result in a decline in our sales. In addition, our ability to significantly reduce expenses in response to any downturn or slowdown in the rate of capital investment by manufacturers in these industries may be limited because of:

Ÿ our continuing need to invest in research and development;

Ÿ our continuing need to market our new products to new and existing customers; and

Ÿ our extensive ongoing customer service and support requirements worldwide.

As a result, we may have difficulty achieving continued profitability during a protracted slowdown.

If we do not respond effectively and on a timely basis to rapid technological changes, our ability to attract and retain customers could be diminished, which would have an adverse effect on our sales and ability to remain competitive.

The semiconductor manufacturing industry is characterized by rapid technological changes, new product introductions and enhancements and evolving industry standards. Our ability to remain competitive and generate sales revenue will depend in part upon our ability to develop new and enhanced systems at competitive prices in a timely and cost-effective manner and to accurately predict technology transitions. Because new product development commitments must be made well in advance of sales, new product decisions must anticipate the future demand for products. If we fail to correctly anticipate future demand for products, our sales and competitive position will suffer. In addition, the development of new measurement technologies, new product introductions or enhancements by our competitors could cause a decline in our sales or loss of market acceptance of our existing products.

We depend on continuous cooperation with Process Equipment Manufacturers (“PEMs”) to enable sales of our integrated metrology systems, and the loss of PEMs as business partners could harm our business.

We believe that sales of integrated metrology systems will continue to be an important source of our revenues. Sales of our integrated metrology systems depend upon the ability of PEMs to sell semiconductor equipment products that are able to integrate with our metrology systems. If our PEMs are unable to sell such products, if they choose to focus their attention on products that do not integrate our systems, or if they choose to develop their own metrology solutions, our business could suffer. If we were to lose our PEMs as business partners for any reason, our inability to realize sales from integrated metrology systems could significantly harm our business. In addition, we may not be able to develop or market new integrated metrology products, which could slow or prevent our growth.

Some of our commercial agreements with PEMs and customers may include exclusivity provisions and limitations on the use of certain intellectual property. Such limitations may prevent us from engaging in certain business relationships with third parties, and may limit our ability to use certain elements of our intellectual property. As a result, our ability to introduce new products in relevant markets might be affected.

Some of our commercial agreements with PEMs and customers may include exclusivity provisions, which prevent us from engaging in certain business relationships with third parties. In addition, some of our commercial agreements with PEMs also include limitations on the use of certain joint intellectual property. These exclusivity obligations and limitations are often used as a tool to promote the development and the penetration of innovative new solutions, and are usually limited in terms of scope and length. When considering whether to enter into any such exclusivity arrangements or accepting such limitations, we usually take into the consideration the terms of the exclusivity (e.g., length and scope), the expected benefit to the Company, and the risks and limitations associated with such exclusivity or limiting undertakings. Exclusivity obligations or limitation of use relating to certain parts of our technology and products may affect our ability to commercialize our products, engage in potentially beneficial business relationships with third parties (including by means of a merger or acquisition), or introduce new products into relevant markets, which could slow or prevent our growth.

If any of our systems fail to meet or exceed our internal quality specifications, we cannot ship them until such time as they have met such specifications. If we experience significant delays or are unable to ship our products to our customers as a result of our internal processes or for any other reason, our business and reputation may be adversely affected.

Our products are complex and require technical expertise to design and manufacture. Various problems occasionally arise during the manufacturing process that may cause delays and/or impair product quality. We actively monitor our manufacturing processes to ensure that our products meet our internal quality specifications. Any significant delays stemming from the failure of our products to meet or exceed our internal quality specifications, or for any other reasons, would delay our shipments. Shipment delays could be harmful to our business, revenues and reputation in the industry.

Increased information technology security threats, more sophisticated computer crime, and changes in privacy laws could disrupt our business.

Our global operations are linked by information systems, including telecommunications, the internet, our corporate intranet, network communications, email and various computer hardware and software applications. In light of information technology security threats, we have implemented network security measures and engaged the services of a cybersecurity consulting firm to conduct an information security risk assessment review which was reviewed and discussed by our audit committee and board of directors. In the current environment, there are numerous and evolving risks to cybersecurity and privacy, including criminal hackers, hacktivists, state-sponsored intrusions, industrial espionage, employee malfeasance and human or technological error. High-profile security breaches at other companies and in government agencies have increased in recent years, and security industry experts and government officials have warned about the risks of hackers and cyberattacks targeting businesses such as ours. Computer hackers and others routinely attempt to breach the security of technology products, services and systems, and to fraudulently induce employees, customers, or others to disclose information or unwittingly provide access to systems or data.

Although we have invested in measures to reduce these risks, we can provide no assurance that our current IT systems are fully protected against third-party intrusions, viruses, hacker attacks, information or data theft or other similar threats. We have experienced and expect to continue to experience actual or attempted cyberattacks of our IT networks. Although none of these actual or attempted cyberattacks has had a material adverse effect on our operations or financial condition thus far, we cannot guarantee that any such incidents will not have a material adverse effect on our operations or financial condition in the future. As such, our tools and servers are vulnerable to computer viruses, break-ins and similar disruptions from unauthorized tampering with our computer systems and tools located at our facility or at customer sites, or could be subject to system failures or malfunctions for other reasons. Increased information technology security threats and more sophisticated computer crime pose a risk to the security of our systems and networks and the confidentiality, availability and integrity of our data or customer data. Cybersecurity attacks could also include attacks targeting the security, integrity and/or reliability of the hardware and software installed in our products. System failures or malfunctioning could disrupt our operations and our ability to timely and accurately process and report key components of our financial results. Further, the regulatory framework for privacy and security issues worldwide is rapidly evolving and is likely to remain uncertain for the foreseeable future. In May 2016, the European Union adopted the General Data Protection Regulation (“GDPR”), fully enforceable as of May 25, 2018, that impose more stringent data protection requirements and provides for greater penalties for noncompliance. We may be required to incur significant costs to comply with privacy and data security laws, rules and regulations, including the GDPR. Any inability to adequately address privacy and security concerns or comply with applicable privacy and data security laws, rules and regulations could have an adverse effect on our business prospects, results of operations and/or financial position.

We may incorporate open source technology in some of our software and products, which may expose us to liability and have a material impact on our product development and sales.

Some of our software and products utilize open source technologies. These technologies may be subject to certain open source licenses, including but not limited to the General Public License, which, when used or integrated in particular manners, impose certain requirements on the subsequent use of such technologies, and pose a potential risk to proprietary nature of products. In the event that we have or will in the future, use or integrate software that is subject to such open source licenses into or in connection with our products in such ways that will trigger certain requirements of these open source licenses, we may (i) be required to include certain notices and abide by other requirements in the absence of which we may be found in breach of the copyrights owned by the creators of such open source technologies; and/or (ii) be required to disclose our own source code or parts thereof to the public, which could enable our competitors to eliminate some or any technological advantage that our products may have over theirs. Any such requirement to disclose our source code or other confidential information related to our products, and the failure to abide by license requirement resulting in copyright infringement, could materially adversely affect our competitive position and impact our business results of operations and financial condition.

There can be no assurance that revenues from future products or product enhancements will be sufficient to recover the development costs or to ensure the sale of inventory related to these products

We must continue to make significant investments in research and development in order to introduce new products, or to enhance the performance, features and functionality of our existing products, to keep pace with the competitive landscape and to satisfy customer demands. Substantial research and development costs are typically incurred before we confirm the technical feasibility and commercial viability of a new product, and not all development activities result in commercially viable products. There can be no assurance that revenues from future products or product enhancements will be sufficient to recover the development costs associated with such products or enhancements. In addition, we cannot be sure that these products or enhancements will receive market acceptance or that we will be able to sell these products at prices that are favorable to us. Our business will be seriously harmed if we are unable to sell our products at favorable prices or if the market in which we operate does not accept our products. In addition, in some cases, we accumulate inventories based on sales forecasts. If such sales forecasts are not materialized, we might need to write-off the related inventory, which will increase our losses.

New product lines that we may introduce in the future may contain defects, which will require us to allocate time and financial resources to correct.

Our new product lines may contain defects when first introduced. If there are defects, we will need to divert the attention of our personnel from our ongoing product development efforts to address the detection and correction of the defects. We cannot provide assurances that we will not incur any costs or liabilities or experience any lags or delays in the future. Moreover, the occurrence of such defects, whether caused by our products or the products of another vendor, may result in significant customer relations problems and adversely affect our reputation and may impair the market acceptance of our products.

We have historically generated losses and may incur future losses.

Since the year 2009, we have been able to demonstrate continued profitability, yet since our inception in 1993, we have had several years of losses and we may incur net losses in future years as well. We plan to increase our aggregate operating expenses in 2019 relative to 2018. However, our ability to generate profits is dependent mainly on our ability to generate sufficient sales. In the future, our sales may not be sufficient to cover the increase in our expenses and we may not be able to maintain profitability, mainly during a protracted slowdown.

Our dependence on a single manufacturing facility per product line magnifies the risk of an interruption in our production capabilities.

We have one manufacturing facility for our Optical CD product lines, which is located in Weizman Science Park, Ness-Ziona-Rehovot, Israel, and one manufacturing facility for our XPS product line, which is located in Santa Clara, CA, US (the "Manufacturing Facilities"). These Manufacturing Facilities include special clean room environments and manufacturing jigs, which are customized to our needs. In addition, most of our on-going inventories, including our main warehouse and work in process, are located in these Manufacturing Facilities. Although we adopted a disaster recovery plan, any event affecting any of our Manufacturing Facilities, including natural disaster, labor stoppages or armed conflict, may disrupt or indefinitely discontinue our manufacturing capabilities and could significantly impair our ability to fulfill orders and generate revenues, thus negatively impacting our business.

Our lease agreements for our Manufacturing Facilities include provisions that exempt the landlord and others from liability for damages to our Manufacturing Facilities.

Pursuant to our lease agreements for our Manufacturing Facilities (one of which is also our headquarters), the landlord and anyone on its behalf, and additional tenants are exempt from any liability for direct or consequential damages to our Manufacturing Facilities, except in the event of willful misconduct. While we have obtained insurance policies against certain damages, the aforementioned exemption of liability could compromise our ability to recover the full amount of such damages, and consequently we may incur substantial costs upon the occurrence of such damages.

Because shipment dates may be changed and some of our customers may cancel or delay orders with little or no penalty, and since we encounter difficulties in collecting cancellation fees from our customers, our backlog may not be a reliable indicator of actual sales and financial results.

We schedule production of our systems based upon order backlog and customer forecasts. We include in backlog only those orders to which the customer has assigned a purchase order number and for which delivery has been specified. In general, our ability to rely on our backlog for future forecasting and planning is limited because shipment dates may be changed, some customers may cancel or delay orders with little or no penalty, and our ability to collect cancelation fees from customers is not assured. Thus, our backlog may not be a reliable indicator of actual sales and financial results.

We experience quarterly fluctuations in our operating results, which may adversely impact our share price.

Our quarterly operating results within a specific year can fluctuate significantly. A principal reason is that we derive a substantial portion of our revenue from the sale of a relatively small number of systems to a relatively small number of customers. As a result, our revenues and results of operations for any given quarter may decrease due to factors relating to the timing of orders, the timing of shipments of systems, and the timing of recognizing these revenues. Furthermore, our quarterly results are affected by the cyclical nature of the semiconductor capital equipment market and industries.

We also have a limited ability to predict revenues for future quarterly periods and, as a result, face risks of revenue shortfalls. If the number of systems we actually ship, and thus the amount of revenues we are able to record in any particular quarter, is below our expectations, the adverse effect may be magnified by our inability to adjust spending quickly enough to compensate for the revenue shortfall.

We operate in an extremely competitive market, and if we fail to compete effectively, our revenues and market share will decline.

Although the market for process control systems used in semiconductor manufacturing is currently concentrated and characterized by relatively few participants, the semiconductor capital equipment industry is intensely competitive. We compete mainly with Nanometrics Inc., and KLA-Tencor Corp., which manufacture and sell integrated and/or stand-alone process control systems. In addition, we compete with PEMs, such as ASML Holdings N.V., and Applied Materials Inc., which develop (or might as well acquire companies which develop) in-situ sensors and metrology products. Established companies, both domestic and foreign, compete with our product lines, and new competitors enter our market from time to time. Some of our competitors have greater financial, engineering, manufacturing and marketing resources than we do. If a particular customer selects a competitor’s capital equipment, we expect to experience difficulty in selling our solution to that customer for a significant period of time. A substantial investment is required by the customers to evaluate, test, select and integrate capital equipment into a production line. As a result, once a manufacturer has selected a particular vendor’s capital equipment, we believe that the manufacturer generally relies upon that equipment for the specific production line application and frequently will attempt to consolidate its other capital equipment requirements with the same vendor. Accordingly, unless our systems offer performance or cost advantages that outweigh a customer’s expense of switching to our systems, it will be difficult for us to achieve significant sales from that customer once it has selected another vendor’s system for an application. We believe that our ability to compete successfully depends on a number of factors both within and outside of our control, including:

- the contribution of our equipment to the customers’ productivity;
- our product innovation, quality and performance;
- our global technical service and support;
- the return on investment (ROI) of our equipment and its cost of ownership;
- the breadth of our product line;
- our success in developing and marketing new products; and
- the extendibility of our products.

If we fail to compete in a timely and cost-effective manner against current or future competitors, our revenues and market share will decline.

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The ongoing consolidation in our industry may harm us if our competitors are able to offer a broader range of products and greater customer support than we can offer.

We believe that the semiconductor capital equipment market is undergoing consolidation over the last few years. For example, in 2011, Nanometrics acquired Nanda Technologies and in 2015, we have acquired ReVera Inc. In addition, in the past years a major consolidation has occurred in the process equipment manufacturers segment, such as Applied Materials Inc., acquiring Varian Semiconductor Equipment Associates in 2011; Lam Research Corporation acquiring Novellus Systems Inc. in 2016 and Coventor in 2017; Thermo Fisher Scientific Inc. acquired FEI Company, Inc. in 2016; ASML Holdings N.V. acquired Hermes Microvision Inc. in 2016; and KLA Tencor Corporation. acquired Orbotech Ltd. in 2019. We believe that similar acquisitions and business combinations involving our competitors, our customers and the PEMs may occur in the future. These acquisitions could adversely impact our competitive position by enabling our competitors and potential competitors to expand their product offerings and customer services, which could provide them an advantage in meeting customers' needs, particularly with those customers that seek to consolidate their capital equipment requirements with a smaller number of vendors. The greater resources, including financial, marketing, intellectual property and support resources, of competitors involved in these acquisitions could allow them to accelerate the development and commercialization of new competitive products and the marketing of existing competitive products to their larger installed bases. Accordingly, such business combinations and acquisitions by competitors and/or customers could jeopardize our competitive position.

We may not be successful in our efforts to complete and integrate current and/or future acquisitions, which could disrupt our current business activities and adversely affect our results of operations or future growth.

Any acquisition may involve many risks, including the risks of:

- diverting management's attention and other resources from our ongoing business concerns;
- entering markets in which we have no direct prior experience;
- improperly evaluating new services, products and markets;
- being unable to maintain uniform standards, controls, procedures and policies;
- failing to comply with governmental requirements pertaining to acquisitions of local companies or assets by foreign entities;
- being unable to integrate new technologies or personnel;
- incurring the expenses of any undisclosed or potential liabilities; and
- the departure of key management and employees.

If we are unable to successfully complete our future acquisitions or to effectively complete the integration of our future acquisitions, our ability to grow our business or to operate our business effectively could be reduced, and our business, financial condition and operating results could suffer. Even if we are successful in completing acquisitions, we cannot assure that we will be able to integrate the operations of the acquired business without encountering difficulty regarding different business strategies with respect to marketing and integration of personnel with disparate business backgrounds and corporate cultures. Further, in certain cases, mergers and acquisitions require special approvals, or are subject to scrutiny by the local authorities, and failing to comply with such requirements or to receive such approvals, may prevent or limit our ability to complete the acquisitions as well as expose us to legal proceedings prior or following the consummation of such acquisitions. In some cases, such proceedings, if initiated, may conclude in a requirement to divest portions of the acquired business.

Some of our contracts and arrangements potentially subject us to the risk of significant or non-limited liability.

We produce highly complex optical and electronic components and, accordingly, there is a risk that defects may occur in any of our products. Such defects can give rise to significant costs, including expenses relating to recalling products, replacing defective items, writing down defective inventory and loss of potential sales. In addition, the occurrence of such defects may give rise to product liability and warranty claims, including liability for damages caused by such defects.

In our commercial relationship with customers, we attempt to negotiate waivers of consequential and indirect damages arising from damages for loss of use, loss of product, loss of revenue and loss of profit caused by our products. Similarly, with respect to our commercial relationship with subcontractors and suppliers, we attempt to negotiate arrangements which do not include a limitation of liabilities and limitation of consequential and in direct damages. However, some contracts and arrangements we are bound by expose us to product liability claims resulting in personal injury or death, up to an unlimited amount, and the incurrence of the risk of material penalties for consequential or liquidated damages. Additionally, under such contracts and arrangements, we may be named in product liability claims even if there is no evidence that our products caused the damage in question, and such claims could result in significant costs and expenses relating to attorneys' fees and damages.

In addition, such contracts and arrangements may include non-limited liability provisions for infringement of a third party's intellectual property rights in connection with our products.

Although we have not incurred in the past material penalties for consequential or liquidated damages, we may incur such penalties in the future. Such penalties for consequential or liquidated damages may be significant (and so is the legal process conducted in connection with such penalties) and could negatively affect our financial condition or results of operations.

Because of our small size, we depend on a small number of employees who possess both executive and technical expertise, and the loss of any of these key employees would hurt our ability to implement our strategy and to compete effectively.

Because of our small size and our reliance on employees with both executive and advanced technical skills, our success depends significantly upon the continued contributions of our officers and key personnel. All of our key management and technical personnel have expertise, which is in high demand among our competitors, and the loss of any of these individuals could cause our business to suffer. We do not maintain life insurance policies for our officers and directors.

Our lengthy sales cycle increases our exposure to customer delays in orders, which may result in obsolete inventory and volatile quarterly revenues.

Sales of our systems depend, in significant part, upon our customers adding new manufacturing capacity or expanding existing manufacturing capacity, both of which involve a significant capital commitment. We may experience delays in finalizing sales following initial system qualification while a customer evaluates and approves an initial purchase of our systems. In general, for new customers or applications, our normal sales cycle takes between six (6) to twelve (12) months to complete. During this time, we may expend substantial funds and management effort, but fail to make any sales. Lengthy sales cycles subject us to a number of significant risks, including inventory obsolescence and fluctuations in operating results, over which we have limited control.

Because of the technical nature of our business, our intellectual property is extremely important to our business, and our inability to protect our intellectual property could harm our competitive position.

As of December 31, 2018, we have been granted more than 150 U.S. patents and have about 40 U.S. patent applications pending including U.S. provisional patent applications. In addition, we have been granted about 90 non-U.S. patents and more than 105 non-U.S. patent applications pending.

We cannot assure that:

Ÿ pending patent applications will be approved;

Ÿ any patents will be broad enough to protect our technology, will provide us with competitive advantages or will not be challenged or invalidated by third parties; or

Ÿ the patents of others will not have an adverse effect on our ability to do business.

We also cannot assure that others will not independently develop similar products, duplicate our products or, if patents are issued to us, design around these patents. Furthermore, because patents may afford less protection under foreign law than is available under U.S. law, we cannot assure that any foreign patents issued to us will adequately protect our proprietary rights.

In addition to patent protection, we also rely upon trade secret protection, employee and third-party nondisclosure agreements and other intellectual property protection methods to protect our confidential and proprietary information. Despite these efforts, we cannot be certain that others will not otherwise gain access to our trade secrets or disclose our technology.

Additionally, as part of our long-term technological collaboration, we are engaged with joint development activities with some of our strategic customers and vendors as well as with research institutes. These activities impose some limitations on the joint intellectual property developed as part of these programs.

Furthermore, we may be required to institute legal proceedings to protect our intellectual property. If such legal proceedings are resolved adversely to us, our competitive position and/or results of operations could be harmed. For additional information on our intellectual property, see “Item 4B. Business Overview — Intellectual Property” in this annual report on Form 20-F.

There has been significant litigation involving intellectual property rights in the semiconductor and related industries, and similar litigation involving Nova could force us to divert resources to defend against such litigation or deter our customers from purchasing our systems.

We have been, and may in the future be, notified of allegations that we may be infringing intellectual property rights possessed by others. In addition, we may be required to commence legal proceedings against third parties, which may be infringing our intellectual property, in order to defend our intellectual property. In the future, protracted litigation and expense may be incurred to defend ourselves against alleged infringement of third-party rights or to defend our intellectual property against infringement by third parties. Adverse determinations in that type of litigation could:

- result in our loss of proprietary rights;
- subject us to significant liabilities, including triple damages in some instances;
- require us to seek licenses from third parties, which licenses may not be available on reasonable terms or at all; or
- prevent us from selling our products.

Any litigation of this type, even if we are ultimately successful, could result in substantial cost and diversion of time and effort by our management, which by itself could have a negative impact on our profit margin, available funds, competitive position and ability to develop and market new and existing products. For additional information on our intellectual property, see “Item 4B. Business Overview — Intellectual Property” in this annual report on Form 20-F.

We depend on a limited number of suppliers, and in some cases a sole supplier. Any disruption or termination of these supply channels may adversely affect our ability to manufacture our products and to deliver them to our customers.

We purchase components, subassemblies and services from a limited number of suppliers and occasionally from a single or a sole source. Disruption or termination of these sources could occur (due to several factors, including, but not limited to, bankruptcy, work stoppages, acts of war, terrorism, fire, earthquake, energy shortages, flooding or other natural disasters), and these disruptions could have at least a temporary adverse effect on our operations. Although we generally maintain an inventory of critical components used in the manufacture and assembly of our systems, such supplies may not be sufficient to avoid potential delays that could have an adverse effect on our business.

To date, we have not experienced any material disruption or termination of our supply sources.

A prolonged inability on our part to obtain components included in our systems on a cost-effective basis could adversely impact our ability to deliver products on a timely basis, which could harm our sales and customer relationships.

The application of tax laws is subject to interpretation and if tax authorities challenge our methodologies or our analysis of our tax rates it could result in an increase to our worldwide effective tax rate and cause us to change the way we operate our business.

The application of the tax laws of various jurisdictions to our international business activities is subject to interpretation and also depends on our ability to operate our business in a manner consistent with our corporate structure and intercompany arrangements. The tax authorities of the jurisdictions in which we operate may challenge our methodologies for valuing developed technology or intercompany arrangements, including our transfer pricing, or determine that the manner in which we operate our business does not achieve the expected tax consequences, which could increase our worldwide effective tax rate and adversely affect our financial position and results of operations.

A certain degree of judgment is required in evaluating our tax positions and determining our provision for income taxes. In the ordinary course of business, there are many transactions and calculations for which the ultimate tax determination is uncertain. For example, our effective tax rates could be adversely affected by earnings being lower than anticipated in countries where we have lower statutory rates and higher than anticipated in countries where we have higher statutory rates, by changes in foreign currency exchange rates or by changes in the relevant tax, accounting and other laws, regulations, principles and interpretations. As we operate in numerous taxing jurisdictions, the application of tax laws can be subject to diverging and sometimes conflicting interpretations by tax authorities of these jurisdictions. It is not uncommon for taxing authorities in different countries to have conflicting views. In addition, tax laws are dynamic and subject to change as new laws are passed and new interpretations of the law are issued or applied. For example, the work being carried out by the OECD on base erosion and profit shifting as a response to increasing globalization of trade could result in changes in tax treaties or the introduction of new legislation that could impose an additional tax on businesses. As a result of changes to laws or interpretations, our tax positions could be challenged, and our income tax expenses could increase in the future.

For instance, if tax authorities in any of the countries in which we operate were to successfully challenge our transfer prices, they could require us to reallocate our income to reflect transfer pricing adjustments, which could result in an increased tax liability to us. In addition, if the country from which the income was reallocated did not agree with the reallocation asserted by the first country, we could become subject to tax on the same income in both countries, resulting in double taxation. If tax authorities were to allocate income to a higher tax jurisdiction, subject our income to double taxation or assess interest and penalties, it could increase our tax liability, which could adversely affect our financial position and results of operations.

The disclosure rules regarding the use of conflict minerals may affect our relationships with suppliers and customers.

The Securities and Exchange Commission requires certain disclosure by companies that use conflict minerals in their products, with substantial supply chain verification requirements in the event that the materials come from, or could have come from, the Democratic Republic of the Congo or adjoining countries. These rules and verification requirements may impose additional costs on us and on our suppliers, and limit the sources or increase the prices of materials used in our products. Among other things, this rule could affect sourcing at competitive prices and availability in sufficient quantities of certain minerals used in the manufacture of components that are incorporated into our products. In addition, the number of suppliers who provide conflict-free minerals may be limited, and there may be material costs associated with complying with the disclosure requirements, such as costs related to the process of determining the source of certain minerals used in our products, as well as costs of possible changes to products, processes, or sources of supply as a consequence of such verification activities. We may not be able to sufficiently verify the origins of the relevant minerals used in components manufactured by third parties through the procedures that we implement, and we may encounter challenges to satisfy those customers who require that all of the components of our products be certified as conflict-free, which could place us at a competitive disadvantage if we are unable to do so. While we have created processes and procedures designed to enable compliance to these rules, if in the future we are unable to certify that our products are conflict free, we may face challenges with our customers, which could place us at a competitive disadvantage and harm our reputation.

We are dependent on international sales, which expose us to foreign political and economic risks that could impede our plans for expansion and growth.

Our principal customers are located in Taiwan, South Korea, China, the United States and Germany, and we produce our products in Israel and the United States. International operations expose us to a variety of risks that could seriously impact our financial condition and impede our growth including:

- instability in political or economic conditions, including but not limited to inflation, recession, foreign currency exchange restrictions and devaluations, restrictive governmental controls on the movement and repatriation of earnings and capital, and actual or anticipated military or political conflicts, particularly in emerging markets;

- intergovernmental conflicts or actions, including but not limited to armed conflict, trade wars and acts of terrorism or war; and

- interruptions to the Company's business with its largest customers, distributors and suppliers resulting from but not limited to, strikes, and financial instabilities. For instance, trade restrictions, changes in tariffs and import and export license requirements could adversely affect our ability to sell our products in the countries adopting or changing those restrictions, tariffs or requirements. This could reduce our sales by a material amount.

In addition, effective October 30, 2018, the U.S. Department of Commerce has taken action to restrict exports to Fujian Jinhua Integrated Circuit Company, Ltd. (Jinhua) by adding them to the Entity List (Supplement No. 4 to Part 744 of the Export Administration Regulations (EAR), claiming that Jinhua poses a significant risk of becoming involved in activities that are contrary to the national security interests of the United States. On November 1, 2018, a federal grand jury indicted JHICC, along with four other criminal defendants, charging them with crimes related to a conspiracy to steal, convey, and possess stolen trade secrets of an American semiconductor company for the benefit of a company controlled by the PRC government. JHICC has acquired several of our metrology solutions in the past, and due to the abovementioned export ban our U.S. subsidiary and MMD division is currently not able to ship any tools or parts or provide any form of service to JHICC, until it is cleared to resume by the appropriate authorities. In some cases, these export restrictions might also be applicable to the products which we export from Israel.

Additionally, the uncertainty of the economic, financial, regulatory, trade, tax and legal implications of the withdrawal of the U.K. from the E.U. ("Brexit") and other significant political developments could also have a materially adverse effect on our business. All of these risks could also result in increased costs or decreased revenues, either of which could have a materially adverse effect on our profitability.

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

The international environment in which we operate is affected from inter-country trade agreements and tariffs. As a result of recent revisions in the U.S. administrative policy there are, and may be additional, changes to existing trade agreements, greater restrictions on free trade and significant increases in tariffs on goods imported into the United States, particularly those manufactured in China, Mexico and Canada. Future actions of the U.S. administration and that of foreign governments, including China, with respect to tariffs or international trade agreements and policies remains currently unclear.

The escalation of a trade war, tariffs, retaliatory tariffs or other trade restrictions on products and materials either exported by us to China or raw materials imported by us from China may significantly impeded our ability to provide our solutions and service our customers in China or other effected locations. Such developments may result in a decrease in demand for our products and technologies as well as delays in payments from our customers. Furthermore, other governmental action related to tariffs or international trade agreements, changes in U.S. social, political, regulatory and economic conditions or in laws and policies governing foreign trade, manufacturing, development and investment in the territories and countries, where our customers are located, could adversely affect our business, financial condition, operating results and cash flows.

We may be affected by instability in the global economy and by financial turmoil.

Instability in the global markets and in the geopolitical environment in many parts of the world as well as other disruptions may continue to put pressure on global economic conditions. In the event global economic and market conditions, or economic conditions in key markets, remain uncertain or deteriorate further, we may experience material impacts on our business, operating results, and financial condition.

Because we derive a significant portion of our revenues from sales in Asia, our sales could be hurt by instability of Asian economies.

A number of Asian countries have experienced political and economic instability. For instance, Taiwan and China have had a number of disputes, as have North and South Korea, and Japan has for a number of years experienced significant economic instability. Additionally, the Asia-Pacific region is susceptible to the occurrence of natural disasters, such as earthquakes, cyclones, tsunamis and flooding. We have subsidiaries in Taiwan, Japan and South Korea and we have significant customers in Taiwan and South Korea as well as in China. An outbreak of hostilities or other political upheaval, economic downturns or the occurrence of a natural disaster in these or other Asian countries would likely harm the operations of our customers in these countries, causing our sales to suffer.

A large number of our ordinary shares continue to be owned by a relatively small number of shareholders, whose future sales of our shares, if substantial, may depress our share price.

If our principal shareholders sell substantial amounts of our ordinary shares, including shares issued upon the exercise of outstanding options or warrants, the market price of our ordinary shares may fall. For additional information on our major shareholders, see “Item 7A – Major Shareholders” in this annual report on Form 20-F.

Certain shareholders may control the outcome of matters submitted to a vote of our shareholders, including the election of directors.

To the best of our knowledge, approximately 41% of our outstanding ordinary shares are cumulatively held by seven of our shareholders. As a result, and although we are currently not aware of any voting agreement between such shareholders, if these shareholders voted together or in the same manner, they would have the ability to control the outcome of corporate actions requiring an ordinary majority vote of shareholders as set in the Company’s Amended and Restated Articles of Association. Even if these shareholders do not vote together, each one of them may have the ability to influence the outcome of corporate actions requiring the vote of shareholders as set in the Company’s Amended and Restated Articles of Association. For additional information on our major shareholders, see “Item 7A – Major Shareholders” in this annual report on Form 20-F.

The market price of our ordinary shares may be affected by a limited trading volume and may fluctuate significantly.

In the past, there has been a limited public market for our ordinary shares and there can be no assurance that an active trading market for our ordinary shares will continue. An absence of an active trading market could adversely affect our shareholders' ability to sell our ordinary shares in short time periods. Our ordinary shares have experienced, and are likely to experience in the future, significant price and volume fluctuations, which could adversely affect the market price of our ordinary shares without regard to our operating performance.

We manage our available cash through various bank institutions and invest large portions of our cash reserves in bank deposits. A bankruptcy of one of the banks in which or through which we hold or invest our cash reserves, might prevent us to access that cash for an uncertain period of time.

We manage our available cash through various bank institutions and invest large portions of our cash reserves in bank deposits. As of December 31, 2018, substantially all of our cash reserves were invested in bank institutions, of which approximately 50% was invested in one institution. A bankruptcy of one of the banks in which we hold our cash reserves or through which we invest our cash reserves, might prevent us to access that cash for an uncertain period of time.

We may fail to maintain effective internal control over financial reporting in accordance with Section 404 of the Sarbanes-Oxley Act of 2002.

The Sarbanes-Oxley Act of 2002 imposes certain duties on us and our executives and directors. Our efforts to comply with the requirements of Section 404 (Assessment of Internal Control), which started in connection with our Annual Report on Form 20-F for the fiscal year ended December 31, 2007, have resulted in increased general and administrative expense and a diversion of management time and attention, and we expect these efforts to require the continued commitment of resources. Section 404 of the Sarbanes-Oxley Act of 2002 requires (i) management's annual review and evaluation of our internal control over financial reporting and (ii) an attestation report issued by an independent registered public accounting firm on our internal control over financial reporting, in connection with the filing of our Annual Report on Form 20-F for each fiscal year. We have documented and tested our internal control systems and procedures in order for us to comply with the requirements of Section 404. While our assessment of our internal control over financial reporting resulted in our conclusion that as of December 31, 2018, our internal control over financial reporting was effective, we cannot predict the outcome of our testing in future periods. If we fail to maintain the adequacy of our internal controls, we may not be able to ensure that we can conclude on an ongoing basis that we have effective internal controls over financial reporting. Failure to maintain effective internal control over financial reporting could result in investigation or sanctions by regulatory authorities, and could have a material adverse effect on our operating results, investor confidence in our reported financial information, and the market price of our ordinary shares.

