
**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, DC 20549

FORM 10-Q

(MARK ONE)

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

For the quarterly period ended **June 30, 2016**

or

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

For the transition period from _____ to _____

Commission file number 0-23621

MKS INSTRUMENTS, INC.

(Exact name of registrant as specified in its charter)

Massachusetts
(State or other jurisdiction of
incorporation or organization)

04-2277512
(I.R.S. Employer
Identification No.)

2 Tech Drive, Suite 201, Andover, Massachusetts
(Address of principal executive offices)

01810
(Zip Code)

Registrant's telephone number, including area code (978) 645-5500

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 a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/> (Do not check if a smaller reporting company)	Smaller reporting company	<input type="checkbox"/>

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

As of July 27, 2016, the registrant had 53,570,931 shares of common stock outstanding.

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PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS.

MKS INSTRUMENTS, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except share and per share data)
(Unaudited)

	June 30, 2016	December 31, 2015
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 354,275	\$ 227,574
Restricted cash	5,559	—
Short-term investments	71,373	430,663
Trade accounts receivable, net	233,951	101,883
Inventories, net	278,360	152,631
Other current assets	57,995	26,760
Total current assets	<u>1,001,513</u>	<u>939,511</u>
Property, plant and equipment, net	184,221	68,856
Goodwill	592,605	199,703
Intangible assets, net	426,983	44,027
Long-term investments	15,230	—
Other assets	24,576	21,250
Total assets	<u>\$2,245,128</u>	<u>\$ 1,273,347</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Short-term borrowings and current portion of long-term debt	\$ 12,678	\$ —
Accounts payable	61,538	23,177
Accrued compensation	59,360	28,424
Income taxes payable	7,022	4,024
Other current liabilities	67,092	35,359
Total current liabilities	<u>207,690</u>	<u>90,984</u>
Long-term debt	696,906	—
Non-current deferred taxes	102,101	2,655
Other liabilities	56,821	18,827
Total liabilities	<u>1,063,518</u>	<u>112,466</u>
Commitments and contingencies (Note 20)		
Stockholders' equity:		
Preferred Stock, \$0.01 par value per share, 2,000,000 shares authorized; none issued and outstanding	—	—
Common Stock, no par value, 200,000,000 shares authorized; 53,568,561 and 53,199,720 shares issued and outstanding at June 30, 2016 and December 31, 2015, respectively	113	113
Additional paid-in capital	765,393	744,725
Retained earnings	434,928	427,214
Accumulated other comprehensive loss	(18,824)	(11,171)
Total stockholders' equity	<u>1,181,610</u>	<u>1,160,881</u>
Total liabilities and stockholders' equity	<u>\$2,245,128</u>	<u>\$ 1,273,347</u>

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
AND COMPREHENSIVE INCOME
(in thousands, except per share data)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Net revenues:				
Products	\$ 285,471	\$ 188,281	\$ 439,092	\$ 374,377
Services	40,390	29,685	70,450	57,428
Total net revenues	<u>325,861</u>	<u>217,966</u>	<u>509,542</u>	<u>431,805</u>
Cost of revenues:				
Cost of products	163,993	99,849	249,345	198,501
Cost of services	25,955	19,319	46,371	37,460
Total cost of revenues (exclusive of amortization shown separately below)	<u>189,948</u>	<u>119,168</u>	<u>295,716</u>	<u>235,961</u>
Gross profit	<u>135,913</u>	<u>98,798</u>	<u>213,826</u>	<u>195,844</u>
Research and development	28,214	17,567	45,441	34,247
Selling, general and administrative	71,429	33,269	105,379	64,136
Acquisition costs	8,205	—	10,699	30
Restructuring	24	219	24	1,007
Amortization of intangible assets	8,855	1,709	10,538	3,380
Income from operations	19,186	46,034	41,745	93,044
Interest and other (expense) income, net	(6,818)	790	(5,572)	1,294
Income before income taxes	12,368	46,824	36,173	94,338
Provision for income taxes	3,158	13,604	9,400	27,332
Net income	<u>\$ 9,210</u>	<u>\$ 33,220</u>	<u>\$ 26,773</u>	<u>\$ 67,006</u>
Other comprehensive income:				
Changes in value of financial instruments designated as cash flow hedges, net of tax benefit ⁽¹⁾	\$ (319)	\$ (332)	\$ (1,865)	\$ (1,078)
Foreign currency translation adjustments, net of tax of \$0	(8,886)	612	(6,233)	(2,594)
Unrealized gain (loss) on investments and minimum pension liability adjustment, net of tax expense (benefit) ⁽²⁾	68	(202)	445	57
Total comprehensive income	<u>\$ 73</u>	<u>\$ 33,298</u>	<u>\$ 19,120</u>	<u>\$ 63,391</u>
Net income per share:				
Basic	<u>\$ 0.17</u>	<u>\$ 0.62</u>	<u>\$ 0.50</u>	<u>\$ 1.26</u>
Diluted	<u>\$ 0.17</u>	<u>\$ 0.62</u>	<u>\$ 0.50</u>	<u>\$ 1.25</u>
Cash dividends per common share	<u>\$ 0.17</u>	<u>\$ 0.17</u>	<u>\$ 0.34</u>	<u>\$ 0.335</u>
Weighted average common shares outstanding:				
Basic	<u>53,461</u>	<u>53,384</u>	<u>53,348</u>	<u>53,299</u>
Diluted	<u>53,806</u>	<u>53,589</u>	<u>53,685</u>	<u>53,559</u>

(1) Tax (benefit) was \$(209) and \$(178) for the three months ended June 30, 2016 and 2015, respectively. Tax (benefit) was \$(1,250) and \$(387) for the six months ended June 30, 2016 and 2015, respectively.

(2) Tax expense (benefit) was \$44 and \$(108) for the three months ended June 30, 2016 and 2015, respectively. Tax expense was \$299 and \$21 for the six months ended June 30, 2016 and 2015, respectively.

The accompanying notes are an integral part of the consolidated financial statements.

MKS INSTRUMENTS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)
(Unaudited)

	Six Months Ended June 30,	
	2016	2015
Cash flows provided by operating activities:		
Net income	\$ 26,773	\$ 67,006
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	21,708	11,082
Amortization of inventory step-up adjustment to fair value	10,119	—
Stock-based compensation	14,668	6,778
Provision for excess and obsolete inventory	6,737	6,335
Provision for bad debt	85	(105)
Deferred income taxes	1,381	342
Excess tax benefits from stock-based compensation	(452)	(869)
Other	72	203
Changes in operating assets and liabilities:		
Trade accounts receivable	(35,874)	(18,787)
Inventories	3,868	(18,471)
Income taxes	6,420	6,404
Other current assets	(4,908)	(5,964)
Accrued compensation	391	(2,439)
Other current and non-current liabilities	(993)	6,862
Accounts payable	7,457	(26)
Other assets	(8,090)	(155)
Net cash provided by operating activities	<u>49,362</u>	<u>58,196</u>
Cash flows used in investing activities:		
Acquisition of businesses, net of cash acquired	(939,591)	(9,910)
Purchases of investments	(99,261)	(264,581)
Maturities of investments	114,256	88,857
Sales of investments	336,276	28,229
Purchases of property, plant and equipment	(7,264)	(5,334)
Net cash used in investing activities	<u>(595,584)</u>	<u>(162,739)</u>
Cash flows provided by (used in) financing activities:		
Restricted cash	(5,559)	—
Proceeds from short-term borrowings	10,597	2,020
Payments of short-term borrowings	(2,239)	(2,020)
Net proceeds from long-term borrowings	746,321	—
Payments of long-term borrowings	(50,000)	—
Repurchase of common stock	(1,545)	(4,341)
Net payments related to employee stock awards	(2,921)	(1,124)
Dividend payments to common stockholders	(18,141)	(17,868)
Excess tax benefits from stock-based compensation	452	869
Net cash provided by (used in) financing activities	<u>676,965</u>	<u>(22,464)</u>
Effect of exchange rate changes on cash and cash equivalents	<u>(4,042)</u>	<u>(111)</u>
Increase (decrease) in cash and cash equivalents	126,701	(127,118)
Cash and cash equivalents at beginning of period	227,574	305,437
Cash and cash equivalents at end of period	<u>\$ 354,275</u>	<u>\$ 178,319</u>

The accompanying notes are an integral part of the consolidated financial statements

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(in thousands, except share and per share data)

1) Basis of Presentation

The terms “MKS” and the “Company” refer to MKS Instruments, Inc. and its subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation. The interim financial data as of June 30, 2016 and for the three and six months ended June 30, 2016 and 2015 are unaudited; however, in the opinion of MKS, the interim data includes all adjustments, consisting of normal recurring adjustments, necessary for a fair statement of the results for the interim periods. The condensed consolidated balance sheet presented as of December 31, 2015 has been derived from the consolidated audited financial statements as of that date. The unaudited condensed consolidated financial statements presented herein have been prepared in accordance with the instructions to Form 10-Q and do not include all of the information and note disclosures required by United States generally accepted accounting principles (“U.S. GAAP”). The unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto included in the MKS Annual Report on Form 10-K for the year ended December 31, 2015 filed with the Securities and Exchange Commission on February 26, 2016.

On April 29, 2016, the Company completed its acquisition of Newport Corporation which is more fully described in Note 3 below. This transaction was recorded using the purchase method of accounting; accordingly, the financial results of the acquisition are included in the accompanying unaudited condensed consolidated financial statements for the periods subsequent to the acquisition.

The preparation of these unaudited condensed consolidated financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent liabilities at the date of the unaudited condensed consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. On an on-going basis, management evaluates its estimates and judgments, including those related to revenue recognition, stock-based compensation, inventory, intangible assets, goodwill and other long-lived assets, warranty liabilities, pension liabilities, acquisition expenses, income taxes and investments. Management bases its estimates and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

2) Recently Issued Accounting Pronouncements

In January 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2016-01, “Financial Instruments—Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities.” This ASU provides guidance for the recognition, measurement, presentation, and disclosure of financial instruments. The new pronouncement revises accounting related to equity investments and the presentation of certain fair value changes for financial assets and liabilities measured at fair value. Among other things, it amends the presentation and disclosure requirements of equity securities that do not result in consolidation and are not accounted for under the equity method. Changes in the fair value of these equity securities will be recognized directly in net income. This pronouncement is effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated statements of financial position and results of operations.

In March 2016, the FASB issued ASU 2016-09, “Compensation - Stock Compensation (Topic 718)—Improvements to Employee Share-Based Payment Accounting.” This standard simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. The provisions of this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years and early adoption is permitted. The Company is currently evaluating the requirements of this ASU and has not yet determined its impact on the Company’s consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842).” This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. The Company is currently evaluating the requirements of this ASU and has not yet determined its impact on the Company’s consolidated financial statements.

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except share and per share data)

In July 2015, the FASB issued ASU 2015-11, “Inventory (Topic 330)—Simplifying the Measurement of Inventory.” The amendments in this ASU apply to all inventory that is measured using first-in, first-out or average cost. This standard requires that an entity measure inventory within the scope of this update at the lower of cost and net realizable value. Net realizable value is the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. The amendments in this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years. The Company does not expect adoption of this ASU to have a material impact on the Company’s consolidated statements of financial position and results of operations.

In August 2014, the FASB issued ASU 2014-15, “Presentation of Financial Statements—Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity’s Ability to Continue as a Going Concern.” Under this guidance, management will be required to assess an entity’s ability to continue as a going concern, and to provide related footnote disclosures in certain circumstances. The provisions of this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years. The Company does not expect the adoption of this ASU to have an impact on the Company’s consolidated financial statements.

In May 2014, the FASB issued ASU 2014-09, “Revenue from Contracts with Customers (Topic 606),” which supersedes all existing revenue recognition requirements, including most industry-specific guidance. This standard requires a company to recognize revenue when it transfers goods and services to customers in an amount that reflects the consideration that the company expects to be entitled to in exchange for those goods or services. The ASU also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and assets recognized from costs incurred to obtain or fulfill a contract. This pronouncement is effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. The two permitted transition methods under the new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. The Company has not yet selected a transition method. The Company is currently evaluating the requirements of this ASU and has not yet determined its impact on the Company’s consolidated financial statements.