Risks Related to Operations in Israel

Our operations may be disrupted by the obligation of key personnel to perform military service.

Some of our executive officers and employees in Israel are obligated to perform significant periods of military reserve service until the age of 40 for soldiers and until the age of 45 for officers. This time-period may also be extended by the Military Chief of the General Staff and the approval of the Minister of Defense or by a directive of the Minister of Defense in the event of a declared national emergency. Our operations could be disrupted by the absence for a significant period of one or more of our executive officers or key employees due to military service. To date, our operations have not been materially disrupted as a result of these military service obligations. Any disruption in our operations due to such obligations would adversely affect our ability to produce and market our existing products and to develop and market future products.

Provisions of our Amended and Restated Articles of Association and Israeli law may delay, prevent or make difficult an acquisition of Nova, which could prevent a change of control and negatively affect the price of our ordinary shares.

Israeli corporate law regulates mergers, requires tender offers for acquisitions of shares above specified thresholds, for special approvals for transactions involving directors, officers or significant shareholders and regulates other matters that may be relevant to these types of transactions. Furthermore, Israeli tax considerations may make potential transactions unappealing to us or to some of our shareholders. See Item 10.B, “Additional Information – Memorandum and Articles of Association”. For a more detailed discussion regarding some anti-takeover effects of Israeli law.

These provisions of Israeli law may delay, prevent or make difficult an acquisition of Nova, which could prevent a change of control and therefore depress the price of our shares.

The rights and responsibilities of our shareholders are governed by Israeli law and differ in some respects from the rights and responsibilities of shareholders under U.S. law.

We are incorporated under Israeli law. The rights and responsibilities of holders of our ordinary shares are governed by our Amended and Restated Articles of Association and by the Israeli Companies Law, 1999 (the “Companies Law”). These rights and responsibilities differ in some respects from the rights and responsibilities of shareholders in typical U.S. corporations. In particular, pursuant to the Companies Law each shareholder of an Israeli company has to act in good faith in exercising his or her rights and fulfilling his or her obligations toward the company and other shareholders and to refrain from abusing his power in the company, including, among other things, in voting at the general meeting of shareholders and class meetings, on amendments to a company’s articles of association, increases in a company’s authorized share capital, mergers, and transactions requiring shareholders’ approval under the Companies Law. In addition, a controlling shareholder of an Israeli company or a shareholder who knows that it possesses the power to determine the outcome of a shareholder vote or who has the power to appoint or prevent the appointment of a director or officer in the company, or has other powers toward the company has a duty of fairness toward the company. However, Israeli law does not define the substance of this duty of fairness. Because Israeli corporate law has undergone extensive revision in recent years, there is little case law available to assist in understanding the implications of these provisions that govern shareholder behavior.

Because most of our revenues are generated in U.S. dollars, but a significant portion of our expenses is incurred in currencies other than U.S. dollars, and mainly New Israeli Shekels, our profit margin may be seriously harmed by currency fluctuations.

We generate most of our revenues in U.S. dollars, but incur a significant portion of our expenses in currencies other than U.S. dollar, and mainly New Israeli Shekel, commonly referred to as NIS. In addition, starting January 1, 2019, in accordance with ASC 842 of lease accounting standard, we are required to present a significant NIS linked liability related to our operational leases in Israel. As a result, we are exposed to risk of devaluation of the U.S. dollar in relation to the NIS and other currencies. In such event, the dollar cost of our operations in countries other than the U.S. will increase and our dollar measured results of operations will be adversely affected. During 2018, the U.S. dollar revaluated against the NIS by 8.1%, after devaluated by approximately 10.9% in the previous three years. We cannot predict the future trends in the rate of devaluation or revaluation of the U.S. dollar against the NIS, and our operations also could be adversely affected if we are unable to hedge against currency fluctuations in the future.

We participate in government programs under which we receive research and development grants. Some of these programs impose restrictions on our ability to use the technologies developed under these programs and the reduction or termination of these programs would increase our costs.

Until the end of 2016, we received royalty-bearing grants from the Israel Innovation Authority, or IIA (formerly known as the Office of the Chief Scientist of the Ministry of Economy and Industry, or the OCS), or the IIA funding, for the financing of certain of our research and development programs that meet specified criteria. We may be required to pay royalties related to grants received in the framework of such royalty bearing programs in the future. Starting 2018, we also participate in IIA royalty free grant programs.

In addition, through the years, we participated in consortiums which are either solely managed by the IIA, or are joint consortiums of the IIA and the European Research Area. To maintain our eligibility for these programs, we must continue to meet certain conditions. These programs also restrict our ability to manufacture particular products and transfer particular technology, which were developed as part of the IIA’s programs, outside of Israel. The restrictions associated with these IIA’s programs may require us to obtain approval of the research and development committee nominated by the IIA for certain actions and transactions and pay additional payments to the IIA. Approval to manufacture products outside of Israel or consent to the transfer of technology, if requested, might not be granted and if granted, may increase our financial liabilities to IIA. In addition, if we fail to comply with certain restrictions associated with formerly received IIA's funding, we may be subject to criminal charges.

We are further exposed to risks related to the receipt of funding from other governments or governmental agencies in connection with strategic development programs, under which we receive funding. Under such strategic development programs, governments and governmental agencies typically have the right to terminate the program’s funding at any time. In addition, a project may be terminated by a mutual agreement, if the parties determine that the project's goals or milestones are not being achieved. As a result, there is no assurance that these sources of external funding will continue to be available to us in the future. Moreover, under the terms of certain governmental funding programs in which we receive funding, the applicable granting agency has the right to audit the costs that we incur, directly and indirectly, in connection with such programs. Any such audit could result in modifications to, or even termination of, the applicable governmental funding program. Any adverse finding resulting from any such audit could lead to penalties (financial or otherwise), termination of funding programs, suspension of payments or other adverse consequences to our ability to receive governmental funding.

We are subject to certain limitations related to the repatriation of funds that benefited from the tax exemption under the Approved and Benefited Enterprises, Preferred Enterprises and New Technological Enterprise Incentives regimes. The distribution or deemed distribution of such funds may be subject to recapture provisions under which we will be subject to the corporate tax that we were initially exempt from.

Until the end of 2015 we were eligible to receive certain tax benefits under Israeli law for capital investments as an Approved and Benefited Enterprise. In 2016, we made an election to receive tax benefits under Israeli law for capital investments as a “Preferred Enterprise”. Starting 2017, we made an election to receive Tax benefits under Israeli “Economic Efficiency Law” as a “Preferred Technological Enterprise”. While we believe that we meet the statutory conditions to entitle us to such benefits there can be no assurance that the tax authorities in Israel will concur to our position in general and for each specific year separately. We may be subject to additional taxes resulting from deemed dividend distribution of profits allocated to Approved Enterprise (Alternative Track) benefits, for example in case of a share repurchase or investment in foreign companies. Should it be determined that we have not, or do not meet such conditions, the benefits received could be cancelled. We could also be required to pay increased taxes or refund any benefits previously received, adjusted for inflation and interest. For additional information regarding Approved and Benefited Enterprise, Preferred Enterprise and Preferred Technological Enterprise see, “Item 10E. Taxation – Israeli Taxation” in this annual report on Form 20-F.

It should be noted that the Israeli government may reduce or eliminate the above-mentioned benefits in the future. The termination or reduction of these grants or tax benefits could harm our business, financial condition and results of operations, and result in significantly higher fluent tax payment. In addition, if we increase our activities outside Israel due to, for example, future acquisitions or outsourcing of manufacturing or development activities, these activities generally will not be eligible for inclusion in Israeli grants or tax benefit programs. Accordingly, our effective corporate tax rate could increase significantly in the future and our grants might be reduced.

Any shareholder with a cause of action against us as a result of buying, selling or holding our ordinary shares may have difficulty asserting a claim under U.S. securities laws or enforcing a U.S. judgment against us or our officers, directors or Israeli auditors.

We are organized under the laws of the State of Israel, and we maintain most of our operations in Israel. Most of our officers and directors as well as our Israeli auditors reside outside of the United States and a substantial portion of our assets and the assets of these persons are located outside the United States. Therefore, if you wish to enforce a judgment obtained in the United States against us, or our officers, directors and auditors, you will probably have to file a claim in an Israeli court. Additionally, you might not be able to bring civil actions under U.S. securities laws if you file a lawsuit in Israel. We have been advised by our Israeli counsel that Israeli courts generally enforce a final executory judgment of a U.S. court for liquidated amounts in civil matters after a hearing in Israel. If a foreign judgment is enforced by an Israeli court, it will be payable in Israeli currency. However, payment in the local currency of the country where the foreign judgment was given will be acceptable, subject to applicable foreign currency restrictions.

Our shares are listed for trade on more than one stock exchange, and this may result in price variations.

Our ordinary shares are listed for trading on the Nasdaq Global Select Market and on the Tel Aviv Stock Exchange Ltd., or TASE. This may result in price variations. Our ordinary shares are traded on these markets in different currencies, U.S. dollars on the Nasdaq Global Select Market and New Israeli Shekels on the TASE. These markets have different opening times and close on different days. Different trading times and differences in exchange rates, among other factors, may result in our shares being traded at a price differential on these two markets. In addition, market influences in one market may influence the price at which our shares are traded on the other.

Our business could be negatively affected as a result of actions of activist shareholders, and such activism could impact the trading value of our securities.

In recent years, certain Israeli issuers listed on United States exchanges have been faced with governance-related demands from activist shareholders, as well as unsolicited tender offers and proxy contests. Although as a foreign private issuer we are not subject to U.S. proxy rules, responding to these types of actions by activist shareholders could be costly and time-consuming, disrupting our operations and diverting the attention of management and our employees. Such activities could interfere with our ability to execute our strategic plan. In addition, a proxy contest for the election of directors at our annual meeting would require us to incur significant legal fees and proxy solicitation expenses and require significant time and attention by management and our board of directors. The perceived uncertainties due to these potential actions of activist shareholders also could affect the market price and volatility of our securities.

We may be classified as a “passive foreign investment company” for U.S. income tax purposes, which could have significant and adverse tax consequences to U.S. shareholders.

Generally, if for any taxable year 75% or more of our gross income consists of specified types of passive income, or, on average, at least 50% of our assets are held for the production of, or produce, passive income, we may be characterized as a passive foreign investment company (a “PFIC”) for U.S. federal income tax purposes. Classification of Nova as a PFIC could result in adverse U.S. tax consequences to our U.S. shareholders, such as ineligibility for any preferred tax rates on capital gains or on dividends, interest charges on certain taxes treated as deferred, and additional reporting requirements under U.S. federal income tax laws and regulations. It may be possible for U.S. holders of our ordinary shares to mitigate certain of these consequences by making an election to treat us as a “qualified electing fund” under Section 1295 of the Internal Revenue Code of 1986, as amended (the “Code”) or a “mark-to-market election” under Section 1296 of the Code. U.S. shareholders should consult with their own U.S. tax advisors with respect to the U.S. tax consequences of investing in our ordinary shares.

We believe that for our 2018 taxable year we were not a PFIC. Nonetheless, because the determination of whether we are, or will be, a PFIC for a taxable year depends on our assets, income and activities in each year and the application of complex U.S. federal income tax rules, which are subject to various interpretations, there is a risk that we were a PFIC in 2018. Absent one of the elections referenced above and described in greater detail below, if we are a PFIC for any taxable year during which a U.S. holder holds our ordinary shares, we generally will continue to be treated as a PFIC with respect to such U.S. holder in all succeeding years regardless of whether we cease to meet the PFIC tests in one or more subsequent years. Currently we expect that we will not be a PFIC in 2019. However, PFIC status is determined based on our assets and income over the course of each taxable year, and is dependent on a number of factors, including the value of our assets, the trading price of our ordinary shares and the amount and type of our gross income. Therefore, there can be no assurances that we will not become a PFIC for the 2019 taxable year, or any future year, or that the Internal Revenue Service will not challenge any determination made by us concerning our PFIC status. For a discussion on how we might be characterized as a PFIC and related tax consequences, please see the section of this annual report entitled “Taxation - U.S. Taxation – Passive Foreign Investment Companies.” Investors should consult their own tax advisors regarding all aspects of the application of the PFIC rules to our ordinary shares.

If a United States person is treated as owning at least 10% of our shares, such holder may be subject to adverse U.S. federal income tax consequences.

If a United States person is treated as owning (directly, indirectly or constructively) at least 10% of the value or voting power of our shares, such person may be treated as a “United States shareholder” with respect to each “controlled foreign corporation” in our group (if any). Because our group includes one or more U.S. subsidiaries, certain of our future non-U.S. subsidiaries could be treated as controlled foreign corporations (regardless of whether we are or are not treated as a controlled foreign corporation). A United States shareholder of a controlled foreign corporation may be required to annually report and include in its U.S. taxable income its pro rata share of the controlled foreign corporation’s “Subpart F income”, “global intangible low-taxed income” and investments in U.S. property, whether or not such controlled foreign corporation makes any distributions. An individual that is a United States shareholder with respect to a controlled foreign corporation generally would not be allowed certain tax deductions or foreign tax credits that would be allowed to a United States shareholder that is a U.S. corporation. A failure to comply with these reporting obligations may subject you to significant monetary penalties and may prevent the statute of limitations with respect to your U.S. federal income tax return for the year for which reporting was due from starting. We cannot provide any assurances that we will assist investors in determining whether any of our current or future non-U.S. subsidiaries are treated as a controlled foreign corporation or whether such investor is treated as a United States shareholder with respect to any of such controlled foreign corporations or furnish to any United States shareholders information that may be necessary to comply with the aforementioned reporting and tax paying obligations. A United States investor should consult their own advisors regarding the potential application of these rules to its investment in the shares.

Our business may be materially affected by changes to fiscal and tax policies. Potentially negative or unexpected tax consequences of these policies, or the uncertainty surrounding their potential effects, could adversely affect our results of operations and share price.

The U.S. Tax Cuts and Jobs Act of 2017 was approved by Congress on December 20, 2017, and signed into law by President Donald J. Trump on December 22, 2017. This legislation makes significant changes to the U.S. Internal Revenue Code. Such changes include a reduction in the corporate tax rate and limitations on certain corporate deductions and credits, among other changes.

While it is still unclear how these changes will affect us, certain of these changes could have a negative impact on our results of operations and business. In addition, the final impacts of the Tax Cuts and Jobs Act could be materially different from our expectations.

Item 4. Information on the Company

4.A History and Development of the Company

Nova Measuring Instruments Ltd. was incorporated in May 1993 under the laws of the State of Israel. We commenced operations in October 1993 to design, develop and produce integrated process control systems for use in the manufacture of semiconductors, also known as integrated circuits or chips.

In April 2000, we conducted an initial public offering and our shares were listed for trading on the Nasdaq stock exchange.

In June 2002, we listed our shares on the TASE, pursuant to legislation which enables Israeli companies whose shares are traded on certain stock exchanges outside of Israel to be registered on the TASE, while reporting, in substance, in accordance with the provision of the relevant foreign securities law applicable to the Company.

Until 2008, most of our products were sold to process equipment manufacturers such as Applied Materials, Inc. and Ebara Corp., which later sold these products to semiconductor manufacturers. Since then, we have completely changed our business model, selling most of our products directly to semiconductor manufacturers. Through this process, which has also enabled us to introduce to these customers additional products and features, we have improved our products gross margins and net profitability. In parallel, we continue to work with the process equipment manufacturers as business partners for future products and process control solutions.

In February 2010, we successfully completed an underwritten public follow-on offering in which we received approximately $17.0 million in net proceeds.

In March 2014, we announced a $12.0 million share repurchase program, which we completed in May 2016.

In April 2015, we acquired ReVera Inc., a privately held company headquartered in Santa Clara, California, which develops, manufactures and sells stand-alone metrology tools for measurements of thin-films and composition applications in the semiconductor industry. Following its acquisition, ReVera became a wholly owned subsidiary of our U.S. subsidiary, Nova Measuring Instruments, Inc. Effective December 31, 2017, we merged ReVera into its parent company, Nova Measuring Instruments, Inc.

On November 1, 2018, we announced a $25 million share repurchase program.

We currently have five direct and indirect fully owned subsidiaries in the U.S., Japan, Taiwan, Korea and Germany.

Our headquarter office is located in Israel at the Weizmann Science Park, Building 22, 2nd Floor, Ness-Ziona. Our telephone number at our main office is +972-73-229-5600. In 2018, we entered into a new lease agreement for the lease a total of approximately 12,000 square meters at a new building being built at the Science Park in Rehovot, with the intention to move our Israel headquarters into this building during 2019. For more information about our new lease see “Item 4D. Property, Plant and Equipment.”

4.A.8.

The SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC (http://www.sec.gov). The information is also available on our website (http://www.novami.com).

4.B Business Overview

We deliver continuous innovation by providing advanced metrology solutions for the semiconductor manufacturing industry. Deployed by the world’s largest integrated-circuit manufacturers, Nova’s novel technologies provide semiconductor manufacturers with process insight and clarity required to boost process performance, product yields and time to market. We bring pioneering metrology solutions to the world of process control, by industrializing lab technologies and developing emerging metrology solutions to enhance process control and facilitate our customers’ challenging technical transitions. We offer a combination of materials and dimensional metrology, advanced modeling algorithms that combine machine learning and big data within both integrated and standalone configurations, thereby enabling our customers to gain deeper insight throughout the entire development and manufacturing processes. We supply our metrology solutions to major semiconductor manufacturers worldwide, and are recognized for excellence since our first system was installed in 1995.

The semiconductor manufacturing process starts with a flat silicon disc known as a silicon wafer upon which circuits are constructed. To construct the circuits, a series of layers of thin films that act as conductors, semiconductors or insulators are applied to the polished side of the wafer. During the manufacturing process, these film layers are subjected to processes which remove portions of the film, create circuit patterns and perform other functions. The semiconductor manufacturing process requires precise steps and strict control of equipment performance and process sequences. Tight control can be achieved through monitoring silicon wafers and measuring relevant parameters before or after each process step with metrology tools such as those we produce.

Prior to the introduction of our integrated metrology systems, process control was solely achieved through stand-alone measurement equipment. Stand-alone measurement equipment requires semiconductor manufacturers to interrupt the manufacturing process sequence, remove sample silicon wafers from the process equipment and place the silicon wafers on the stand-alone measuring or inspection tool. In contrast, our integrated metrology approach is based on patented measuring methods that enable us to produce optical measuring systems that are small enough to be integrated directly inside many types of semiconductor process equipment. We believe that in several instances during the manufacturing process, our integrated approach offers considerable advantages over the conventional stand-alone approach to metrology control, enabling manufacturers using our integrated equipment to reduce costs and to improve production efficiency, yield and quality.

We have always invested in our integrated metrology solutions as this continues to be an area where we have a leading position. In addition, we have developed stand-alone metrology systems, leveraging our technology, methods, metrology expertise and market position in the integrated metrology field to expand our offerings into the larger market for stand-alone metrology systems. Over the past several years we developed several generations of Stand-Alone metrology tools. Through a customer driven roadmap which aligns our development efforts with both R&D as well as high volume manufacturing needs of our customers, we have been able to build a differentiated product offering. The success of this endeavor has allowed us to grow this aspect of our business such that it now represents a significant part of our overall business. Today, both stand-alone and integrated metrology solutions have reached a level of maturity allowing semiconductor manufactures to choose how to use either technology and make decisions based on merit specific to the process step in question, always balancing between the amount of data attained and the use made of the data for capabilities such as automated process control. Our long-term strategy is focused on advanced metrology and process control solutions where our integrated metrology products and stand-alone metrology products are compatible or complementary and used in a customized way to meet specific customer needs.

In April 2015, through the acquisition of ReVera, we expanded our technology base. The foregoing technology added a unique capability to our product portfolio, allowing us to measure ultra-thin film thickness and composition for critical wafer fabrication steps. We believe that the combination of our XPS/XRF technology and our dimensional optical CD technology, creates a compelling and unique portfolio for the measurement of film, composition, material properties and critical-dimension (CD) parameters, which address today’s growing challenges associated with the transition to advanced nodes in the semiconductor segments.

During 2017, as part of the post-acquisition integration of ReVera, we have reorganized into two product divisions. The Dimensional Metrology Division (DMD) which is responsible for the optical metrology (integrated and standalone) products, and the Material Metrology Division (MMD) which is responsible for the X-ray technology products. The corporate units, such as marketing, technology, human resources, finance and global business group, support both divisions. This reorganization allows us to focus the required management attention in each of our product lines as well as facilitate the integration of a future non-organic growth opportunities we might pursue. Demand for metrology systems is driven by capital equipment spending by semiconductor manufacturers, which in turn are driven by worldwide demand for semiconductor devices and technological transition processes, which are required from these devices for the most advanced high-end applications. Industry data indicates that through the years worldwide demand for semiconductors has been growing. We believe that this growth in demand will continue to generate demand for process control equipment, including metrology systems, as semiconductor manufacturers invest in technology and capacity expansion. We also believe that demand for metrology systems will be driven by the increasing cost of semiconductor manufacturing and by the requirements of semiconductor manufacturers for better control of process equipment. Finally, demand for metrology is strongly driven by technology challenges. The growing investment in advanced technology nodes and device structures introduces growing complexity and new challenges. Scaling limits and technology progress are continuously pushed in order to improve cost and gain competitive advantage. These fundamental elements create favorable market conditions for metrology growth where more process steps are needed, new novel materials are introduced and innovative structures and packaging solutions are incorporated. We believe that all the above market conditions set favorable business environment for growth.

Our Market

Semiconductor Industry and the Metrology Market

The increased use of semiconductors has been accompanied by an increase in their complexity. Due to the creation of new applications and markets for semiconductors, suppliers and manufacturers are faced with an increasing demand for new products that provide greater functionality and better performance at lower prices. As a result, many new complex materials, structures and processes are being introduced into the semiconductor manufacturing ecosystem. Such materials include, among others, copper, low-k and high-k dielectrics, silicon-on-insulator, silicon-germanium, III-V, strained silicon and raised source/drain. Manufacturers have transitioned in the past years toward 300 mm silicon wafers (from 200 mm silicon wafers). While 300 mm wafers can yield up to twice as many integrated circuits than 200 mm wafers, they also create new manufacturing challenges. For example, because 300 mm wafers can bend or bow more than twice that of 200 mm wafers, they are more susceptible to damage. The larger area of 300 mm wafers also makes it more difficult to maintain film uniformity across the entire wafer. Semiconductors also continue to move toward smaller feature sizes and more complex structures such as 3D FinFET transistors, GAA (Gate All Around), 3D-NAND and emerging memory structures. The growing complexity of semiconductor devices increase the complexity and the costs of the semiconductor manufacturing process, which has also been a driver for the growing demand for metrology systems.

The ever-increasing level of complexity and the decrease in feature sizes has also significantly increased the cost and performance requirements of semiconductor fabrication equipment. The cost of wafer fabrication equipment has also increased due to the higher levels of automation being utilized by manufacturers. Thus, semiconductor manufacturers must increase their investment in capital equipment in order to sustain technological leadership, to expand manufacturing capacity and maintain profitability. According to published reports by an industry market research firm, the cost of building a state-of-the-art semiconductor manufacturing facility has grown , and may reach $10 billion in 2019 for building mega fab facilities capable of manufacturing 300 mm wafers. We believe that the process control equipment market, which includes the metrology segment, will grow in the future at a pace greater than the overall process equipment market since the challenges of meeting process design goals will become increasingly difficult such that process control equipment will consume a larger portion of the overall costs of semiconductor manufacturing equipment.

The Semiconductor Manufacturing Process

Semiconductors typically consist of transistors or other components connected by an intricate system of circuitry on silicon wafers. Integrated circuit manufacturing involves thousands of individual steps, some of which are repeated several times, through which numerous copies of an integrated circuit are formed on a single silicon wafer. Typically, more than 30 very thin patterned layers are created on each wafer during the manufacturing process. At the end of the manufacturing process, the wafer is cut into individual chips or dies. Because semiconductor specifications are extremely tight, and integrated circuits are becoming more complex, requiring ever more sophisticated manufacturing processes, the process steps are constantly monitored, and critical parameters are measured at each step using metrology equipment.

Many of the manufacturing steps involve the controlled application or removal of layers of materials to or from the wafer. The application of materials to the wafer, known as deposition, involves the layering of extremely thin films of electrically insulating, conducting or semi-conducting materials. These layers can range down to less than tens of angstroms in thickness and create electrically active regions on the wafer and its surface. A wide range of materials and deposition processes are used to build up thin film layers on wafers to achieve specific performance characteristics. One of the principal methods of thin film layer deposition is chemical vapor deposition (CVD). In CVD, a chemical is introduced into the chamber where the wafer is being processed and is deposited using heat and a chemical reaction to form a layer of solid material on the surface of the silicon wafer. Although CVD equipment represents the largest equipment type, there are more segments in the thin-layer deposition equipment market as epitaxy, physical vapor deposition (PVD) and atomic layer deposition (ALD). Metrology systems monitor the thickness and uniformity of thin film layers during the deposition process.

Once the thin film has been deposited on the wafer to form a solid material, circuit patterns are created using a process known as photolithography. During this process, a light sensitive coating called photoresist is applied to the wafer, which is then exposed to intense light through a patterned, opaque piece of glass. For the photolithography process to work properly, the thickness of the photoresist must be precise and uniform. In addition, to control the photolithography process, the film thickness, reflectivity, overlay registration and critical dimensions are all measured and verified. The exposed photoresist is developed when it is subjected to a chemical solution. The developed wafer is then exposed to another chemical solution, or plasma, that etches away any areas not covered by the photoresist to create the structure of the integrated circuit. Semiconductor manufacturers use metrology systems to verify the removal of material through the etch process and the critical dimensions of the structures created.

To meet the flatness challenges posed by ever smaller feature sizes and the critical need for ultra-flat foundation for high precision photolithography, manufacturers use process technology known as Chemical Mechanical Planarization, or CMP. CMP removes uneven film material deposited on the surface of the wafer from processes such as CVD and photolithography by carefully “polishing” the wafer with abrasives and chemicals, creating an extremely flat and even surface for the patterning of subsequent film layers. Metrology systems are used to control and verify the results of the CMP process by measuring the thin film layer to determine when the correct thickness has been achieved.

The processes described above are repeated in sequence until the last layer of structures on the wafer has been completed. Each integrated circuit on the wafer is then inspected and its functionality tested before shipment. Measurements taken by metrology systems during the manufacturing process help ensure process uniformity and help semiconductor manufacturers avoid costly rework and misprocessing, thereby increasing efficiency and profitability.

Process Control Requirement

The steps used to create semiconductors are accurate processes that require strict control of equipment performance and process sequences for the resulting semiconductors devices to function properly. Tight control is achieved through monitoring of the in process wafers and by measuring relevant parameters after each process step. These procedures are usually carried out on a small sample of the wafers though in some steps where process stability is difficult to achieve, the number of sampled wafers will increase. The monitoring may include measurement of several parameters, such as the thickness of the layers of thin film deposited, the dimensions of the features that are patterned through the photolithography process, as well as the registration or alignment between two consecutive layers, known as overlay and the material properties. Monitoring also includes inspection of the wafer for irregularities, defects or scratches. If parameters are out of specification or if defects or contamination are present, the manufacturer adjusts the process and measures another sample of wafers thereby allowing manufacturers to reduce costs and improve device performance.

The Need for Effective Process Control Tools

A number of technical and operational trends within the semiconductor manufacturing industry are strengthening the need for more effective process control solutions. These trends include:

- Development of Smaller Semiconductor Features. The development of smaller features, now as small as 7nm in production and 3nm in R&D, enables semiconductor manufacturers to produce larger numbers of circuits per wafer and to achieve higher circuit performance. As feature geometries decrease, manufacturing yields become increasingly sensitive to processing deviations and defects, as more integrated circuits are lost with every discarded wafer. In addition, the increased complexity and number of layers of the integrated circuits increase the chance of error during the manufacturing of the wafer and therefore needs much more inline monitoring.

- Transition to 3D Device Structures. Foundries have adopted 3D FinFET transistors starting at 14/16 nm technology nodes to get improved performance and use less power in 1x technology nodes. Memory makers moved to 3D NAND and vertical structures for next generation NAND technology. These trends require process control with metrology solutions capable of measuring critical dimensions in these 3D structures.

- Transition to 3D Integration Technology. Three-dimensional (3D) integration of active devices, directly connecting multiple IC chips, offers many benefits, including power efficiency, performance enhancements, significant product miniaturization, and cost reduction. It provides an additional way to extend Moore’s law beyond spending ever-increasing efforts to shrink feature sizes. A critical element in enabling 3D integration is the Through-Silicon Via (TSV); TSV provides the high-bandwidth interconnection between stacked chips. The TSV process is beginning to enter production. In the case of TSV, since multiple chips are connected, the process has to achieve and maintain very high yield levels in order to be economically viable. TSV metrology solutions are required to closely monitor and measure depth, side-wall slope, top and bottom diameter (CD), and bottom curvature.

- Shortening of Technology Life Cycles. The technology life cycle of integrated circuits continues to shorten as semiconductor manufacturers strive to adopt new processes that allow a faster transition to smaller, faster and more complex devices. In the past, the technology life cycle was approximately three years; it is now less than two years. The accelerating rate of obsolescence of technology makes early achievement of enhanced productivity and high manufacturing yields an even more critical component of a semiconductor manufacturer's profitability and metrology continues to play an even more critical role in achieving these demanding results.

- New Materials. Copper metal layers continue to be the key material for the back end of line for advanced integrated circuits in order to increase performance and reduce the cost of integrated circuits. In addition, new material such as Cobalt and Ruthenium metals are being introduced at the first metal steps to enable reduction in resistivity. The Industry is continuously searching directions to reduce the effective K of the low K materials and to reduce the barrier thickness and material types. These changes require new processing and metrology equipment and thus represent challenging developments for the semiconductor manufacturing industry. In addition, in order to overcome limitations in the continued shrink of transistor dimensions, leading edge integrated circuit manufacturers are introducing new materials in the transistor gate stack. The adoption of high-k dielectrics is a key element for gate control in the most advanced technology nodes of 16/14nm, 10nm and 7nm currently in production, while R&D works to implement the next gate control material being done with Silicon Germanium and III-IV materials. These new materials, combined with metal layers, require new processing and metrology equipment in the atom level and thus represent a challenging development for the semiconductor manufacturing industry.

- Increasing Use of Multi Patterning Lithography. The continuous need for scaling to meet reduced transistor costs combined in pushing the industry to develop additional techniques on top of EUV lithography such as multi patterning, and E-BEAM. These alternative technologies are increasing the Etch and CMP process steps and thus increasing the process control and metrology steps in these areas accordingly.

- Foundry Manufacturing. As a result of the rising investment needed for semiconductor process development and production as well as the proliferation of different types of semiconductors, semiconductor manufacturing is increasingly being outsourced to large semiconductor contract manufacturers, or foundries. A foundry typically runs several different processes and makes hundreds to thousands of different semiconductor product types in one facility, making the maintenance of a constant high production yield and overall equipment efficiency more difficult to achieve. This trend of shifting to foundries for manufacturing needs has progressed even further during recent years. The challenges associated with foundry in the following years relate to aspects such as: shortening the time to market, reducing costs and monitoring process complexity.

- Growth in 3D-NAND Manufacturing. As a result of recent years' transition from 2D planar NAND to 3D NAND structures and the increase in demand for NAND devices driven by smartphones and SSDs, memory IC manufacturers have significantly increased investment in 3D NAND manufacturing and in continuous development of 3D NAND technology to support reductions in cost-per-bit.

- Growth in DRAM Manufacturing – As result of continued undersupply conditions in the DRAM market and technology transition to 1x DRAM technology nodes, memory IC manufacturers have significantly increased the investment in DRAM manufacturing in order to support growth in demand for DRAM IC devices.

In order to address the increasing costs associated with these trends, we believe semiconductor manufacturers must enhance manufacturing productivity. One way to enhance productivity is through improvements in process control, with a greater emphasis on metrology as part of process control. As part of this emphasis on metrology, manufacturers are taking more measurements to characterize each step of the semiconductor manufacturing process, new and enhanced measurement techniques are being used to provide meaningful data and the data provided is being used in new ways to enhance the manufacturing process. We believe that the demand for advanced process control systems that address the evolving needs of semiconductor manufacturers will continue to drive the growth in the market for process control systems and that the demand for metrology will be even higher as a result of the short time cycle of each technology and the need to fast ramp from R&D to production.

We believe that in certain process steps, integrated metrology systems provide semiconductor manufacturers with the greatest opportunity to increase the productivity and yields of their equipment, thereby increasing their profitability. Therefore, we plan to continue to maintain a major focus on the integrated metrology market. However, recognizing that a significant number of process steps will continue to rely on stand-alone equipment, we intend to continue leveraging our market leading position in the integrated metrology market and our metrology expertise to deepen our penetration of the stand-alone metrology market. Furthermore, the technological and operational trends within the semiconductor manufacturing industry that are strengthening the need for more effective process control solutions can sometimes be addressed through the use of stand-alone metrology equipment or a combination of both stand-alone and integrated metrology.

The Semiconductor Market – Update

Gartner Inc., forecasts the world GDP to grow by 2.9% in 2019 compared to an estimated increase of 3.1% in 2018.

Gartner Inc. forecasts semiconductor revenues to increase by 2.6% in 2019, compared to an increase of 13.4% in 2018. In addition, Gartner Inc. forecasts capital spending and WFE sales in 2019 to decrease by 16.2% and 16.6% respectively, following an estimated increase of 7.1% and 10.6% respectively in 2018 (Gartner Forecast: Semiconductor Wafer Fab Equipment (Including Wafer-Level Packaging), Worldwide, 4Q18 Update", published on December 28, 2018) .

According to research reports, future demand drivers for semiconductors include mobile devices, data centers infrastructure, Artificial Intelligence, Augmented and Virtual Reality, Smart Sensors, internet-of-things and other electronic equipment.

The Nova Approach

DMD Product lines

Optical CD Integrated Metrology

As development cycles are becoming shorter, fabrication processes are becoming less stable and call for tight process control schemes that are closer to the actual process step and produce wafer to wafer variation control. Nova's approach is to lead the industry with solutions that can enable effective and accurate measurements in non-ideal process conditions. Our integrated metrology systems provide semiconductor manufacturers with effective and efficient process control by measuring wafers and their properties immediately after the process, without removing the wafer from the process equipment. All our products use our patented measuring methods that enable us to produce optical measuring systems that are small enough to be incorporated directly inside many types of equipment used in semiconductor processing. Integrated systems measure the wafer within the actual process environment, reducing labor and wafer handling as well as the risk of contamination of or damage to the wafer. In addition, we believe that our systems deliver significant increases in overall equipment efficiency through advanced process control, along with improving wafer-to wafer uniformity, all with minimal operator intervention.

We provide our customers with flexible integrated process control solutions by offering systems that meet thin film as well as Optical CD measurement needs in critical applications in the wafer fabrication process. Our integrated process control platform can be deployed in multiple processes and applications of semiconductor manufacturing cycle.

We believe that our integrated metrology systems can provide several important advantages to semiconductor manufacturers, enabling them to:

- utilize the process equipment wafer handling mechanism to allow measurement of the sample wafers while processing other wafers and avoid the need for the costly additional wafer handling required by stand-alone metrology systems;

- perform the measurements without removing the wafer from the process equipment, increasing the efficiency of the process and decreasing the risk of contamination;

- reduce manufacturing equipment processing variability through the use of wafer to wafer measurements and closed loop control based on automated feedback of process variability;

- reduce capital costs of the fabrication facility by increasing overall equipment efficiency and reducing labor costs and necessary clean room area;

- reduce the amount of time required to qualify process equipment that is usually idle during qualification steps, thus, minimizing costly equipment down time;

- reduce the number of test wafers; and

- detect processing errors as early as possible.

We believe that as semiconductor manufacturers demand greater efficiency from their manufacturing equipment, process equipment manufacturers will increasingly seek to offer their customers integrated metrology in their tools to lower costs and increase overall efficiency. We believe the drive toward more efficient manufacturing operations in the face of increasing complexity and cost will continue the trend of adopting integrated metrology solutions such as those we offer to multiple processes.

Optical CD Stand-Alone Metrology

As stated above, we pioneered the area of integrated metrology and to-date revenues from that product continue to represent the larger portion of our overall revenues. With the adoption of our technology and the formation of long standing relationships with leading customers, we have come to realize that our technology can be extended beyond integrated metrology into areas such as stand-alone metrology. Accordingly, we developed stand-alone metrology tools to perform measurements similar to those performed by our integrated metrology tools. The expression “stand-alone metrology” generically describes free standing metrology equipment which is located in line, i.e., next to the processing equipment and receives cassettes or FOUP of wafers to allow sampling of a few or several wafers from each cassette it receives. There are several types of stand-alone metrology tools each of which performs a distinct type of measurement, e.g., defect inspection, electrical performance, microscopic analysis, cross sections, etc. Our specific focus is in the area of optical CD measurement which is generally utilized in order to characterize critical dimensions on a wafer, their width, shape and profile. This technology is utilized today in several areas of the fab such as photolithography, etch, CMP, deposition, etc. The key advantage offered by this technique is that it provides visualization of the full cross-section-like profile of the structure, while remaining non-destructive and extremely fast with very high accuracy and repeatability. Adding stand-alone metrology to our product portfolio has allowed us to expand our reach into more areas of the fab.

We introduced this concept in 2006 and were successful in penetrating several major accounts since then, allowing us to see a significant increase in our overall customer base and revenues with the stand-alone products. With the introduction of stand-alone metrology, we have expanded our addressable markets and are now able to provide metrology solutions for four of the five critical manufacturing steps, as opposed to the one or two we were previously able to provide, when our product offering was limited to integrated tools only.

Modeling and Software Solutions

The integrated and stand-alone products are combined with our suite of software modeling products comprised of NovaMARS® model-based and NovaFit™ machine learning modeling solutions and supported by the Nova HPC® (High Power Computing) platform. NovaMARS is our physical modeling and application development software that enables complex 2D, 3D and in-die measurements with high accuracy and fast time-to-solution. NovaFit modeling suite compliments traditional modeling of Optical Critical Dimensions by machine learning and data driven algorithmic solutions. The algorithmic suite works in conjunction with NovaMARS® modeling engine to improve metrology performance, speed up time to solution and expend metrology envelope for enriched process control. NovaFit embeds the most advanced machine learning and big data architecture into optical modeling, revolutionizes the way customers utilize metrology measurement data and expands the metrology performance envelope to tighten process windows, avoid process excursions and improve yield. In addition to our modeling software solutions, we have provided the Nova Fleet Management platform which is Nova solution for managing large fleets of metrology tools to deliver high productivity, operational efficiency and advanced analytics in high volume production environment of foundry and memory customers. The fleet management solution offers an easy and intuitive platform for managing and improving the overall productivity of Nova’s fleet of systems and is designed to address the needs and working methodologies of metrology and process engineers in the fab.

MMD Product Lines - Materials and TF Measurements

The growing usage of complex materials in advanced FinFET logic, DRAM and 3D NAND memory technology nodes has increased the demand for metrology solutions that can measure composition and film thickness with high precision and accuracy in recent years. Our materials metrology division, has pioneered the materials metrology segment with products that utilize X-ray photoelectron spectroscopy (XPS), a powerful technology that has been optimized to provide the automation, speed and reliability required in today's advanced semiconductor production environment. XPS is uniquely suited for the move to thinner films and smaller features, while improving the performance at each new technology node. Our XPS products are used by logic and memory device manufacturers worldwide to measure, monitor and control critical device layers in high-volume production and to enable rapid development and control of complex, new processes. Nova products set the standard for High K – Metal Gate, tunnel oxide and capacitor film metrology.

Hybrid and Technology Synergies

As part of our holistic metrology approach that uses additional sources and channels of information to optimize the metrology performance, we have introduced hybrid metrology. Hybrid metrology combines measurements from multiple metrology toolset types in order to enable or improve the measurement of one or more critical parameters required for process control of advanced devices, materials and architectures. In the hybrid ecosystem, two or more toolsets measure the same or similar targets. The data from one toolset helps reducing the model degrees of freedom of the other toolset (typically Optical metrology) resulting in improved performance of the combined measurement in compare of that of any of the individual toolsets. Nova's hybrid metrology solution is implemented in production in advanced technology nodes and is available with multiple metrology toolsets including CD SEM and X-ray Photoelectron Spectroscopy (XPS) technologies.

Our Technology

We believe that our technological and engineering expertise and research and development capabilities allow us to develop and offer new products and technologies to meet the ever-changing demands of the semiconductor industry. We have applied our technological and engineering expertise to develop a wide range of integrated and stand-alone products for the dielectric CMP, copper CMP, Tungsten CMP, Etch and lithography processes as well as high end CVD deposited layers, Cu electroplating and sputtering of Cu barrier and seed materials. Because of our open architecture policy, our integrated metrology solutions can work with most models of CMP and Etch tools made by the major process equipment manufacturers, for both 200 mm and 300 mm applications.

Our scatterometry capabilities have enabled us to penetrate new customers with Stand-Alone Optical CD metrology systems. Our combined offering of advanced measurement hardware and advanced modeling software places us in a position to offer an advantageous solution to our customers.

Following the acquisition of ReVera in April 2015, we have expanded our capabilities beyond dimensional metrology in the measurement of material composition and areal density of films down to sub-atomic thickness. These stand-alone products address issues in transistor gate dielectrics, work function adjustment materials, DRAM capacitor dielectrics, and VNAND cell fabrication.

Our suite of technological capabilities includes:

- Broadband Spectrophotometry. Our broadband Spectrophotometry capabilities range from deep ultraviolet to infrared. This technology enables fast, accurate and small spot size film thickness measurement in a large range of applications on a very cost-effective basis, both as an integrated system and as a stand-alone system.

- Scatterometry. Our Scatterometry systems are based on our broadband Spectrophotometry technology. These systems use a fully polarized deep ultraviolet to near-infrared spectral light source. This technology enables fast and cost-effective system development. Scatterometry provides two and three-dimensional characterization of very fine geometries on patterned product wafers. These profiling and critical dimension capabilities are key enablers of advanced process control, allowing almost real-time metrology of the most advanced design rules, down to 3 nm. A key component in scatterometry technology is the modeling software which converts raw spectra coming from the measurement tool into useful information in terms of customer parameters. This segment of the technology is where we currently focus our attention and where we have also acquired specific advantages due to our unique solutions. Some of Nova's metrology solutions use multi-channel reflectometry to reduce the ambiguity, increase the sensitivity to critical parameters, and improve measurement accuracy. The measurements are gathered using different wave lengths, polarizations and directions in order to deliver highly-accurate results.

- Dark Field Spectral Reflectometry. In order to further increase the variety of independent channels, we implemented measurement schemes based on the notion of dark-field (DF) detection.
- Imaging and Image Processing. One of Nova's key core technologies is high-end optical imaging. As part of this specialty, Nova has implemented advanced image processing algorithms, sophisticated navigational channels, and robust pattern recognition capabilities, in its tools.

- Computational Modeling for Electromagnetic and Optical Systems. Our MARS multi-channel metrology modeling suite is capable of providing modeling solutions for the most advanced 3D structures in semiconductor manufacturing. It is a complete modeling and application development solution designed to provide high accuracy in short time to solution and is coupled with Nova advanced computation hardware.

- Advanced modeling empowered by physical and mathematical models. Our NOVAFit modeling software engine enhances traditional modeling capabilities with advanced machine learning algorithms. This modeling software improves metrology capabilities and accelerates time to solution in complex 3D and High Aspect Ratio devices. Together with Nova's Fleet Management solutions, NOVAFit utilizes fleetwide information to provide adaptive advanced metrology solutions based on continuous training.

- Hybrid Metrology technology. The Hybrid metrology technology is part of our holistic metrology approach that utilizes different sources of information that can enhance the overall metrology performance. It combines data from different metrology toolsets in the fab together with Nova's optical metrology to provide improved performance above that of any individual toolset. Nova has been pioneering the hybrid concept in the past several years and has proven the value of the solution in multiple publications and technical papers.

- X-ray Photoelectron Spectroscopy. Our XPS systems measure the material composition, bonding states, and thicknesses of thin (<10nm) film stacks. Primary application is monitoring the transistor gates and VNAND layer deposition in integrated circuits. Through XPS we have also gained expertise in charged particle optics technologies.

- X-ray Fluorescence. We have added XRF capability to our Veraflex III XPS tool. The combination of XPS and XRF allows measurement of composition and thickness at greater depths than provided by XPS alone. Compared to conventional XRF systems, our vacuum-based XRF system offers superior detection of elements of low atomic number, and smaller measurement areas.

- Lab to Fab - Nova now has the experience, capability and know-how to transform traditional analytical laboratory instrumentation into high volume, high productivity production tools.

The measurement techniques used in our metrology products are unique and protected by a number of patents.

Throughout our history, we have been a technological leader in the integrated metrology field. We were the first to offer integrated metrology solutions for semiconductor manufacturers and are the only provider of integrated metrology solutions that can measure wafers in water, which allows for more efficient and close-to-the-process metrology.

Through the acquisition of ReVera, Nova has gained strong positioning as a provider of X-ray technologies to semiconductor high volume manufacturing, and we believe we are the sole provider of XPS technology to semiconductor high volume manufacturing customers. Effective as of December 31, 2017, we merged ReVera with and into its parent company, our U.S. subsidiary, Nova Measuring Instruments, Inc.

Products

Our product portfolio includes a complete set of, integrated and stand-alone metrology platforms suited for dimensional, films and material metrology measurements for process control across multiple semiconductor manufacturing process steps including lithography, Etch, CMP and deposition. Our solutions utilize optical spectral reflectometry and X-ray technologies combined with advanced software modeling and unique algorithmic capabilities and address a broad range of metrology requirements of our end-user and process equipment manufacturer customers. Nova’s fleet management platform addresses the need for high efficiency and productivity in the most advanced production lines of our customers, manages large fleets of metrology tools, and is designed to address the needs and working methodologies of metrology and process engineers in the fab. As part of our holistic view of metrology that extends to use more channels and sources of information available for optimizing the metrology solution performance, we also provide the hybrid metrology solution that combines data from different toolsets in the fab such as CD-SEM and X-ray together with Nova’s optical metrology to provide improved performance above that of any individual toolset. Following is a summary of our main products:

- The Nova i550 is the most recent addition to Nova’s integrated metrology product portfolio that enhances metrology performance by using newly designed optics enabling better sensitivity and accuracy while measuring the most complex structures. The i550 delivers a significant boost in productivity required in the most advanced production lines and supports new disruptive modeling that incorporate smart learning and training capabilities. The i550 platform is qualified with major process equipment vendors and is designed to meet the metrology and process control challenges of the most advanced FinFET and 3D-NAND in R&D and production.

- The Nova i500 integrated metrology product family delivers advanced metrology with high throughput and tool matching performance. The platform is qualified with multiple process tools and is deployed in both R&D and high-volume production of the most advanced logic and memory technology nodes.

- The NovaScan 3090Next is a legacy system still sold into 300mm fabs as the latest and most advanced of the NovaScan line. Targeted for 45nm and 32nm technology nodes with extendibility down to 20nm, this tool was released in 2006 and provided significant improvements in throughput, accuracy, tool to tool matching and spectral range over the older NovaScan 3090. It also improved overall tool reliability. The NovaScan 3090Next is available as integrated metrology and as stand-alone metrology systems for both thin film and Optical CD (scatterometry) applications.

- The NovaScan 2040 is Nova's integrated thickness monitoring systems for 200mm fabs with enhanced spectral range, addressing the needs of the industry for chemical mechanical polishing high-end applications of thin films and complex layer stacks.

- The Nova T600 MMSR (Multi-Measurement Spectral Reflectometry) enhances Nova's stand-alone metrology performance by adding unique channels of information to its newly designed optical unit. The platform is complemented with advanced algorithms for smart utilization of multiple channels to optimize more accurate and faster solutions. Nova T600MMSR is designed to meet the metrology and process control challenges for advanced FinFET and 3D-NAND in R&D and production.

- The Nova T600 features multi-channel reflectometry configuration that is optimized for best sensitivity on small features and critical device parameters in both Memory and Logic\Foundry advanced manufacturing.

- The Nova T550 is a high-productivity dimensional metrology platform designed to address the unique challenges of the semiconductor manufacturing industry, delivering a highly efficient and effective solution for advanced nodes. With full commonality and same optics design as the Nova i550 integrated metrology platform, the Nova T550 completes Nova's unique and highly efficient offering for CMP metrology and process control.

- The Nova T500 is a high-productivity metrology platform that delivers increased sampling rates and high performance film thickness and Optical CD metrology capabilities. The T500 platform provides unique capabilities of thick layer measurement (TLM), enabling solutions for applications requiring accurate, repetitive measurements of thick films, such as in CMOS image sensor BSI CMP applications..

- NovaFit is our data-driven modeling software engine that enhances traditional modeling capabilities with advanced machine learning algorithms. The NovaFit suite works in conjunction with NovaMARS® augmented modeling engine and Nova's Fleet management solution to improve metrology performance, speed up time to solution and expend metrology envelope for enriched process control. NovaFit embeds the most advanced machine learning and big data architecture into optical modeling, revolutionizing the way customers utilize metrology measurement data and expands the metrology performance envelope to tighten process windows, avoid process excursions and improve yield.

- NovaMars is an advanced scatterometry modeling and application development software tool enabling complex 2D, 3D and in-die measurements as well as Real Time Regression (RTR) capabilities. Process engineers can harness the power and flexibility of the tool to develop their own scatterometry applications by themselves thus keeping the details of their process within the fab. Its user interface and high level of automation provide easier and faster application development and eliminate discrepancies between different developers, enabling the best solution, independent of user proficiency. Combined with the NovaMARS innovative modeling software capabilities, Nova's Optical CD tools provide the metrology precision and accuracy as well as application development flexibility needed for the development of most advanced technology nodes. The NovaMars is an integral part in all Nova integrated and stand-alone solutions.

- Nova Fleet Management platform is Nova solution for managing large fleets of metrology tools to deliver high productivity, operational efficiency and advanced analytics in high volume production environment of foundry and memory customers. The Fleet Management solution offers an easy and intuitive platform for managing and improving the overall productivity of Nova's fleet of systems and is designed to address the needs and working methodologies of metrology and process engineers in the fab.

- NovaHPC (High Power Computer) supports the NovaMars Application Development Tool and enables effective and timely calculations of attained spectra. Scalable and user configurable infrastructure with Nova's proprietary task management software addresses the growing needs of IC manufacturing metrology.

- The VeraFlex III+ XF is the most advanced, fourth generation version of the VeraFlex family of in-line XPS production metrology tools. It provides enhanced metrology performance, improved productivity, precision and sensitivity that extend the utilization of XPS technology in high volume production in the most advanced Logic and Memory technology nodes.

- The VeraFlex III XF is the third generation of the globally adopted VeraFlex series of XPS production systems. It combines enhanced XPS capability with a unique low energy XRF (LE-XRF) channel as an option to address the metrology challenges of the most advanced nodes. The VeraFlex III XF provides solutions for emerging applications in FinFET HKMG (High K Metal Gate), interconnect processes, and advanced memories.

- QED is the Offline Advanced Data Analysis and Recipe Creation and Maintenance System that supports VeraFlex III XF. It brings the VeraFlex series engineering interface from the fab to the office. Built on PHI MultiPak's package of extensive XPS analysis function, QED brings all the tools necessary to manage the most effective film thickness and composition control recipes. QED functions include all aspects of film acquisition and analysis, a full suite of recipe creation and editing tools, and powerful signal analysis functions used to find and process the most critical elemental peaks.

Metrology is becoming a technology enabler that allows process equipment suppliers to tighten their specifications in order to meet customer's demand. Our strategy to offer holistic and diverse portfolio to enable the industry transitions, establishes the advantage and the value that innovative company like us brings to our customers and the market. With such a diversified portfolio, we now cover a variety of applications in both front end and back end of line that increases our served and available markets and footprint in all customer segments.

Research and Development

We have assembled a core team of experienced scientists and engineers who are highly skilled in their particular field or discipline. Our research and development core competencies, technologies and disciplines are in scatterometry, thin film metrology, XPS and material metrology and include measurement instruments, optical modeling, interpretation software, image acquisition, pattern recognition, X-ray energy sources, electron optics and detection, vacuum systems and equipment integration. Our research and development staff consists of about 275 highly skilled members, approximately 83 of which hold Ph.D.'s. In addition, we rely on independent subcontractors and consultants in various fields. Since June 2003, our research and development operations in Israel are certified as 9001/2000 quality standard.

The metrology and process control market is characterized by continuous technological development and product innovations. We believe that the rapid and ongoing development of new products and enhancements to our existing product lines is critical to our success. Accordingly, we devote a significant portion of our technical, management and financial resources to developing new applications and emerging technologies.

Our vision is to continue to be a market leader in the semiconductor process control market, increase our leadership in integrated metrology solutions, increase our leadership in in-line composition and thickness of ultra-thin layers and become the leader in the stand-alone Optical CD metrology market, and our research and development efforts and activities are designed to support this vision. Our research and development policy is based on a structured process of initiating new projects and on-going review of existing development projects. Project initiation is based on a detailed project plan, risk and market analysis. Each project is monitored throughout its life cycle in a structured process, including design reviews and project management reviews. In the frame of our research and development activities we enter into development consortium arrangements, which also help us to support our customers in the transition to advance technology nodes in the coming years. These consortiums are joint collaboration programs with other semiconductors companies, and are supported and funded by the IIA and\or European Joint Research. It should be noted, that in order to maintain our eligibility for these programs, we must continue to meet certain conditions. These programs might also restrict our ability to manufacture particular products and transfer particular technology, which were funded by the IIA. For additional information, see "Item 5C - Grants from the Israel Innovation Authority" in this annual report on Form 20-F.

As part of our long-term technological collaboration, we are also engaged with joint development activities with some of our strategic customers, as well as with research institutes and other semiconductor companies. These activities impose some limitations on the joint intellectual property developed as part of these programs.

Intellectual Property

Our success depends in part upon our ability to protect our intellectual property. We therefore have an extensive program devoted to seeking patent protection for our inventions and discoveries that we believe will provide us with competitive advantages. As of December 31, 2018, our portfolio includes more than 150 U.S. patents and about 90 non-U.S. patents. The U.S. patents we hold have expiration dates ranging from 2019 to 2034. We also have about 40 U.S. patent applications pending and more than 105 applications pending in other countries including 7 PCT applications. Our patents and applications principally cover various aspects of optical measurement systems and methods, integrated process control implementation concepts, and optical, opto-mechanical and mechanical design. In addition, our patents and applications principally cover various aspects of X-ray based measurement systems and methods, including process control implementation concepts, X-ray energy sources, electron optics and detection, vacuum systems and equipment integration. We have also registered 7 trademarks in the U.S. and have more than 30 registered trademarks and 16 applications for trademarks' registration in countries other than the U.S.

To protect our proprietary rights, we also rely on a combination of copyrights, trademarks, trade secret laws, contractual provisions (e.g. confidentiality agreements) and licenses. Our copyrights include software copyrights. We constantly seek to control access to, and distribution of our proprietary information, such as our proprietary algorithms.

While we attempt to protect our intellectual property through patents, copyrights and non-disclosure and confidentiality agreements, we may not be able to adequately protect our technology. Competitors may be able to develop similar technology independently or design around our patents and, despite our efforts, our trade secrets may be disclosed to others. Furthermore, the laws of countries other than the U.S. may not protect our intellectual property to the same extent as the laws in the U.S. We also cannot assure that: (i) our pending patent applications will be approved; (ii) any patents granted will be broad enough to protect our technology or provide us with competitive advantages or will not be successfully challenged or invalidated by third parties; or (iii) that the patents of others will not have an adverse effect on our ability to do business. We may also have to commence legal proceedings against third parties to protect our intellectual property.

From time to time, we receive communications from others asserting that our products infringe or may infringe their intellectual property rights. Typically, our in-house patent counsel investigates these matters and, where appropriate, retains outside counsel to provide assistance. We are not presently involved in any material legal proceedings in which a third party has asserted that we have violated their intellectual property rights. If, however, we become involved in any such litigation and its outcome is adverse to us, it may result in a loss of proprietary rights, subject us to significant liabilities, including treble damages in some instances, require us to seek licenses from third parties which may not be available on reasonable terms or at all, or prevent us from selling our products. Furthermore, any litigation relating to intellectual property, even if we are ultimately successful, could result in substantial costs and diversion of time and effort by our management. This in and of itself could have a negative impact on us.

While we believe that we would be successful in any litigation seeking to enforce our patent rights, the ultimate outcome of any litigation or other legal proceedings cannot be predicted.

Our Customers, Sales and Marketing

Our sales and marketing strategy is based mostly on a direct approach where we engage with our customers from the early stages of process development, work in collaboration to address their challenges in the development phase and support the transition to high volume production. We seek to establish and maintain close and mutually beneficial relationships with our customers by consistently providing them with a high level of service, support and new capabilities. We have a global network of sales and marketing, customer service and applications support offices worldwide.

In addition, we have established sales and support activities with key process equipment manufacturers to ensure our products are combined into our partners' next generation equipment sets as those become available. As part of our integrated tools sales effort, we continuously add new process equipment manufacturers as partners as we introduce new integrated process control systems that can be integrated with different types of equipment.

We serve all sectors of the integrated circuit manufacturing industry including logic, ASIC, foundries and memory manufactures. Our end user and process equipment manufacturer customers are located in different countries.

The table below describes the distribution of our total revenues, from systems and services, according to the geographic location of the actual installation of our systems in end-user sites:

	2016	2017	2018
	(US Dollars, in thousands)		
Taiwan, R.O.C.	$74,567	$68,041	$62,460
Korea	26,871	61,664	79,290
USA	15,269	38,254	20,082
China	31,269	36,715	58,982
Other	15,927	17,319	30,320
Total	163,903	221,992	251,134

The semiconductor industry is dominated by a small number of large companies. As a result, while our overall customer base is diverse, our sales are highly concentrated among a relatively small number of customers. The following table indicates the percentage of our total revenues derived from sales to our five largest customers and the range of these revenues from these customers for the periods indicated.

	2016	2017	2018
Total revenues from five largest customers	76 %	75 %	66 %
Range of revenues from five largest customers	10%-34%	8%-23%	5%-20%

We anticipate that our revenues will continue to depend on a limited number of major customers, although the companies considered to be our major customers and the percentage of our revenue represented by each major customer may vary from year to year. As our customer base is highly concentrated, if any of our customers becomes insolvent or has difficulties meeting its financial obligations to us, we may suffer losses that may be material in amount. A loss of any of our major customers may likewise cause us to suffer a material decrease in sales and revenue.

The highly competitive nature of the market for semiconductor capital equipment affects our ability to successfully implement our marketing and sales efforts. Competitive factors in the market for integrated process control systems include technological leadership, system performance, ease of use, reliability, cost of ownership, technical support and customer relationships. For integrated process control, an adequate business model, internal organization and unique process equipment manufacturer agreements and partnerships are also significant factors. We believe we compete favorably on the basis of these factors in the markets we serve.

Our current stand-alone metrology products compete with both Nanometrics and KLA-Tencor. In this area, we are using our broad portfolio of stand-alone metrology platforms combined with advanced modeling and software capabilities. These solutions are being used for in line metrology at leading foundries and memory customers. In the integrated metrology field, we primarily compete with products manufactured by Nanometrics. We see an increasing demand for implementing high end metrology solutions, that are coupling software and hardware, as customers move forward to advanced nodes.

In the films and material metrology field, we primarily compete with thin films metrology products manufactured by KLA-Tencor.

We also compete against companies manufacturing other types of equipment as a result of the disruptive nature of the technology we offer. These companies include Hitachi hi-tech and Applied Materials in the area of CD-SEM and Rudolph Technologies in the area of acoustic measurement of top metal copper lines.

Manufacturing

We have one manufacturing facility for our Optical CD product lines, which is located in Ness-Ziona, Israel, divided into two buildings, and one manufacturing facility for our X-ray product line, which is located in Santa Clara, CA, US.

Our principal manufacturing activities include assembly, integration, final testing and calibration. Our production activities are conducted in our manufacturing and repair center facility in Israel and in Santa Clara. We rely and expect to continue to rely on subcontractors and turnkey suppliers to fabricate components, build subassemblies and perform other non-core activities in a cost-effective manner. While we use standard components and subassemblies wherever possible, most mechanical parts, metal fabrications, optical components and other critical components used in our products are engineered and manufactured to our specifications. A small portion of these components and subassemblies are obtained from a limited group of suppliers, and occasionally from a single source supplier.

In order to leverage the relatively high volume of the systems we manufacture, and in order to decrease production costs, we continue to focus our internal manufacturing activities on processes that add significant value or require unique technology or specialized knowledge and outsource others. Our manufacturing operations in Israel received the ISO 9001 quality mark by an international certification institute in October 1999. Since then, we have upgraded our quality systems to conform to ISO 9001:2015 requirements. We received the formal certification of ISO 14001 in 2010 which was upgraded to ISO:2015 in 2016 and in 2014 we received the formal certification of OHSAS 18001:2007 for our manufacturing operations in Israel.

Capital Expenditures

Our capital expenditures are primarily for network infrastructure, computer hardware and software, leasehold improvements of our facilities, expansion of clean room facilities and system demonstration and development tools. None of these assets are held as collateral or guarantee other obligations. For additional information on our capital expenditures, see “Item 5B. Liquidity and Capital Resources” in this annual report on Form 20-F.

Government Regulation

For information relating to the impact of certain government regulations on our business, see "Item 5.C – Grants from the Israel Innovation Authority" on this annual report on Form 20-F.

4.C Organizational Structure

Our Subsidiaries

Our subsidiaries and the countries of their incorporation are as follows. All of our subsidiaries are wholly owned by the Company:

Name of Subsidiary	Country of Incorporation
Nova Measuring Instruments, Inc.	Delaware, U.S.
Nova Measuring Instruments K.K.	Japan
Nova Measuring Instruments Taiwan Ltd.	Taiwan
Nova Measuring Instruments Korea Ltd.	Korea
Nova Measuring Instruments GmbH	Germany

4.D Property, Plant and Equipment

Our main facilities, located in Ness-Ziona, Israel, occupy approximately 9,200 square meters, including: approximately 2,000 square meters of production facilities, approximately 4,800 square meters of research and development offices (including approximately 700 square meters of laboratories) and approximately 2,400 square meters of headquarters, sales and marketing, service and support and administration facilities. Our current lease agreement (which was amended in May 2016 to include additional space required for our operations) extends the lease period of the premises until January 31, 2026 (with a right, at Nova's sole discretion, to terminate the agreement on January 31, 2021, upon a 180-day prior notice).

We entered into a new lease agreement for the lease of a total of approximately 12,000 square meters at a new building being built at the Science Park in Rehovot, with the intention to move our Israel headquarters during 2019. The lease period is expected to extend for a period of ten years. We have the option to extend the lease period by two periods of five years each, subject to customary conditions. The lease period for the additional approximately 2,000 square meters, is expected to begin in 2021 and will extend through the same lease periods as the initial space. The manufacturing facility for Optical CD product lines and several R&D laboratories are expected to remain at the same location in Ness-Ziona, which lease term extends until 2026.

Our subsidiaries lease offices in various locations, for use as a research and development, manufacturing, service and pre-sale facility (depending on each subsidiary's needs). Our U.S. subsidiary (Nova Measuring Instruments, Inc.) leases approximately 1,885 square meters including approximately 450 square meters of production facilities. The current lease agreement of the premises expires on January 31, 2020 (with, at Nova Measuring Instruments, Inc.'s sole discretion, a right to extend the lease period for an additional two years). Nova Measuring Instruments, Inc. is expected to move into approximately 3,800 square meters of a newly leased space, which includes approximately 850 square meters of production facilities, during the first half of 2019. This new facility lease will expire on March 31, 2026 (with, at Nova Measuring Instruments, Inc.'s sole discretion, a right to extend the lease period for an additional five years). Our Japanese subsidiary leases approximately 90 square meters, our Taiwanese subsidiary leases approximately 1,025 square meters and our Korean subsidiary leases approximately 1,060 square meters. Our European subsidiary leases approximately 200 square meters in Germany and France.

We believe that our facilities and equipment are in good operating condition and adequate for their present usage.

Item 4A. Unresolved Staff Comments

None.

Item 5. Operating and Financial Review and Prospects

Information in this Operating Review and Financial Prospects Section should be read in conjunction with our consolidated financial statements and notes thereto which are included elsewhere in this report.

Executive Overview

We are a worldwide leading designer, developer and producer of metrology systems for the semiconductor manufacturing industry. Our metrology systems are used to take precise measurements of semiconductors during the manufacturing process to control the manufacturing process and increase the productivity of manufacturing equipment. We market and sell our metrology systems mainly to semiconductor manufacturers, and in some cases to semiconductor process equipment manufacturers.

Our business is greatly affected by the level of spending on capital equipment by semiconductor manufacturers. In addition, demand for our products and services is affected by the timing of new product announcements and releases by us and our competitors, market acceptance of our new or enhanced products and changes or advances in semiconductor design or manufacturing processes.

In the recent five years (2013-2018), we were able to present positive Compound Annual Growth Rate (CAGR) of products revenues of approximately 18%, while Gartner Inc. estimates that the Wafer Fab Equipment ("WFE") segment have experienced a CAGR of approximately 14%. We believe that our improved performance is attributed mainly to our continued diversification in revenue contribution. In the last five years we diversified our technology through acquisition to include X-ray capabilities on top of our Optical technology, we added advanced machine learning algorithms on top of our physical modeling and we advanced our traditional tool set to include the most advanced capabilities. We also diversified our revenue mix to include approximately 50% contribution from Memory, with several large customers. During these years we benefited from market growth as well being able to increase our total available market with new applications for Materials and Dimensions metrology.

In 2018, product sales accounted for approximately 77% of our total revenues, and services accounted for approximately 23%.