3) Acquisitions

Newport Corporation

On April 29, 2016, the Company completed its acquisition of Newport Corporation (“Newport”) pursuant to an Agreement and Plan of Merger, dated as of February 22, 2016 (the “Merger Agreement”), by and among the Company, PSI Equipment, Inc., a wholly owned subsidiary of the Company (“Merger Sub”), and Newport (the “Newport Merger”). At the effective time of the Newport Merger and pursuant to the terms and conditions of the Merger Agreement, each share of Newport’s common stock that was issued and outstanding immediately prior to the effective time of the Newport Merger was converted into the right to receive \$23.00 in cash, without interest and subject to deduction for any required withholding tax.

Newport’s innovative solutions leverage its expertise in advanced technologies, including lasers, photonics and precision motion equipment, and optical components and sub-systems, to enhance the capabilities and productivity of its customers’ manufacturing, engineering and research applications. Newport is a global supplier of advanced-technology products and systems to customers in the scientific research and defense/security, microelectronics, life and health sciences and industrial manufacturing markets.

The purchase price of Newport consisted of the following:

Cash paid for outstanding shares (1)	\$ 905,254
Settlement of share-based compensation awards (2)	8,824
Cash paid for Newport debt (3)	<u>93,200</u>
Total purchase price	<u>\$1,007,278</u>
Less: Cash and cash equivalents acquired	<u>(61,463)</u>
Total purchase price, net of cash and cash equivalents acquired	<u>\$ 945,815</u>

(1) Represents cash paid of \$23.00 per share for approximately 39,359,000 shares of Newport common stock, without interest and subject to a deduction for any required withholding tax.

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
 (in thousands, except share and per share data)

- (2) Represents the vested but not issued portion of Newport share-based compensation awards as of the acquisition date of April 29, 2016.
 (3) Represents the cash paid for the outstanding balance of Newport’s senior secured revolving credit agreement.

The Company funded the payment of the aggregate consideration with a combination of the Company’s available cash on hand and the proceeds from the Company’s senior secured term loan facility, as described in Note 11.

Under the acquisition method of accounting, the total estimated acquisition consideration is allocated to the acquired tangible and intangible assets and assumed liabilities of Newport based on their fair values as of the acquisition date. Any excess of the acquisition consideration over the fair value of assets acquired and liabilities assumed is allocated to goodwill. The Company expects that all such goodwill and intangible assets will not be deductible for tax purposes.

The following table summarizes the allocation of the preliminary purchase price to the fair values assigned to assets acquired and liabilities assumed at the date of the Newport Merger:

Current assets (including cash)	\$ 185,388
Inventory	142,914
Intangible assets	394,804
Goodwill	395,784
Property, plant and equipment	119,932
Long-term assets	22,726
Total assets acquired	1,261,548
Current liabilities	94,422
Other long-term liabilities	159,848
Total liabilities assumed	254,270
Fair value of assets acquired and liabilities assumed	1,007,278
Less: cash and cash equivalents acquired	(61,463)
Total purchase price, net of cash and cash equivalents acquired	\$ 945,815

The fair value write-up of acquired finished goods inventory was \$14,482, the amount of which will be amortized over the expected period during which the acquired inventory is sold. Accordingly, for the three and six months ended June 30, 2016, the Company recorded a \$10,119 incremental cost of sales charge associated with the fair value write-up of inventory acquired in the merger with Newport.

The fair value write-up of acquired property, plant and equipment of \$36,242 will be amortized over the useful life of the asset. Property, plant and equipment is valued at its value-in-use, unless there was a known plan to dispose of the asset.

The acquired intangible assets are being amortized on a straight-line basis, which approximates the economic use of the asset.

The following table reflects the allocation of the acquired intangible assets and related estimate of useful lives:

Order backlog	\$ 12,100	1 year
Customer relationships	243,093	6-18 years
Trademarks and trade names	55,200	Indefinite
Developed technology	75,386	4-8 years
In-process research and development	6,899	Undefined ⁽¹⁾
Leasehold interest	2,126	4-5 years
Total	\$394,804	

- (1) The useful lives of in-process research and development will be defined in the future upon further evaluation of the status of these applications.

The fair value of the acquired intangibles was determined using the income approach. In performing these valuations, the key underlying probability-adjusted assumptions of the discounted cash flows were projected revenues, gross margin expectations and operating cost estimates. The valuations were based on the information that was available as of the acquisition date and the expectations and assumptions that have been deemed reasonable by the Company’s management. There are inherent uncertainties and management judgment required in these determinations. This acquisition resulted in a purchase price that exceeded the estimated fair value of tangible and intangible assets, the excess amount of which was allocated to goodwill.

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
 (in thousands, except share and per share data)

While the Company uses its best estimates and assumptions as part of the purchase price allocation process to value the assets acquired and liabilities assumed on the acquisition date, its estimates and assumptions are subject to refinement. Fair value estimates are based on a complex series of judgments about future events and uncertainties and rely heavily on estimates and assumptions. The judgments used to determine the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact the Company's results of operations. The finalization of the purchase accounting assessment will result in a change in the valuation of assets acquired and liabilities assumed and may have a material impact on the Company's results of operations and financial position. As a result, during the measurement period, which may be up to one year from the acquisition date, the Company records adjustments to the assets acquired and liabilities assumed with a corresponding offset to goodwill to reflect additional information received about facts and circumstances which existed at the date of acquisition. The Company records adjustments to the assets acquired and liabilities assumed subsequent to the purchase price allocation period in the Company's operating results in the period in which the adjustments were determined. The size and breadth of the Newport Merger will necessitate the use of this measurement period to adequately analyze and assess a number of the factors used in establishing the fair value of certain tangible and intangible assets acquired and liabilities assumed as of the acquisition date and the related tax impacts of any changes made. Any potential adjustments made could be material in relation to the preliminary values presented above.

The Company believes the amount of goodwill relative to identifiable intangible assets relates to several factors including: (1) potential buyer-specific synergies related to market opportunities for a combined product offering; and (2) potential to leverage the Company's sales force to attract new customers and revenue and cross sell to existing customers.

The results of this acquisition were included in the Company's consolidated operations beginning on April 29, 2016. Newport constitutes the Company's Light & Motion Division reportable segment (see Segment Note 19).

Certain executives from Newport have severance provisions in their respective Newport employment agreements. The agreements include terms that are accounted for as dual-trigger arrangements. Through the Company's acquisition accounting, the expense relating to these benefits was recognized in the combined entity's financial statements while the benefit itself will not be distributed until the change in control provision is exercised by each eligible executive. The Company recorded costs of \$6,631 and \$3,334 as compensation expense and stock-based compensation expense, respectively, for the three and six months ended June 30, 2016 associated with these severance provisions. The restricted stock units and stock appreciation rights that are eligible for accelerated vesting if the executive exercises his rights, but are not issued as of each reporting period-end, will be excluded from the computation of basic earnings per share and included in the computation of diluted earnings per share for such reporting period.

Pro Forma Results

The following unaudited pro forma financial information presents the combined results of operations of the Company as if the Newport Merger had occurred on January 1, 2015. The unaudited pro forma financial information is not necessarily indicative of what the Company's condensed consolidated results of operations actually would have been had the acquisition occurred at the beginning of each year. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined company.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Total net revenues	\$ 358,483	\$ 365,125	\$687,650	\$ 734,800
Net income	14,158	26,024	31,730	25,448
Net income per share:				
Basic	\$ 0.26	\$ 0.49	\$ 0.59	\$ 0.48
Diluted	\$ 0.26	\$ 0.49	\$ 0.59	\$ 0.48

The unaudited pro forma financial information above gives effect primarily to the following:

- (1) Incremental amortization and depreciation expense related to the estimated fair value of identifiable intangible assets and property, plant and equipment from the purchase price allocation.
- (2) Revenue adjustments as a result of the reduction in deferred revenue related to its estimated fair value.
- (3) Incremental interest expense related to the Company's term loan credit agreement.
- (4) The exclusion of acquisition costs and inventory step-up amortization from the three and six month periods ended June 30, 2016 and the addition of these items to the six month period ended June 30, 2015.
- (5) The estimated tax impact of the above adjustments.

Investment in Reno Sub-Systems, Inc.

On April 27, 2016, the Company invested \$9,300 for a minority interest in Reno Sub-Systems, Inc., a Delaware corporation, which operates in the field of semiconductor process equipment instrumentation. The Company accounted for this investment using the cost method of accounting.

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
 (in thousands, except share and per share data)

Precisive, LLC

On March 17, 2015, the Company acquired Precisive, LLC (“Precisive”) for \$12,085, net of cash acquired of \$435. The purchase price included a deferred payment amount of \$2,600 to cover any potential indemnification claims, which amount was paid to the Sellers in the second quarter of 2016. Precisive is an innovative developer of optical analyzers based on Tunable Filter Spectroscopy, which provide real-time gas analysis in the natural gas and hydrocarbon processing industries, including refineries, hydrocarbon processing plants, gas-to-power machines, biogas processes and fuel gas transportation and metering, while delivering customers a lower total cost of ownership.

The following table summarizes the estimated fair value of the assets acquired and liabilities assumed at the date of the Precisive acquisition:

Current assets	\$ 693
Non-current assets	18
Intangible assets	5,110
Goodwill	7,042
Total assets acquired	12,863
Total current liabilities assumed	(343)
Fair value of assets acquired and liabilities assumed	12,520
Less cash acquired	(435)
Total purchase price, net of cash acquired	\$12,085

Substantially all of the purchase price is deductible for tax purposes. The following table reflects the allocation of the acquired intangible assets and related estimates of useful lives. These acquired intangibles will be amortized on a straight-line basis, which approximates the pattern of use.

Order backlog	\$ 50	18 months
Customer relationships	1,430	8 years
Exclusive patent license	2,600	10 years
Trade names	210	10 years
Developed technology	820	10 years
Total	\$5,110	

The fair value of the acquired intangibles was determined using the income approach. The Precisive acquisition resulted in a purchase price that exceeded the estimated fair value of tangible and intangible assets, the excess amount of which was allocated to goodwill. The Company believes the amount of goodwill relative to identifiable intangible assets relates to several factors including: (1) potential buyer-specific synergies related to market opportunities for a combined product offering; (2) potential to leverage the Company’s sales force and intellectual property to attract new customers and revenue; and (3) potential to strengthen and expand into new but complementary markets, including targeting new applications such as natural gas processing, hydrocarbon processing and other oil and gas segments.

The results of this acquisition were included in the Company’s consolidated operations beginning on March 17, 2015. Precisive is included in the Company’s Instruments, Control and Vacuum Products group within the Vacuum & Analysis Division segment.

4) Investments

Investments classified as short-term consists of the following:

	June 30, 2016	December 31, 2015
Available-for-sale investments:		
Time deposits and certificates of deposit	\$ 17,358	\$ 11,892
Bankers’ acceptance drafts	3,056	728
Asset-backed securities	14,173	124,997
Corporate obligations	19,468	165,109
Municipal bonds	595	8,355
U.S. treasury obligations	1,154	—
U.S. agency obligations	15,569	119,582
	\$ 71,373	\$ 430,663

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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Investments classified as long-term consists of the following:

	June 30, 2016	December 31, 2015
Available-for-sale investments:		
Group insurance contracts	5,930	—
Cost method investments:		
Minority interest in Reno Sub-Systems, Inc.	\$ 9,300	\$ —
	<u>\$ 15,230</u>	<u>\$ —</u>

The following tables show the gross unrealized gains and (losses) aggregated by investment category for short-term available-for-sale investments:

As of June 30, 2016:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$17,358	\$ —	\$ —	\$17,358
Bankers' acceptance drafts	3,056	—	—	3,056
Asset-backed securities	14,164	16	(7)	14,173
Corporate obligations	19,454	21	(7)	19,468
Municipal bonds	592	3	—	595
U.S. treasury obligations	1,151	3	—	1,154
U.S. agency obligations	15,563	6	—	15,569
	<u>\$71,338</u>	<u>\$ 49</u>	<u>\$ (14)</u>	<u>\$71,373</u>

As of June 30, 2016:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Long-term investments:				
Available-for-sale investments:				
Group insurance contracts	\$5,938	\$ —	\$ (8)	\$ 5,930

As of December 31, 2015:	Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
Short-term investments:				
Available-for-sale investments:				
Time deposits and certificates of deposit	\$ 11,893	\$ —	\$ (1)	\$ 11,892
Bankers' acceptance drafts	728	—	—	728
Asset-backed securities	125,271	—	(274)	124,997
Corporate obligations	165,445	5	(341)	165,109
Municipal bonds	8,346	13	(4)	8,355
U.S. agency obligations	119,699	3	(120)	119,582
	<u>\$431,382</u>	<u>\$ 21</u>	<u>\$ (740)</u>	<u>\$430,663</u>

The tables above, which show the gross unrealized gains and (losses) aggregated by investment category for available-for-sale investments as of June 30, 2016 and December 31, 2015, reflect the inclusion within short-term investments of investments with contractual maturities greater than one year from the date of purchase. Management has the ability, if necessary, to liquidate any of its investments in order to meet the Company's liquidity needs in the next 12 months. Accordingly, those investments with contractual maturities greater than one year from the date of purchase are classified as short-term investments on the accompanying balance sheet.

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Interest income is accrued as earned. Dividend income is recognized as income on the date the stock trades “ex-dividend.” The cost of marketable securities sold is determined by the specific identification method. Realized gains or losses are reflected in income and were not material for the three and six months ended June 30, 2016 and 2015.

5) Fair Value Measurements

In accordance with the provisions of fair value accounting, a fair value measurement assumes that the transaction to sell an asset or transfer a liability occurs in the principal market for the asset or liability or, in the absence of a principal market, the most advantageous market for the asset or liability and defines fair value based upon an exit price model.

The fair value measurement guidance establishes a fair value hierarchy which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The guidance describes three levels of inputs that may be used to measure fair value:

- | | |
|---------|---|
| Level 1 | Quoted prices in active markets for identical assets or liabilities assessed as of the reporting date. Active markets are those in which transactions for the asset or liability occur in sufficient frequency and volume to provide pricing information on an ongoing basis. |
| Level 2 | Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Level 2 assets and liabilities include debt securities with quoted prices that are traded less frequently than exchange-traded instruments or securities or derivative contracts that are valued using a pricing model with inputs that are observable in the market or can be derived principally from or corroborated by observable market data. |
| Level 3 | Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. Level 3 assets and liabilities include financial instruments whose value is determined using pricing models, discounted cash flow methodologies, or similar techniques, as well as instruments for which the determination of fair value requires significant management judgment or estimation. |

In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, the Company categorizes such assets and liabilities based on the lowest level input that is significant to the fair value measurement in its entirety. The Company’s assessment of the significance of a particular input to the fair value measurement in its entirety requires judgment and considers factors specific to the asset or liability.

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Assets and liabilities of the Company are measured at fair value on a recurring basis as of June 30, 2016 and are summarized as follows:

Description	June 30, 2016	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	\$ 6,919	\$ 6,919	\$ —	\$ —
Bankers' acceptance drafts	497	—	497	—
Restricted cash	5,559	—	5,559	—
Available-for-sale investments:				
Time deposits and certificates of deposit	17,358	—	17,358	—
Bankers' acceptance drafts	3,056	—	3,056	—
Asset-backed securities	14,173	—	14,173	—
Corporate obligations	19,468	—	19,468	—
Municipal bonds	595	—	595	—
U.S. treasury obligations	1,154	—	1,154	—
U.S. agency obligations	15,569	—	15,569	—
Group insurance contracts	5,930	—	5,930	—
Derivatives – currency forward contracts	655	—	655	—
Derivatives – option contracts	105	—	105	—
Funds in investments and other assets:				
Israeli pension assets	13,611	—	13,611	—
Total assets	<u>\$ 104,649</u>	<u>\$ 6,919</u>	<u>\$ 97,730</u>	<u>\$ —</u>
Liabilities:				
Derivatives – currency forward contracts	\$ 2,989	\$ —	\$ 2,989	\$ —
Derivatives – option contracts	97	—	97	—
Total liabilities	<u>\$ 3,086</u>	<u>\$ —</u>	<u>\$ 3,086</u>	<u>\$ —</u>
Reported as follows:				
Assets:				
Cash and cash equivalents ⁽¹⁾	\$ 7,416	\$ 6,919	\$ 497	\$ —
Restricted cash	5,559	—	5,559	—
Short-term investments	71,373	—	71,373	—
Other current assets	14,371	—	14,371	—
Total current assets	<u>\$ 98,719</u>	<u>\$ 6,919</u>	<u>\$ 91,800</u>	<u>\$ —</u>
Long-term investments	<u>\$ 5,930</u>	<u>\$ —</u>	<u>\$ 5,930</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	<u>\$ 3,086</u>	<u>\$ —</u>	<u>\$ 3,086</u>	<u>\$ —</u>

(1) The cash and cash equivalents amounts presented in the table above do not include cash of \$344,727 and non-negotiable time deposits of \$2,132 as of June 30, 2016.

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Assets and liabilities of the Company are measured at fair value on a recurring basis as of December 31, 2015 and are summarized as follows:

Description	December 31, 2015	Fair Value Measurements at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	\$ 106,099	\$ 106,099	\$ —	\$ —
Bankers' acceptance drafts	11	—	11	—
Corporate obligations	330	—	330	—
Available-for-sale investments:				
Time deposits and certificates of deposit	11,892	—	11,892	—
Bankers' acceptance drafts	728	—	728	—
Asset-backed securities	124,997	—	124,997	—
Corporate obligations	165,109	—	165,109	—
Municipal bonds	8,355	—	8,355	—
U.S. agency obligations	119,582	—	119,582	—
Derivatives – currency forward contracts	1,486	—	1,486	—
Total assets	<u>\$ 538,589</u>	<u>\$ 106,099</u>	<u>\$ 432,490</u>	<u>\$ —</u>
Liabilities:				
Derivatives – currency forward contracts	<u>\$ 263</u>	<u>\$ —</u>	<u>\$ 263</u>	<u>\$ —</u>
Reported as follows:				
Assets:				
Cash and cash equivalents ⁽¹⁾	\$ 106,440	\$ 106,099	\$ 341	\$ —
Short-term investments	430,663	—	430,663	—
Other current assets	1,486	—	1,486	—
Total current assets	<u>\$ 538,589</u>	<u>\$ 106,099</u>	<u>\$ 432,490</u>	<u>\$ —</u>
Liabilities:				
Other current liabilities	<u>\$ 263</u>	<u>\$ —</u>	<u>\$ 263</u>	<u>\$ —</u>

(1) The cash and cash equivalents amounts presented in the table above do not include cash of \$110,118 and non-negotiable time deposits of \$11,016 as of December 31, 2015.

Money Market Funds

Money market funds are recorded as cash and cash equivalents and are classified within Level 1 of the fair value hierarchy.

Restricted Cash

The Company has letters of credit, which require it to maintain specified cash deposit balances as collateral. Such amounts have been classified as restricted cash.

Available-For-Sale Investments

As of June 30, 2016, available-for-sale investments consisted of time deposits and drafts denominated in the Euro currency, certificates of deposit, bankers' acceptance drafts, asset-backed securities (which include auto loans, credit card receivables and equipment trust receivables), corporate obligations, municipal bonds, U.S. treasury obligations, U.S. agency obligations and group insurance contracts.

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The Company measures its debt and equity investments at fair value. The Company's available-for-sale investments are classified within Level 1 and Level 2 of the fair value hierarchy.

Israeli Pension Assets

Israeli pension assets represent investments in mutual funds, government securities and other time deposits. These investments are set aside for the retirement benefit of the employees at the Company's Israeli subsidiaries. These funds are classified within Level 2 of the fair value hierarchy.

Derivatives

As a result of the Company's global operating activities, the Company is exposed to market risks from changes in foreign currency exchange rates, which may adversely affect its operating results and financial position. When deemed appropriate, the Company minimizes its risks from foreign currency exchange rate fluctuations through the use of derivative financial instruments. The principal market in which the Company executes its foreign currency contracts is the institutional market in an over-the-counter environment with a relatively high level of price transparency. The market participants are usually large commercial banks. The forward foreign currency exchange and option contracts are valued using broker quotations, or market transactions and are classified within Level 2 of the fair value hierarchy.

6) Derivatives

The Company entered into derivative instruments for risk management purposes only, including derivatives designated as hedging instruments and those utilized as economic hedges. The Company operates internationally and, in the normal course of business, is exposed to fluctuations in interest rates and foreign exchange rates. These fluctuations can increase the costs of financing, investing and operating the business. The Company has used derivative instruments, such as forward contracts and foreign currency option contracts, to manage certain foreign currency exposure.

By nature, all financial instruments involve market and credit risks. The Company enters into derivative instruments with major investment grade financial institutions, for which no collateral is required. The Company has policies to monitor the credit risk of these counterparties. While there can be no assurance, the Company does not anticipate any material non-performance by any of these counterparties.

The Company hedges a portion of its forecasted foreign currency-denominated intercompany sales of inventory, over a maximum period of eighteen months, using forward foreign exchange contracts accounted for as cash-flow hedges related to Japanese, South Korean, British, Euro and Taiwanese currencies. To the extent these derivatives are effective in off-setting the variability of the hedged cash flows, and otherwise meet the hedge accounting criteria, changes in the derivatives' fair value are not included in current earnings but are included in other comprehensive income (loss) ("OCI") in stockholders' equity. These changes in fair value will subsequently be reclassified into earnings, as applicable, when the forecasted transaction occurs. To the extent that a previously designated hedging transaction is no longer an effective hedge, any ineffectiveness measured in the hedging relationship is recorded currently in earnings in the period it occurs. The cash flows resulting from forward exchange contracts are classified in the consolidated statements of cash flows as part of cash flows from operating activities. The Company does not enter into derivative instruments for trading or speculative purposes.

The Company also enters into forward exchange contracts to hedge certain balance sheet amounts and foreign currency option contracts related to the Israeli Shekel. To the extent the hedge accounting criteria is not met, the related foreign currency forward contracts and foreign currency option contracts are considered as economic hedges and changes in the fair value of these contracts are recorded immediately in earnings in the period in which they occur. These include hedges that are used to reduce exchange rate risks arising from the change in fair value of certain foreign currency-denominated assets and liabilities (i.e., payables, receivables) and other economic hedges where the hedge accounting criteria were not met.

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As of June 30, 2016 and December 31, 2015, the Company had outstanding forward foreign exchange contracts with gross notional values of \$65,504 and \$89,989, respectively. The following tables provide a summary of the primary net hedging positions and corresponding fair values held as of June 30, 2016 and December 31, 2015:

Currency Hedged (Buy/Sell)	June 30, 2016	
	Gross Notional Value	Fair Value(1) Asset/(Liability)
U.S. Dollar/Japanese Yen	\$ 21,046	\$ (2,560)
U.S. Dollar/South Korean Won	26,685	(68)
U.S. Dollar/Euro	6,732	22
U.S. Dollar/U.K. Pound Sterling	2,856	305
U.S. Dollar/Taiwan Dollar	8,185	(33)
Total	<u>\$ 65,504</u>	<u>\$ (2,334)</u>

(1) Represents the fair value of the net (liability) asset amount included in the condensed consolidated balance sheet.

Currency Hedged (Buy/Sell)	December 31, 2015	
	Gross Notional Value	Fair Value(1) Asset/(Liability)
U.S. Dollar/Japanese Yen	\$ 26,848	\$ (136)
U.S. Dollar/South Korean Won	34,777	915
U.S. Dollar/Euro	10,987	19
U.S. Dollar/U.K. Pound Sterling	4,587	61
U.S. Dollar/Taiwan Dollar	12,790	364
Total	<u>\$ 89,989</u>	<u>\$ 1,223</u>

(1) Represents the fair value of the net (liability) asset amount included in the condensed consolidated balance sheet.