Presently, we have no significant long-term debt (except liabilities related to the implementation of the new ASC 842 of lease accounting starting January 1st, 2019), and during 2018 our overall cash reserves increase by approximately $28 million. As of the end of 2018, we had overall cash reserves of approximately $178 million and working capital of approximately $233 million.

Our service organization is operated on a profit and loss basis and is measured as a cost center in each territory and on a global basis. The objectives of our service organization are defined and measured by: customer satisfaction; quality parameters, such as time to repair and mean time between failures; and by profit and loss criteria. The service organization provides support to all products we sell, during both the warranty period and the post warranty period.

Significant Events in 2018and Outlook for 2019

During 2018, we demonstrated several significant achievements:

- 6th consecutive year of revenue growth, with record high annual revenue of $251 million.
- Improved geography diversification yielded three large territories, each contributing more than 20% to our total products revenue – China, Korea and Taiwan.
- Diversified customer mix, with four major customers accounting for 10% or more of products’ revenues, two of which are Memory customers.
- Diversified product portfolio supported growth in revenue from Memory, which accounted for approximately 50% of total product revenues.
- Further market rollout of Nova’s portfolio, and adoption of this product portfolio for advanced devices by several customers:
  - Hardware and Software coupling
  - Unique Optical and X-ray solutions
  - Holistic offering, including Integrated and Standalone metrology
- Deepening collaboration with several research institutes, process vendors and customers' technology development centers, utilizing a variety of our products, leading to our positioning as a long term technology development and high-volume manufacturing partner.
- Record net profit in parallel to increased investments in research and development programs aimed to generate new organic growth engines.

In 2019, we plans to focus on the following:

- Continue to strengthen our competitive and market position, through unique innovation and technical leadership.
- Continue our aggressive innovation and development plans for meeting future industry challenges in both the memory and foundry segments.
- Expand our total available market by addressing new emerging metrology applications and market segments, through solutions delivery to the challenging buildup of advanced Logic technology nodes, memory scaled VNAND nodes and DRAM scaling at leading edge customers.

- Continue delivery of advanced metrology systems to the trailing edge technology nodes to support IOT and other new applications ramp up.

- Continue our progress to meet Nova300 strategic plan, which defines the Company's growth path in revenue, customers, technology and financial performance, to support our profitable growth plans.

- Continue leading the emerging metrology markets with innovative and disruptive solutions.

- Continue the collaborations and joint research programs with leading semiconductor manufacturers and relevant leading research institutes.

- Continue our products innovation and diversification through several new product introductions to extend the Company's market leadership.

- Continue our aggressive plans to generate revenues and competitive edge through SW algorithm products.

- Strengthening the partnership with our customers and build a "Customer Centric" approach to accommodate and deliver customers' requirements along the semiconductor lifecycle.

The challenges and risks we face in meeting our plans include:

- On time delivery of the required process control solutions to meet the current and future needs of our existing and new customers.

- Correctly understanding the market trends and competitive landscape to ensure our products retain proper differentiation to win customer confidence.

- Creating aggressive, innovative and competitive roadmap deliverables at reasonable costs in order to properly control expenses.

- Identifying the metrology evolution for future industry needs to meet process control requirements and lead the market.

- Achieving long-term growth targets while supporting global extensive growth in all our activities.

- Building a solid company infrastructure to accommodate further growth.

In order to address these risks and challenges, we are working closely with leading customers' process development groups and with the leading process equipment manufacturers as well as with leading technology research institutes. The purpose of working closely with these entities is to receive from them as early as possible information and feedback on their current and future metrology and process control needs and tune the roadmap to support such needs.

In 2018, we were able to present growth in revenue as well as record revenues for the sixth consecutive year, demonstrating our growing position in the market.

It is our belief that we have been able to consistently win and grow as a result of a combination of factors:

- Optical metrology has become an enabler for the entire industry over the last few years, sometimes on the account of other metrology capabilities, which are not optical based.

- XPS has been widely adopted by leading memory and foundry customers for complex materials composition and film thickness applications.

- Nova’s unique metrology solutions, combining Optical and X-ray metrology for both dimensions and materials, provide the most advanced solution, combining the best innovative and technical metrology capabilities with the best cost of ownership.

- The ability to provide a unique and differentiated technology portfolio sets us apart from the competition and adding a competitive edge to our offering.

- Our technical innovative solutions are well accepted by leading customers that allow us to gain more market share with additional process steps and new applications.

- Our ability to closely team with our customers allows us to predict the industry evolution and process control challenges and by that introduce innovative and advanced metrology solutions to solve industry needs.

- Our diversified portfolio, which is a result of continuous research and development, is becoming more attractive to our customers.

- Widening our solutions’ base to include hardware and software elements in a coupled offering.

- Well controlled P&L and operating model to support our profitable growth plans.

Understanding the industry’s challenges for the next several years, it is our belief that we should continue growing going forward as the adoption of our solutions increases as a function of process complexity and industry development. We believe that our served addressable market is continuously expanding as we penetrate to more steps of the semiconductor manufacturing processes and, as we continue innovating our portfolio for leading new emerging metrology opportunities. We also believe that going forward, as the semiconductor process is becoming much more complicated with variety of challenges, the necessity for our unique portfolio, combining multiple technologies for both materials, film and dimensional metrology, will grow in the next few years.

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 of America. We believe the following critical accounting policies, among others, affect our more significant judgments and estimates used in the preparation of our consolidated financial statements.

Use of Estimates – General

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Our management evaluates its estimates on an ongoing basis, including those related to, but not limited to income taxes and tax uncertainties, collectability of accounts receivable, inventory accruals, fair value and useful lives of intangible assets, and revenue recognition. These estimates are based on management's knowledge about current events and expectations about actions the Company may undertake in the future. Actual results could differ from those estimates.

Revenue Recognition

Under ASC 606, the company derives revenue from the sales of advanced process control systems, spare parts, labor hours (mainly systems installation) and service contracts.

Revenues derived from sales of advanced process control systems, spare parts and labor hour are recognized at point in time, when control of the promised goods or services is transferred to the customers, upon fulfillment of the contractual terms.

Revenues derived from service contract, which generally specify fixed payment amounts and contractual terms for periods longer than one month, are recognized ratably over time.

The amount recognized reflects the consideration that the Company expects to be entitled to in exchange for those performance obligations.

Revenues from sales which were not yet determined to be final sales due to acceptance provisions are deferred.

Contracts with customers may include multiple performance obligations. For such arrangements, the Company allocates revenue to each performance obligation based on its relative Standalone Selling Price (“SSP”). Judgment is required to determine the SSP for each distinct performance obligation. The Company uses a range of amounts to estimate SSP when it sells each of the products and services separately and needs to determine whether there is a discount to be allocated based on the relative SSP of the various products and services.

The Company enters into revenue arrangements that includes products and services which are generally distinct and accounted for as separate performance obligations. The Company determines whether arrangements are distinct based on whether the customer can benefit from the product or service on its own or together with other resources that are readily available and whether the Company's commitment to transfer the product or service to the customer is separately identifiable from other obligations in the contract.

Inventories Write-Off

We carry our inventory at the lower of either the actual cost or the net realizable value of the inventory. We regularly review inventory quantities on hand and record a provision for excess and obsolete inventory based primarily on our estimated forecast of product demand and production requirements for the next twenty-four months. As demonstrated in the past, demand for our products can fluctuate significantly. A significant increase in the demand for our products could result in a short-term increase in inventory purchases while a significant decrease in demand could result in an increase in the amount of excess inventory quantities on hand, which could lead to losses. In addition, our industry is characterized by rapid technological change, frequent new product developments, and rapid product obsolescence that could result in an increase in the amount of obsolete inventory quantities on hand. Additionally, our estimates of future product demand may prove to be inaccurate, in which case we may have understated or overstated the provision required for excess and obsolete inventory. In the future, if our inventory is determined to be overvalued, we would be required to recognize such costs in our cost of goods sold at the time of such determination. Likewise, if our inventory is determined to be undervalued, we may have over-reported our costs of goods sold in previous periods and would be required to recognize such additional operating income at the time of sale. Therefore, although we make every effort to ensure the accuracy of our forecasts of future product demand, any significant unanticipated changes in demand or technological developments could have a significant impact on the value of our inventory and our reported operating results.

Goodwill

Goodwill and other purchased intangible assets have been recorded as a result of the acquisition of ReVera. Goodwill represents the excess of the purchase price in a business combination over the fair value of net tangible and intangible assets acquired, and related liabilities. Goodwill amount on December 31, 2018 was $20 million.

Goodwill is not amortized, but rather is subject to an impairment test. In accordance with ASC 350, “Intangibles – Goodwill and Other”, at least annually (in the fourth quarter), or more frequently if events or changes in circumstances indicate that the carrying value may be impaired. The Company has an option to perform a qualitative assessment to determine whether it is more-likely-than-not that the fair value of a reporting unit is less than its carrying value prior to performing the quantitative goodwill impairment test. The Company operates in one operating segment, and this segment comprises its only reporting unit.

Following the adoption of ASU 2017-04, "Simplifying the Test for Goodwill Impairment", as part of the quantitative goodwill impairment test, any excess of the carrying value of the reporting unit over its fair value is recognized as an impairment loss, and the carrying value of goodwill is written down to the fair value of the reporting unit. For the year ended December 31, 2018, we performed an annual impairment analysis, using market capitalization, and no impairment losses have been identified.

Intangible assets

As a result of the acquisition of ReVera in April 2015, our balance sheet included acquired intangible assets, in the aggregate amount of approximately $12.8 million and $10.2 million as of December 31, 2017 and 2018, respectively.

In 2015, we allocated the purchase price of ReVera to the tangible and intangible assets acquired and liabilities assumed, based on their estimated fair values. These valuations require management to make significant estimations and assumptions, especially with respect to intangible assets. Critical estimates in valuing intangible assets include future expected cash flows from technology acquired, backlog and customer relationships. Management’s estimates of fair value are based on assumptions believed to be reasonable, but which are inherently uncertain and unpredictable.

Intangible assets are comprised of acquired technology, customer relations, backlog and IP R&D.

During 2017 and 2018, no impairment charges were identified.

For a discussion of other significant accounting policies used in the preparation of our financial statements and recent accounting pronouncements, see Note 2 to our consolidated financial statements contained elsewhere in this report.

New Accounting Pronouncements

For information regarding new accounting pronouncements, see Note 2W to our consolidated financial statements contained elsewhere in this annual report.

Starting January 1, 2019, in accordance with ASC 842 - lease accounting standard, we are required to present a significant NIS linked liability related to our operational leases in Israel, which is expected to have a material impact on our financial statements, resulting from USD to NIS currency trends.

5.A Operating Results

Overview

The table below describes the distribution of our total revenues, from products and services, by geographic areas of our product installations at semiconductor manufacturing facilities.

	2016	2017	2018
Taiwan, R.O.C.	45 %	31 %	25 %
USA	9 %	17 %	8 %
Korea	16 %	28 %	32 %
China	19 %	17 %	23 %
Other	11 %	8 %	12 %
Total	100 %	100 %	100 %

Historically, a substantial portion of our revenues has come from a small number of customers, and we anticipate that our revenues will continue to depend on a limited number of major customers.

The sales cycle for our systems typically ranges from six (6) to twelve (12) months and depends upon the status of our system's integration with a particular manufacture and model of process equipment, the evaluation criteria of our customers, and the technology or application of the process. Additionally, the rate and timing of customer orders may vary significantly from month to month as a function of the specific timing of fab expansions. Accordingly, if sales of our products do not occur when we expect or we are unable to adjust our estimates on a timely basis, our expenses and inventory levels may fluctuate relative to revenues and total assets. In 2018, our inventory levels at the end of each quarter ranged from $39 million to $42 million. We schedule production of our systems based upon order backlog and customer forecasts. We include in backlog only those orders to which the customer has assigned a purchase order number and for which delivery has been specified.

Our revenues increased by 13% in 2018 following an increase of 35% in 2017, and an increase of 10% in 2016.

The following table shows the relationship, expressed as a percentage, of the listed items from our consolidated income statements to our total revenues for the periods indicated:

	Percentage of Total Revenues Year ended December 31,		
	2016	2017	2018
Revenues from product sales	74.7%	78.5%	77.0%
Revenues from services	25.3%	21.5%	23.0%
Total revenues	100 %	100 %	100 %
Cost of products sale	30.7%	28.0%	28.6%
Cost of services	15.5%	12.9%	13.6%
Expense related to settlement of IIA grants	7.9 %	-	- %
Total cost of revenues	54.1%	40.9%	42.2%
Gross profit	45.9%	59.1%	57.8%
Operating expenses:			
Research and development expenses, net	21.3%	17.5%	18.1%
Sales and marketing expenses	13.1%	11.1%	11.5%
General and administrative expenses	4.2 %	3.6 %	3.5 %
Amortization of intangible assets	1.1 %	1.2 %	0.7 %
Total operating expenses	39.7%	33.0%	33.8%
Operating profit	6.2 %	26.0%	24.1%
Financial income, net	0.7 %	1.0 %	1.2 %
Income before income taxes	6.9 %	27.1%	25.3%
Income tax expenses (benefit)	1.0 %	6.1 %	3.6 %
Net income	5.9 %	20.9%	21.7%

Comparison of Years Ended December 31, 2018 and 2017

Revenues. Our revenues in 2018 increased by $29.1 million, or 13.1%, compared to 2017. Revenues attributable to product sales were $193.3 million, an increase of $19.0 million, or 10.9%, compared to 2017. Revenues attributable to services were $57.8 million, an increase of $10.2 million, or 21.4%, compared to 2017. The increase in product revenues in 2018 was attributed to XPS products. The increase in services revenues is attributed mainly to higher time and materials revenues, as a result of the higher installed base of systems.

Cost of Revenues and Gross Profit. Cost of revenues consists of labor, material and overhead costs of manufacturing our systems, royalties, and the costs associated with our worldwide service and support infrastructure. It also consists of inventory write-offs and provisions for estimated future warranty costs for systems we have sold. Our cost of revenues attributable to product sales in 2018 was $71.7 million. Our gross margin attributable to product revenues in

2018 was 62.9%, compared to 64.3% in 2017. The decrease in products gross margins in 2018 is related to the decrease in software sales which have a higher gross margin.

Our cost of services in 2018 was $34.2 million, relative to $28.6 million in 2017. Gross margin attributable to service revenues in 2018 was 40.9%, compared to 40.1% in 2017.

Research and Development Expenses, net. Consist primarily of salaries and related expenses and also include consulting fees, subcontracting costs, related materials and overhead expenses, after offsetting grants received or receivable from the IIA and the European Community. Our net research and development expenses in 2018 were $45.5 million, an increase of $6.5 million, or 16.7%, compared to 2017, after offsetting grants received of $5.8 million in 2018 and $4.6 million in 2017. Research and development expenses excluding grants received or receivable in 2018 were $51.2 million, compared to $43.6 million in 2017. In 2018, net research and development expenses represented 18.1% of our revenues, compared to 17.5% of our revenues in 2017. The increase in research and development expenses in 2018 is mainly related to the investments in new technologies, which are aimed to expand our addressable markets, towards their market introduction in 2019-2020.

Sales and Marketing Expenses. Sales and marketing expenses are mainly comprised of salaries and related costs for sales and marketing personnel, travel related expenses, overhead and commissions to our representatives and sales personnel. Starting 2015, sales and marketing expenses also include amortization of intangibles related to customer relations. Our sales and marketing expenses in 2018 were $28.8 million, an increase of $4.3 million, or 17.5%, compared to 2017. The increase in sales and marketing expenses in 2018 was mainly attributed to an increase in headcount and related labor costs of sales and marketing personnel and commissions. Sales and marketing expenses represented 11.5% our revenues in 2018 compared to 11.1% of our revenues in 2017.

Amortization of Intangible Assets. As part of the acquisition of ReVera on April 2, 2015, the company acquired $12.3 million of intangible asset related to technology. In both 2018 and 2017, the company recorded $1.8 million of amortization of intangible assets.

General and Administrative Expenses. General and administrative expenses are comprised of salaries and related expenses and other non-personnel related expenses such as legal expenses. Our general and administrative expenses in 2018 were $8.7 million, an increase of $0.6 million, or 7.8%, compared to 2017. The increase in general and administration expenses was attributed mainly to the increase in headcount related labor costs. In 2018, general and administration expenses represented 3.5% of our revenues, compared to 3.6% of our revenues in 2017.

Income Tax Expenses. Income tax expenses are comprised of current tax expenses and deferred tax expenses/income. In 2018, we recorded $9.1 million of income tax expenses, reflecting effective tax rate of 14.3%. In 2017, we recorded $13.6 million of income tax expenses, reflecting effective tax rate of 21%. The decrease in the effective tax rate in 2018 is attributed mainly to tax benefits related to US Tax Cuts and Jobs Act.

Comparison of Years Ended December 31, 2017 and 2016

Revenues. Our revenues in 2017 increased by $58.1 million, or 35.4%, compared to 2016. Revenues attributable to product sales were $174.3 million, an increase of $51.9 million, or 42.4%, compared to 2016. Revenues attributable to services were $47.6 million, an increase of $6.2 million, or 15%, compared to 2016. The increase in product revenues in 2017 was attributed to an increase in sales of Optical CD (mainly integrated metrology and software) and XPS products. The increase in services revenues is attributed mainly to higher time and materials revenues, as a result of the higher installed base of systems.

Cost of Revenues and Gross Profit. Cost of revenues consists of labor, material and overhead costs of manufacturing our systems, royalties, and the costs associated with our worldwide service and support infrastructure. It also consists of inventory write-offs and provisions for estimated future warranty costs for systems we have sold. Our cost of revenues attributable to product sales in 2017 was $62.2 million. Our gross margin attributable to product revenues in 2017 was 64.3%, compared to 48.3% in 2016, which included $12.9 million of expenses related to the royalty buyout agreement and $1.9 million of inventory write-off. The increase in products gross margins in 2017 excluding these non-recurring items, is related to the increase in software sales which have a higher gross margin, as well as to efficiencies related to the product revenues scale.

Our cost of services in 2017 was $28.6 million, relative to $25.3 million in 2016. Gross margin attributable to service revenues in 2017 was 40.1%, compared to 38.8% in 2016. The increase in service gross margins in 2017 is mainly related to scale efficiencies as a result of incremental service revenues utilizing similar infrastructure.

Research and Development Expenses, net. Consist primarily of salaries and related expenses and also include consulting fees, subcontracting costs, related materials and overhead expenses, after offsetting grants received or receivable from the IIA and the European Community. Our net research and development expenses in 2017 were $39.0 million, an increase of $4.0 million, or 11%, compared to 2016, after offsetting grants received or receivable of $4.6 million in 2017 and $4.3 million in 2016. Research and development expenses excluding grants received or receivable in 2017 were $43.6 million, compared to $39.3 million in 2016. In 2017, net research and development expenses represented 17.5% of our revenues, compared to 21.4% of our revenues in 2016.

Sales and Marketing Expenses. Sales and marketing expenses are mainly comprised of salaries and related costs for sales and marketing personnel, travel related expenses, overhead and commissions to our representatives and sales personnel. Starting 2015, sales and marketing expenses also include amortization of intangibles related to customer relations. Our sales and marketing expenses in 2017 were $24.6 million, an increase of $3.0 million, or 14%, compared to 2016. The increase in sales and marketing expenses in 2017 was mainly attributed to an increase in headcount and related labor costs of sales and marketing personnel. Sales and marketing expenses represented 11.1% our revenues in 2017 compared to 13.1% of our revenues in 2016.

Amortization of Intangible Assets. As part of the acquisition of ReVera on April 2, 2015, the company acquired $12.3 million of intangible asset related to technology. In both 2017 and 2016, the company recorded $1.8 million of amortization of intangible assets.

General and Administrative Expenses. General and administrative expenses are comprised of salaries and related expenses and other non-personnel related expenses such as legal expenses. Our general and administrative expenses in 2017 were $8.1 million, an increase of $1.3 million, or 19%, compared to 2016. The increase in general and administration expenses was attributed mainly to the increase in headcount and related labor costs. In 2017, general and administration expenses represented 3.6% of our revenues, compared to 4% of our revenues in 2016.

Income Tax Expenses. Income tax expenses are comprised of current tax expenses and deferred tax expenses/income. In 2017, we recorded $13.6 million of income tax expenses, reflecting effective tax rate of 23%. In 2016, we recorded $1.7 million of income tax expenses reflecting effective tax rate of 15%. The increase in the effective tax rate in 2017 is attributed mainly to a $3.5 million tax provision due to prior years’ tax assessment.

5.B Liquidity and Capital Resources

As of December 31, 2018, we had working capital of approximately $233.5 million compared to working capital of approximately $180.1 million as of December 31, 2017. The increase in our working capital is related mainly to our fluent profits and cash flow.

Cash and cash equivalents, short-term and long-term deposits as of December 31, 2018 were $177.8 million compared to $149.8 million as of December 31, 2017.

Trade accounts receivables increased from $40.9 million as of December 31, 2017 to $53.5 million as of December 31, 2018, mainly as a result of the higher quarterly sales levels and the timing of tool shipments in the last quarter of the year.

Inventories increased from $34.9 million as of December 31, 2017 to $41.8 million as of December 31, 2018. The increase in inventory is related to the higher business volumes in 2018 compared to 2017.

Operating activities in 2018 generated positive cash flow of $36.1 million compared to a positive cash flow of $61.8 million in 2017. The decrease in operating cash flow in 2018 is mainly related to working capital requirements which included increased accounts receivables and inventories.

The following table describes our investments in capital expenditures during the last three years:

	2016		2017		2018	
	Domestic	Abroad	Domestic	Abroad	Domestic	Abroad
	(US dollars, in thousands)					
Electronic equipment	1,618	136	2,320	177	2,400	237
Office furniture and equipment	83	-	141	105	21	19
Leasehold improvements	1,183	113	3,488	64	493	508
Total	2,884	249	5,949	346	2,914	764

In 2018, the investment in capital expenditures was financed from our fluent operating cash flow. We expect to significantly increase our capital spending in 2019, to approximately $25 million, mainly for leasehold improvements in our new office facilities, and for electronic equipment used in our research and development labs. We expect capital expenditures to reduce once we complete the transition to the new office facilities.

Our principal liquidity requirement is expected to be for working capital and capital expenditures as well as additional acquisitions. We believe that our current cash reserves will be adequate to fund our planned activities for at least the next twelve months. Our long-term capital requirements will be affected by many factors, including the success of our current products, our ability to enhance our current products and our ability to develop and introduce new products that will be accepted by the semiconductor industry. We plan to finance our long-term capital needs with our cash reserves together with positive cash flow from operations, if any. If these funds are insufficient to finance our future business activities, which may include acquisitions, we would have to raise additional funds through the issuance of additional equity or debt securities, through borrowing or through other means. We cannot assure that additional financing will be available on acceptable terms.

Presently, we have no long-term debt, nor any readily available source of long-term debt financing such as a line of credit.

With regard to usage of hedging financial instruments and the impact of inflation and currency fluctuations, see "Item 11. Quantitative and Qualitative Disclosures about Market Risk" in this annual report on Form 20-F.

5.C Research and Development, Patents and Licenses, etc.

For information regarding our research and development activities, see "Item 4B – Research and Development" in this annual report on Form 20-F.

Grants from the Israeli Innovation Authority & European Programs

IIA sponsoring for generic research and development projects of large Israeli companies

We participate in a generic research and development programs sponsored by the IIA, available for Israeli companies that meet specific criteria's set forth by the IIA. Companies eligible to participate in this program receive IIA funding intended to focus on long-term creation of know-how and technological infrastructure, used for the development or production of future innovative products. These programs do not require payments of royalties to the IIA, but all other restrictions under the Innovation Law, such as local manufacturing obligations and know-how transfer limitations, as further detailed hereunder, are applicable to the know how developed by us with the funding received in such program.

IIA sponsoring for Israeli research and development consortiums

In 2018 and 2017, and in previous years, we participated in a consortium program sponsored by IIA. Under the terms of this program, we cooperate with additional companies and research institutes in Israel, organized in a consortium for the development of new technologies. The rules of the consortium include several references to the distribution of knowledge between the consortium members, requires us to provide the other members in the consortium with a non-sublicensable license to use the "new information" developed by such member, without consideration. These programs do not require payments of royalties to the IIA, but all other restrictions under the Innovation Law, such as local manufacturing obligations and know-how transfer limitations, as further detailed hereunder, are applicable to the know how developed by us with the funding received in such program.

Joint programs of the European Research Area and the IIA

We participate in European consortiums, which are joint programs governed by the Electronic Component Systems for European Leadership Joint Undertaking (the "JU") as part of the Horizon 2020 cooperation between the European Research Area and the IIA (the "EU Consortiums").

Some of the obligations and undertakings specified hereunder in connection with our IIA activities (such as the restrictions under the Innovation Law and obligation to grant certain access rights to our technology and intellectual property rights) apply with respect to these joint projects. In addition, the participation in an EU Consortium includes specific obligations, such as the following: The budgeted grant will be paid to the company pursuant to certain rules regarding 'eligible costs'; Obligation to properly implement the activities assigned under the specific EU Consortium project; Restrictions in contributions of third parties (by service or otherwise); Obligation to keep information up to date and to inform about events and circumstances likely to affect the consortium activity; Obligations related to records keeping, investigations and audits by the JU in order to verify the proper implementation of the specific EU Consortium project and compliance with the obligations under the terms of the program, including assessing deliverables and reports during a period of up to two years following the receipt by the company of the full grant payment; Obligations related to Intellectual property allocation generated by an EU Consortium, background intellectual property designation prior to the commencement of the EU Consortium's project and the provision of access rights to results obtained as part of the EU Consortium. Breach of such obligations may result in the reduction of the aggregate expected grant amount or claiming back previously received grants. In addition, the company may be subject to administrative and financial penalties such as temporary exclusion from all JU European Consortiums and fines of up to 10% of the maximum expected grant, as well as to contractual liabilities.

Past royalty bearing programs and royalties arrangements

Some of our previous research and development efforts were financed in part through royalty-bearing grants. We were obligated to pay royalties of 5% in 2016 and 2015 and in previous years, of revenues derived from sales of products funded with these grants. This obligation included different annual interest rates ranging up to 5%. In August 2016, we entered into a royalty buyout arrangement, or the Arrangement, with the IIA. As part of the Arrangement we paid approximately $12.9 million to the IIA in September 2016. The contingent net royalty liability to the IIA at the time we executed the Arrangement was approximately $24 million.. As a result of the foregoing payment, we are released from any future royalty payments on these previous funds received from the IIA. However, to the extent that we will be able to commercialize products that were developed as part of IIA programs and were declared as “failed” at the time of the Arrangement, we will be required to pay royalties to the IIA from income generated from such commercialization. Currently, we do not anticipate that such failed projects will generate revenues in the future. We note that the Arrangement does not release the Company from other obligations towards the IIA as further detailed herein. See also Note 8A to our consolidated financial statements contained elsewhere in this report. In addition, in the future, we may, alone or together with third parties, participate in research and development programs, which may bear royalty obligations (depending on the specific terms of the applicable program).

Pertinent obligations under the Israeli Encouragement of Research, Development and Technological Innovation in the Industry Law 1984

Under the Encouragement of Research, Development and Technological Innovation in the Industry Law 1984 and the provisions of the applicable regulations, rules, procedures and benefit tracks, together the Innovation Law, a qualifying research and development program is typically eligible for grants of up to 50% of the program’s pre-approved research and development expenses. The program must be approved by a committee of the IIA. The recipient of the grants is required to return the grants by the payment of royalties on the revenues generated from the sale of products (and related services) developed (in whole or in part) under IIA program up to the total amount of the grants received from IIA, linked to the U.S. dollar and bearing annual interest. (as determined in the Innovation Law). Following the full payment of such royalties and interest, there is generally no further liability for royalty payment for our currently developed and sold products. Nonetheless, the restrictions under the Innovation Law (as generally specified below) will continue to apply even after our company has repaid the grants, including accrued interest, in full.

The main pertinent obligations under the Innovation Law are as follows:

- Local Manufacturing Obligation. The terms of the grants under the Innovation Law require that we manufacture the products developed with these grants in Israel. Under the regulations promulgated under the Innovation Law, the products may be manufactured outside Israel by us or by another entity only if prior approval is received from the IIA (such approval is not required for the transfer of less than 10% of the manufacturing capacity in the aggregate, as declared to be manufactured out of Israel in the applications for funding, in which case a notice should be provided to the IIA). This approval may be given only if we abide by all the provisions of the Innovation Law and related regulations. Ordinarily, as a condition to obtaining approval to manufacture outside Israel, we would be required to pay royalties at an increased rate (usually 1% in addition to the standard rate and increased royalties cap between 120% and 300% of the grants, depending on the manufacturing volume that is performed outside Israel). We note that a company also has the option of declaring in its the IIA grant application an intention to exercise a portion of the manufacturing capacity abroad, thus, if the grant application is approved by IIA, such company will avoid the need to obtain additional approvals and pay the increased royalties cap for manufacturing outside of Israel at portions which were mentioned in such approved grant applications.

- Know-How transfer limitation. The Innovation Law restricts the ability to transfer know-how funded by the IIA outside of Israel, including by way of a license to a non-Israeli entity. Transfer of IIA funded know-how outside of Israel requires prior approval of the IIA. The IIA approval to transfer know-how created, in whole or in part, in connection with an IIA-funded project to third party outside Israel is subject to payment of a redemption fee to the IIA calculated according to a formula provided under the Innovation Law that is based, in general, on the ratio between the aggregate IIA grants to the company's aggregate investments in the project that was funded by these IIA grants, multiplied by the transaction consideration, taking into account depreciation mechanism, and less royalties already paid to the IIA The regulations promulgated under the Innovation Law establish a maximum payment of the redemption fee paid to the IIA under the above mentioned formulas and differentiates between two situations: (i) in the event that the company sells its IIA funded know-how, in whole or in part, or is sold as part of an M&A transaction, and subsequently ceases to conduct business in Israel, the maximum redemption fee under the above mentioned formulas will be no more than six times the total grants received (plus accrued interest) for development of the know-how being transferred, or the entire amount received from the IIA, as applicable; (ii) in the event that following the transactions described above (i.e., asset sale of IIA funded know-how or transfer as part of an M&A transaction) the company undertakes to continue its R&D activity in Israel (for at least three years following such transfer and maintain at least 75% of its R&D staff employees it had for the six months before the know-how was transferred, while keeping the same scope of employment for such R&D staff), then the company is eligible for a reduced cap of the redemption fee of no more than three times the amounts received (plus accrued interest) for the applicable know-how being transferred, or the entire amount received from the IIA, as applicable. No assurance can be given that approval to any such transfer, if requested, will be granted and what will be the amount of the redemption fee payable.

Approval of the transfer of IIA funded technology to another Israeli company requires a pre-approval by IIA and may be granted only if the recipient undertakes to fulfil all the liabilities to IIA and undertakes abides by all the provisions of the Innovation law and related regulations, including the restrictions on the transfer of know-how and manufacturing rights outside of Israel and the obligation to pay royalties. In light of the Arrangement (as further discussed below), in certain circumstances, under such sale transactions (i.e., the transfer of IIA funded technology or portion thereof to another Israeli company), we might be obligated to pay royalties to the IIA from any income derived from such a sale transaction.

- Licensing arrangements. Under the terms of the Innovation Law, licensing know how developed under the IIA programs outside of Israel, requires prior consent of IIA and payment of license fees to IIA, calculated in accordance with the licensing rules promulgated under the Innovation Law. The payment of the license fees does not discharge the company from the obligation to pay royalties or other payments due to IIA in accordance with Innovation Law.

These restrictions may impair our ability to enter into agreements for those products or technologies which were developed with assistance of the IIA grants without the approval of the IIA. We cannot be certain that any approval of the IIA will be obtained on terms that are acceptable to us, or at all. Furthermore, in the event that we undertake a transaction involving the transfer to a non-Israeli entity of know-how developed with IIA funding pursuant to a merger or similar transaction, the consideration available to our shareholders may be reduced by the amounts we are required to pay to the IIA. Any approval, if given, will generally be subject to additional financial obligations. Failure to comply with the requirements under the Innovation Law may subject us to mandatory repayment of grants received by us (together with interest and penalties), as well as may expose us to criminal proceedings. In addition, IIA may from time to time audit sales of products which it claims incorporate technology funded via IIA programs and this may lead to additional royalties being payable on additional products.

5.D Trend Information

For Information regarding most significant recent trends in our market, see “Item 4B– Our Market – The World Economy – Update” in this annual report on Form 20-F.

5.E Off-Balance Sheet Arrangements

We do not have and are not party to any off-balance sheet arrangements.