The following table provides a summary of the fair value amounts of the Company's derivative instruments:

	June 30, 2016	December 31, 2015
Derivative assets:		
Forward exchange contracts	\$ 655	\$ 1,486
Foreign currency option contracts	105	—
Derivative liabilities:		
Forward exchange contracts	(2,989)	(263)
Foreign currency option contracts	(97)	—
Total net derivative (liabilities) assets(1)	<u>\$ (2,326)</u>	<u>\$ 1,223</u>

(1) The derivative asset of \$760 and derivative liability of \$3,086 are classified in other current assets and other current liabilities in the condensed consolidated balance sheet as of June 30, 2016. The derivative asset of \$1,486 and derivative liability of \$263 are classified in other current assets and other current liabilities in the condensed consolidated balance sheet as of December 31, 2015. These foreign exchange contracts are subject to a master netting agreement with one financial institution. However, the Company has elected to record these contracts on a gross basis in the balance sheet.

The net amount of existing gains as of June 30, 2016 that the Company expects to reclassify from OCI into earnings within the next twelve months is immaterial.

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The following table provides a summary of the (losses) gains on derivatives designated as hedging instruments:

<u>Derivatives Designated as Cash Flow Hedging Instruments</u>	<u>Three Months Ended</u> <u>June 30,</u>		<u>Six Months Ended</u> <u>June 30,</u>	
	<u>2016</u>	<u>2015</u>	<u>2016</u>	<u>2015</u>
Forward exchange contracts:				
Net loss recognized in OCI(1)	\$ (14)	\$(1,430)	\$(3,433)	\$(3,520)
Net (loss) gain reclassified from accumulated OCI into income(2)	\$(419)	\$ 716	\$ 277	\$ 1,909

(1) Net change in the fair value of the effective portion classified in OCI.

(2) Effective portion classified in cost of products for the three and six months ended June 30, 2016 and 2015. The tax effect of the gains or losses reclassified from accumulated OCI into income is immaterial.

As of June 30, 2016, the Company had outstanding foreign currency option contracts related to the Israeli Shekel with gross notional values of \$(860) and a net fair value of \$8. These instruments do not qualify for hedge accounting.

The following table provides a summary of the losses on derivatives not designated as hedging instruments:

<u>Derivatives Not Designated as Hedging Instruments</u>	<u>Three Months Ended</u> <u>June 30,</u>		<u>Six Months Ended</u> <u>June 30,</u>	
	<u>2016</u>	<u>2015</u>	<u>2016</u>	<u>2015</u>
Forward exchange contracts:				
Net loss recognized in income(1)	\$ (378)	\$ (108)	\$ (943)	\$ (10)

(1) The Company enters into foreign exchange contracts to hedge against changes in the balance sheet for certain subsidiaries and also enters into foreign currency option contracts to mitigate the risk associated with certain foreign currency transactions in the ordinary course of business. These derivatives are not designated as hedging instruments and gains or losses from these derivatives are recorded immediately in selling, general and administrative expenses.

7) Inventories

Inventories consist of the following:

	<u>June 30, 2016</u>	<u>December 31, 2015</u>
Raw materials	\$ 100,901	\$ 78,352
Work-in-process	97,587	23,297
Finished goods	79,872	50,982
	<u>\$ 278,360</u>	<u>\$ 152,631</u>

8) Goodwill and Intangible Assets

Goodwill

The Company's methodology for allocating the purchase price relating to purchase acquisitions is determined through established and generally accepted valuation techniques. Goodwill is measured as the excess of the cost of the acquisition over the sum of the amounts assigned to tangible and identifiable intangible assets acquired less liabilities assumed. The Company assigns assets acquired (including goodwill) and liabilities assumed to one or more reporting units as of the date of acquisition. Typically acquisitions relate to a single reporting unit and thus do not require the allocation of goodwill to multiple reporting units. If the products obtained in an acquisition are assigned to multiple reporting units, the goodwill is distributed to the respective reporting units as part of the purchase price allocation process.

Goodwill and purchased intangible assets with indefinite useful lives are not amortized, but are reviewed for impairment annually during the fourth quarter of each fiscal year and whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. The process of evaluating the potential impairment of goodwill and intangible assets requires significant judgment. The Company regularly monitors current business conditions and other factors including, but not limited to, adverse industry or economic trends, restructuring actions and lower projections of profitability that may impact future operating results.

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The changes in the carrying amount of goodwill and accumulated impairment (loss) during the six months ended June 30, 2016 and year ended December 31, 2015 were as follows:

	Six Months Ended June 30,			Twelve Months Ended December 31,		
	2016			2015		
	Gross Carrying Amount	Accumulated Impairment (Loss)	Net	Gross Carrying Amount	Accumulated Impairment (Loss)	Net
Beginning balance at January 1	\$ 339,117	\$ (139,414)	\$ 199,703	\$ 331,795	\$ (139,414)	\$ 192,381
Acquired goodwill ⁽¹⁾	395,784	—	395,784	8,017	—	8,017
Foreign currency translation	(2,882)	—	(2,882)	(695)	—	(695)
Ending balance at June 30, 2016 and December 31, 2015	<u>\$ 732,019</u>	<u>\$ (139,414)</u>	<u>\$ 592,605</u>	<u>\$ 339,117</u>	<u>\$ (139,414)</u>	<u>\$ 199,703</u>

- (1) During 2016, the Company recorded \$395,784 of goodwill related to the Newport Merger. During 2015, the Company recorded \$7,042 of goodwill related to the acquisition of Precise. During 2015, the Company recorded a purchase accounting adjustment of \$975 primarily related to an inventory valuation adjustment related to an acquisition that occurred in 2014.

Intangible Assets

Components of the Company's intangible assets are comprised of the following:

As of June 30, 2016:	Gross	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology ⁽¹⁾	\$ 176,586	\$ (85,881)	\$ (366)	\$ 90,339
Customer relationships ⁽¹⁾	280,344	(20,906)	(1,114)	258,324
Patents, trademarks, trade names and other ⁽¹⁾	99,822	(28,314)	39	71,547
In-process research and development	6,899	—	(126)	6,773
	<u>\$ 563,651</u>	<u>\$ (135,101)</u>	<u>\$ (1,567)</u>	<u>\$ 426,983</u>

As of December 31, 2015:	Gross	Accumulated Amortization	Foreign Currency Translation	Net
Completed technology ⁽²⁾	\$ 101,200	\$ (82,330)	\$ (272)	\$ 18,598
Customer relationships ⁽²⁾	37,251	(16,345)	10	20,916
Patents, trademarks, trade names and other ⁽²⁾	30,396	(25,888)	5	4,513
	<u>\$ 168,847</u>	<u>\$ (124,563)</u>	<u>\$ (257)</u>	<u>\$ 44,027</u>

- (1) During 2016, the Company recorded \$394,804 of separately identified intangible assets related to the Newport Merger, of which \$75,386 was completed technology, \$243,093 was customer relationships, \$69,426 was patents, trademarks, trade names and other, and \$6,899 was in-process research and development.
- (2) During 2015, the Company recorded \$5,110 of separately identified intangible assets related to the acquisition of Precise, of which \$820 was completed technology, \$1,430 was customer relationships and \$2,860 was patents, trademarks, trade names and other.

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Aggregate amortization expense related to acquired intangibles for the six months ended June 30, 2016 and 2015 was \$10,538 and \$3,380, respectively. Estimated amortization expense for each of the remaining fiscal years is as follows:

Year	Amount
2016 (remaining)	\$ 24,739
2017	41,424
2018	37,376
2019	37,333
2020	33,351
2021	26,896
Thereafter	170,664

9) Other Assets

	June 30, 2016	December 31, 2015
Other Current Assets:		
Income tax receivable	\$ 15,923	\$ 8,682
Prepaid income tax	10,257	4,755
Other	31,815	13,323
Total other current assets	<u>\$ 57,995</u>	<u>\$ 26,760</u>
Other Assets:		
Deferred tax assets, net	\$ 2,893	\$ 19,252
Israeli pension assets	13,611	—
Other	8,072	1,998
Total other assets	<u>\$ 24,576</u>	<u>\$ 21,250</u>

10) Other Liabilities

	June 30, 2016	December 31, 2015
Other Current Liabilities:		
VAT payable	\$ 4,889	\$ 3,075
Customer prepayments	4,960	1,741
Product warranties	7,936	5,205
Deferred revenue	13,582	7,189
Other	35,725	18,149
Total other current liabilities	<u>\$ 67,092</u>	<u>\$ 35,359</u>
Other Liabilities:		
Long-term income tax payable	\$ 10,281	\$ 4,483
Accrued compensation	12,398	13,395
Long-term pension liability	30,409	—
Other	3,733	949
Total other liabilities	<u>\$ 56,821</u>	<u>\$ 18,827</u>

11) Debt

Term Loan Credit Agreement

In connection with the completion of the Newport Merger, the Company entered into a term loan credit agreement (the “Credit Agreement”) with Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto (the “Lenders”), that provided senior secured financing of \$780,000, subject to increase at the Company’s option in accordance with the Credit Agreement (the “Term Loan Facility”). Borrowings under the Term Loan Facility bear interest per annum at one of the following rates selected by the Company: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in The Wall Street Journal, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each

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case, an applicable margin of 3.00%; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.75%, plus an applicable margin of 4.00%. The Company has elected Option B for interest rates. The Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

The term loans are prepayable in whole or in part from time to time, subject to a prepayment premium if prepayment is made on or prior to October 29, 2016 and only in certain circumstances. The Company will be obligated to pay a prepayment fee equal to 1.00% of the amount of the term loans outstanding immediately prior to any amendment resulting in a repricing transaction.

On June 9, 2016, the Company entered into Amendment No. 1 (the “Repricing Amendment”) to the Credit Agreement by and among the Company, the Lenders and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Repricing Amendment decreased the applicable margin for borrowings under the Company’s Term Loan Facility to 2.50% for base rate borrowings and 3.50% for LIBOR borrowings and extended the period during which a prepayment premium may be required for a “Repricing Transaction” (as defined in the Credit Agreement) until six months after the effective date of the Repricing Amendment. In connection with the execution of the Repricing Amendment, the Company paid a prepayment premium of 1.00%, or \$7,300, as well as certain fees and expenses of the administrative agent and the Lenders, in accordance with the terms of the Credit Agreement. Immediately prior to the effectiveness of the Repricing Amendment, the Company prepaid \$50,000 of principal under the Credit Agreement, reducing the outstanding principal under the Credit Agreement from \$780,000 to \$730,000.

The Company incurred \$28,747 of deferred finance fees, original issue discount and a repricing fee related to the term loans, which are included in long-term debt in the accompanying consolidated balance sheets and will be amortized to interest expense over the estimated life of the term loans using the effective interest method.

Under the Credit Agreement, the Company is required to prepay outstanding term loans, subject to certain exceptions, with portions of its annual excess cash flow as well as with the net cash proceeds of certain asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt. The Company is also required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the term loans made on the closing date with such original principal amount reduced by any prepayments (such as the \$50,000 prepaid to date), with the balance due on the seventh anniversary of the closing date.

All obligations under the Term Loan Facility are guaranteed by certain of the Company’s domestic subsidiaries, and are secured by substantially all of the Company’s assets and the assets of such subsidiaries, subject to certain exceptions and exclusions.

The Credit Agreement contains customary representations and warranties, affirmative and negative covenants and provisions relating to events of default. If an event of default occurs, the Lenders under the Term Loan Facility will be entitled to take various actions, including the acceleration of amounts due under the Term Loan Facility and all actions generally permitted to be taken by a secured creditor. At June 30, 2016, the Company is in compliance with all covenants under the Credit Agreement.

Senior Secured Asset-Based Revolving Credit Facility

In connection with the completion of the Newport Merger, the Company also entered into an asset-based credit agreement with Deutsche Bank AG New York Branch, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto (the “ABL Facility”), that provides senior secured financing of up to \$50,000, subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) subject to certain notice and field examination and appraisal requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent; provided that until the administrative agent’s receipt of a field examination of accounts receivable the borrowing base shall be equal to 70% of the book value of certain eligible accounts. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$15,000. The Company has not drawn against the ABL Facility.

Borrowings under the ABL Facility bear interest per annum at one of the following rates selected by the Company: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in The Wall Street Journal, and (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, plus, in each case, an initial applicable margin of 0.75%; and (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, plus an initial applicable margin of 1.75%. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the applicable margin for borrowings thereunder is subject to upward or downward adjustment each fiscal quarter, based on the average historical excess availability during the preceding quarter.

The Company incurred \$1,201 of costs in connection with the ABL Facility which were capitalized and included in other assets in the accompanying consolidated balance sheets and will be amortized to interest expense using the straight-line method over the contractual term of five years of the ABL Facility.

In addition to paying interest on outstanding principal under the ABL Facility, the Company is required to pay a commitment fee in respect of the unutilized commitments thereunder. The initial commitment fee is 0.375% per annum. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the commitment fee is subject to downward adjustment based on the amount of average unutilized commitments for the three-month period immediately preceding such adjustment date. The Company must also pay customary letter of credit fees and agency fees.

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Lines of Credit and Short-Term Borrowing Arrangements

One of the Company’s Japanese subsidiaries has lines of credit and short-term borrowing arrangements with two financial institutions which arrangements generally expire and are renewed at three-month intervals. The lines of credit provided for aggregate borrowings as of June 30, 2016 of up to an equivalent of \$22,369 U.S. dollars. One of the borrowing arrangements has an interest rate based on the Tokyo Interbank Offer Rate at the time of borrowing and the other has an interest rate based on the Japanese Short-term Prime Lending Rate. There were no borrowings outstanding under these arrangements at June 30, 2016 and December 31, 2015.

The Company assumed various revolving lines of credit and a financing facility with the completion of the Newport Merger. These revolving lines of credit and financing facility have no expiration date and provided for aggregate borrowings as of June 30, 2016 of up to an equivalent of \$9,726 U.S. dollars. Both revolving lines of credit have a base interest rate of 1.25% plus a Japanese Yen overnight LIBOR rate.

One of the Company’s Austrian subsidiaries has four outstanding loans from the Austrian government to fund research and development. These loans are unsecured and do not require principal repayment as long as certain conditions are met. Interest on these loans is payable semi-annually. The interest rates associated with these loans range from 0.75% - 2.00%.

	June 30, 2016
Short-term debt:	
Japanese lines of credit	\$ 5,050
Japanese receivables financing facility	308
Other short-term obligations	20
Current portion of Term Loan Facility	7,300
	\$ 12,678
Long-term debt:	
Austrian loans due through March 2020	\$ 585
Term Loan Facility, net (1)	696,321
	\$ 696,906

(1) Net of original issuance discount and refinance premium of \$13,871 and deferred financing fees of \$12,508.

For the three and six months ended June 30, 2016, the Company recognized interest expense of \$8,397 in relation to the Term Loan Facility, including \$2,368 related to deferred finance fees, original issue discount and a repricing fee.

Contractual maturities of the Company’s debt obligations as of June 30, 2016 are as follows:

Year	Amount
2016 (remaining)	\$ 9,008
2017	7,393
2018	7,312
2019	7,722
2020	7,344
2021	7,300
Thereafter	689,850

12) Product Warranties

The Company records the estimated costs to fulfill customer warranty obligations upon the recognition of the related revenue. While the Company engages in extensive product quality programs and processes, including actively monitoring and evaluating the quality of its component suppliers, the Company’s warranty obligation is affected by shipment volume, product failure rates, utilization levels, material usage, and supplier warranties on parts delivered to the Company. Should actual product failure rates, utilization levels, material usage, or supplier warranties on parts differ from the Company’s estimates, revisions to the estimated warranty liability would be required. The product warranty liability is included in other current liabilities in the condensed consolidated balance sheet.

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Product warranty activities were as follows:

	<u>Six Months Ended June 30,</u>	
	<u>2016</u>	<u>2015</u>
Beginning of period	\$ 5,205	\$ 6,266
Assumed product warranty liability from Newport Merger	3,040	—
Provision for product warranties	2,991	2,095
Direct charges to warranty liability	(3,202)	(2,434)
Foreign currency translation	8	(51)
End of period (1)	<u>\$ 8,042</u>	<u>\$ 5,876</u>

(1) Short-term product warranty of \$7,936 and long-term product warranty of \$106 are included in other current liabilities and other liabilities, respectively, in the accompanying condensed consolidated balance sheet.

13) Pension Plans

As a result of the Newport Merger, the Company has assumed all assets and liabilities of Newport's defined benefit pension plans, which cover substantially all of its full-time employees in France, Germany, Israel and Japan. In addition, there are certain pension liabilities relating to former employees in the United Kingdom. The German plan is unfunded, as permitted under the plan and applicable laws.

For financial reporting purposes, the calculation of net periodic pension costs was based upon a number of actuarial assumptions including a discount rate for plan obligations, an assumed rate of return on pension plan assets and an assumed rate of compensation increase for employees covered by the plan. All of these assumptions were based upon management's judgment, considering all known trends and uncertainties. Actual results that differ from these assumptions would impact future expense recognition and the cash funding requirements of the Company's pension plans.

The Company has included the net periodic benefit costs for the plans from the date of the acquisition on April 29, 2016 through June 30, 2016. The net periodic benefit costs included the following components:

	<u>Two months ended</u>	
	<u>June 30, 2016</u>	
Service cost	\$	403
Interest cost on projected benefit obligations		80
Expected return on plan assets		(31)
	<u>\$</u>	<u>452</u>

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The projected benefit obligation and plan assets assumed as part of the acquisition, the changes to these amounts and their balances as of June 30, 2016 were as follows:

	June 30, 2016
Change in projected benefit obligations:	
Liabilities assumed through acquisition on April 29, 2016	\$ 22,563
Service cost	403
Interest cost	80
Benefits paid	(121)
Currency translation adjustments	(598)
Projected benefit obligation as of June 30, 2016	<u>\$ 22,327</u>
Change in plan assets:	
Assets assumed through acquisition on April 29, 2016	7,907
Company contributions	35
Gain on plan assets	23
Fair value of plan assets as of June 30, 2016	<u>7,965</u>
Funded status	<u>\$ (14,362)</u>
Amounts recognized in the balance sheet:	
Current portion of pension liabilities	\$ (100)
Pension liabilities	(14,262)
Net amount recognized	<u>\$ (14,362)</u>

The Company's Israeli subsidiaries have pension plans that are accounted for using the shut-down method of accounting. Under the shut-down method, the liability is calculated as if it was payable as of each balance sheet date, on an undiscounted basis and plan assets are reported separate from the pension liability. As a result, the Israeli plan assets and vested benefit obligation are not included in the Company's plan assets and projected benefit obligation shown above. These Israeli plans had assets of \$13,611 and vested benefit obligations of \$16,147, which were presented on a gross basis as of June 30, 2016. Israeli plan assets and liabilities are included in other assets and other liabilities, respectively in the accompanying condensed consolidated balance sheet.

Other Pension-Related Assets

As of June 30, 2016, the Company had assets with an aggregate market value of \$5,930, which it has set aside in connection with its German pension plans. These assets are invested in group insurance contracts through the insurance company administering these plans, in accordance with applicable pension laws. Because these assets were not separate legal assets of the pension plan, they were not included in the Company's plan assets shown above. However, the Company has designated such assets to pay pension benefits and these assets are included in long-term investments in the accompanying condensed consolidated balance sheet.

14) Income Taxes

The Company's effective tax rate for the three and six months ended June 30, 2016 was 25.5% and 26.0%, respectively. The effective tax rate for the three and six months ended June 30, 2016 was lower than the U.S. statutory tax rate primarily due to the geographic mix of income and profits earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, the federal research credit and the deduction for domestic production activities, offset by non-deductible acquisition-related costs and state income taxes. The Company's effective tax rate for the three and six months ended June 30, 2015 was 29.1% and 29.0%, respectively. The effective tax rate for the three and six months ended June 30, 2015 was lower than the U.S. statutory tax rate primarily due to the geographic mix of income and profits earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate and the deduction for domestic production activities.

As of June 30, 2016, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$23,740. At December 31, 2015, the total amount of gross unrecognized tax benefits, which excludes interest and penalties, was approximately \$4,332. The net increase from December 31, 2015 was primarily attributable to the addition of historical Newport gross unrecognized tax benefits included as a result of the Newport Merger. As of June 30, 2016, if these gross unrecognized tax benefits were recognized in a future period, the timing of which is not estimable, the net unrecognized tax benefit of \$20,000, excluding interest and penalties, would impact the Company's effective tax rate. The Company accrues interest expense, and if applicable, penalties, for any uncertain tax positions.

MKS INSTRUMENTS, INC.
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Interest and penalties are classified as a component of income tax expense. As of June 30, 2016 and December 31, 2015, the Company had accrued interest on unrecognized tax benefits of approximately \$746 and \$157, respectively.

Over the next 12 months it is reasonably possible that the Company may recognize approximately \$3,015 of previously net unrecognized tax benefits, excluding interest and penalties, related to various U.S. federal, state and foreign tax positions primarily as a result of the expiration of certain statutes of limitations.

The Company and its subsidiaries are subject to examination by U.S. federal, state and foreign tax authorities. The United States Internal Revenue Service commenced an examination of the Company's U.S. federal tax filings for tax years 2011 through 2013 during the quarter ended March 31, 2015. The audit was effectively settled during the three months ended December 31, 2015 upon the Company's acceptance of the income tax examination changes. As part of the audit, the Company consented to extend the U.S. statute of limitations for tax year 2011 until September 30, 2016.

The U.S. statute of limitations remains open for tax years 2011 through present. The statute of limitations for the Company's tax filings in other jurisdictions varies between fiscal years 2007 through present. The Company also has certain federal credit carry-forwards and state tax loss and credit carry-forwards that are open for examination for tax years 2000 through present.

15) Interest and Other (Expense) Income, Net

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Interest and other income	\$ 569	\$ 828	\$ 1,493	\$ 1,369
Interest (expense)	(8,474)	(38)	(8,519)	(75)
Impact of foreign exchange income	1,087	—	1,454	—
Interest and other (expense) income, net	<u>\$ (6,818)</u>	<u>\$ 790</u>	<u>\$ (5,572)</u>	<u>\$ 1,294</u>

In 2016, the Company reclassified the impact of foreign exchange income (expense) from selling, general and administrative expenses to interest and other (expense) income, net. The amount included in selling, general and administrative expenses for the three and six months ended June 30, 2015 was \$(337) of expense and \$548 of income, respectively.

16) Net Income Per Share

The following table sets forth the computation of basic and diluted net income per share:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Numerator:				
Net income	<u>\$ 9,210</u>	<u>\$ 33,220</u>	<u>\$ 26,773</u>	<u>\$ 67,006</u>
Denominator:				
Shares used in net income per common share – basic	53,461,000	53,384,000	53,348,000	53,299,000
Effect of dilutive securities:				
Stock options, restricted stock, stock appreciation rights and employee stock purchase plan	<u>345,000</u>	<u>205,000</u>	<u>337,000</u>	<u>260,000</u>
Shares used in net income per common share – diluted	<u>53,806,000</u>	<u>53,589,000</u>	<u>53,685,000</u>	<u>53,559,000</u>
Net income per common share:				
Basic	\$ 0.17	\$ 0.62	\$ 0.50	\$ 1.26
Diluted	\$ 0.17	\$ 0.62	\$ 0.50	\$ 1.25

Basic earnings per share ("EPS") is computed by dividing income available to common stockholders by the weighted-average number of common shares outstanding during the period. The computation of diluted EPS is similar to the computation of basic EPS except that the denominator is increased to include the number of additional common shares that would have been outstanding (using the treasury stock method) if securities containing potentially dilutive common shares (stock options, restricted stock units and stock appreciation rights) had been converted to such common shares, and if such assumed conversion is dilutive.