5.F Tabular Disclosure of Contractual Obligations

As of December 31, 2018, we had contractual obligations as described in the following table:

	Payment due by Period (US Dollars, in $ thousands)				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Operating Lease Obligations	$48,542	$3,135	$6,896	$6,021	$32,489
Purchase Obligations	31,028	27,564	3,459	3	2
Total	79,570	30,699	10,355	6,024	32,491

Item 6. Directors, Senior Management and Employees

6.A Directors and Senior Management

The following is the list of senior management and directors as of February 14, 2019:

Name	Age	Position
Michael Brunstein (3)	75	Chairman of the Board of Directors
Avi Cohen (1)	65	Director
Raanan Cohen (2)	63	Director
Zehava Simon (1)(2)(3)	60	Director (External Director until May 2018)
Dafna Gruber (1)(2)	53	Director (External Director until May 2018)
Eli Fruchter (1)(3)	63	Director
Ronnie (Miron) Kenneth (2)(3)	62	Director
Eitan Oppenhaim	53	President and Chief Executive Officer
Dror David	49	Chief Financial Officer
Shay Wolfling	47	Chief Technology Officer
Gabriel Waisman	48	Chief Business Officer
Adrian S. Wilson	47	General Manager Material Metrology Division
Gabi Sharon	56	Corporate Vice President Operations
Dov Farkash	59	Corporate Vice President Strategic Development
Sharon Dayan	46	Corporate Vice President Human Resources
Zohar Gil	52	Corporate Vice President Marketing and Business Development
Udi Cohen	46	Corporate VP and General Manager Dimensional Metrology Division

(1) Member of the audit committee

(2) Member of the compensation committee

(3) Member of the Nominating committee

Dr. Michael Brunstein was named chairman of our board of directors in June 2006, after serving as member of our board of directors from November 2003. During the years 1990 and 1999, Dr. Brunstein served as Managing Director of Applied Materials Israel Ltd. Prior to that, Dr. Brunstein served as President of Opal Inc., and as a Director of New Business Development in Optrotech Ltd. Dr. Brunstein holds a B.Sc. in Mathematics and Physics from The Hebrew University, Jerusalem, and a M.Sc. and a Ph.D. in Physics from Tel Aviv University, Israel.

Mr. Avi Cohen has served as a director of the Company since 2008. From July 2016 to September 2017 Mr. Cohen served as the Chief Executive Officer of MX1, a global media service provider founded in July 2016 as a result of a merger between RR Media Ltd., and SES Platform Services GmbH. From July 2012 and until its merger with SES Platform Services GmbH, Mr. Cohen served as the chief executive officer of RR Media Ltd. (previously known as RRsat Global Communications Network Ltd.), which was a public company traded on Nasdaq. Prior to that, until March 2012, Mr. Cohen served as President and Chief Executive Officer of Orbit Technologies, a public company traded on the TASE. Prior to joining Orbit in December 2008, Mr. Cohen served as Chief Operating Officer and Deputy to the chief executive officer of ECI Telecom Ltd. a leading supplier of best-in-class networking infrastructure equipment for carrier and service provider networks worldwide. Prior to joining ECI in September 2006, Mr. Cohen served in a variety of management positions at KLA-Tencor. From 2003 Mr. Avi Cohen was a Group Vice President, Corporate Officer and Member of the Executive Management Committee based at the corporate headquarters in the U.S. During his tenure, he successfully led the creation of KLA-Tencor’s global Metrology Group. From 1995 he was the President of KLA-Tencor Israel responsible for the Optical Metrology Division. Before joining KLA-Tencor, Mr. Cohen also spent three years as Managing Director of Octel Communications, Israel, after serving as Chief Executive Officer of Allegro Intelligent Systems, which he founded and which was acquired by Octel. Mr. Cohen is currently a Director of BioFishency Ltd. ESC-BAZ Ltd., Beit Issie Shapiro, Israel Consumer Council and Israel Wine Institute. Mr. Cohen holds B.Sc. and M.Sc. degrees in electrical engineering and applied physics from Case Western Reserve University, USA.

Mr. Raanan Cohen was appointed as a director of the Company by our board of directors in February 2014. Prior to that and until December 2012, Mr. Cohen has served as the President and Chief Executive Officer of Orbotech Ltd., a public company traded on Nasdaq. Mr. Cohen has also served in a range of other executive positions at Orbotech Ltd, including Co-President for Business and Strategy, EVP and President of the Printed Circuit Board (PCB) Division, Vice President for the PCB-AOI product line and President and chief executive officer of Orbotech, Inc. Prior to its merger with Orbotech in 1991, Mr. Cohen held various positions at Orbot, another manufacturer of AOI systems. Prior to joining Orbot in 1984, he worked at Telrad Networks Ltd. Mr. Cohen currently serves as the Chief Executive Officer of EyeWay Vision Ltd., as a member of the board of directors of Utilight Ltd., all private companies. Mr. Cohen holds a B.Sc. in Computer Science from the Hebrew University in Jerusalem, Israel.

Ms. Zehava Simon was elected as the Company's external director in accordance with the provisions of the Companies Law in June 2014 and reelected in June 2017. Effective as of May 2018, and our adoption of the exemption under the Regulation (as defined below), Ms. Simon is no longer classified as an external director under the Companies Law. Ms. Simon served as a Vice President of BMC Software from 2000 until 2013 and in her last position (as of 2011) acted as Vice President of Corporate Development. From 2002 to 2011, Ms. Simon served as Vice President and General Manager of BMC Software in Israel. In this role, she was responsible for directing operations in Israel and India as well as offshore sites. Prior to that, Ms. Simon held various positions at Intel Israel., which she joined in 1982, including leading of Finance & Operations and Business Development for Intel in Israel. Ms. Simon is currently a board member of Audiocodes, a public company traded on Nasdaq and TASE, Nice Systems, a public company traded on Nasdaq and TASE, and Amiad water systems, a public company traded on London Stock Exchange. Ms. Simon is a former member of the board of directors of Insightec Ltd. (2005-2012), M-Systems Ltd., a Nasdaq listed company which was acquired in 2006 by SanDisk Corp., a public company traded on Nasdaq as well (2005-2006) and Tower Semiconductor Ltd., a public company traded on TASE and Nasdaq (1999-2004). Ms. Simon holds a B.A. in Social Sciences from the Hebrew University, Jerusalem, Israel, a law degree (LL.B.) from the Interdisciplinary Center in Herzlia and an M.A. in Business and Management from Boston University, USA.

Ms. Dafna Gruber was elected as the Company's external director in accordance with the provisions of the Companies Law in April 2015 and reelected in April 2018. Effective as of May 2018, and our adoption of the exemption under the Regulation, Ms. Gruber is no longer classified as an external director under the Companies Law. Ms. Gruber has more than 25 years of broad experience, serving as chief financial officer and a senior executive management member in leading hi-tech companies traded on both Nasdaq and TASE. Since September 2017, Ms. Gruber has been serving as the chief financial officer of Landa Corporation Ltd., and then as financial advisor to Landa group, private companies. From October 2015 until September 2017, Ms. Gruber has been serving as the chief financial officer of Clal Industries Ltd., a private company. From April 2007 until April 2015, Ms. Gruber served as the chief financial officer of Nice Systems Ltd., a public company traded on Nasdaq and TASE. As a member of the senior management team, Ms. Gruber was a senior member of the strategy and M&A forum of the company. During her employment with Nice, Ms. Gruber was responsible, inter alia, for finance, operation, MIS and IT, legal and investor relations. From 1996 until May 2007, Ms. Gruber was part of Alvarion Ltd., a public company traded on Nasdaq and TASE, mostly as chief financial officer. Prior to that, from 1993 to 1996, Ms. Gruber was a controller at Lannet Data Communications Ltd., subsequently acquired by Lucent Technologies Inc. Ms. Gruber serves as an external director at TAT Technologies Ltd., a public company traded on Nasdaq and TASE, since November 2013, and as a member of the board of directors of Clal Biotechnologies Ltd., a public company traded on TASE. In addition, Ms. Gruber serves on the boards of directors of several private companies held by Clal Industries Ltd. Ms. Gruber is a certified public accountant and holds a Bachelor's degree in Accounting and Economics from Tel Aviv University, Israel.

Mr. Eli Fruchter was appointed to serve as a director of the Company by our board of directors in August 2016. Mr. Fruchter founded EZchip Semiconductor Ltd., a supplier of highly integrated Network Processors, where he served as the chief executive officer until February 2016 when the company was acquired by Mellanox (Nasdaq: MLNX) for approximately $811 million. Prior to EZChip, Mr. Fruchter co-founded LanOptics Ltd., a supplier of networking products, where he served as co-general manger. During his tenure at LanOptics, Mr. Fruchter led LanOptics' successful initial public offering on the Nasdaq. Mr. Frutcher was also among the founders of Adacom Technologies Ltd., a manufacturer of data communications products. Mr. Fruchter holds a B.Sc. degree in Electrical Engineering from the Technion – Israel Institute of Technology, Haifa, Israel.

Mr. Ronnie (Miron) Kenneth was appointed to serve as a director of the Company by our board of directors in December 2017 and was reappointed by our shareholders in April 2018. Mr. Kenneth is a veteran high-tech leader who served for ten years as Chairman and Chief Executive Officer at Voltaire Technologies Ltd. (Nasdaq: VOLT), leading it to an initial public offering on Nasdaq in 2007. Following Voltaire's merger with Mellanox Technologies Ltd. (Nasdaq: MLNX) in 2011, Mr. Kenneth became the Chief Executive Officer of Pontis Ltd., a privately-held company, until 2013. Mr. Kenneth currently serves as the Chairman of Teridion Technologies Ltd., and Varada Ltd., and he is a director of Allot Communications Ltd. (Nasdaq: ALLT) and Orbotech Ltd. (Nasdaq: ORBK). Mr. Kenneth holds a BA in Economics and Computer Science from the Bar-Ilan University and an MBA from the Golden Gate University, San Francisco.

Mr. Eitan Oppenhaim has been serving as the President and Chief Executive Officer of the Company since July 31, 2013. He has previously served as the Executive Vice President Global Business Group, since November 2010. From 2009 until 2010, Mr. Oppenhaim served as Vice President and Europe General Manager of Alvarion Ltd., a public company traded on Nasdaq. During the years 2007 through 2009, Mr. Oppenhaim served as Vice President of sales and marketing of OptimalTest Ltd., a public company traded the New York Stock Exchange. Prior to that, from 2002 till 2006, Mr. Oppenhaim served as Vice President – Business Manager of the Flat Panel Displays division of Orbotech Ltd., a public company traded on Nasdaq. From 2001 till 2002, Mr. Oppenhaim served as Managing Director of Asia Pacific at TTI Telecom International, a leading provider of assurance, analytics and optimization solutions to communications service providers (CSP) worldwide. Prior to that, from 1994 till 2001, Mr. Oppenhaim held several key executive positions at Comverse Network Systems Ltd., a public company traded on Nasdaq. Mr. Oppenhaim holds a BA in Economics and Accounting from the Haifa University, Israel and an MBA from Ben-Gurion University, Beer-Sheva, Israel.

Mr. Dror David has served as the Chief Financial Officer since November 2005. Mr. David joined Nova in April 1998, as the Company's Controller, and since then served in various financial and operational positions, including the position of Vice President of Resources, in which he was responsible for the finance, operations, information systems and human resources functions of the Company. Mr. David was also a leading member in the Company's initial public offering on Nasdaq in 2000, the Company's private placement in 2007 and the Company's secondary offering in 2010. Prior to joining Nova, Mr. David spent five years in public accounting with Delloitte Touch in Tel Aviv, specializing in industrial high-tech companies. Mr. David is a shareholder and a board member of P2P Ltd., a privately held company. Mr. David is a Certified Public Accountant in Israel, holds a B.A. in Accounting and Economics from Bar Ilan University, and an M.B.A. from Derby University of Britain.

Dr. Shay Wolfling joined Nova in 2011, as Chief Technology Officer. Prior to joining Nova, Dr. Wolfling was an R&D manager at KLA-Tencor-Belgium (formerly ICOS Vision Systems, a public traded company acquired by KLA in 2008), where he led multidisciplinary metrology & inspection development projects. From 2000 until its technology acquisition by ICOS in 2005, Dr. Wolfling was a founder and Vice President of Research and Development of Nano-Or-Technologies, a start-up company with a proprietary technology for 3D optical measurements. Dr. Wolfling took Nano-Or from the idea stage to initial product sales. Prior to founding Nano-Or, Dr. Wolfling was a project manager in Y-Beam-Technologies, a start-up offering laser-based skin treatments. Dr. Wolfling has several patents under his name in the field of optical measurements. Dr. Wolfling holds a B.Sc. in physics and mathematics from the Hebrew University of Jerusalem, Israel, a second degree in physics from Tel-Aviv University, Israel and a Ph.D. in physics from the Hebrew University of Jerusalem, Israel.

Mr. Gabriel Waisman joined Nova in 2016 as our Chief Business Officer, responsible for the Company's customer facing groups, including global sales, marketing, customer support and applications. Mr. Waisman brings over 19 years of managerial expertise in a global geographically dispersed environment, and extensive experience in working with pioneering multidisciplinary technologies, particularly within the electronics and telecom sectors. Prior to joining Nova, Mr. Waisman served as President at Orbotech Pacific (Orbotech LTD, Hong Kong) from August 2013 until April 2016 and Orbotech West (Orbotech Inc., USA) from May 2011 until July 2013, where he was responsible for sales and marketing, finance and operations, and customer support. Previous to this, from June 2003 until May 2011, Mr. Waisman served in various managerial positions at Alvarion Technologies Ltd., starting as Strategic Marketing Director, EMEA, and moving on to Vice President of Strategic Accounts, General Manager of West Europe, followed by Managing Director, Asia-Pacific. Mr. Waisman has also served as EMEA Regional Sales and Marketing Director (Broadband division) at Comverse Ltd. Mr. Waisman holds a B.Sc. in electronic engineering from the Technion – Israel Institute of Technology, Haifa, Israel and an MBA in Business Administration from the Tel-Aviv University, Israel.

Mr. Adrian S. Wilson Joined Nova in January 2018 as General Manager Material Metrology Division. Mr. Wilson has over 20 years of Semiconductor capital equipment and materials experience. Mr. Wilson joins us from Nanometrics Inc, where he held the position of Vice President & General Manager of Advanced Imaging and Analytics Business Unit. Prior to Nanometrics Inc, he held the position of Managing Director of Element Six Technologies Ltd., the non-abrasive arm of the synthetic diamond group of DeBeers, focused on thermal management and optical components for the semiconductor industry. Mr. Wilson has experience in leading both start-ups and divisions within large public multi-nationals' companies, including KLA-Tencor, FormFactor Inc and Phoenix X-ray Systems & Services Inc, a capital equipment start-up. Mr. Wilson holds a Bachelor's Degree in Electronics Engineering, post Grad in Marketing Management and a MBA in Technology Management. Mr. Wilson's accreditations include Fellow of the Chartered Institute of Marketing (UK) and Fellow of the Institute of Directors (UK).

Mr. Gabi Sharon has served as Corporate Vice President of Operations since September 2006. Having joined Nova in 1995, Mr. Sharon served in several key positions in the Company including as Global Customer Support Manager from September 1995 to September 2004. From September 2004 until September 2006 Mr. Sharon managed the Product Development Division, and spearheaded the NovaScan 3090 product line and its successful market launch. For a period of two years, from 2004 to 2006, he also served as the Product Marketing Manager and led the initial penetration of the Copper CMP market. Prior to joining Nova Mr. Sharon served as Project Manager in ECI Israel. Mr. Sharon holds a B.Sc. in Computer Science from Northeastern University, Boston, Massachusetts, and a M.Sc. in Technology Management from Polytechnic University, New York.

Mr. Dov Farkash has served as our Corporate Executive Vice President Strategic Development since August 2017. Prior to that, Mr. Farkash served as Senior Corporate Vice President Modeling Software Division between April 2016 and July 2017, and as our Senior Vice President Strategic Software between April 2014 and March 2016. Mr. Farkash joined Nova in 2000, and till 2005 he served in various key sales positions in Nova. From 2005 until 2009, Mr. Farkash has served as VP Sales of Nova. From 2009 until April 2014, Mr. Farkash served as our Vice President Business Development. Prior to joining Nova, Mr. Farkash served as worldwide Sales and Marketing Manager of AFCON Ltd., and AFCON Inc., USA. Prior to that, Mr. Farkash served in various managerial positions in software development in various Hi-tech companies. Mr. Farkash holds a B.Sc. in Computer Engineering and an MBA from the Technion – Israel Institute of Technology, Haifa, Israel.

Ms. Sharon Dayan joined Nova in January 2018, as Corporate Vice President Human Resources. Ms. Dayan is an experienced HR executive, bringing diversified experience which covers all human resources disciplines, including HR strategy, organizational and people development, M&A and employee experience. Prior to joining Nova Ms. Dayan served in several senior HR regional and corporate positions within global companies. Her last position before joining Nova, was in the role of SVP at Teva in the capacity of HR Business Partner for the global corporate functions. Prior to that she served as the Global Head of HR as part of Comverse management, responsible for all HR functions in the company. Before joining Comverse, Ms. Dayan had multiple positions in Amdocs. Ms. Dayan holds BA in Social Science from Tel-Aviv – Jaffe college, MSc. In Organizational Development from Tel-Aviv University and Group dynamics diploma from Tel Aviv university.

Mr. Zohar Gil has served as our Corporate Vice President Marketing and Business Development since March 2016. Mr. Gil joined Nova in June 2011, and until March 2016 served in several key business and marketing positions including Head of Customer Management for Nova’s foundry accounts in the Asia Pacific region and Head of Marketing and Product Management. Currently, as our Vice President Marketing and Business Development, Mr. Gil is focusing on the Company’s corporate marketing, strategy and M&A activities. Prior to joining Nova, from 2001 until 2010, Mr. Gil held leading business and marketing positions at Alvarion Ltd., including General Manager for the Carrier Line of Business and Vice President of Product Management. Prior to that, from 1997 until 2001, Mr. Gil served in variety of marketing and product management positions in 3Com Corporation. Mr. Gil holds a B.Sc. in Industrial Engineering from Tel-Aviv University, Israel, and an Executive MBA from Northwestern and Tel-Aviv Universities from the Kellogg-Recanati Business School of Management.

Dr. Udi Cohen has served as our Corporate Vice President and GM Dimensional Metrology Division since June 2017. Prior to joining Nova, Dr. Cohen served as Chief Executive Officer of BioControl Medical [(B.C.M) Ltd.] since 2005. Under his leadership, BioControl Medical attracted a world-class group of senior executives, engineers and medical advisors and developed an advanced implantable electrostimulation platform technology with potential application in numerous therapeutic areas. Dr. Cohen successfully led BioControl Medical through three financing rounds, and also the sale of its technology assets in urology and gynecology to American Medical Systems Inc., in 2006. Since 2010, he led the strategic partnership with Medtronic focused on developing and commercializing implantable electrostimulation devices for the treatment of congestive heart failure. Dr. Cohen received a Bachelor Degree of Science in Mathematics and Physics as well as a Ph.D. in Physics from Hebrew University in Jerusalem and participated in Wharton's AMP program.

Voting Agreement

We are not aware of any voting agreement currently in effect.

6.B Compensation

The aggregate compensation expensed, including share-based compensation and other compensation expensed by us, to our executive officers with respect to the year ended December 31, 2018 (consisting of 10 persons, including two former executive officers) was $6.7 million. This amount includes approximately $0.6 million set aside or accrued to provide pension, severance, retirement, or similar benefits and amounts expensed by the Company for automobiles made available to its executive officers.

Disclosure regarding the compensation of our senior executives on an individual basis will be disclosed in our proxy statement in connection with the 2019 annual general meeting of shareholders in accordance with Israeli regulations.

Terms of employment of Mr. Eitan Oppenhaim, our President and Chief Executive Officer, as approved by our shareholders, are as follows:

General

(i) a monthly base salary of NIS 126,000; (ii) an annual bonus of up to twelve (12) monthly base salaries (with additional payment of up to 50% of the target bonus in the case of over achievement), subject to objectives which are annually predetermined by the board of directors and its committees, in accordance with our compensation policy; (iii) in connection with termination of employment (other than for cause), a three month advance notice and a six month adjustment period, during which Mr. Oppenhaim will be entitled to all of his compensation elements, and to the continuation of vesting of his options. In the event of employment termination during a fiscal year (unless for cause), the bonus shall be prorated (subject to certain adjustments); (iv) customary social benefits such as pension fund or management insurance, education fund, vacation pay, sick leave and convalescence pay; (v) subject to required approvals under applicable law, a directors and officers insurance, including a "run-off" insurance policy; (vi) non-disclosure, non-compete and ownership of intellectual property undertakings; and (vii) monthly travel expenses or a Company car, cellular phone, a land line phone, toll road expenses, a laptop computer and other expense reimbursements pursuant to the Company general policies.

Equity-Based Compensation

Since January 1, 2015 until December 31, 2018, per the approval of the respective annual general meeting of shareholders, Mr. Oppenhaim was granted a total of 373,334 options to purchase ordinary shares of the Company with a weighted average exercise price of $16.94 and 82,222 restricted share units. The options and restricted share units: vest in equal annual installments over a terms of four years commencing one year from the grant date; expire seven (7) years after each grant date; can be cancelled in accordance with the terms and conditions of the applicable incentive plan of the Company or the employment terms of Mr. Oppenhaim; and, were made in accordance with and subject to Section 102 of the Income Tax Ordinance of 1961 (New Version) (the “Ordinance”). In addition, Mr. Oppenhaim was granted in July 2017 and May 2018 60,000 performance based restricted units that vest over a period of three (3) years, provided that the Company exceeded the performance targets for vesting set by the compensation committee and board of directors of the Company, unless such restricted share units have been cancelled in accordance with the terms and conditions of the share incentive plan of the Company or the employment terms of Mr. Oppenhaim. In the event a portion of these restricted share units fails to vest, such portion will be carried forward to the third vesting date and will vest if the Company’s average annual return on equity based on net income during the previous three (3) years shall be no less than ten percent (10%).

Compensation upon Significant Event

Upon the occurrence of a Significant Event, unvested options granted to Mr. Oppenhaim will vest upon the consummation of the Significant Event, and unexercised options may be exercised until the earlier of two years from the consummation of the Significant Event, and termination of the options. Such arrangements will not apply if Mr. Oppenhaim remains the chief executive officer of our company or the surviving entity, and unvested options are replaced for new options of the surviving entity as part of the Significant Event with a vesting schedule and terms identical to the replaced options. Further, upon a Significant Event, Mr. Oppenhaim will be entitled to a special bonus of up to 12 monthly salaries, subject to the approval of the compensation committee and our board of directors and subject to the limitation on a special bonus imposed by our compensation policy. In the event of termination of employment (up to 12 months from the Significant Event), Mr. Oppenhaim will be entitled to the retirement terms under his employment agreement, the special bonus described above and the payment of the annual bonus in full for the year in which the Significant Event has occurred, subject to the annual bonus plan, on an annual basis calculation, and subject to the approval of the compensation committee and our board of directors prior to the consummation of the transaction, or the respective body in the new surviving entity following the transaction, as applicable. A “Significant Event” is defined for this purpose as: (1) the sale of all or substantially all of our company’s assets; (2) a merger of our company with or into another company or entity after which our shareholders will hold 50% or less of the surviving entity; (3) our company becoming a division or a subsidiary of another company; or (4) the purchase of our company's shares, after which the purchaser will hold 50% or more of our company's shares, provided, however, that the purchaser is not one of our institutional investors upon execution of the purchase agreement.

Compensation upon Acquisition

Upon Acquisition of a company (which is not an affiliate of the company), Mr. Oppenhaim will be entitled to receive a bonus of up to 12 monthly salaries subject to the approval of the compensation committee and our board of directors and subject to the limitation on a special bonus imposed by our compensation policy. An “Acquisition” includes, among others, a merger of our company or a subsidiary of our company with or into another entity, such that upon consummation of such transaction our shareholders will hold more than 50% of the surviving entity.

Directors and Officers Equity Based Compensation

As of February 14, 2019, a total of 1,027,928 options to purchase our ordinary shares and 130,702 RSU’s were outstanding and held by certain current executive officers and directors (consisting of 17 persons), of which 509,181 options are currently exercisable or exercisable within 60 days of February 14, 2018, 38,274 shares are held by trustee due to vested RSUs and 8,278 RSU’s will vest within 60 days of February 14, 2018. See “Item 6E. Share Ownership” in this annual report on Form 20-F.

In accordance with our equity-based compensation policy, effective August 2017, the exercise price of granted options is equal to the closing sale price of the Company's ordinary shares on Nasdaq on the day of grant.

Compensation of Directors

The total amount paid or payable to the directors, including our directors who were in the position of external directors until May 2018, (consisting of eight persons from January until April 2018, and seven persons from May until December 2017), for 2018 was $0.36 million.

The compensation arrangement of the Company’s directors (excluding the chairman of the board of directors and, unless approved otherwise, any other director who is also an employee of the Company), as approved by our shareholders at the 2012 annual general meeting, includes:

1. An annual payment of US$18,000 (or an equivalent amount in NIS calculated into NIS according to a NIS 4.00 = US$1.00 exchange rate) but not less than the annual payment required under the Companies Regulations (Rules Regarding Compensation and Expenses to an External Director), 2000, and the Companies Regulations (Relief for Public Companies with Shares Listed for Trading on a Stock Market Outside of Israel), 2000 (collectively, the “Regulations”).

2. Additionally, the following payments (subject to the minimal and maximal payment restrictions applicable to the Company under the Regulations): (i) for each meeting that the director or attends in person, an amount of US$600 (in an equivalent amount in NIS according to a NIS 4.00 = US$1.00 exchange rate, provided that such payment will not be lower than the applicable payment required under the Regulations to be paid to external directors); (ii) for each execution of a written consent in lieu of a meeting, an amount of US$300 (in an equivalent amount in NIS according to a NIS 4.00 = US$1.00 exchange rate, provided that such payment will not be lower than the applicable payment required under the Regulations to be paid to external directors); and (iii) for each meeting that the director attends by teleconference, an amount of US$360 (in an equivalent amount in NIS according to a NIS 4.00 = US$1.00 exchange rate, provided that such payment will not be lower than the applicable payment required under the Regulations to be paid to external directors).

3. An annual award of an option to purchase up to 10,000 ordinary shares or options with fair market value of US$80,000, the lower of the two, to be granted to each director on the date of each annual general meeting at which such director is elected or reelected. The exercise price of each option will be determined pursuant to our policy and consistent with our compensation policy, the options will vest quarterly over a period of four years.

All the above mentioned sums were paid in an equivalent amount in NIS according to a NIS 4.00 = US$1.00 exchange rate, provided that such payment will not be lower than the applicable payment required under the Regulations to be paid to external directors, and the proposed changes are in line with the Company's Compensation Policy (as further detailed below).

In February 2017, our board of directors has resolved, based on the recommendation of our compensation committee, that effective as of July 2017, the compensation arrangement of the Company's directors (excluding the chairman of the board of directors and, unless approved otherwise, any other director who is also an employee of the Company) will be changed such that the annual payment will be increased to NIS 92,000 (approximately US$26,300) and the payment per meeting to NIS3,000 (approximately US$860) (for each execution of a written consent in lieu of a meeting, an amount of NIS 1,500 and for each meeting that the director attends by teleconference, an amount of NIS 1,800), subject to the applicable minimum and maximum limitations include in the Companies Regulations (Rules Regarding the Compensation and Expenses of an External Director), 5760- 2000, as amended by the Companies Regulations (Relief for Public Companies Traded in Stock Exchange Outside of Israel), 5760-2000, as such regulations may be amended from time to time. No change was made with respect to the equity grants to the directors. The revisions in the annual and per meeting fees are exempted from approval of the Company's shareholders pursuant to Rule 7 of Companies Regulations (Rules Regarding the Compensation and Expenses of an External Director), 5760-2000 and Rule 1A(2) of the Companies Regulations (Relief from Related Party Transactions), 5760-2000.

The compensation arrangement of Dr. Michael Brunstein, the chairman of our board of directors, as approved by our shareholders at the 2006, 2008 and 2010 annual general meetings, includes: (i) a gross annual fee of US$110,000 payable monthly in NIS; (ii) an annual award of options to purchase up to 10,000 ordinary shares, to be granted to Dr. Brunstein on the date of each annual general meeting at which the chairman of the board of directors is elected or reelected, starting the 2008 annual general meeting, the exercise price of which will be determined pursuant to our equity based compensation policy and the other terms (i.e., the amount, exercise price and vesting schedule) will be identical to the terms of options granted to other directors on an annual award; and (iii) a biennial award of an option to purchase up to 75,000 ordinary shares to Dr. Brunstein on the date of every other annual general meeting at which the chairman of the board of directors is elected or reelected, starting with the 2010 annual general meeting (and thereafter in 2012). The exercise price of such options is determined pursuant to our equity based compensation policy, and consistent with our compensation policy, the options will vest quarterly over a period of four years.

On September 12, 2013, our shareholders approved the Company's compensation policy.

Pursuant to the Companies Law a compensation policy must be re-approved (and re-considered) at least once in every three years. Our shareholders voted on June 30, 2016 against the amended and restated compensation policy recommended by our board of directors. In August 2, 2016, our board of directors (per the recommendation of our compensation committee) has concluded that the approval of the proposed amended and restated compensation plan is for the benefit of the company, and based on detailed arguments and in accordance with the provisions of the Companies Law, has resolved to approve our amended and restated compensation policy despite the objection of our shareholders. Accordingly, our amended compensation policy is effective as of that date. The full text of the amended and restated compensation policy was included as Appendix A to the proxy statement attached to our report on Form 6-K, furnished to the Securities and Exchange Commission on May 26, 2016.

6.C Board Practices

Our Amended and Restated Articles of Association, as adopted by the Company's shareholders and recently amended on April 26, 2018, or the Amended Articles, provide that we may have between five and nine directors. Our board of directors currently consists of seven directors, two of which are women.

Under the Companies Law, companies incorporated under the laws of the State of Israel that are "public companies," including companies with shares listed on the Nasdaq Global Select Market, are required to appoint at least two external directors.

Pursuant to regulations promulgated under the Companies Law, companies with shares traded on a U.S. stock exchange, including the Nasdaq Global Select Market, may, subject to certain conditions, "opt out" from the Companies Law requirements to appoint external directors and related Companies Law rules concerning the composition of the audit committee and compensation committee of the board of directors. In accordance with these regulations, in May 2018, we elected to "opt out" from the Companies Law requirements to appoint external directors and related Companies Law rules concerning the composition of the audit committee and compensation committee of the board of directors.

Under these regulations, the exemptions from such Companies Law requirements will continue to be available to us so long as: (i) we do not have a "controlling shareholder" (as such term is defined under the Companies Law), (ii) our shares are traded on a U.S. stock exchange, including the Nasdaq Global Select Market, and (iii) we comply with the director independence requirements, the audit committee and the compensation committee composition requirements, under U.S. laws (including applicable Nasdaq Rules) applicable to U.S. domestic issuers.

Our board of directors has determined that all of our directors qualify as ''independent directors'' as defined by The Nasdaq Stock Market Rules.

Our Amended Articles provide that directors may be elected at our annual general meeting of shareholders by a vote of the holders of more than 50% of the total number of votes represented at such meeting, not taking into consideration abstention votes. In addition, our board of directors is authorized to appoint directors, at its discretion, provided that the total number of directors does not exceed the maximum number of directors permitted by the Amended Articles. Our directors (other than the directors who were in the position of external directors until May 2018) serve as such until the next annual general meeting of our shareholders. Effective as of May 2018, and our adoption of the exemption under the Israeli Companies Regulations (Reliefs for Public Companies whose Shares are Listed on a Stock Exchange Outside of Israel), 2000, or the Regulation, our directors in office who were elected and classified as external directors, Ms. Dafna Gruber and Ms. Zehava Simon, are no longer classified as such under the Companies Law. The transition rules set forth under the Regulation provide that such directors have the right to remain in office as our directors at their option after the exemption under the Regulation is adopted until the earlier of such directors' original end of term of office or the second annual meeting of shareholders after the adoption of the exemption under the Regulation, which in the case of Ms. Gruber is until the date of our annual meeting of shareholders to be held in 2020, and in case of Ms. Simon is until earlier of the date of our annual meeting of shareholders to be held in 2020 and June 2020.

According to the Companies Law, the board of directors of a public company must establish the minimum number of board members that are to have accounting and financial expertise while considering, inter alia, the nature of the company, its size, the scope and complexity of its operations and the number of directors stated in the Amended Articles.

Our board of directors resolved that the minimum number of board members that need to have accounting and financial expertise is one (1).

Our board of directors determined that each of Ms. Dafna Gruber and Ms. Zehava Simon has accounting and financial expertise as described in the regulations promulgated pursuant to the Companies Law, and that, therefore, the requirements of the minimum number of board members that need to have accounting and financial expertise, as set by the board of directors, has been met.

Our board of directors has adopted a training program for newly appointed directors. Once appointed and following the completion of their onboard training, our directors continue to receive ongoing training as part of our directors training and development efforts.

Family Relationships

There are no family relationships between any members of our executive management and our directors.