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NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
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17) Stockholder's Equity

Stock Repurchase Program

On July 25, 2011, the Company's Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of \$200,000 of its outstanding common stock from time to time in open market purchases, privately negotiated transactions or through other appropriate means. The timing and quantity of any shares repurchased depends upon a variety of factors, including business conditions, stock market conditions, debt agreement limitations and business development activities, including, but not limited to, merger and acquisition opportunities. These repurchases may be commenced, suspended or discontinued at any time without prior notice.

During the six months ended June 30, 2016, the Company repurchased approximately 45,000 shares of its common stock for \$1,545, or an average price of \$34.50 per share. During the six months ended June 30, 2015, the Company repurchased approximately 116,000 shares of its common stock for \$4,341, or an average price of \$37.55 per share.

Cash Dividends

Holders of the Company's common stock are entitled to receive dividends when they are declared by the Company's Board of Directors. During the six months ended June 30, 2016, the Company's Board of Directors declared a cash dividend of \$0.17 per share in the first and second quarters of 2016, which totaled \$18,141. During the six months ended June 30, 2015, the Company's Board of Directors declared a cash dividend of \$0.165 per share in the first quarter of 2015 and a cash dividend of \$0.17 per share in the second quarter of 2015, which totaled \$17,868.

On July 25, 2016, the Company's Board of Directors declared a quarterly cash dividend of \$0.17 per share to be paid on September 9, 2016 to shareholders of record as of August 29, 2016. Future dividend declarations, if any, as well as the record and payment dates for such dividends, are subject to the final determination of the Company's Board of Directors.

18) Stock-Based Compensation

In connection with the completion of the Newport Merger, the Company assumed:

- all restricted stock units ("RSUs") granted under any Newport equity plan that were outstanding immediately prior to the effective time of the Newport Merger, and as to which shares of Newport common stock were not fully distributed in connection with the closing of the Newport Merger, and
- all stock appreciation rights granted under any Newport equity plan, whether vested or unvested, that were outstanding immediately prior to the effective time of the Newport Merger.

As of the effective time of the Newport Merger, based on a formula provided in the Merger Agreement, (a) such RSUs were converted automatically into RSUs with respect to 360,674 shares of the Company's common stock (the "Assumed RSUs"), and (b) such stock appreciation rights were converted automatically into stock appreciation rights with respect to 899,851 shares of the Company's common stock (the "Assumed SARs").

Included in the total number of Assumed RSUs were 36,599 shares for outside directors that were part of the Newport Deferred Compensation plan (the "DC Plan"), of which 19,137 shares were released from the DC Plan in May 2016. The remaining 17,462 shares will not become issued shares until their respective release dates.

The shares of the Company's common stock that are subject to the Assumed SARs and the Assumed RSUs are issuable pursuant to the Company's 2014 Stock Incentive Plan (the "Plan").

The 1,260,525 shares of the Company's common stock that are issuable pursuant to the Assumed RSUs and the Assumed SARs under the Plan were registered under the Securities Act of 1933 on the Registration Statement on Form S-8. These shares are in addition to the 18,000,000 shares of the Company's common stock reserved for issuance under the Plan and previously registered under the Securities Act of 1933 on the Registration Statement on Form S-8.

During the six months ended June 30, 2016, the Company granted 695,284 RSUs with a weighted average grant date fair value of \$35.17 and the Company did not grant any stock appreciation rights during the six months ended June 30, 2016.

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The total stock-based compensation expense included in the Company’s consolidated statements of income and comprehensive income was as follows:

	<u>Three Months Ended June 30,</u>		<u>Six Months Ended June 30,</u>	
	2016	2015	2016	2015
Cost of revenues	\$ 890	\$ 578	\$ 1,330	\$ 1,057
Research and development expense	689	428	1,063	850
Selling, general and administrative expense	8,937	2,560	12,275	4,871
Total pre-tax stock-based compensation expense	<u>\$ 10,516</u>	<u>\$ 3,566</u>	<u>\$ 14,668</u>	<u>\$ 6,778</u>

At June 30, 2016, the total compensation expense related to unvested stock-based awards granted to employees, officers and directors under the Company’s stock-based compensation plan that had not been recognized was \$33,207, net of estimated forfeitures. The future compensation expense is recognized on a straight-line basis over the requisite service period, net of estimated forfeitures except for retirement eligible employees in which the Company expenses the fair value of the grant in the period the grant is issued. The Company considers many factors when estimating expected forfeitures, including types of awards and historical experience. Actual results, and future changes in estimates, may differ substantially from the Company’s current estimates.

The following table presents the activity for RSUs under the Plan:

	<u>Six Months Ended June 30, 2016</u>	
	Non-vested RSUs	Weighted Average Grant Date Fair value
Non-vested RSUs – beginning of period	733,162	\$ 30.94
Assumed shares from Newport Merger	324,075	35.01
Granted	695,284	35.17
Vested	(429,484)	31.17
Forfeited or expired	(37,585)	32.56
Non-vested RSUs – end of period	<u>1,285,452</u>	<u>\$ 34.19</u>

For the three and six months ended June 30, 2016, there were approximately 1,000 weighted-average restricted stock units that would have an anti-dilutive effect on EPS, and would thus need to be excluded from the computation of diluted weighted-average shares.

As of June 30, 2015, stock options and restricted stock units related to an aggregate of approximately 772,000 shares were outstanding. For the three and six months ended June 30, 2015, there were no weighted-average shares of restricted stock units and stock options that were excluded from the computation of diluted weighted-average shares outstanding that would have an anti-dilutive effect on EPS.

At June 30, 2016, the Company’s outstanding and exercisable stock appreciation rights, the weighted-average base value, the weighted average remaining contractual life and the aggregate intrinsic value thereof, were as follows:

	Number of shares	Weighted Average Base Value	Weighted Average Remaining Contractual Life (years)	Aggregate Intrinsic Value
Stock appreciation rights outstanding	746,184	\$ 27.87	4.3	\$ 11,334
Stock appreciation rights exercisable	506,436	\$ 26.57	3.7	\$ 8,349

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19) Business Segment, Geographic Area, Product and Significant Customer Information

The Company is a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. The Company also provides services relating to the maintenance and repair of products it sells, software maintenance, installation services and training.

The Company's Chief Operating Decision Maker ("CODM") utilizes financial information to make decisions about allocating resources and assessing performance for the entire Company, which is used in the decision making process to assess performance. Based upon the information provided to the CODM, the Company has determined it has two reportable segments.

Effective April 29, 2016, in conjunction with the Newport Merger, the Company changed its reportable segments based upon the organizational structure of the Company and how the CODM utilizes information provided to allocate resources and make decisions. The Company's two reportable segments are the Vacuum & Analysis Division and the Light & Motion Division.

The Vacuum & Analysis Division provides a broad range of instruments, components, subsystems and software which are derived from the Company's core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control and information technology, ozone generation and delivery, RF & DC power, reactive gas generation and vacuum technology.

The Light & Motion Division provides a broad range of instruments, components and subsystems which are derived from the Company's core competencies in lasers, photonics, sub-micron positioning, vibration isolation and optics.

The Company derives its segment results directly from the manner in which results are reported in its management reporting system. The accounting policies that the Company uses to derive reportable segment results are substantially the same as those used for external reporting purposes. The Company does not disclose external or intersegment revenues separately by reportable segment as this information is not presented to the CODM for decision making purposes.

The following is net revenues by reportable segment:

	<u>Three Months Ended June 30,</u>		<u>Six Months Ended June 30,</u>	
	<u>2016</u>	<u>2015</u>	<u>2016</u>	<u>2015</u>
Vacuum & Analysis Division	\$ 207,359	\$ 217,966	\$391,040	\$ 431,805
Light & Motion Division	118,502	—	118,502	—
	<u>\$ 325,861</u>	<u>\$ 217,966</u>	<u>\$509,542</u>	<u>\$ 431,805</u>

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The following is a reconciliation of segment gross profit to consolidated net income:

	<u>Three Months Ended June 30,</u>		<u>Six Months Ended June 30,</u>	
	2016	2015	2016	2015
Gross profit by reportable segment:				
Vacuum & Analysis Division	\$ 90,859	\$ 98,798	\$168,772	\$ 195,844
Light & Motion Division	45,054	—	45,054	—
Total gross profit by reportable segment	135,913	98,798	213,826	195,844
Operating expenses:				
Research and development	28,214	17,567	45,441	34,247
Selling, general and administrative	71,429	33,269	105,379	64,136
Acquisition costs	8,205	—	10,699	30
Restructuring	24	219	24	1,007
Amortization of intangible assets	8,855	1,709	10,538	3,380
Income from operations	19,186	46,034	41,745	93,044
Interest and other (expense) income, net	(6,818)	790	(5,572)	1,294
Income before income taxes	12,368	46,824	36,173	94,338
Provision for income taxes	3,158	13,604	9,400	27,332
Net income	<u>\$ 9,210</u>	<u>\$ 33,220</u>	<u>\$ 26,773</u>	<u>\$ 67,006</u>

The following is capital expenditures by reportable segment for the three and six months ended June 30, 2016 and 2015:

	<u>Vacuum & Analysis Division</u>	<u>Light & Motion Division</u>	<u>Total</u>
Three Months Ended June 30, 2016:			
Capital expenditures	<u>\$ 3,036</u>	<u>\$ 2,072</u>	<u>\$5,108</u>
Six Months Ended June 30, 2016:			
Capital expenditures	<u>\$ 5,192</u>	<u>\$ 2,072</u>	<u>\$7,264</u>
Three Months Ended June 30, 2015:			
Capital expenditures	<u>\$ 2,830</u>	<u>\$ —</u>	<u>\$2,830</u>
Six Months Ended June 30, 2015:			
Capital expenditures	<u>\$ 5,334</u>	<u>\$ —</u>	<u>\$5,334</u>

The following is depreciation and amortization by reportable segment for the three and six months ended June 30, 2016 and 2015:

	<u>Vacuum & Analysis Division</u>	<u>Light & Motion Division</u>	<u>Total</u>
Three Months June 30, 2016:			
Depreciation and amortization	<u>\$ 5,209</u>	<u>\$ 11,221</u>	<u>\$16,430</u>
Six Months Ended June 30, 2016:			
Depreciation and amortization	<u>\$ 10,487</u>	<u>\$ 11,221</u>	<u>\$21,708</u>

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	Vacuum & Analysis Division	Light & Motion Division	Total
Three Months Ended June 30, 2015:			
Depreciation and amortization	\$ 5,550	\$ —	\$ 5,550
Six Months Ended June 30, 2015:			
Depreciation and amortization	\$ 11,082	\$ —	\$ 11,082

Total income tax expense is impracticable to present by reportable segment because the necessary information is not available or used by the CODM.

The following is segment assets by reportable segment:

June 30, 2016:	Vacuum & Analysis Division	Light & Motion Division	Total
Segment assets:			
Accounts receivable	\$ 124,629	\$ 109,322	\$ 233,951
Inventory	155,647	122,713	278,360
Total segment assets	\$ 280,276	\$ 232,035	\$ 512,311

December 31, 2015:	Vacuum & Analysis Division	Light & Motion Division	Total
Segment assets:			
Accounts receivable	\$ 101,883	\$ —	\$ 101,883
Inventory	152,631	—	152,631
Total segment assets	\$ 254,514	\$ —	\$ 254,514

A reconciliation of segment assets to consolidated total assets is as follows:

	June 30, 2016	December 31, 2015
Total segment assets	\$ 512,311	\$ 254,514
Cash and cash equivalents and investments	440,878	658,237
Other current assets, including restricted cash	63,554	26,760
Property, plant and equipment, net	184,221	68,856
Goodwill and intangible assets, net	1,019,588	243,730
Other assets	24,576	21,250
Consolidated total assets	\$ 2,245,128	\$ 1,273,347

Goodwill associated with the Company's reportable segments is as follows:

	June 30, 2016	December 31, 2015
Reportable segment:		
Vacuum & Analysis Division	\$ 199,903	\$ 199,703
Light & Motion Division	392,702	—
Total goodwill	\$ 592,605	\$ 199,703

MKS INSTRUMENTS, INC.
 NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
 (in thousands, except share and per share data)

Worldwide Product Information

The Company groups its products into six groups of similar products based upon the similarity of product function. Worldwide net revenue for each group of products is as follows:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Instruments, Control & Vacuum Products	\$ 108,172	\$ 110,441	\$202,650	\$ 220,877
Power & Reactive Gas Products	83,854	92,977	160,970	181,476
Analytical Solutions Products	15,340	14,548	27,427	29,452
Photonics Products	45,864	—	45,864	—
Optics Products	35,263	—	35,263	—
Lasers Products	37,368	—	37,368	—
	<u>\$ 325,861</u>	<u>\$ 217,966</u>	<u>\$509,542</u>	<u>\$ 431,805</u>

Sales of Instruments, Control & Vacuum Products, Power & Reactive Gas Products and Analytical Solutions Products are included in the Company's Vacuum & Analysis Division segment. Sales of Photonics Products, Optics Products and Lasers Products are included in the Light & Motion Division segment.

Geographic

Information about the Company's operations in different geographic regions is presented in the tables below. Net revenues to unaffiliated customers are based on the location in which the sale originated. Transfers between geographic areas are at negotiated transfer prices and have been eliminated from consolidated net revenues.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Net revenues:				
North America	\$ 168,471	\$ 123,413	\$262,689	\$ 243,594
Korea	26,048	27,349	46,598	59,421
Japan	25,532	17,046	41,768	34,302
Asia (excluding Korea and Japan)	64,891	30,743	98,347	54,426
Europe	40,919	19,415	60,140	40,062
	<u>\$ 325,861</u>	<u>\$ 217,966</u>	<u>\$509,542</u>	<u>\$ 431,805</u>

	June 30, 2016	December 31, 2015
Long-lived assets:(1)		
North America	\$ 128,660	\$ 56,594
Europe	31,287	5,783
Asia	49,310	8,952
	<u>\$ 209,257</u>	<u>\$ 71,329</u>

(1) Long-lived assets include property, plant and equipment, net and certain other long-term assets, excluding long-term tax related accounts.

Major Customers

The Company had two customers with net revenues greater than 10% of total net revenues in the periods shown as follows:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Applied Materials, Inc.	13.5%	18.1%	15.4%	17.8%
LAM Research Corporation	8.9%	13.2%	11.8%	12.7%

MKS INSTRUMENTS, INC.
NOTES TO UNAUDITED CONDENSED CONSOLIDATED FINANCIAL STATEMENTS – (continued)
(in thousands, except share and per share data)

20) Commitments and Contingencies

On March 9, 2016, a putative class action lawsuit captioned *Dixon Chung v. Newport Corp., et al*, Case No. A-16-733154-C, was filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport for claims related to the Merger Agreement. The complaint, filed on March 9, 2016, named as defendants the Company, Newport, Merger Sub, and certain members of Newport's former board of directors. The complaint alleges that the named directors breached their fiduciary duties to Newport's stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, and by agreeing to unfair deal protection devices. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors' alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, monetary damages, and an award of attorneys' and other fees and costs, among other relief. On March 25, 2016, the plaintiff in the Chung action filed an amended complaint, which adds certain allegations, including that the preliminary proxy statement filed by Newport on March 15, 2016 (the "Proxy") omitted material information. The amended complaint also names as defendants the Company, Newport, Merger Sub, and then-current members of Newport's board of directors.

Also on March 25, 2016, a second putative class action complaint captioned *Hubert C. Pincon v. Newport Corp., et al.*, Case No. A-16-734039-B, was filed in the District Court, Clark County, Nevada, on behalf of a putative class of the Newport's stockholders for claims related to the Merger Agreement. The complaint names as defendants the Company, Newport, and Merger Sub and the then-current members of Newport's former board of directors. It alleges that the named directors breached their fiduciary duties to Newport's stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices, and by omitting material information from the Proxy. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors' alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, and an award of attorneys' and other fees and costs, among other relief.

On April 14, 2016, the Court granted plaintiffs' motion to consolidate the Pincon and Chung actions and appointed counsel in the Pincon action as lead counsel. Also on April 14, 2016, the Court granted plaintiffs' motion for expedited discovery and scheduled a hearing on plaintiffs' anticipated motion for a preliminary injunction for April 25, 2016. On April 20, 2016, plaintiffs filed a motion to vacate the hearing on their anticipated motion for a preliminary injunction and notified the Court that they did not presently intend to file a motion for a preliminary injunction regarding the Merger Agreement. On April 22, 2016, the Court vacated the hearing on plaintiffs' anticipated motion for a preliminary injunction.

The Company believes that the claims asserted in the complaints have no merit and the Company, Newport, Merger Sub and the named directors intend to defend vigorously against these claims.

We are also subject to various other legal proceedings and claims, which have arisen in the ordinary course of business. In our opinion, the ultimate disposition of these matters will not have a material adverse effect on our results of operations, financial condition or cash flows.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS.

This Quarterly Report on Form 10-Q contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). When used herein, the words "believes," "anticipates," "plans," "expects," "estimates," "would," "will," "intends" and similar expressions are intended to identify forward-looking statements. These forward-looking statements reflect management's current opinions and are subject to certain risks and uncertainties that could cause results to differ materially from those stated or implied. While we may elect to update forward looking statements in the future, we specifically disclaim any obligation to do so even if our estimates or expectations change. Risks and uncertainties include, but are not limited to those discussed in Part II, Item 1A "Risk Factors" of this Quarterly Report on Form 10-Q.

Overview

We are a global provider of instruments, subsystems and process control solutions that measure, control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. We also provide services relating to the maintenance and repair of our products, software maintenance, installation services and training.

Our products are derived from our core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control and information technology, ozone generation and delivery, RF & DC power, reactive gas generation, vacuum technology, lasers, photonics, sub-micron positioning, vibration isolation and optics. Our primary served markets include semiconductor capital equipment, general industrial, life sciences and research.

Acquisition of Newport Corporation

On April 29, 2016, we completed our acquisition of Newport Corporation ("Newport") pursuant to an Agreement and Plan of Merger dated as of February 22, 2016 (the "Newport Merger"). At the effective time of the Newport Merger, each share of Newport's common stock issued and outstanding as of immediately prior to the effective time of the Newport Merger was converted into the right to receive \$23.00 in cash, without interest and subject to deduction for any required withholding tax. We paid to the former Newport stockholders aggregate consideration of approximately \$905 million, excluding related transaction fees and expenses, and repaid approximately \$93 million of Newport's U.S. indebtedness outstanding as of immediately prior to the effective time of the Newport Merger. We funded the payment of the aggregate consideration with a combination of our available cash on hand of approximately \$240 million and the proceeds from the senior secured term loan facility of \$780 million described below.

Newport is a global supplier of advanced-technology products and systems to customers in the scientific research and defense/security, microelectronics, life and health sciences and industrial manufacturing markets.

Effective April 29, 2016, in conjunction with our acquisition of Newport, we changed the structure of our reportable segments based upon our organizational structure and how our Chief Operating Decision Maker utilizes information provided to allocate resources and make decisions. Our two reportable segments are the Vacuum & Analysis Division and the Light & Motion Division.

The Vacuum & Analysis Division provides a broad range of instruments, components, subsystems and software which are derived from our core competencies in pressure measurement and control, flow measurement and control, gas and vapor delivery, gas composition analysis, residual gas analysis, leak detection, control and information technology, ozone generation and delivery, RF & DC power, reactive gas generation and vacuum technology.

The Light & Motion Division provides a broad range of instruments, components and subsystems which are derived from our core competencies in lasers, photonics, sub-micron positioning, vibration isolation and optics.

For the six months ended June 30, 2016 and 2015, approximately 61% and 71% of our net revenues, respectively, were from sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers. As a result of our acquisition of Newport, we expect that sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers will account for approximately 50% of our total sales in future periods.

Net revenues from semiconductor capital equipment manufacture and semiconductor device manufacture customers increased by 13% and 1% for the three and six months ended June 30, 2016, compared to the same periods in the prior year. These increases are primarily attributed to net semiconductor revenues from the Newport Merger of \$27.2 million for the three and six months ended June 30, 2016. These increases for the three and six months ended June 30, 2016 are offset by decreases in net revenues from our semiconductor capital

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equipment manufacture and semiconductor device manufacture customers, from the legacy MKS business of \$7.1 million and \$23.5 million for the three and six months ended June 30, 2016, respectively. The semiconductor capital equipment industry is subject to rapid demand shifts, which are difficult to predict, and we are uncertain as to the timing or extent of future demand or any future weakness in the semiconductor capital equipment industry.

Our net revenues from customers in other advanced markets, which exclude semiconductor capital equipment and semiconductor device manufacture customers, increased by 138% and 59% for the three and six months ended June 30, 2016, compared to the same periods in the prior year. These increases are primarily attributed to net revenues from customers in other advanced markets resulting from the Newport Merger of \$91.3 million for the three and six months ended June 30, 2016. These increases are offset by decreases in net revenues from customers in other advanced markets from the legacy MKS business of \$3.5 million and \$17.2 million for the three and six months ended June 30, 2016, respectively. Revenues from customers in other advanced markets are made up of many different markets, including semiconductor capital equipment, general industrial, life sciences and research. Some of these markets are project-based and our revenues can fluctuate quarter to quarter.

A significant portion of our net revenues is from sales to customers in international markets. For the six months ended June 30, 2016 and 2015, international net revenues accounted for approximately 48% and 44% of our total net revenues, respectively. A significant portion of our international net revenues were in Korea, Japan and Israel. As a result of our Newport Merger, we expect that international net revenues will continue to represent a significant percentage of our total net revenues.

Recent Events

In connection with the completion of the Newport Merger, we entered into a term loan credit agreement (the “Credit Agreement”) with Barclays Bank PLC as administrative agent and collateral agent, that provided senior secured financing of \$780 million, subject to increase in accordance with the terms of the Credit Agreement.

In June 2016, we entered into an amendment to the Credit Agreement (the “Repricing Amendment”) where we decreased the applicable margin for borrowings by 0.50%. In connection with the Repricing Amendment we paid a prepayment premium of 1.0% or \$7.3 million, as well as certain fees and expenses. Immediately prior to the effectiveness of the Repricing Amendment, we prepaid \$50 million of principal under the Credit Agreement, reducing the outstanding principal balance from \$780 million to \$730 million.

In connection with the completion of the Newport Merger, we also entered into an asset-based credit agreement with Deutsche Bank AG New York Branch as administrative agent and collateral agent, that provides senior secured financing of up to \$50 million, subject to a borrowing base limitation, none of which has been drawn down to date.

Critical Accounting Policies and Estimates

The preparation of our consolidated financial statements and related disclosures in conformity with accounting principles generally accepted in the United States of America requires management to make judgments, assumptions and estimates that affect the amounts reported. There have been no material changes in our critical accounting policies since December 31, 2015. For further information, please see the discussion of critical accounting policies in our Annual Report on Form 10-K for the year ended December 31, 2015 in the section captioned “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Critical Accounting Policies and Estimates.”

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Results of Operations

The following table sets forth, for the periods indicated, the percentage of total net revenues of certain line items included in our consolidated statements of operations and comprehensive income data.