Board of Directors' Committees

The Company's board of directors has appointed the following committees:

Audit Committee

Our Audit Committee is comprised of Dafna Gruber, Zehava Simon, Avi Cohen and Eli Fruchter. The audit committee is responsible to provide oversight of the accounting and financial reporting process of the Company and the audits of the financial statements of the Company, and assist the Board in its oversight of (i) the integrity of the Company's financial statements and other published financial information, (ii) the Company's compliance with applicable financial and accounting related standards, rules and regulations, (iii) the selection, engagement and termination, subject to shareholder approval, of the Company's independent auditor, (iv) the pre-approval of all audit, audit-related and all permitted non-audit services, if any, by the Company's independent auditor, and the compensation therefor, (v) the Company's internal controls over financial reporting and (vi) risk assessment and risk management.

Under the Companies Law, the audit committee is responsible, among others, for (i) identifying deficiencies in the business management practices of the Company, including by consulting with the internal auditor, and recommending remedial actions with respect to such deficiencies; (ii) reviewing and approving related party transactions, including, among others, determining whether or not such transactions are deemed material actions or extraordinary transactions; (iii) ensuring that a competitive process is conducted for related party transactions with a controlling shareholder (regardless of whether or not such transactions are deemed extraordinary transactions), optionally based on criteria which may be determined by the audit committee annually in advance; (iv) setting forth the approval process for transactions that are 'non-negligible' (i.e., transactions with a controlling shareholder that are classified by the audit committee as non-negligible, even though they are not deemed extraordinary transactions), as well as determining which types of transactions would require the approval of the audit committee, optionally based on criteria which may be determined annually in advance by the audit committee; (v) evaluating the Company's internal audit program and the performance of the Company's internal auditor and the resources at his/her disposal; (vi) reviewing the scope of work of the Company's external auditor and making recommendations regarding his/her salary; and (vii) creating procedures relating to the employees' complaints regarding deficiencies in the administration of the Company as well as adopting against retaliation. The audit committee is also responsible for reviewing and approving any material change or waiver in the Company's Corporate Code of Conduct regarding directors or executive officers, and disclosures made in the Company's annual report in such regard. The audit committee operates under a charter dully adopted by the board of directors.

Our board of directors has determined that each member of our audit committee is independent as such term is defined in Rule 10A 3 under the Exchange Act, and that each member of our audit committee satisfies the additional requirements applicable under the Nasdaq rules to members of an audit committee.

Compensation Committee

Our Compensation Committee is comprised of Zehava Simon, Dafna Gruber, Raanan Cohen and Miron (Ronnie) Kenneth. The function of the compensation committee is described in the approved charter of the committee, and includes assisting the board of directors in discharging its responsibilities relating to compensation of the Company's officers, directors and executives and the overall compensation programs and reviewing and approving, or if required by law, approving and recommending for approval by the board of directors, grants and awards under the Company's equity incentive plans. The primary objective of the committee is to oversee the development and implementation of the compensation policies and plans that are appropriate for the Company in light of all relevant circumstances, and which provide incentives that fit the Company's long-term strategic plans and are consistent with the culture of the Company and the overall goal of enhancing shareholder's value.

Our board of directors has determined that each member of our compensation committee is independent under the Nasdaq rules, including the additional independence requirements applicable to the members of a compensation committee.

Under the Companies Law and our compensation committee charter, our compensation committee is responsible, among others, for (i) recommending to the board of directors regarding its approval of a compensation policy in accordance with the requirements of the Companies Law, and any other compensation policies, incentive-based compensation plans and equity-based plans; (ii) overseeing the development and implementation of such compensation plans and policies that are appropriate in light of all relevant circumstances and recommending to the board of directors regarding any amendments or modifications that the compensation committee deems appropriate; (iii) determining whether to approve transactions concerning the terms of engagement and employment of our officers and directors that require compensation committee approval under the Companies Law or our compensation plans and policies; and (iv) taking any further actions as the compensation committee is required or allowed to under the Companies Law or the compensation plans and policies.

Nominating Committee

Our Nominating Committee is comprised of Ronnie (Miron) Kenneth, Michael Brunstein, Eli Fruchter and Zehava Simon. The function of the nominating committee is described in the approved charter of the committee, and includes responsibility for identifying individuals qualified to become board members and recommending that the board of directors consider the director nominees for election at the general meeting of shareholders. The nominating and corporate governance committee is also responsible for developing and recommending to the board of directors a set of corporate governance guidelines applicable to the Company, periodically reviewing such guidelines and recommending any changes thereto.

On September 7, 2010, our board of directors resolved to authorize the audit committee to fulfill the scope and act as the Company's investment committee.

All committees are acting according to written charters that were approved by our board of directors. In February 2012, we adopted an internal enforcement plan which was approved by our board of directors. The internal enforcement plan, as part of which we adopted and implementing procedures and policies in order to comply with the provisions of the Israeli Securities Law, 5728-1968 (the "Israeli Securities Law"), the Companies Law and the applicable guidelines issued by Israeli Securities Authority. The internal enforcement plan includes, among others, the board committees' charters, procedures with respect to related party transactions, insider trading, which prohibits hedging activities, reporting and complaints, anti-bribery policy and a code of conduct. Each of our committees have the power to retain, terminate and approve the related fees and other retention terms, as it deems appropriate, outside counsel and other experts and consultants to assist the committee in connection with its responsibilities without our board of directors approval and at the Company's expense.

In May 2017, we completed a review process of our enforcement plan and related procedures.

Approval of Related Party Transaction

The Companies Law requires that office holders of a company, including directors and executive officers, promptly disclose to the board of directors any personal interest they may have and all related material information known to them about any existing or proposed transaction with such company. The approval of the board of directors is required for 'non-extraordinary' transactions between a company and its office holders, or between a company and other persons in which an office holder has a personal interest, unless such company's articles of association provide otherwise. Under the Companies Law, a 'non-extraordinary' transaction between a company or between the company and a third party in which an office holder of a company has a personal interest, will require the approval of the board of directors or a committee authorized by the board of directors, unless such company's articles of association provide otherwise. Our Amended Articles do not provide otherwise, and therefore such transaction requires the approval of our board of directors. If a transaction is an "extraordinary transaction", it is subject to the approval of the audit committee prior to its approval by the board of directors. For information regarding the necessary approvals under the Companies Law for transactions with office holders and directors regarding their terms of engagement with the company, see "— Compensation of Officers and Directors" in this Item below.

In addition, an extraordinary transaction between a public company and a controlling shareholder (i.e. a shareholder who has the ability to direct the activities of a company, including a shareholder that owns 25% or more of the voting rights if no other shareholder owns more than 50% of the voting rights, but excluding a shareholder whose power derives solely from its position on the board of directors or any other position with the company), or in which a controlling shareholder has a personal interest, including a private placement in which the controlling shareholder has a personal interest, a transaction between a public company and a controlling shareholder, the controlling shareholders' relative, or entities under its control, directly or indirectly, with respect to services to be provided to the public company, and a transaction concerning the terms of compensation of the controlling shareholder or the controlling shareholder’s relative, who is an office holder or an employee, requires the approval of the audit committee or, in some cases, the compensation committee (see "— Compensation of Officers and Directors" in this Item below), the board of directors and a majority of the shares voted by the shareholders of the company participating and voting on the matter in a shareholders’ meeting. In addition, the shareholder approval must fulfill one of the following requirements: (i) the majority must include at least a majority of the shares of the voting shareholders who have no personal interest in the transaction (in counting the total votes of such shareholders, abstentions are not taken into account); or (ii) the total of opposition votes among the shareholders who have no personal interest in the transaction may not exceed 2% of the aggregate voting rights in the company. Any such transaction the term of which is more than three years, must be approved in the same manner every three years, unless with respect to certain transactions as permitted by the Companies Law, the audit committee has determined that longer term is reasonable under the circumstances.

According to the Companies Law, if an extraordinary transaction is discussed by the board of directors or the audit committee, directors and office holders that have personal interest in the proposed transaction, may not participate in the discussion or vote. However, if the majority of the members of the audit committee or the board of directors (as applicable) have personal interest in the proposed transaction, then all directors (including those with personal interest) may participate in the discussion and vote, provided that in the event the majority of the members of the board of directors have personal interest in the transaction, said transaction will also be subject to the approval of the Company's shareholders.

Compensation of Officers and Directors

Under the Companies Law, Israeli public companies are required to establish a compensation committee and adopt a policy regarding the compensation and terms of employment of their directors and officers. For information on the composition, roles and objectives of the compensation committee pursuant to the Companies Law and our compensation committee charter, see above “—Board of Directors” Committees — Compensation Committee" in this annual report on Form 20-F.

Pursuant to the Companies Law, the compensation policy must be approved by the company's board of directors after reviewing the recommendations of the compensation committee. The compensation policy also requires the approval of the general meeting of the shareholders, which approval must satisfy one of the following (the "Majority Requirement"): (i) the majority should include at least a majority of the shares of the voting shareholders who are non-controlling shareholders or do not have a personal interest in the approval of the compensation policy (in counting the total votes of such shareholders, abstentions are not be taken into account) or (ii) the total number of votes against the proposal among the shareholders mentioned in paragraph (i) does not exceed two percent of the aggregate voting power in the company. Under certain circumstances and subject to certain exceptions, the board of directors may approve the compensation policy despite the objection of the shareholders, provided that the compensation committee and the board of directors determines that it is for the benefit of the company, following an additional discussion and based on detailed arguments. In August 2016, our compensation committee and board of directors acted accordingly and adopted our amended and restated compensation plan despite our shareholders’ objection.

The Companies Law provides that the compensation policy must be re-approved (and re-considered) every three years, in the manner described above. Moreover, the board of directors is responsible for reviewing from time to time the compensation policy and deciding whether or not there are any circumstances that require an adjustment to the company's compensation policy. When approving the compensation policy, the relevant organs must take into consideration the goals and objectives listed in the Companies Law, and include reference to specific issues listed in the Companies Law. Such issues include, among others (the "Compensation Policy Mandatory Criteria"): (i) the relevant person's education, qualifications, professional experience and achievements; (ii) such person's position within the company, the scope of his responsibilities and previous compensation arrangements with the company; (iii) the proportionality of the employer cost of such person in relation to the employer cost of other employees of the company, and in particular, the average and median pay of other employees in the company, including contract workers, and the impact of the differences between such person's compensation and the other employees' compensation on the labor relations in the company; (iv) the authority, at the board of director's sole discretion, to lower any variable compensation components or set a maximum limit (cap) on the actual value of the non-cash variable components, when paid; and (v) in the event that the terms of engagement include any termination payments - the term of employment of the departing person, the company's performance during that term, and the departing person's contribution to the performance of the company.

In addition, the Companies Law provides that the following matters must be included in the compensation policy (the "Compensation Policy Mandatory Provisions"): (i) the award of variable components must be based on long term and measurable performance criteria (other than non-material variable components, which may be based on non-measurable criteria taking into account the relevant person's contribution to the performance of the company); (ii) the company must set a ratio between fixed and variable pay, set a cap on the payment of any cash variable compensation components as of the payment of such components, and set a cap on the maximum cash value all non-cash variable components as of their grant date; (iii) the compensation policy must include a provision requiring the relevant person to return to the company any compensation that was awarded on the basis of financial figures that were subsequently restated; (iv) equity based variable compensation components should have an appropriate minimum vesting periods, which should be linked to long term performance objectives; and (v) the company must set a clear limit on termination payments.

Pursuant to the Companies Law, any transaction with an office holder (except directors and the chief executive officer of the company) with respect to such office holder's compensation arrangements and terms of engagement, requires the approval of the compensation committee and the board of directors. Such transaction must be consistent with the provisions of the company's compensation policy, provided that the compensation committee and the board of directors may, under special circumstances, approve such transaction that is not in accordance with the company's compensation policy, if both of the following conditions are met: (i) the compensation committee and the board of directors discussed the transaction in light of the roles and objectives of the compensation committee (also see above "—Board of Directors' Committees — Compensation Committee" in this annual report on Form 20-F) and after taking into consideration the Compensation Policy Mandatory Criteria and including in such transaction the Compensation Policy Mandatory Provisions; and (ii) the company's shareholders approved the transaction, provided that in public companies the approval must satisfy the Majority Requirement. Notwithstanding the above, the compensation committee and the board of directors may, under special circumstances, approve such transaction even if the shareholders' meeting objected to its approval, provided that (i) both the compensation committee and the board of directors re-discussed the transactions and decided to approve it despite the shareholder's objection, based on detailed arguments, and (ii) the company is not a 'Public Pyramid Held Company'. For the purpose hereof, a "Public Pyramid Held Company" is a public company that is controlled by another public company (including companies that issued only debentures to the public), which is also controlled by another public company (including companies that issued only debentures to the public) that has a controlling shareholder.

Transactions between public companies (including companies that have issued only debentures to the public) and their chief executive officer, with respect to his or her compensation arrangement and terms of engagement, require the approval of the compensation committee, the board of directors and the shareholder's meeting, provided that the approval of the shareholders' meeting must satisfy the Majority Requirement. Notwithstanding the above, the compensation committee and the board of directors may, under special circumstances, approve such transaction with the chief executive officer even if the shareholders' meeting objected to its approval, provided that (i) both the compensation committee and the board of directors re-discussed the transactions and decided to approve it despite the shareholder's objection, based on detailed arguments, and (ii) the company is not a Public Pyramid Held Company. Such transaction with the chief executive officer must be consistent with the provisions of the company's compensation policy, provided that the compensation committee and the board of directors may, under special circumstances, approve such transaction that is not in accordance with the company's compensation policy, if both of the following conditions are met: (i) the compensation committee and the board of directors discussed the transaction in light of the roles and objectives of the compensation committee (see above —"Board of Directors' Committees – Compensation Committee" in this annual report on Form 20-F) and after taking into consideration the Compensation Policy Mandatory Criteria and including in such transaction the Compensation Policy Mandatory Provisions; and (ii) the company's shareholders approved the transaction, provided that in public companies the approval must satisfy the Majority Requirement. In addition, the compensation committee may determine that such transaction with the CEO does not have to be approved by the shareholders of the company, provided that: (i) the chief executive officer is independent based on criteria set forth in the Companies Law; (ii) the compensation committee determined, based on detailed arguments, that bringing the transaction to the approval of the shareholders may compromise the chances of entering into the transaction; and (iii) the terms of the transaction are consistent with the provisions of the company's compensation policy. Under the Companies Law, non-material amendments of transactions relating to the compensation arrangement or terms of engagement of office holders (including the chief executive officer), require only the approval of the compensation committee.

With respect to transactions relating to the compensation arrangement and terms of engagements of directors in public companies (including companies that have issued only debentures to the public), the Companies Law provides that such transaction is subject to the approval of the compensation committee, the board of directors and the shareholders' meeting. Such transaction must be consistent with the provisions of the company's compensation policy, provided that the compensation committee and the board of directors may, under special circumstances, approve such transaction that is not in accordance with the company's compensation policy, if both of the following conditions are met: (i) the compensation committee and the board of directors discussed the transaction in light of the roles and objectives of the compensation committee (see above "—Board Practices –Board of Directors' Committees – Compensation Committee" in this annual report on Form 20-F) and after taking into consideration the Compensation Policy Mandatory Criteria and including in such transaction the Compensation Policy Mandatory Provisions; and (ii) the company's shareholders approved the transaction, provided that in public companies the approval must satisfy the Majority Requirement.

Pursuant to the Companies Law a compensation policy must be re-approved (and re-considered) at least once in every three years. Our shareholders voted on June 30, 2016 against the amended and restated compensation policy recommended by our board of directors. On August 2, 2016, our board of directors (per the recommendation of our compensation committee) has concluded that the approval of the proposed amended and restated compensation plan is in the interest of the Company, and based on detailed arguments and in accordance with the provisions of the Companies Law, has resolved to approve our amended and restated compensation policy despite the objection of our shareholders. Accordingly, our amended compensation policy is effective as of that date. For the full text of the amended and restated compensation policy see our report on Form 6-K furnished to the Securities and Exchange Commission on May 26, 2016.

Internal Auditor

Under the Companies Law, the board of directors must also appoint an internal auditor nominated by the audit committee. Our internal auditor is Ms. Dana Gottesman-Erlich, CPA (Isr.) of BDO Ziv Haft, an independent registered accounting firm which is a part of the BDO international accounting firm. Ms. Gottesman-Erlich replaced Mr. Guy Sapir, C.P.A (Isr) of Kesselman & Kesselman PwC Israel as our internal auditor as of January 2016. The role of the internal auditor is to examine whether a company’s actions comply with the law and proper business procedure. The internal auditor may not be an interested party or office holder, or a relative of any interested party or office holder, and may not be a member of the company’s independent accounting firm or its representative. The Companies Law defines an interested party as a holder of 5% or more of the shares or voting rights of a company, any person or entity that has the right to nominate or appoint at least one director or the general manager of the company or any person who serves as a director or as the general manager of a company. Our internal auditor is working based on a risk survey and audit plan, which is determined by our audit committee and approved by our board of directors.

6.D Employees

Set forth below is a chart showing the number of people we employed at the times indicated:

	As of December 31,		
	2016(*)	2017(*)	2018(*)
Total Personnel	510	616	662
Located in Israel	299	352	373
Located abroad	211	264	289
In operations	83	100	100
In research and development	178	216	275
In global business	214	251	242
In general and administration	35	49	45

(*) The numbers of employees set forth in this table do not include contractors and an insignificant number of temporary employees retained by the Company from time to time.

We were a member of the Industrialists Association in Israel, an employer's union until December 31, 2006. Under applicable Israeli law, we and our employees are subject to protective labor provisions such as restrictions on working hours, minimum wages, paid vacation, sick pay, severance pay and advance notice of termination of employment as well as equal opportunity and anti-discrimination laws. Orders issued by the Israeli Ministry of Economy and Industry make certain industry-wide collective bargaining agreements applicable to us. These agreements affect matters such as cost of living adjustments to salaries, length of working hours and week, recuperation and travel expenses. In Israel, Nova is subject to the instructions of the Extension Order in the Industrial Field for Extensive Pension Insurance 2006 according to the Israeli Collective Bargaining Agreements Law, 1957 (the "Extension Order"). The Extension Order determines the pension terms of the employees which fall under its criteria.

6.E Share Ownership

Based on information provided to us, our 17 directors and officers listed in Item 6A above, have had, as a group, sole voting and investment power for 560,028 shares beneficially owned by them as of February 14, 2018 (representing 2% of the 27,925,149 issued and outstanding ordinary shares of the Company as of such date). Such number includes 512,148 shares subject to options that are immediately exercisable or exercisable within 60 days of February 14, 2018 (with expiration dates ranging between 2019 and 2026; exercise prices ($/share) ranging between 0.93 and 29.45), 45,769 shares held by the trustee due to vested RSUs, and 2,111 RSUs to be vested within 60 days as of February 14, 2018. Each of such directors and executive officers beneficially owned less than 1% of the Company's shares as of such date.

Beneficial ownership of shares is determined in accordance with the rules of the SEC and generally includes any shares over which a person exercises sole or shared voting or investment power. Ordinary shares that are subject to warrants or options that are presently exercisable or exercisable within 60 days of the date of February 14, 2018 are deemed to be outstanding and beneficially owned by the person holding the options for the purpose of computing the percentage ownership of that person, but are not treated as outstanding for the purpose of computing the percentage of any other person.

Employee Benefit Plans

The share option plans under which we have outstanding equity grants, are described below:

2007 Incentive Plan (which was active until October 2017) - The maximum number of ordinary shares to be issued under the plan, which was adopted by our shareholders on October 25, 2007, was 2,500,000, subject to future increases or decreases by the Company. On May 1, 2012, the board of directors resolved to increase the aggregate number of shares issuable under the 2007 Incentive Plan by one million shares, and amend the 2007 Incentive Plan to address a change in the clearing procedures of the TASE. On December 17, 2014, the board of directors resolved to increase the aggregate number of shares issuable under the 2007 Incentive Plan by two million shares, and to amend the 2007 Incentive Plan. Such amendment includes, among others, a change of the exercise period in the event of termination, and in case of death, disability or retirement of the optionee. In connection with the aforementioned increases, we have not obtained a shareholder approval as required under Nasdaq Listing Rules and followed in lieu home practice rules that do not require such approval. As of December 31, 2018, options to purchase 3,354,112 ordinary shares at an exercise prices which range from $0.43 to $24.70, the fair market value of Nova’s stock based on the dates of grant, were granted under this plan of which, as of December 31, 2018, 2,288,813 options were exercised, 691,720 options were outstanding and exercisable, 932,227 options had been cancelled and 391,352 were outstanding and unvested. As of December 31, 2018, 834,142 RSU’s had been granted, of which 622,993 had vested, 97,411 had been cancelled and 113,738 RSU's were outstanding. Following adoption of 2017 share incentive plan, as detailed herein, we have ceased granting equity under the 2007 incentive plan.

2017 Share Incentive Plan - The maximum number of ordinary shares to be issued under the plan, which was adopted by our board of directors on August 1, 2017, is 2,500,000, subject to future increases or decreases by the Company. The Company has used its option as a foreign private issuer to opt out of Nasdaq requirement for a shareholders’ approval of the plan, by providing a legal opinion letter to Nasdaq on August 25, 2017. As of December 31, 2018, options to purchase 314,681 ordinary shares at an exercise prices which range from $22.56 to $31.26, the closing price of the Company's ordinary shares on Nasdaq on the day of grant, were granted under this plan of which, as of December 31, 2018, no options were exercised, 36,345 options were outstanding and exercisable, 5,680 options had been cancelled and 410,656 were outstanding and unvested. As of December 31, 2018, 226,303 RSU’s had been granted, of which 12,450 RSU’s had vested, 3,696 had been cancelled and 210,157 RSU's were outstanding.

On September 12, 2013, our shareholders (following an approval by our compensation committee and board of directors), approved the Company's compensation policy, which includes, among others, provisions relating to equity-based compensation for Nova's executive officers. On August 2, 2016, our board of directors (per the recommendation of our compensation committee) has concluded that the approval of the proposed amended and restated compensation plan is in the interest of the Company, and based on detailed arguments and in accordance with the provisions of the Companies Law, has resolved to approve our amended and restated compensation policy despite the objection of our shareholders. Accordingly, our amended compensation policy is effective as of that date.

The amended and restated compensation policy provides, among others, that: (i) such equity based compensation is intended to be in a form of share options and/or other equity based awards, such as RSUs, in accordance with the Company's equity incentive plan in place as may be updated from time to time; (ii) all equity-based incentives granted to executive officers will be subject to vesting periods in order to promote long-term retention of the awarded executive officers. Unless determined otherwise in a specific award agreement approved by the compensation committee and the board of directors, grants to executive officers (other than directors) will vest gradually over a period of between three to five years; and (iii) all other terms of the equity awards will be in accordance with Nova's incentive plans and other related practices and policies. The board of directors may, following approval by the compensation committee, extend the period of time for which an award is to remain exercisable and make provisions with respect to the acceleration of the vesting period of any executive officer's awards, including, without limitation, in connection with a corporate transaction involving a change of control, subject to any additional approval as may be required by the Companies Law. The compensation policy also provides that the equity-based compensation will be granted from time to time and be individually determined and awarded according to the performance, educational background, prior business experience, qualifications, role and the personal responsibilities of the executive officer. The fair market value of the equity-based compensation for the executive officers will be determined according to acceptable valuation practices at the time of grant.

Our equity-based compensation policy, which was initially adopted in February 2007 and was most recently amended in December 2018, provides, among others, that the exercise price for each option will be equal to the closing sale price of the Company's ordinary shares on Nasdaq on the day of grant.

For additional information regarding our employees' incentive plans, see Note 9 of our consolidated financial statements, contained elsewhere in this report.

Item 7. Major Shareholder and Related Party Transactions

A. Major Shareholders

The following table sets forth certain information regarding the beneficial ownership of our outstanding ordinary shares as of the dates indicated below for each person who we know beneficially owns five percent or more of the outstanding ordinary shares.

Beneficial ownership of shares is determined under rules of the SEC and generally includes any shares over which a person exercises sole or shared voting or investment power. Applicable percentages are based on 27,925,149 ordinary shares outstanding as of February 14, 2018.

Name	Number of Ordinary Shares Beneficially Owned	Percentage of Ordinary Shares Beneficially Owned	
Menora Mivtachim Holdings Ltd. and Menora Mivtachim Pensions and Gemel Ltd. (1)	2,748,785	9.84	%
The Phoenix Holdings Ltd., Itshak Sharon (Tshuva), and Delek Group Ltd. (2)	2,228,397	7.98	%
Harel Insurance Investments & Financial Services Ltd. (3)	2,095,493	7.50	%
Clal Insurance Enterprises Holdings Ltd., IDB Development Corporation Ltd. and Eduardo Sergio Elsztain. (4)	2,025,849	7.25	%
Renaissance Technologies LLC. (5)	2,013,700	7.21	%
Psagot Investment House Ltd. (6)	1,505,717	5.39	%

(1) The information is based upon Amendment no. 2 to Schedule 13G/A filed with the SEC by Menora Mivtachim Holdings Ltd. and Menora Mivtachim Pensions and Gemel Ltd. on February 14, 2019.

(2) The information is based upon Amendment no. 1 to Schedule 13G/A filed with the SEC by The Phoenix Holdings Ltd., Delek Group Ltd. and Itshak Sharon (Tshuva) as of February 14, 2019.

(3) The information is based upon Amendment no. 5 to Schedule 13G/A filed with the SEC by Harel Insurance Investments & Financial Services Ltd. on January 29, 2019.

(4) The information is based upon Amendment no. 1 to Schedule 13G/A filed with the SEC by Clal Insurance Enterprises Holdings Ltd., and IDB Development Corporation Ltd. and Eduardo Sergio Elsztain on February 14, 2019.

(5) The information is based upon Amendment no. 5 to Schedule 13G filed with the SEC by Renaissance Technologies LLC on February 13, 2019.

(6) The information is based upon Amendment No. 2 to Schedule 13G filed with the SEC by Psagot Investment House Ltd. on February 21, 2019.

All the shareholders of the Company have the same voting rights.

To our knowledge, the significant changes in the percentage of ownership held by our major shareholders during the past three years have been: (i) the decrease in the percentage of ownership by Clal Insurance Enterprises Holdings Ltd. below 5% in 2017 and increase above 5% in 2018; (ii) the increase in the percentage of ownership held by Wellington Management Group LLP, Wellington Group Holdings LLP, Wellington Investment Advisors Holdings LLP and Wellington Management Company LLP above 5% in 2016, and the decrease in the percentage of ownership below 5% in 2017; (iii) the increase in the percentage of ownership held by Menora Mivtachim Holdings Ltd. above 5% in 2017, (iv) the increase in the percentage of ownership of Psagot Investment House Ltd. above 5% in 2018; (v) the decrease in the percentage of ownership of Yelin Lapidot Holdings Management Ltd., Dov Yelin, Yair Lapidot below 5% in 2018, and (vi) the decrease of in the percentage of ownership of Migdal Insurance & Financial Holdings below 5% in 2018.

As of February 14, 2019, our ordinary shares were held by 14 registered holders (not including CEDE & Co.). Based on the information provided to us by our transfer agent, as of February 14, 2018, 12 registered holders were U.S. domicile holders and held approximately 0.13% of our outstanding ordinary shares.

Control of Registrant

To the Company’s knowledge, it is not owned or controlled by a foreign government. Except for the shareholders identified above owning more than five percent of the Company’s ordinary shares, the Company has no knowledge of any corporation or other natural or legal person owning a controlling interest in the Company.

B. Related Party Transactions

In June 2018, we obtained directors’ and officers’ liability insurance for our officers and directors with coverage in an aggregate amount of $50,000,000 (including $5,000,000 Side A DIC). This directors’ and officers’ liability insurance was presented and approved by our compensation committee in accordance with the framework approved by our shareholders on June 22, 2017(the “Policy”).

The resolution of our compensation committee and Board in May 2017, and the approval of our shareholders in June 2017, authorized the Company, from time to time and for up to a period of three years in the aggregate (effective immediately as of the approval of our shareholders), to extend and/or renew the Policy or enter into a new insurance policy, with the same insurers or any other insurers, in Israel or overseas, for the insurance of directors and officers liability with respect to the directors and/or officers serving in the Company and its subsidiaries, as may serve from time to time, and with the directors and/or officers serving in associated companies on behalf of the Company and/or on behalf of its subsidiaries, provided however, that the insurance transaction complies with the following conditions: (i) the annual premium to be paid by us will not exceed 1.5% of the aggregate coverage of the insurance policy; (ii) the limit of liability of the insurer will not exceed the greater of $50 million or 30% of our shareholders equity based on our most recent financial statements at the time of approval by the compensation committee; and (iii) the insurance policy, as well as the limit of liability and the premium for each extension or renewal will be approved by the compensation committee (and, if required by law, by the board of directors) which will determine that the sums are reasonable considering our exposures, the scope of coverage and the market conditions and that the insurance policy reflects the current market conditions, and it will not materially affect our profitability, assets or liabilities.

Further, upon circumstances to be approved by the compensation committee (and, if required by law, by the board of directors), we will be entitled to enter into a "run off" insurance policy of up to seven years, with the same insurer or any other insurance, as follows: (i) the limit of liability of the insurer will not exceed the greater of $50 million or 30% of our shareholders equity based on our most recent financial statements at the time of approval by the compensation committee; (ii) the annual premium will not exceed 300% of the last paid annual premium; and (iii) the insurance policy, as well as the limit of liability and the premium for each extension or renewal will be approved by the compensation committee (and, if required by law, by the board of directors) which shall determine that the sums are reasonable considering our exposures covered under such policy, the scope of cover and the market conditions, and that the insurance policy reflects the current market conditions and that it will not materially affect our profitability, assets or liabilities.

We may also extend the insurance policy in place to include cover for liability pursuant to a future public offering of securities as follows: (i) the additional premium for such extension of liability coverage will not exceed 50% of the last paid annual premium; and (ii) the insurance policy as well as the additional premium will be approved by the compensation committee (and if required by law, by the board of directors) which will determine that the sums are reasonable considering the exposures pursuant to such public offering of securities, the scope of cover and the market conditions and that the insurance policy reflects the current market conditions, and it does not materially affect our profitability, assets or liabilities.

In addition, we undertook to indemnify our officers and directors. On June 21, 2012, the shareholders at the annual general meeting approved an amended letter of indemnification to be given to our directors and officers. The aggregate indemnification amount that the Company can pay to all its officers and directors pursuant to these letters of indemnification will not exceed 25% of the Company’s shareholders’ equity, according to the most recent consolidated financial statement prior to the date of indemnification payment. Prior to that, we undertook to indemnify our officers and directors up to an aggregate amount of $10,000,000 or 25% of the Company’s shareholders equity, the higher of the two. Pursuant to our amended and restated compensation policy, we may indemnify our directors and officers to the fullest extent permitted by applicable law, for any liability and expense that may be imposed on the director or the officer, as provided in the indemnity agreement between us and such individuals, all subject to applicable law and our articles of association. Our amended and restated compensation policy also provides that we may exempt our directors and officers in advance for all or any of their liability for damage in consequence of a breach of the duty of care vis-a-vis our company, to the fullest extent permitted by applicable law.

For information relating to options granted to officers and directors, see “Item 6E. Share Ownership” in this annual report on Form 20-F. For information regarding our compensation policy and compensation arrangements with our directors and executive officers (including our chairman and chief executive officer), please refer to “Item 6B. Compensation” in this annual report on Form 20-F

7.C Interest of Experts and Counsel

Not applicable.

Item 8. Financial Information

8.A Consolidated Statements and Other Financial Information

See “Item 17. Financial Statements” in this annual report on Form 20-F and pages F-1 through F-30.

Legal Proceedings

From time to time, we or our subsidiaries may be a party to legal proceedings and claims in the ordinary course of business. While the outcome of these matters cannot be predicted with certainty, we do not believe they will have a material effect on our consolidated financial position, results of operations, or cash flows.

We are currently not involved in any significant legal proceedings.

Dividend Policies

We anticipate that, for the foreseeable future, we will retain any earnings to support operations and to finance the growth and development of our business. Therefore, we do not expect to pay cash dividends for at least the next several years.

The distribution of dividends may be limited by the Companies Law, which permits the distribution of dividends only out of retained earnings or earnings derived over the two most recent fiscal years, whichever is higher, provided that there is no reasonable concern that payment of a dividend will prevent a company from satisfying its existing and foreseeable obligations as they become due. Our Amended and Restated Articles of Association provide that dividends will be paid at the discretion of, and upon resolution by, our board of directors.

In addition, distribution of dividends may be subject to certain tax implication. For additional information regarding tax implication of dividends' distribution, see “Item 10E. Taxation – Israeli Taxation” in this annual report on Form 20-F.

Export Sales

Substantially all of our products are sold to customers located outside Israel and the United States.

8.B Significant Changes

Not applicable.

Item 9. The Offer and Listing

9.A Offer and Listing Details

Our ordinary shares began trading on Nasdaq on April 11, 2000 under the symbol “NVMI”. Our ordinary shares were registered for trading on the Tel Aviv Stock Exchange Ltd. in 2002 under the symbol “ ”.

9.B Plan of Distribution

Not applicable.

9.C Markets

Our ordinary shares are quoted on the Nasdaq Global Select Market under the symbol “NVMI” and on the Tel Aviv Stock Exchange.

9.D Selling Shareholders

Not applicable.

9.E Dilution

Not applicable.

9.F Expenses on the Issue

Not applicable.

Item 10. Additional Information

10.A Share Capital

Not applicable.

10.B Memorandum and Articles of Association

Set forth below is a summary of certain provisions of our “Amended Articles” and Israeli law affecting shareholders of the Company. This summary does not purport to be complete and is qualified in its entirety by reference to our Amended Articles and the applicable law.

Registration.

The Company was incepted and registered with the Israeli Registrar of Companies on May 17, 1993, under registration number 51-181-246-3.

Purpose of the Company. The purposes of the Company, as provided by Article 4 of our Amended Articles, are (a) to invent, design, plan, develop, manufacture, market and trade in the field of measuring instruments in electronics, micro-electronics, medicine, chemistry, metallurgy, ceramics and any other field, (b) to initiate, participate, manage, execute, import and export any kind of project within the borders of the State of Israel and/or outside Israel, (c) to register patents, trademarks, trade names, intellectual property rights, marketing rights and any other right of any kind whatsoever, both in Israel and abroad and (d) to engage in any legal activity, both in Israel and abroad.

Share Capital.

The Company currently has one class of ordinary shares, 0.01 NIS par value per share. The Amended Articles provide that the board of directors may decide on a distribution, subject to the provisions set forth under the Companies Law and the Amended Articles. Under the Companies Law, dividends may be paid out of net earnings, as calculated under that law, for the two years preceding the distribution of the dividend and retained earnings, provided that there is no reasonable concern that the dividend will prevent the company from satisfying its existing and foreseeable obligations as they become due. For more information, see the Company's balance sheet and the statement of shareholders' equity in the financial statements. Each ordinary share is entitled to one vote at all shareholders meetings.

Changes of Rights of Holders of the Shares.

According to the Amended Articles, any change in the rights and privileges of the holders of any class of shares requires the approval of a class meeting of such class of shares by a simple majority (unless otherwise provided by the Companies Law or the regulations thereto or by the terms of issue of the shares of that class).

Shareholders Meetings.

An annual meeting should be convened at least once every calendar year, and no later than 15 months after the preceding annual meeting, to review the Company's financial statements and to transact any other business required pursuant to the Amended Articles or to the Companies Law, and any other matter which the board of directors places on the agenda of the annual meeting, at a time and place that the board of directors will determine. A special meeting may be called by the board of directors and at the demand of any of the following: two directors or one-quarter of the directors then serving; one or more shareholders who hold at least five percent of the issued and outstanding capital stock and at least one percent of the voting rights in the Company; or one or more shareholders who hold at least five percent of the voting rights in the Company.

According to the Amended Articles, the quorum required for an ordinary meeting of shareholders is at least two shareholders present in person or by proxy who together hold or represent in the aggregate 33 1/3 % or more of the voting power. A meeting adjourned for lack of a quorum is reconvened one day thereafter at the same time and place or to such other day, time and place as our board of directors may indicate in a notice to the shareholders. At the reconvened meeting, the required quorum consists of any number of members present in person or by proxy, regardless of the number of shares represented. The Companies Law and regulations determine that prior notice of no less than 21 days should be given to the company's shareholders, prior to convening a meeting. In the event that the issue to be resolved is an issue subject to the Israeli proxy rules, a notice of no less than 35 days should be given to the company's shareholders. In some cases, a prior notice of not less than 14 days may be given to the company's shareholders.

Subject to anti-terror legislations, there are no limitations on the rights of non-resident or foreign owners to hold or vote ordinary shares imposed under Israeli law or under the Amended Articles.

Changes in Capital.

Our share capital may be increased or decreased by a vote of our shareholders in accordance with the Companies Law.

Borrowing Powers

Pursuant to the Companies Law and our articles of association, our board of directors may exercise all powers and take all actions that are not required under law or under our articles of association to be exercised or taken by a certain organ of the Company, including the power to borrow money for company purposes.

Acquisition of a Controlling Stake.

According to the Companies Law, an acquisition pursuant to which a purchaser will hold a "controlling stake", that is defined as 25% or more of the voting rights if no other shareholder holds a controlling stake, or an acquisition pursuant to which such purchaser will hold more than 45% of the voting rights of the company if no other shareholder owns more than 45% of the voting rights, may not be performed by way of market accumulation, but only by way of a special tender offer (as defined in the Companies Law) made to all of the company's shareholders on a pro rata basis. A special tender offer may not be consummated unless a majority of the shareholders who announced their stand on such offer have accepted it (in counting the total votes of such shareholders, shares held by the controlling shareholders, shareholders who have personal interest in the offer, shareholders who own 25% or more of the voting rights in the company, relatives or representatives of any of the above or the bidder and corporations under their control, shall not be taken into account). A shareholder may be free to object to such an offer without such objection being deemed as a waiver of his right to sell its respective shares if the transaction is approved by a majority of the company's shareholders despite his objection. Shares purchased not in accordance with those provisions will become "dormant shares" and will not grant the purchaser any rights so long as they are held by the purchaser.

Acquisition.

A person wishing to acquire shares or a class of shares of an Israeli public company and who would, as a result, own more than 90% of the target company's issued and outstanding share capital or of certain class of its shares, is required by the Companies Law to make a full tender offer (as defined in the Companies Law) to all of the company's shareholders for the purchase of all of the issued and outstanding shares of the company or class of shares. If either (i) the shareholders who do not accept the offer hold, in the aggregate, less than 5% of the issued and outstanding share capital of the company or of the applicable class, and more than half of the shareholders who do not have a personal interest in the offer accept the offer, or (ii) the shareholder who do not accept the offer hold less than 2% of the issued and outstanding share capital of the company or of the applicable class, then all of the shares that the acquirer offered to purchase will be transferred to the acquirer by operation of law. However, a shareholder that had its shares so transferred, whether or not it accepted the tender offer (unless otherwise provided in the offering memorandum), may, within six (6) months from the date of acceptance of the tender offer, petition the court to determine that the tender offer was for less than fair value and that the fair value should be paid as determined by the court. If the shareholders who did not accept the tender offer hold at least 5% of the issued and outstanding share capital of the company or of the applicable class of shares, the acquirer may not acquire shares of the company that will increase its holdings to more than 90% of the company's issued and outstanding share capital or of the applicable class from shareholders who accepted the tender offer.

The Companies Law provides that corporate mergers require the approval of both companies' boards of directors and shareholders. In the event, however, that shares of the target company are held by the acquiring company or by a person holding 25% or more of any type of controlling means of the acquiring company, the merger will not be approved if a majority of the shareholders of the target company attending and voting at the meeting at which the merger is considered (without taking into account, for that purpose, the shares held by the acquiring company or by a person holding 25% or more of any type of controlling means of the acquiring company) object to and do not vote in favor of the merger. If a person holds 25% or more of any type of controlling means of more than one merging company, the same provisions shall apply with regard to the shareholders' vote with respect to each such company. Upon the request of a creditor of either party to the proposed merger, the court may delay or prevent the merger if the court concludes that there exists a reasonable concern that as a result of the merger the surviving company will be unable to satisfy the target company's obligations. Furthermore, a merger may not close unless at least 30 days have passed from the time that the general meeting of each of the merging companies was held and at least 50 days have passed from the date on which the merger proposal was sent to the Israeli Registrar of Companies.

10.C Material Contracts

Israeli Lease Agreement

On May 3, 2018, we entered into a lease agreement, or the Lease Agreement, with Bayside Land Corporation Ltd., or Bayside. Pursuant to the Lease Agreement, we will lease from Bayside a total of approximately 12,000 square meters at a new building being built at the Science Park in Rehovot, with the intention to move the our headquarters in Israel to such premises.

The lease period for approximately 10,000 square meters, or the Initial Space, is expected to begin in the fourth quarter of 2019 and extend for a period of ten years, or the Initial Lease Period. We will have the option to extend the lease period by two periods of five years each, subject to customary conditions. The lease period for the additional approximately 2,000 square meters, or the Additional Space, is expected to begin in 2021, and may be extended through the same lease periods as the Initial Space. The lease cannot be terminated by us during the Initial Lease Period. Under certain circumstances, Bayside may terminate the Agreement in the event of change of control in the Company.

The average monthly lease, parking and management costs for the Initial Space in the Initial Lease Period are expected to be approximately NIS 665,000 per month. During each of the additional lease option periods, the monthly lease and parking payments for the Initial Space will be increased by 2.5%. The monthly lease, parking and management costs for the Additional Space are expected to be NIS 175,000 per month. The monthly lease, parking and management costs will be linked to the Israeli consumer price index.

On February 3, 2019, we entered into a construction contractor agreement with A. Weiss Construction and Supervision Ltd. in order to set the terms under which the contractor will perform the main construction and adjustment works in connection our new Israeli Lease Agreement. The services include, among others, adjustments of electro-mechanical systems as well as works related to electricity, plumbing, air conditioning, flooring, cladding and carpentry, all in accordance with the specifications, plans and the quantities schedule (Ktav-Kamuyot) enclosed to the agreement. The agreement may be terminated by the us for convenience, by providing to the Contractor a seven-days prior written notice.

10.D Exchange Controls

Israeli law and regulations do not impose any material foreign exchange restrictions on non-Israeli holders of our ordinary shares.

Dividends, if any, paid to holders of our ordinary shares, and any amounts payable upon our dissolution, liquidation or winding up, as well as the proceeds of any sale in Israel of our ordinary shares to an Israeli resident, may be paid in non-Israeli currency or, if paid in Israeli currency, may be converted into freely repatriable dollars at the rate of exchange prevailing at the time of conversion.

10.E Taxation

Israeli Taxation

The following is a summary of the material Israeli tax laws applicable to us, and some Israeli Government programs benefiting us. This section also contains a discussion of some Israeli tax consequences to persons owning our ordinary shares. This summary does not discuss all the aspects of Israeli tax law that may be relevant to a particular investor in light of his or her personal investment circumstances or to some types of investors subject to special treatment under Israeli law. Examples of this kind of investor include traders in securities or persons that own, directly or indirectly, 10% or more of our outstanding voting capital, all of whom are subject to special tax regimes not covered in this discussion. Some parts of this discussion are based on a new tax legislation which has not been subject to judicial or administrative interpretation. The discussion should not be construed as legal or professional tax advice and does not cover all possible tax considerations.

SHAREHOLDERS ARE URGED TO CONSULT THEIR OWN TAX ADVISORS AS TO THE ISRAELI OR OTHER TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF OUR ORDINARY SHARES, INCLUDING, IN PARTICULAR, THE EFFECT OF ANY FOREIGN, STATE OR LOCAL TAXES.

General Corporate Tax Structure in Israel

Israeli companies are generally subject to corporate tax on their taxable income at the rate of 23% for the 2018 tax year and thereafter. However, the effective tax rate payable by a company that derives income from an Approved Enterprise, a Benefited Enterprise or a Preferred Enterprise (as discussed below) may be lower. Capital gains derived by an Israeli company are generally subject to the prevailing regular corporate tax rate.

Income Tax Regulations (Rules on Bookkeeping by Foreign Invested Companies and Certain Partnerships and Determination of their Taxable Income), 1986

As a “foreign invested company” (as defined in the Israeli Law for the Encouragement of Capital Investments-1959), the Company's management has elected to apply Income Tax Regulations (Rules for Maintaining Accounting Records of Foreign Invested Companies and Certain Partnerships and Determining Their Taxable Income) - 1986. Accordingly, its taxable income or loss is calculated in US Dollars.

Tax Benefits under the Law for the Encouragement of Capital Investments, 1959

Tax benefits prior to the 2005 Amendment

The Law for the Encouragement of Capital Investments, 1959, generally referred to as the “Investments Law”, provides that a capital investment in eligible facilities may, upon application to the Israeli Authority for Investments and Development of the Industry and Economy (the “Investment Center”), be granted the status of an Approved Enterprise. Each certificate of approval for an Approved Enterprise relates to a specific investment program delineated both by its financial scope, including sources or funds, and by its physical characteristics or the facility or other assets, e.g., the equipment to be purchased and utilized pursuant to the program.

A company owning an Approved Enterprise is eligible for a combination of grants and tax benefits (the "Grant Track"). The tax benefits under the Grant Track include, among others, accelerated depreciation and amortization for tax purposes. The benefits period is ordinarily seven years commencing with the year in which the Approved Enterprise first generates taxable income. The benefits period is limited to 12 years from the earlier of the commencement of production by the Approved Enterprise or 14 years from the date of approval of the Approved Enterprise.

The tax benefits under the Investments Law also apply to income generated by a company from the grant of a usage right with respect to know-how developed pursuant to the Approved Enterprise, income generated from royalties, and income derived from a service which is auxiliary to such usage right or royalties, provided that such income is generated within the ordinary course of business of the company investing in the Approved Enterprise. If a company has more than one approval or only a portion of its capital investments are approved, its effective tax rate is the result of a weighted average of the applicable rates. The tax benefits under the Investments Law are not generally available with respect to income derived from products manufactured outside of Israel. In addition, the tax benefits available to a company investing in an Approved Enterprise are contingent upon the fulfillment of conditions stipulated in the Investments Law and related regulations and the criteria set forth in the specific certificate of approval, as described above. In the event that a company does not meet these conditions, it may be required to refund the amount of tax benefits, plus a consumer price index linked adjustment and interest.

A company that has an Approved Enterprise program that qualifies as a foreign investment company (an "FIC") will be eligible for a three-year extension of tax benefits following the expiration of the available seven-year period. In addition, in the event that the level of foreign ownership in an Approved Enterprise reaches 49% or higher, the corporate tax rate applicable to income earned from the Approved Enterprise is reduced as follows:

% of Foreign Ownership	Tax Rate
Over 25% but less than 49%	Up to 25%
49% or more but less than 74%	20%
74% or more but less than 90%	15%
90% or more	10%

A company owning an Approved Enterprise may elect to forego its entitlements to grants and tax benefits under the Grant Track and apply for alternative package of tax benefits for a benefit period of between seven and ten years (the "Alternative Track"). Under the Alternative Track, a company's undistributed income derived from the Approved Enterprise will be exempt from corporate tax for a period of between two and ten years, starting from the first year the company derives taxable income under the Approved Enterprise program. The length this exemption will depend on the geographic location of the Approved Enterprise within Israel. After the exemption period lapses, the company subject to tax at a reduced corporate tax rate between of 10% to 25% depending on the level of foreign investment in the company in each year, as detailed above, for the remainder of the benefits period.

We elected to be taxed under the Alternative Track. A company that has elected the Alternative Track and subsequently pays a dividend out of income derived from the Approved Enterprise during the tax exemption period will be subject to corporate tax on the amount that is determined by the distributed amount (grossed up to reflect such pre-tax income that it would have had to earn in order to distribute the dividend) with the effective corporate tax rate which would have been applied had the company not elected the Alternative Track, which is at referred above ranged between 10%-25%, depending on the level of foreign investment in the company in each yare year as explained above. Under the Investments Law, the transfer of funds from the Company to shareholders and other related parties may be deemed to be regarded as a dividend distribution for this purpose in certain circumstances. Dividends paid out of any income derived from an Approved Enterprise are generally subject to withholding tax at source at the reduced rate of 15% (or a lower rate under a tax treaty, if applicable, subject to the receipt in advance of a valid certificate from the Israel Tax Authority (“ITA”), allowing for a reduced tax rate), if the dividend is distributed during the tax exemption period or within 12 years thereafter. After such period, the withholding tax will be applied at a rate of up to 30%, or at a lower rate under an applicable tax treaty (subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate). In the event, however, which the company qualifies as a FIC, there is no such time limitation.

Under the Alternative Track, dividends paid by a company are considered to be attributable to income received from the entire company and the company’s effective tax rate is the result of a weighted average of the various applicable tax rates, excluding any tax-exempt income. Under the Investments Law, a company that has elected the Alternative Track is not obliged to distribute retained profits, and may generally decide from which year’s profits to declare dividends.

We currently intend to reinvest any income derived from our Approved Enterprise program and not to distribute such income as a dividend.

Tax benefits under the 2005 Amendment

An amendment to the Investments Law, which is effective as of April 1, 2005, has changed certain provisions of the Investments Law, or the 2005 Amendment. An eligible investment program under the 2005 Amendment qualifies for benefits as a “Benefited Enterprise” (rather than as an Approved Enterprise, which status is still applicable for investment programs approved prior to December 31, 2004 and/or investment programs under the Grant Track). According to the 2005 Amendment, only Approved Enterprises receiving cash grants require the prior approval of the Investment Center. As a result, a company is no longer required to obtain the advance approval of the Investment Center in order to receive the tax benefits previously available under the alternative benefits program. Rather, a company may claim the tax benefits offered by the Investment Law directly in its tax returns, provided that its facilities meet the criteria for tax benefits set forth in the 2005 Amendment. A company that has a Benefited Enterprise may, at its discretion, approach the ITA for a pre-ruling confirming that it is in compliance with the provisions of the Investment Law.

The duration of the tax benefits described herein is limited to the earlier of seven (7) or ten (10) years (depending on the geographic location of the Benefited Enterprise within Israel) from the Commencement Year (as described below) or 12 or 14 years from the first day of the Year of Election (as described below), depending on the location of the company within Israel. Commencement Year is defined as the later of the first tax year in which a company had derived liable income for tax purposes from the Benefited Enterprise, or the Year of Election, which is defined as the year in which a company requested to have the tax benefits apply to the Benefited Enterprise. The tax benefits granted to a Benefited Enterprise are determined, depending on the geographic location of the Benefited Enterprise within Israel, according to one of the following, which may be applicable to us:

(i) Similar to the currently available Alternative Track, exemption from corporate tax may be available on undistributed income for a period of two to ten years, depending on the geographic location of the Benefited Enterprise within Israel, and a reduced corporate tax rate of 10% to 25% for the remainder of the benefits period, depending on the level of foreign investment in each year. If the company pays a dividend out of income derived from the Benefited Enterprise during the tax exemption period and such dividend is actually paid at any time up to 12 years thereafter, except with respect to an FIC, in which case the 12-year limit does not apply, such income will be subject to deferred corporate tax with respect to the amount distributed (grossed up to reflect such pre-tax income that it would have had to earn in order to distribute the dividend) at the corporate tax rate which would have otherwise been. The company is required to withhold tax on such distribution at a rate of 15% (or a lower rate under a tax treaty, if applicable, subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate); or

(ii) A special track which enables companies owning facilities in certain geographical locations in Israel to pay corporate tax at a flat rate of 11.5% on income the Benefited Enterprise (the “Ireland Track”). The benefit period under the Ireland Track is for a period of ten years. Upon payment of dividends, the company is required to withhold tax on such dividend at a rate of 15% for Israeli residents and at a rate of 4% for foreign residents.

The benefits available to a Benefited Enterprise are subject to the continued fulfillment of conditions stipulated in the Investment Law and its regulations. If a company does not meet these conditions, it would be required to refund the amount of tax benefits, as adjusted by the Israeli consumer price index and interest, or other monetary penalty.

As a result of the 2005 Amendment, tax-exempt income generated under the provisions of the Investments Law, as amended, will subject us to taxes upon distribution or liquidation and we may be required to record deferred tax liability with respect to such tax-exempt income.

We had three Approved Enterprise plans under the Investments Law, which entitled us to certain tax benefits. In addition, in 2011, based on Company investments in property and equipment in the years 2008 and 2009, the Company submitted the applicable form as a Benefited Enterprise in accordance with the 2005 Amendment to the Investments Law. The year of election was 2010.

Tax benefits under the 2011 Amendment

On December 29, 2010, the Israeli Parliament approved the 2011 amendment to the Investments Law (the “2011 Amendment”). The 2011 Amendment significantly revised the tax incentive regime in Israel, commencing on January, 1 2011.

The 2011 Amendment introduced a new status of “Preferred Enterprise”, replacing the existed status of “Benefited Enterprise” and introduced new benefits for income generated by a “Preferred Company” through its Preferred Enterprise. A Preferred Company is an industrial company that meets certain conditions (including a minimum threshold of 25% export). However, under the 2011 Amendment the requirement for a minimum investment in productive assets in order to be eligible for the benefits granted under the Investments Law as with respect to “Benefited Enterprise” was cancelled.

A Preferred Company is entitled to a reduced flat tax rate with respect to the income attributed to the Preferred Enterprise, at the following rates:

Tax Year	Development Region "A"	Other Areas within Israel
2011-2012	10%	15%
2013	7%	12.5%
2014-2016	9%	16%
2017 onwards	7.5%	16%

* In December 2016, the Israeli Parliament (the Knesset) approved an amendment to the Investments Law pursuant to which the tax rate applicable to Preferred Enterprises in Development Region "A" would be reduced to 7.5% as of January 1, 2017.

The classification of income generated from the provision of usage rights in know-how or software that were developed in the Preferred Enterprise, as well as royalty income received with respect to such usage, as Preferred Enterprise income is subject to the issuance if a pre-ruling from the ITA stipulates that such income is associated with the productive activity of the Preferred Enterprise in Israel.

In addition, the 2011 Amendment introduced a new status of "Special Preferred Company" which is an Industrial company meeting, in addition to the conditions prescribed for "Preferred Company" certain additional conditions (including that the total Preferred Enterprise income is at least NIS 1.5 billion in 2016 and NIS 1 billion in 2017 and thereafter). The tax rate applicable for a period of 10 years to income generated by such an enterprise will be reduced to 5%, if located in Development Region "A", or to 8%, if located in other area within the State of Israel.

Dividends distributed from income which is attributed to a "Preferred Enterprise" or a "Special Preferred Enterprise" will be subject to withholding tax at source at the following rates: (i) Israeli resident corporations – 0% (although, if such dividends are subsequently distributed to individuals or a non-Israeli company, withholding tax at a rate of 20% or such lower rate as may be provided in an applicable tax treaty will apply), (ii) Israeli resident individuals – 20% (iii) non-Israeli residents - 20% (or a lower rate under a tax treaty, if applicable, subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate). In 2017 to 2019, dividends paid out of preferred income attributed to a Special Preferred Enterprise, directly to a foreign parent company, are subject to withholding tax at source at the rate of 5% (temporary provisions).The 2011 Amendment also revised the Grant Track to apply only to the approved programs located in Development Region "A" and shall provide not only cash grants (as prior to the 2011 Amendment) but also the granting of loans. The rates for grants and loans shall not be fixed but up to 20% of the amount of the approved investment (may be increased with additional 4%). In addition, a company owning a Preferred Enterprise under the Grant Track may be entitled also to the tax benefits which are prescribed for a Preferred Enterprise.

The provisions of the 2011 Amendment do not apply to existing "Benefited Enterprises" or "Approved Enterprises", which will continue to be entitled to the tax benefits under the Investments Law, as has been in effect prior to the 2011 Amendment, unless the company owning such enterprises had made an election to apply the provisions of the 2011 Amendment (such election cannot be later rescinded), which is to be filed with the ITA, not later than the date prescribed for the filing of the company's annual tax return for the respective year. A company owning a Benefited Enterprise or Approved Enterprise which made such election by June 30, 2015, will be entitled to distribute income generated by the Approved/Benefited Enterprise to its Israeli corporate shareholders tax free.

Until the end of 2015, we did not utilize tax benefits related to Preferred Enterprises. In 2016, we started utilizing such benefits, with a related tax rate which could range 12% to 16%.

The New Technological Enterprise Incentives Regime—the 2017 Amendment

The 2017 Amendment was enacted as part of the Economic Efficiency Law that was published on December 29, 2016, and became effective on January 1, 2017. The 2017 Amendment provides new tax benefits for two types of "Technology Enterprises", as described below, and is in addition to the other existing tax beneficial programs under the Investment Law.

The new incentives regime will apply to "Preferred Technological Enterprises" that meet certain conditions, including: (1) the R&D expenses in the three years preceding the tax year were at least 7% of the company's turnover or exceeded NIS 75 million (approximately $21 million); and (2) one of the following: (a) at least 20% of the workforce (or at least 200 employees) are employed in R&D; (b) a venture capital investment approximately equivalent to at least $2 million was previously made in the company and the company did not change its line of business; (c) growth in sales by an average of 25% over the three years preceding the tax year, provided that the turnover was at least NIS 10 million (approximately $2.8 million), in the tax year and in the preceding three years; or (d) growth in workforce by an average of 25% over the three years preceding the tax year, provided that the company employed at least 50 employees, in the tax year and in the preceding three years.

A "Special Preferred Technological Enterprise" is an enterprise that meets conditions 1 and 2 above, and in addition has total annual consolidated revenues above NIS 10 billion (approximately $2.8 billion).

Preferred Technological Enterprises will be subject to a reduced corporate tax rate of 12% on their income that qualifies as "Preferred Technology Income", as defined in the Investment Law. The tax rate is further reduced to 7.5% for a Preferred Technology Enterprise located in Development Region "A". These corporate tax rates shall apply only with respect to the portion of intellectual property developed in Israel. In addition, a Preferred Technology Company will enjoy a reduced corporate tax rate of 12% on capital gain derived from the sale of certain "Benefited Intangible Assets" (as defined in the Investment Law) to a related foreign company if the Benefited Intangible Assets were acquired from a foreign company on or after January 1, 2017 for at least NIS 200 million (approximately $56 million), and the sale receives prior approval from the IIA. Special Preferred Technological Enterprises will be subject to 6% on "Preferred Technology Income" regardless of the company's geographic location within Israel. In addition, a Special Preferred Technology Enterprise will enjoy a reduced corporate tax rate of 6% on capital gain derived from the sale of certain "Benefited Intangible Assets" to a related foreign company if the Benefited Intangible Assets were either developed by an Israeli company or acquired from a foreign company on or after January 1, 2017, and the sale received prior approval from IIA. A Special Preferred Technology Enterprise that acquires Benefited Intangible Assets from a foreign company for more than NIS 500 million (approximately $142 million), will be eligible for these benefits for at least ten years, subject to certain approvals as specified in the Investment Law.

Dividends distributed by a Preferred Technology Enterprise or a Special Preferred Technology Enterprise, paid out of Preferred Technology Income, are generally subject to withholding tax at source at the rate of 20% or such lower rate as may be provided in an applicable tax treaty (subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate). However, if such dividends are paid to an Israeli company, no tax is required to be withheld. If such dividends are, distributed to a parent foreign company holding at least 90% of the shares of the distributing company and other conditions are met, the withholding tax rate will be 4% (or a lower rate under a tax treaty, if applicable, subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate).

We reviewed the criteria for the tax rate of a "Special Preferred Technological Enterprise" and concluded that we are entitled to the reduced tax rate under the "Preferred Technological Enterprises" tax incentive regime starting 2017. We have notified the ITA that we elected applying this status starting 2017. We cannot asses at this stage the ITA position.

Law for the Encouragement of Industry (Taxes), 5729-1969

The Law for the Encouragement of Industry (Taxes), 1969, or the Industry Encouragement Law defines "Industrial Company" as an Israeli resident company which was incorporated in Israel, of which 90% or more of its income in any tax year (exclusive of income from certain government loans) is generated from an "Industrial Enterprise" that it owns and located in Israel. An "Industrial Enterprise" is defined as an enterprise whose principal activity in any given tax year is industrial manufacturing.

An Industrial Company is entitled to certain tax benefits, including: (i) a deduction of the cost of purchases of patents, know-how and certain other intangible property rights (other than goodwill)) that were purchased in good faith and are used for the development or promotion of the Industrial Enterprise over a period of eight years, beginning from the year in which such rights were first used, (ii) the right to elect to file consolidated tax returns with additional Israeli Industrial Companies controlled by it, and (iii) the right to deduct expenses related to public offerings in equal amounts over a period of three years beginning from the year of the offering.

Eligibility for benefits under the Encouragement of Industry Law is not contingent upon the approval of any governmental authority.

We believe that we qualify as an "Industrial Company" within the meaning of the Industry Encouragement Law. There is no assurance that we qualify or will continue to qualify as an Industrial Company or that the benefits described above will be available to us in the future.

Taxation of the Company Shareholders

Capital Gains

Capital gain tax is imposed on the disposition of capital assets by an Israeli resident, and on the disposition of such assets by a non-Israel resident if those assets are either (i) located in Israel; (ii) are shares or a right to a share in an Israeli resident corporation, or (iii) represent, directly or indirectly, rights to assets located in Israel, unless a tax treaty between Israel and the seller's country of residence provides otherwise. The Ordinance distinguishes between "Real Gain" and the "Inflationary Surplus". Real Gain is the excess of the total capital gain over Inflationary Surplus computed generally on the basis of the increase in the Israeli Consumer Price Index (CPI) or, in certain circumstances, according to the change in the foreign currency exchange rate, between the date of purchase and the date of disposition.

Generally, the capital gain accrued by individuals on the sale of our ordinary shares will be taxed at the rate of 25%. However, if the individual shareholder is a "Controlling Shareholder" (i.e., a person who holds, directly or indirectly, alone or together with such person's relative or another person who collaborates with such person on a permanent basis, 10% or more of one of the Israeli resident company's means of control) at the time of sale or at any time during the preceding twelve (12) months period, such gain will be taxed at the rate of 30%.

The Real Gain derived by corporations will be generally subject to the ordinary corporate tax (2% in 2018 and thereafter).

Individual and corporate shareholder dealing in securities in Israel are taxed at the tax rates applicable to business income – 23% for corporations in 2018 in 2018 and thereafter and a marginal tax rate of up to 47% in 2018 for individuals, unless the benefiting provisions of an applicable treaty applies.

Notwithstanding the foregoing, capital gain derived from the sale of our ordinary shares by a non-Israeli shareholder may be exempt under the Ordinance from Israeli taxation provided that the following cumulative conditions are met: (i) the shares were purchased upon or after the registration of the securities on the stock exchange (this condition will not apply to shares purchased on or after January 1, 2009), (ii) the seller does not have a permanent establishment in Israel to which the derived capital gain is attributed. ; and (iii) with respect our ordinary shares listed on a recognized stock exchange outside of Israel, so long as neither the shareholder nor the particular capital gain is otherwise subject to the Israeli Income Tax Law (Inflationary Adjustments) 5745-1985. Non-Israeli corporations will not be entitled to the foregoing exemptions if (i) an Israeli resident has a controlling interest, directly or indirectly, alone or together with another (i.e., together with a relative, or together with someone who is not a relative but with whom, according to an agreement, there is regular cooperation in material matters of the company, directly or indirectly), or together with another Israeli resident, exceed 25% in one or more of the means of control in such non-Israeli resident corporation or (ii) Israeli residents are the beneficiaries of, or are entitled to, 25% or more of the revenues or profits of such non-Israeli resident corporation, whether directly or indirectly.

In addition, the sale of shares may be exempt from Israeli capital gain tax under the provisions of an applicable tax treaty. For example, the U.S.-Israel Double Tax Treaty exempts U.S. resident from Israeli capital gain tax in connection with such sale, exchange or disposition provided, among others (i) the U.S. resident owned, directly or indirectly, less than 10% of an Israeli resident company's voting power at any time within the 12 month period preceding such sale; (ii) the seller, being an individual, is present in Israel for a period or periods of less than 183 days in the aggregate at the taxable year; and (iii) the capital gain from the sale was not derived through a permanent establishment of the U.S. resident which is maintained in Israel the capital gain arising from such sale, exchange or disposition is not attributed to real estate located in Israel; (v) the capital gains arising from such sale, exchange or disposition is not attributed to royalties; and (vi) the shareholder is a U.S. resident (for purposes of the U.S.-Israel Double Tax Treaty) is holding the shares as a capital asset.

Either the purchaser, the stockbrokers or financial institution, through which payment to the seller is made, are obliged, subject to the above-mentioned exemptions, to withhold Israeli tax at source from such payment. Shareholders may be required to demonstrate that they are exempt from tax on their capital gains in order to avoid withholding at source at the time of sale. Specifically, in transactions involving a sale of all of the shares of an Israeli resident company, in the form of a merger or otherwise, the ITA may require from shareholders who are not liable for Israeli tax to sign declarations in forms specified by this authority or obtain a specific exemption from the ITA to confirm their status as non-Israeli resident.

At the sale of securities traded on a stock exchange a detailed return, including a computation of the tax due, must be filed and an advanced payment must be paid on January 31 and July 31 of every tax year in respect of sales of securities made within the previous six months. However, if all tax due was withheld at source according to applicable provisions of the Ordinance and regulations promulgated thereunder the aforementioned return need not be filed and no advance payment must be paid. Capital gain is also reportable on the annual income tax return.

Dividends

A distribution of dividends from income, which is not attributed to an Approved Enterprise/Benefited Enterprise/Preferred Enterprise to an Israeli resident individual, will generally be subject to income tax at a rate of 25%. However, a 30% tax rate will apply if the dividend recipient is a “Controlling Shareholder” (as defined above) at the time of distribution or at any time during the preceding 12 months period. If the recipient of the dividend is an Israeli resident corporation, such dividend will be exempt from income tax provided the income from which such dividend is distributed was derived or accrued within Israel.

Distribution of dividends from income attributed to a Preferred Enterprise is generally subject to a tax at a rate of 20%. However, if such dividends are distributed to an Israeli company, no tax is imposed (although, if such dividends are subsequently distributed to individuals or a non-Israeli company, withholding tax at a rate of 20% or such lower rate as may be provided in an applicable tax treaty will apply (subject to the receipt in advance of a valid certificate from the Israel Tax Authority allowing for an exemption)). Dividends distributed from income attributed to an Approved Enterprise and/or a Benefited Enterprise are generally subject to a tax rate of 15%. Those rates may be further reduced under the provisions of any applicable double tax treaty (subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate).

The Ordinance generally provides that a non-Israeli resident (either individual or corporation) is subject to an Israeli income tax on the receipt of dividends at the rate of 25% (30% if the dividends recipient is a “Controlling Shareholder” (as defined above), at the time of distribution or at any time during the preceding 12 months period); those rates are subject to a reduced tax rate under the provisions of an applicable double tax treaty (subject to the receipt in advance of a valid certificate from the ITA allowing for a reduced tax rate). For example, under the U.S.-Israel Double Tax Treaty the following rates will apply in respect of dividends distributed by an Israeli resident company to a U.S. resident: (i) if the U.S. resident is a corporation which holds during that portion of the taxable year which precedes the date of payment of the dividend and during the whole of its prior taxable year (if any), at least 10% of the outstanding shares of the voting stock of the Israeli resident paying corporation and not more than 25% of the gross income of the Israeli resident paying corporation for such prior taxable year (if any) consists of certain type of interest or dividends – the maximum tax rate is 12.5% on dividends, not generated by an Approved Enterprise or Benefited Enterprise, (ii) if both the conditions mentioned in section (i) above are met and the dividend is paid from an Israeli resident company’s income which was entitled to a reduced tax rate applicable to an Approved Enterprise or Benefited Enterprise – the tax rate is 15%, and (iii) in all other cases, the tax rate is 25%, or the domestic rate (if such is lower). The aforementioned rates under the U.S.-Israel Double Tax Treaty will not apply if the dividend income was derived through a permanent establishment of the U.S. resident maintained in Israel.

If the dividend is attributable partly to income derived from an Approved Enterprise, a Benefited Enterprise or a Preferred Enterprise, and partly to other sources of income, the withholding rate will be a blended rate reflecting the relative portions of the two types of income.

Payors of dividends on our shares, including the Israeli stockbroker effectuating the transaction, or the financial institution through which the securities are held, are generally required, subject to any of the foregoing exemption, reduced tax rates and the demonstration of a shareholder of his, her or its foreign residency, to withhold taxes upon the distribution of dividends at a rate of 25%, provided that the shares are registered with a Nominee Company (for corporations and individuals).

Excess Tax

Individuals who are subject to tax in Israel are also subject to an additional tax at a rate of 3% on annual income exceeding NIS 641,880 for 2018 and thereafter, which amount is linked to the Israeli Consumer Price Index)), including, but not limited to income derived from dividends, interest and capital gains.

Foreign Exchange Regulations

Non-residents of Israel who hold our ordinary shares are able to receive any dividends, and any amounts payable upon the dissolution, liquidation and winding up of our affairs, repayable in non-Israeli currency at the rate of exchange prevailing at the time of conversion. However, Israeli income tax is generally required to have been paid or withheld on these amounts. In addition, the statutory framework for the potential imposition of currency exchange control has not been eliminated, and may be restored at any time by administrative action.

U.S. Taxation

The following discussion describes certain material United States ("U.S.") federal income tax consequences generally applicable to U.S. holders (as defined below) of the purchase, ownership and disposition of our ordinary shares. This summary addresses only holders who acquire and hold ordinary shares as "capital assets" for U.S. federal income tax purposes (generally, assets held for investment purposes).

For purposes of this discussion, a "U.S. holder" is a beneficial owner of ordinary shares who is:

- An individual citizen or resident of the U.S. (as determined under U.S. federal income tax rules);
- a corporation (or another entity taxable as a corporation for U.S. federal income tax purposes) created or organized in or under the laws of the U.S., any state thereof, or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income taxation regardless of its source; or
- a trust, if (a) a U.S. court is able to exercise primary supervision over its administration and one or more U.S. persons have the authority to control all of its substantial decisions; or (b) the trust has in effect a valid election in effect under applicable Treasury Regulations (as defined below) to be treated as a United States person.

This summary is for general information purposes only and does not purport to be a comprehensive description of all of the U.S. federal income tax considerations that may be relevant to a decision to purchase, hold or dispose of the Company's ordinary shares. In addition, the possible application of U.S. federal estate or gift taxes or any aspect of state, local or non-U.S. tax laws is not considered. This discussion is based on current provisions of the Internal Revenue Code of 1986, as amended (the "Code"), Treasury Regulations promulgated under the Code by the U.S. Treasury Department (including proposed and temporary regulations) (the "Treasury Regulations"), rulings, current administrative interpretations and official pronouncements by the Internal Revenue Service (the "IRS"), and judicial decisions, all as currently in effect and all of which are subject to differing interpretations or to change, with a retroactive effect. Such changes could materially and adversely affect the tax consequences described below. No assurance can be given that the IRS would not assert, or that a court would not sustain, a position contrary to any of the tax consequences described below.

This discussion does not address all aspects of U.S. federal income taxation that may be relevant to any particular U.S. holder based on the holder's particular circumstances, including, but not limited to:

- persons who own, directly, indirectly or constructively, 10% or more (by voting power or value) of our outstanding voting shares;

- persons who hold the ordinary shares as part of a hedging, straddle or conversion transaction;

- persons whose functional currency is not the U.S. dollar;

- persons who acquire their ordinary shares in a compensatory transaction;

- broker-dealers;

- insurance companies;

- regulated investment companies;

- real estate investment companies;

- qualified retirement plans, individual retirement accounts and other tax-deferred accounts;

- traders who elect to mark-to-market their securities;

- tax-exempt organizations;

- banks or other financial institutions;

- persons subject to special tax accounting rules as a result of any item of gross income with respect to ordinary shares being taken into account in an applicable financial statement;

- U.S. expatriates and certain former citizens and long-term residents of the United States; and

- persons subject to the alternative minimum tax.

The tax treatment of a partner in a partnership (or other entity or arrangement classified as a partnership for U.S. federal income tax purposes) may depend on both the partnership's and the partner's status and the activities of the partnership. Partnerships (or other entities or arrangements classified as a partnership for U.S. federal income tax purposes) that are beneficial owners of ordinary shares, and their partners and other owners, should consult their own tax advisers regarding the tax consequences of the acquisition, ownership and disposition of ordinary shares.

THIS SUMMARY OF MATERIAL UNITED STATES FEDERAL INCOME TAX CONSIDERATIONS IS FOR GENERAL INFORMATION ONLY AND IS NOT TAX ADVICE. EACH HOLDER SHOULD CONSULT ITS TAX ADVISOR WITH RESPECT TO THE PARTICULAR TAX CONSEQUENCES TO IT OF AN INVESTMENT IN THE ORDINARY SHARES, INCLUDING THE EFFECTS OF APPLICABLE UNITED STATES FEDERAL INCOME TAX LAWS AS WELL AS ANY TAX CONSEQUENCES ARISING UNDER THE UNITED STATES FEDERAL ESTATE OR GIFT TAX RULES OR UNDER THE LAWS OF ANY FOREIGN, STATE OR LOCAL JURISDICTION OR UNDER ANY APPLICABLE TAX TREATY.

Distributions on the Ordinary Shares

We currently do not intend to distribute dividends for at least the next several years. However, if we make any distributions of cash or other property to a U.S. holder of our ordinary shares, the amount of the distribution for U.S. federal income tax purposes will equal the amount of cash and the fair market value of any property distributed and will also include the amount of Israeli taxes withheld, if any, as described above under "[Israel Taxation] — Dividends" above. In general (and subject to the PFIC rules discussed below), any distribution paid by us on the ordinary shares to a U.S. holder will be treated as dividend income to the extent the distribution does not exceed our current and/or accumulated earnings and profits, as determined under U.S. federal income tax principles. The amount of any distribution which exceeds these earnings and profits will be treated first as a non-taxable return of capital, reducing the U.S. holder's tax basis in its ordinary shares to the extent thereof, and then as capital gain income (long-term capital gain if the U.S. holder's holding period exceeds one year), from the deemed disposition of the ordinary shares (subject to the PFIC rules discussed below). Corporate holders generally will not be allowed a deduction for dividends received on the ordinary shares.

The amount of any dividend paid in NIS (including amounts withheld to pay Israeli withholding taxes) will equal the U.S. dollar value of the NIS calculated by reference to the exchange rate in effect on the date the dividend is received by the U.S. holder, regardless of whether the NIS are converted into U.S. dollars. A U.S. holder will have a tax basis in the NIS equal to their U.S. dollar value on the date of receipt. If the NIS received are converted into U.S. dollars on the date of receipt, the U.S. holder should generally not be required to recognize foreign currency gain or loss in respect of the distribution. If the NIS received are not converted into U.S. dollars on the date of receipt, a U.S. holder may recognize foreign currency gain or loss on a subsequent conversion or other disposition of the NIS. Such gain or loss will be treated as U.S. source ordinary income or loss.

Dividends paid by us generally will be foreign source, "passive income" for U.S. foreign tax credit purposes. U.S. holders may elect to claim as a foreign tax credit against their U.S. federal income tax liability the Israeli income tax withheld from dividends received on the ordinary shares. The Code provides limitations on the amount of foreign tax credits that a U.S. holder may claim. U.S. holders that do not elect to claim a foreign tax credit may instead claim a deduction for Israeli income tax withheld, but only for a year in which these U.S. holders elect to do so for all foreign income taxes. The rules relating to foreign tax credits are complex (and may also be impacted by the tax treaty between the United States and Israel), and you should consult your tax advisor to determine whether you would be entitled to this credit.

Under current law, certain distributions treated as dividends that are received by an individual U.S. holder from a "qualified foreign corporation" generally qualify for a 20% reduced maximum tax rate so long as certain holding period and other requirements are met. A non-U.S. corporation (other than a corporation that is treated as a PFIC with respect to the U.S. holder for the taxable year in which the dividend is paid or the preceding taxable year) generally will be considered to be a qualified foreign corporation (i) if it is eligible for the benefits of a comprehensive tax treaty with the United States which the Secretary of Treasury of the United States determines is satisfactory for purposes of this provision and which includes an exchange of information program, or (ii) with respect to any dividend it pays on stock which is readily tradable on an established securities market in the United States. Dividends paid by us in a taxable year in which we are not a PFIC and with respect to which we were not a PFIC in the preceding taxable year with respect to the U.S. holder are expected to be eligible for the 20% reduced maximum tax rate, although we can offer no assurances in this regard. However, any dividend paid by us in a taxable year in which we are a PFIC or were a PFIC in the preceding taxable year with respect to the U.S. holder will be subject to tax at regular ordinary income rates (along with any applicable additional PFIC tax liability, as discussed below).

The additional 3.8% tax on "net investment income" (described below) may apply to dividends received by certain U.S. holders who meet certain modified adjusted gross income thresholds.

Sale, Exchange or Other Taxable Disposition of the Ordinary Shares

Upon the sale, exchange or other taxable disposition of the ordinary shares (subject to the PFIC rules discussed below), a U.S. holder generally will recognize capital gain or loss in an amount equal to the difference between the amount realized and the U.S. holder's tax basis in the ordinary shares. The gain or loss recognized on the sale or exchange of the ordinary shares generally will be long-term capital gain (currently taxable at a reduced rate for non-corporate U.S. holders) or loss if the U.S. holder's holding period of the ordinary shares is more than one year at the time of the disposition. The deductibility of capital losses is subject to limitations.

Gain or loss recognized by a U.S. holder on a sale or exchange of ordinary shares generally will be treated as U.S. source income or loss for U.S. foreign tax credit purposes. Under the tax treaty between the United States and Israel, gain derived from the sale, exchange or other taxable disposition of ordinary shares by a holder who is a resident of the U.S. for purposes of the treaty and who sells the ordinary shares within Israel may be treated as foreign source income for U.S. foreign tax credit purposes.

The additional 3.8% tax on "net investment income" (described below) may apply to certain U.S. holders who meet certain modified adjusted gross income thresholds, including capital gains.

Passive Foreign Investment Companies

In general, a foreign (i.e., non-U.S.) corporation will be a PFIC for any taxable year in which, after applying the relevant look-through rules with respect to the income and assets of its subsidiaries, either (1) 75% or more of its gross income in the taxable year is "passive income," or (2) assets held for the production of, or that produce, passive income comprise 50% or more of the average of its total asset value in the taxable year. For purpose of the income test, passive income generally includes dividends, interest, royalties, rents, annuities and net gains from the disposition of assets, which produce passive income. For purposes of the asset test, assets held for the production of passive income includes assets held for the production of, or that produce dividends, interest, royalties, rents, annuities, and other income that are considered passive income for purposes of the income test. In determining whether we meet the asset test, cash is considered a passive asset and the total value of our assets generally will be treated as equal to the sum of the aggregate fair market value of our outstanding stock plus our liabilities. If we own at least 25% (by value) of the stock of another corporation, we will be treated, for purposes of the PFIC tests, as owning our proportionate share of the other corporation's assets and receiving our proportionate share of the other corporation's income. The income test is conducted at the taxable year-end. The asset test is conducted on a quarterly basis and the quarterly results are then averaged together.

If a corporation is treated as a PFIC for any year during a U.S. holder's holding period and the U.S. holder does not timely elect to treat the corporation as a "qualified electing fund" under Section 1295 of the Code or elect to mark its ordinary shares to market (both elections described below), any gain on the disposition of the shares will be treated as ordinary income, rather than capital gain, and the holder will be required to compute its tax liability on that gain, as well as on dividends and other distributions, as if the income had been earned ratably over each day in the U.S. holder's holding period for the shares. The portion of the gain and distributions allocated to prior taxable years in which a corporation was a PFIC will be ineligible for any preferential tax rate otherwise applicable to any "qualified dividend income" or capital gains, and will be taxed at the highest ordinary income tax rate in effect for each taxable year to which this portion is allocated. An interest charge will be imposed on the amount of the tax allocated to these taxable years. A U.S. holder may elect to treat a corporation as a qualified electing fund only if the corporation complies with requirements imposed by the IRS to enable the shareholder and the IRS to determine the corporation's ordinary income and net capital gain. Additionally, if a corporation is a PFIC, a U.S. holder who acquires shares in the corporation from a decedent will be denied the normally available step-up in tax basis to fair market value for the shares at the date of death of the decedent and instead will have a tax basis equal to the decedent's tax basis if lower than fair market value. These adverse tax consequences associated with PFIC status could result in a material increase in the amount of tax that a U.S. holder would owe and an imposition of tax earlier than would otherwise be imposed and additional tax form filing requirements. Unless otherwise provided by the IRS, if a corporation is classified as a PFIC, a U.S. person that is a direct or indirect holder generally will be required to file IRS Form 8621, Information Return by a Shareholder of a Passive Foreign Investment Company or Qualified Electing Fund, or any applicable successor form, to report its ownership interest in such entity.

Status of Nova as a PFIC. Under the income test, less than 75% of our gross income was passive income in 2017. For 2018, while we continued to have substantial amounts of cash and short-term deposits and the market value of our ordinary shares continued to be volatile, a determination of the value of our assets by reference to the average market value of our ordinary shares and our liabilities results in a conclusion that the average value of our passive assets did not exceed 50% of the average value of our gross assets in 2017. Nonetheless, there is a risk that we were a PFIC in 2018 or we will be a PFIC in 2019 or subsequent years. For example, taking into account our existing cash balances, if the value of our stock were to decline materially, it is possible that we could become a PFIC in 2019 or a subsequent year. Additionally, due to the complexity of the PFIC provisions and the limited authority available to interpret such provisions, there can be no assurance that our determination regarding our PFIC status could not be successfully challenged by the IRS.

Available Elections. If we become a PFIC for any taxable year, U.S. holders should consider whether or not to elect to treat us as a "qualified electing fund" or to elect to "mark-to-market" their ordinary shares in order to mitigate the adverse tax consequences of PFIC status.

If a U.S. holder makes a qualified electing fund election (a "QEF election") for its ordinary shares that is effective from the first taxable year that the U.S. holder holds our ordinary shares and during which we are a PFIC, the electing U.S. holder will avoid the adverse consequences of our being classified as a PFIC, but will instead be required to include in income a pro rata share of our net capital gain, if any, and other earnings and profits ("ordinary earnings") as long-term capital gains and ordinary income, respectively, on a current basis, in each case whether or not distributed, in the taxable year of the U.S. holder in which or with which our taxable year ends. A subsequent distribution of amounts that were previously included in the gross income of U.S. holders should not be taxable as a dividend to those U.S. holders who made a QEF election. In the event we incur a net loss for a taxable year, such loss will not be available as a deduction to an electing U.S. holder, and may not be carried forward or back in computing our net capital gain or ordinary earnings in other taxable years. The tax basis of the shares of an electing U.S. holder generally will be increased by amounts that are included in income, and decreased by amounts distributed but not taxed as dividends, under the QEF rules described above. In order to make (or maintain) a QEF election, the U.S. holder must annually complete and file IRS Form 8621, Information Return by a Shareholder of a Passive Foreign Investment Company or Qualified Electing Fund, or any applicable successor form. However, we do not expect that we will prepare or provide to U.S. Holders a "PFIC annual information statement," which would enable a U.S. Holder to make one type of a QEF election.

Alternatively, if a U.S. holder elects to "mark-to-market" its ordinary shares, the U.S. holder generally will include in its income any excess of the fair market value of our ordinary shares at the close of each taxable year over the holder's adjusted basis in such ordinary shares. A U.S. holder generally will be allowed an ordinary deduction for the excess, if any, of the adjusted tax basis of the ordinary shares over the fair market value of the ordinary shares as of the close of the taxable year, or the amount of any net mark-to-market gains recognized for prior taxable years, whichever is less. A U.S. holder's adjusted tax basis in the ordinary shares generally will be adjusted to reflect the amounts included or deducted under the mark-to-market election. Additionally, any gain on the actual sale or other disposition of the ordinary shares generally will be treated as ordinary income. Ordinary loss treatment also will apply to any loss recognized on the actual sale or other disposition of ordinary shares to the extent that the amount of such loss does not exceed the net mark-to-market gains previously included with respect to such ordinary shares. If a U.S. holder makes a valid mark-to-market election with respect to our ordinary shares for the first taxable year of the U.S. holder in which the U.S. holder holds (or is deemed to hold) our ordinary shares and for which we are determined to be a PFIC, such holder generally will not be subject to the PFIC rules described above in respect of its ordinary shares. A mark-to-market election applies to the tax year for which the election is made and to each subsequent year, unless our ordinary shares cease to be marketable, as specifically defined, or the IRS consents to revocation of the election. No view is expressed regarding whether our ordinary shares are marketable for these purposes or whether the election will be available.

If a U.S. holder makes either the QEF election or the mark-to-market election, distributions and gain will not be recognized ratably over the U.S. holder's holding period or be subject to an interest charge as described above. Further, the denial of basis step-up at death described above will not apply. If a U.S. holder makes the QEF election, gain on the sale of the ordinary shares will be characterized as capital gain. However, U.S. holders making one of these two elections may experience current income recognition, even if we do not distribute any cash. The elections must be made with the U.S. holder's federal income tax return for the year of election, filed by the due date of the return (as it may be extended) or, under certain circumstances provided in applicable Treasury Regulations, subsequent to that date.

The foregoing discussion relating to the QEF election and mark-to-market elections assumes that a U.S. holder makes the applicable election with respect to the first year in which Nova qualifies as a PFIC. If the election is not made for the first year in which Nova qualifies as a PFIC, the procedures for making the election and the consequences of election will be different.

SPECIFIC RULES AND REQUIREMENTS APPLY TO BOTH THE QEF ELECTION AND THE MARK-TO-MARKET ELECTION, AND YOU ARE URGED TO CONSULT YOUR TAX ADVISOR CONCERNING OUR PFIC STATUS AND THE VARIOUS ELECTIONS YOU CAN MAKE.

Medicare Tax on Net Investment Income

A U.S. holder that is an individual or estate, or a trust that does not fall into a special class of trusts that is exempt from such tax, will be subject to a 3.8% tax on the lesser of (1) the U.S. holder's "net investment income" for the relevant taxable year and (2) the excess of the U.S. holder's modified adjusted gross income for the taxable year over a certain threshold. A U.S. holder's "net investment income" generally may include its dividend income and its net gains from the disposition of shares, unless such dividends or net gains are derived in the ordinary course of the conduct of a trade or business (other than a trade or business that consists of certain passive or trading activities). If you are a U.S. holder that is an individual, estate or trust, you are urged to consult your tax advisors regarding the applicability of the Medicare tax to your income and gains in respect of your investment in the shares and the interaction of these rules with the rules applicable to income included as a result of the QEF election.

United States Information Reporting and Backup Withholding

In general, U.S. holders may be subject to certain information reporting requirements under the Code relating to their purchase and/or ownership of stock of a foreign corporation such as the Company. Failure to comply with these information reporting requirements may result in substantial penalties.

Specifically, certain U.S. Holders holding specified foreign financial assets, including our ordinary shares, with an aggregate value in excess of the applicable U.S. dollar threshold are subject to certain exceptions, required to report information relating to our Ordinary Shares by attaching a complete IRS Form 8938, Statement of Specified Foreign Financial Assets, to their tax returns, for each year in which they hold our ordinary shares. U.S. Holders are urged to consult their own tax advisors regarding information reporting requirements relating to the ownership of our Ordinary Shares.

In addition, and as discussed in the section of this annual report entitled “U.S. Taxation – Passive Foreign Investment Companies”, if a corporation is classified as a PFIC, a U.S. person that is a direct or indirect holder generally will be required to file an informational return annually on IRS Form 8621, Information Return by a Shareholder of a Passive Foreign Investment Company or Qualified Electing Fund, or any applicable successor form, to report its ownership interest in such entity, unless otherwise provided by the IRS.

Dividend payments and proceeds from the sale or disposal of ordinary shares may be subject to information reporting to the IRS and possible U.S. federal backup withholding. Certain holders (including, among others, corporations) generally are not subject to information reporting and backup withholding. A U.S. holder generally will be subject to backup withholding if such holder is not otherwise exempt and such holder:

- fails to furnish its taxpayer identification number, or TIN, which, for an individual, is ordinarily his or her social security number;

- furnishes an incorrect TIN;

- is notified by the IRS that it is subject to backup withholding because it has previously failed to properly report payments of interest or dividends; or

- fails to certify, under penalties of perjury, that it has furnished a correct TIN and that the IRS has not notified the U.S. holder that it is subject to backup withholding.

Any U.S. holder who is required to establish exempt status generally must file IRS Form W-9 (“Request for Taxpayer Identification Number and Certification”).

Backup withholding is not an additional tax and may be claimed as a refund or a credit against the U.S. federal income tax liability of a U.S. Holder, provided that the required information is timely furnished to the IRS.

10.F Dividends and Paying Agents

Not applicable.

10.G Statements by Experts

Not applicable.

10.H Documents on Display

As a foreign private issuer, are exempt from the rules under the Exchange Act related to the furnishing and content of proxy statements, and our officers, directors and principal shareholders are exempt from the reporting and short-swing profit recovery provisions contained in Section 16 of the Exchange Act. Furthermore, as a foreign private issuer, we are also not subject to the requirements of Regulation FD (Fair Disclosure) promulgated under the Exchange Act. In addition, we are not be required under the Exchange Act to file annual or other reports and consolidated financial statements with the SEC as frequently or as promptly as U.S. companies whose securities are registered under the Exchange Act. Instead, we must file with the SEC, within 120 days after the end of each fiscal year, or such other applicable time as required by the SEC, an annual report on Form 20-F containing consolidated financial statements audited by an independent registered public accounting firm. We also intend to furnish certain other material information to the SEC under cover of Form 6-K.

We maintain a corporate website at www.novameasuring.com. Information contained on, or that can be accessed through, our website does not constitute a part of this annual report on Form 20-F. We have included our website address in this annual report on Form 20-F solely as an inactive textual reference.

10.I Subsidiary Information

Not applicable.

Item 11. Quantitative and Qualitative Disclosures About Market Risk

Market Risk

Market risk represents the risk of loss that may impact the consolidated financial position, results of operations or cash flows of the Company. The Company is exposed to market risk in the area of foreign exchange rates, as described below.

The Company does not utilize financial instruments for trading purposes and holds no derivative financial instruments that could expose it to significant market risk.

Impact of Currency Fluctuation

Because our results are reported in Dollars, changes in the rate of exchange between the Dollar and local currencies in those countries in which we operate (primarily the NIS, the Euro and the Japanese Yen) will affect the results of our operations. The dollar cost of our operations in countries other than the U.S., is negatively influenced by revaluation of the U.S. dollar against other currencies. During 2018, the value of the U.S. dollar revaluated against the NIS by 8.1%, devaluated against the Yen by approximately 2.0% and revaluated against the Euro by approximately 4.6%. During the first six months of 2018 the value of the U.S. dollar revaluated against the NIS by approximately 5.3%, devaluated against the Yen by approximately 2.1% and revaluated against the Euro by 3.6%. During the last six months of 2018 the value of the U.S. dollar revaluated against the NIS by approximately 2.7%, devaluated against the Yen by approximately 0.1% and revaluated against the Euro by approximately 1.0%.

As of December 31, 2018, the majority of our net monetary assets were denominated in dollars and the remainder was denominated mainly in NIS. Net monetary assets that are not denominated in dollars or dollar-linked NIS were affected by the currency fluctuations in 2018, and are expected to continue to be affected by such currency fluctuations in 2019. Starting January 1st, 2019, under the implementation of ASC 842 for lease accounting, we expect to record a NIS and Israel CPI linked liability, in the amount of approximately $16 million This liability is also expected to be affected by such currency fluctuations across the term of the lease.

In 2017, we entered into currency-forward transactions and currency-put options (NIS/dollar) of approximately $58 million with settlement dates through 2017-2018, designed to reduce cash-flow exposure to the impact of exchange-rate fluctuations on firm commitments of approximately $58 million. In accordance with ASC 815-10, we recorded in 2017 an increase of approximately $0.16 million in fair market value in "Other Comprehensive Income". Short-term exposures to changing foreign exchange rates are primarily due to operating cash flows denominated in foreign currencies and transactions denominated in non-functional currencies. Our most significant foreign currency exposures are related to our operations in Israel. We have used foreign exchange forward contracts to partially cover known and anticipated exposures. We estimate that an instantaneous 10% depreciation in NIS from its level against the dollar as of December 31, 2017, with all other variables held constant, would increase the fair value of our net assets denominated in foreign currency, held at December 31, 2017, by approximately $0.11 million.

In 2018, we entered into currency-forward transactions and currency-put options (NIS/dollar) of approximately $77 million with settlement dates through 2018-2019, designed to reduce cash-flow exposure to the impact of exchange-rate fluctuations on firm commitments of approximately $77 million. In accordance with ASC 815-10, we recorded in 2018 a decrease of approximately $0.3 million in fair market value in "Other Comprehensive Income". Short-term exposures to changing foreign exchange rates are primarily due to operating cash flows denominated in foreign currencies and transactions denominated in non-functional currencies. Our most significant foreign currency exposures are related to our operations in Israel. We have used foreign exchange forward contracts to partially cover known and anticipated exposures. We estimate that an instantaneous 10% depreciation in NIS from its level against the dollar as of December 31, 2018, with all other variables held constant, would increase the fair value of our net assets denominated in foreign currency, held at December 31, 2018, by approximately $0.25 million.

Item 12. Description of Securities Other than Equity Securities

Not applicable.

PART II

Item 13. Defaults, Dividend Arrearages and Delinquencies

None.

Item 14. Material Modification to the Rights of Security Holders and Use of Proceeds

Not applicable.

Item 15. Controls and Procedures

(a) Our management, including our chief executive officer and chief financial officer, has evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2018. The term “disclosure controls and procedures”, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures that are designed to ensure that information required to be disclosed by us in the reports that we file or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the rules and forms of the SEC. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to the our management, including our chief executive officer and chief financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. Based on the foregoing, our chief executive officer and chief financial officer have concluded that, as of December 31, 2018, our disclosure controls and procedures were effective.

(b) Our management, under the supervision of our chief executive officer and chief financial officer, is responsible for establishing and maintaining adequate internal control over our financial reporting,. The Company’s internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act, means 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. Internal control over financial reporting includes policies and procedures that:

- pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and asset dispositions;
- provide reasonable assurance that transactions are recorded as necessary to permit the preparation of our financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and
- provide reasonable assurance regarding the prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on our financial statements.

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. In addition, 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.

Our management evaluated the effectiveness of our internal control over financial reporting as of December 31, 2018, based on the criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation, our management concluded that, as of December 31, 2018, the Company’s internal control over financial reporting was effective.

(c) Kost Forer Gabbay & Kasierer, an independent registered accounting firm and a member firm of Ernst & Young, has issued an attestation report on the effectiveness of our internal control over financial reporting, as stated in their report included herein. See “Report of Independent Registered Public Accounting Firm” on page F-3.

(d) There were no changes in our internal controls over financial reporting identified with the evaluation thereof that occurred during the period covered by this annual report that have materially affected, or are reasonable likely to materially affect our internal control over financial reporting.

Item 16A. Audit Committee Financial Expert

Our board of directors has determined that our audit committee includes one audit committee financial expert, as defined by Item 16A of Form 20-F. Our board of directors has determined that Ms. Dafna Gruber is an “audit committee financial expert” as defined by the SEC rules as well as an independent director as such term is defined by Rule 5605(a)(2) of the Nasdaq Stock Market and has the requisite financial experience as defined by the Nasdaq rules.

Item 16B. Code of Ethics

The Company has adopted a written code of conduct that applies to all Company employees, including the Company’s directors, principal executive officer, principal financial officer and principal accounting officer.

You may review our code of conduct on our website: http://www.novameasuring.com, under “Corporate/Corporate Governance”.

Item 16C. Principal Accountant Fees and Services

During the last three fiscal years, Kost Forer Gabbay & Kasierer, an independent registered accounting firm and a member firm of Ernst & Young (“Kost Forer Gabbay & Kasierer”) has acted as our registered public accounting firm and independent auditors. The following table provides information regarding fees paid by us to Kost Forer Gabbay & Kasierer for all services, including audit services, for the years ended December 31, 2017 and 2018:

	2017	2018
Audit Fees	$285,000	$310,000
Tax Fees	10,000	$58,000
Other Fees	2,500	$4,000
Total	$297,500	$372,000

“Audit fees” are fees associated with the annual audit and reviews of the Company’s quarterly consolidated financial results submitted on Form 6-K, consultations on various accounting issues and performance of local statutory audits. The audit fee includes fees associated with the audit of management assessment of internal control over financial reporting, annual tax returns and audit of reports to IIA.

"Tax Fees". The tax fees to Kost Forer Gabbay & Kasierer during the year ended December 31, 2017 included services related to tax assessment. The tax fees during the year ended December 31, 2018 include services related to ad- hoc tax advice.

"Other Fees" include services related to SEC regulation consulting, IIA application support and Europe funding reporting requirements.

Our audit committee has adopted a pre-approval policy for the engagement of our independent accountant to perform certain services. Pursuant to this policy, which is designed to assure that such engagements do not impair the independence of our auditors, all audit, audit related and tax services must be specifically approved by the audit committee and certain other non-audit, non-audit related and non-tax services may be approved without consideration of specific case-by-case provided certain terms and procedures are met. The Company's audit committee approved all of the services provided by Kost Forer Gabbay & Kasierer in fiscal years 2018 and 2017.

Item 16D. Exemptions from the Listing Standards for Audit Committees

The Company has not obtained any exemption from applicable audit committee listing standards.

Item 16E. Purchases of Equity Securities by the Issuer and Affiliates Purchasers

In November 2018, we announced a $25 million repurchase program of our ordinary shares. Through December 31, 2018, we spent an aggregate of $4.8 million to repurchase 200,000 ordinary shares under our share repurchase program. The following table provides information regarding our repurchases of our ordinary shares for each month included in the period covered by this annual report on Form 20-F:

Period	(a) Total Number of Ordinary Shares Purchased	(b) Average Price Paid per Ordinary Share	(c) Total Number of Ordinary Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (in millions)
January-October 2018	N\A	N\A	N\A	N\A
November 2018	100,000	$ 23.51	100,000	$ 22.65
December 2018	100,000	$ 24.50	200,000	$ 20.2

Item 16F. Change In Registrant's Certifying Accountant

See ITEM 16F in our annual report on Form 20-F for the year ended December 31, 2015.

Item 16G. Corporate Governance

There are no significant ways in which the Company's corporate governance practices differ from those followed by domestic companies listed on the Nasdaq Global Select Market. However, on August 1, 2017, our board of directors resolved to adopt the 2017 Share Incentive Plan, in connection of which, we have elected to follow home country practice rules which do not require the approval of our shareholders for such action rather than the applicable Nasdaq's shareholder approval requirement.

Item 16H. Mine Safety Disclosure

Not applicable.

PART III

Item 17. Financial Statements

Not applicable.

Item 18. Financial Statements

See pages F-1 through F-30.

Item 19. Exhibits

See Exhibit Index.

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