	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Net revenues:				
Product	87.6%	86.4%	86.2%	86.7%
Services	12.4	13.6	13.8	13.3
Total net revenues	100.0	100.0	100.0	100.0
Cost of revenues:				
Cost of product revenues	50.3	45.8	48.9	46.0
Cost of service revenues	8.0	8.9	9.1	8.7
Total cost of revenues (exclusive of amortization shown separately below)	58.3	54.7	58.0	54.7
Gross profit	41.7	45.3	42.0	45.3
Research and development	8.7	8.0	8.9	7.9
Selling, general and administrative	21.9	15.3	20.7	14.9
Acquisition costs	2.5	—	2.1	—
Restructuring	—	0.1	—	0.2
Amortization of intangible assets	2.7	0.8	2.1	0.8
Income from operations	5.9	21.1	8.2	21.5
Interest (expense) income, net	(2.1)	0.3	(1.1)	0.3
Income from operations before income taxes	3.8	21.4	7.1	21.8
Provision for income taxes	1.0	6.2	1.8	6.3
Net income	2.8%	15.2%	5.3%	15.5%

Net Revenues

(dollars in millions)	Three Months Ended June 30,			Six Months Ended June 30,		
	2016	2015	% Change	2016	2015	% Change
Product	\$285.5	\$188.3	51.6%	\$439.1	\$374.4	17.3%
Service	40.4	29.7	36.1	70.4	57.4	22.7
Total net revenues	\$325.9	\$218.0	49.5%	\$509.5	\$431.8	18.0%

Product revenues increased \$97.2 million and \$64.7 million during the three and six months ended June 30, 2016, respectively, compared to the same periods in the prior year. These increases were primarily attributed to the Newport Merger, which had product revenues of \$109.6 million for the three and six months ended June 30, 2016. This was partially offset by decreases of \$12.4 million and \$44.9 million for the three and six months ended June 30, 2016, respectively, in our legacy MKS business, mainly as a result of a decrease in net revenues from our semiconductor capital equipment manufacture and semiconductor device manufacture customers, which decreased \$7.1 million and \$23.5 million for the three and six months ended June 30, 2016, respectively, primarily due to volume.

Service revenues consisted mainly of fees for services related to the maintenance and repair of our products and software services, installation and training. Service revenues increased \$10.7 million and \$13.0 million during the three and six months ended June 30, 2016, respectively, compared to the same periods in the prior year. These increases for the three and six months ended June 30, 2016, compared to the same periods in the prior year, were primarily attributable to the Newport Merger which had service revenues of \$8.9 million for the three and six months ended June 30, 2016.

Total international net revenues, including product and service, were \$157.4 million and \$246.9 million for the three and six months ended June 30, 2016, respectively, compared to \$94.6 million and \$188.2 million for the three and six months ended June 30, 2015, respectively. These increases of \$62.8 million and \$58.7 million for the three and six months ended June 30, 2016, compared to the same periods in the prior year, was primarily attributable to the Newport Merger, which had total international net revenues, of \$50.4 million for the three and six months ended June 30, 2016.

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The following is our net revenues by reportable segment:

(dollars in millions)	Three Months Ended June 30,			Six Months Ended June 30,		
	2016	2015	% Change	2016	2015	% Change
Net revenues:						
Vacuum & Analysis Division	\$207.4	\$218.0	(4.9)%	\$391.0	\$431.8	(9.4)%
Light & Motion Division	118.5	—	100.0	118.5	—	100.0
Total net revenues	<u>\$325.9</u>	<u>\$218.0</u>	<u>49.5%</u>	<u>\$509.5</u>	<u>\$431.8</u>	<u>18.0%</u>

Net revenues for our Vacuum & Analysis Division segment decreased \$10.6 million and \$40.8 million for the three and six months ended June 30, 2016, respectively. This segment represents the legacy MKS business. These decreases are primarily attributed to a decrease of \$7.1 million and \$23.5 million in net revenues from our semiconductor capital equipment manufacture and semiconductor device manufacture customers for the three and six months ended June 30, 2016, respectively. The remainder of the decreases for the three and six months ended June 30, 2016 are attributable to decreases in revenues from our other advanced markets, including general industrial, medical and solar markets.

Net revenues for our Light & Motion Division segment increased \$118.5 million for the three and six months ended June 30, 2016. This segment represents the legacy Newport business.

Gross Profit

	Three Months Ended June 30,			Six Months Ended June 30,		
	2016	2015	% Points Change	2016	2015	% Points Change
Gross profit as a percentage of net revenues:						
Product	42.6%	47.0%	(4.4)%	43.2%	47.0%	(3.8)%
Service	35.7	34.9	0.8	34.2	34.8	(0.6)
Total gross profit	<u>41.7%</u>	<u>45.3%</u>	<u>(3.6)%</u>	<u>42.0%</u>	<u>45.3%</u>	<u>(3.3)%</u>

Gross profit as a percentage of net product revenues decreased by 4.4 percentage points for the three months ended June 30, 2016, compared to the same period in the prior year. The decrease was primarily attributed to a decrease of 7.5 percentage points due to higher material costs, mainly from the \$10.1 million of inventory step-up amortization from the Newport Merger, partially offset by an increase of 4.0 percentage points from higher revenue volumes.

Gross profit as a percentage of net product revenues decreased by 3.8 percentage points for the six months ended June 30, 2016, compared to the same period in the prior year. The decrease was primarily attributed to a decrease of 4.3 percentage points due to higher material costs, mainly from the \$10.1 million of inventory step-up amortization from the Newport Merger.

Gross profit as a percentage of net service revenues increased by 0.8 percentage points for the three months ended June 30, 2016, compared to the same period in the prior year. The increase was primarily attributed to an increase of 1.9 percentage points due to lower direct labor costs, partially offset by a decrease of 1.2 percentage points due to unfavorable product mix. Cost of service revenues, including salaries and related expenses and other fixed costs, consists primarily of providing services for repair, software services and training.

Gross profit as a percentage of net service revenues decreased by 0.6 percentage points for the six months ended June 30, 2016, compared to the same period in the prior year. The decrease was primarily attributed to a decrease of 3.1 percentage points due to unfavorable product mix, partially offset by an increase of 2.3 percentage points due to lower overhead costs.

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The following is gross profit as a percentage of net revenues by reportable segment:

	Three Months Ended June 30,			Six Months Ended June 30,		
	2016	2015	% Points Change	2016	2015	% Points Change
Gross profit:						
Vacuum & Analysis Division	43.8%	45.3	(1.5)%	43.2%	45.3%	(2.1)%
Light & Motion Division	38.0	—	100.0	38.0	—	100.0
Total gross profit	<u>41.7%</u>	<u>45.3%</u>	<u>(3.6)%</u>	<u>42.0%</u>	<u>45.3%</u>	<u>(3.3)%</u>

Gross profit for our Vacuum & Analysis Division segment decreased by 1.5 percentage points and 2.1 percentage points for the three and six months ended June 30, 2016, respectively, compared to the same periods in the prior year. These decreases were caused mainly by negative product mix, lower revenue volumes and higher excess and obsolete inventory charges. The higher excess and obsolete inventory charges related to a large sell through credit of \$2.1 million that occurred in the second quarter of 2015.

Gross profit for our Light & Motion Division segment was 38% of net revenues for the three and six months ended June 30, 2016. This included a charge of \$10.1 million of inventory step-up amortization related to the acquisition. The Light & Motion Division segment was established in the second quarter of 2016 as a result of the Newport Merger.

Research and Development

(dollars in millions)	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Research and development expenses	\$ 28.2	\$ 17.6	\$ 45.4	\$ 34.2

Research and development expenses increased \$10.6 million for the three months ended June 30, 2016, compared to the same period in the prior year. The increase was primarily attributed to an increase of \$10.0 million from our Newport Merger in the second quarter of 2016, and consisted mainly of \$7.5 million of compensation and related benefits, \$0.9 million of project materials and \$0.8 million of occupancy costs.

Research and development expenses increased \$11.2 million for the six months ended June 30, 2016, compared to the same period in the prior year. The increase was primarily attributed to an increase of \$10.0 million from our Newport Merger in the second quarter of 2016, and consisted mainly of \$7.5 million of compensation costs and related benefits, \$0.9 million of project materials and \$0.8 million of occupancy costs.

Our research and development efforts are primarily focused on developing and improving our instruments, components, subsystems and process control solutions to improve process performance and productivity.

We have thousands of products and our research and development efforts primarily consist of a large number of projects related to these products, none of which is individually material to us. Current projects typically have durations of 3 to 30 months depending upon whether the product is an enhancement of existing technology or a new product. Our current initiatives include projects to enhance the performance characteristics of older products, to develop new products and to integrate various technologies into subsystems. These projects support in large part the transition in the semiconductor industry to smaller integrated circuit geometries and in the flat panel display and solar markets to larger substrate sizes, which require more advanced process control technology. Research and development expenses consist primarily of salaries and related expenses for personnel engaged in research and development, fees paid to consultants, material costs for prototypes and other expenses related to the design, development, testing and enhancement of our products.

We believe that the continued investment in research and development and ongoing development of new products are essential to the expansion of our markets, and we expect to continue to make significant investment in research and development activities. We are subject to risks if products are not developed in a timely manner, due to rapidly changing customer requirements and competitive threats from other companies and technologies. Our success primarily depends on our products being designed into new generations of equipment for the semiconductor industry and other advanced technology markets. We develop products that are technologically advanced so that they are positioned to be chosen for use in each successive generation of semiconductor capital equipment. If our products are not chosen to be designed into our customers' products, our net revenues may be reduced during the lifespan of those products.

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Selling, General and Administrative

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Selling, general and administrative expenses	\$ 71.4	\$ 33.3	\$ 105.4	\$ 64.1

Selling, general and administrative expenses increased by \$38.1 million for the three months ended June 30, 2016, compared to the same period in the prior year. The increase was primarily attributable to an increase of \$33.9 million from our Newport Merger, and consisted primarily of \$14.8 million of compensation costs and related benefits, \$10.3 million of integration costs related to the acquisition, \$2.3 million of consulting and professional fees, \$1.5 million of commissions and \$1.5 million of depreciation. The remaining increase of \$4.2 million relates primarily to the legacy MKS business and consists of \$2.7 million of compensation-related expenses, including the timing of stock compensation expense as well as the annual increase in certain compensation costs, and \$1.6 million of integration costs.

Selling, general and administrative expenses increased by \$41.3 million for the six months ended June 30, 2016, compared to the same period in the prior year. The increase was primarily attributed to an increase of \$33.9 million from our Newport Merger, and consisted primarily of \$14.8 million of compensation costs and related benefits, \$10.3 million of integration costs related to the acquisition, \$2.3 million of consulting and professional fees, \$1.5 million of commissions and \$1.5 million of depreciation. The remaining increase of \$7.4 million relates primarily to the legacy MKS business and consists of \$4.9 million of compensation-related expenses, including the timing of stock compensation expense as well as the annual increase in certain compensation costs, and \$1.6 million of integration costs.

Acquisition Costs

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Acquisition costs	\$ 8.2	\$ —	\$ 10.7	\$ —

We incurred \$8.2 million and \$10.7 million of acquisition costs in the three and six months ended June 30, 2016, respectively, related to our Newport Merger and was comprised mainly of bank fees and consulting and professional fees. We incurred \$30 thousand of acquisition costs in the six months ended June 30, 2015, which was comprised primarily of legal fees related to our acquisition of Precise, LLC (“Precise”), which closed during the first quarter of 2016.

Restructuring

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Restructuring	\$ —	\$ 0.2	\$ —	\$ 1.0

Restructuring expense for the three and six months ended June 30, 2015 included restructuring charges primarily related to severance costs associated with a reduction in workforce of approximately 120 people, primarily at one of our foreign manufacturing sites, as we outsourced a non-core manufacturing process.

Amortization of Intangible Assets

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Amortization of intangible assets	\$ 8.9	\$ 1.7	\$ 10.5	\$ 3.4

Amortization expense increased by \$7.2 million and \$7.1 million for the three and six months ended June 30, 2016. These increases were primarily attributable to \$7.2 million of amortization expense of intangible assets acquired through the Newport Merger. The remainder of the change is attributable to amortization of intangible assets from the Precise acquisition and changes in foreign exchange rates.

Interest and Other (Expense) Income, Net

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Interest and other (expense) income, net	\$ (6.8)	\$ 0.8	\$ (5.6)	\$ 1.3

Interest and other (expense) income of \$(6.8) million and \$(5.6) million for the three and six months ended June 30, 2016, respectively, includes \$8.5 million of interest expense recognized for the three and six months ended June 30, 2016, related to our senior secured Term Loan Facility.

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Provision for Income Taxes

<i>(dollars in millions)</i>	Three Months Ended June 30,		Six Months Ended June 30,	
	2016	2015	2016	2015
Provision for income taxes	\$ 3.2	\$ 13.6	\$ 9.4	\$ 27.3

Our effective tax rate for the three and six months ended June 30, 2016 was 25.5% and 26.0%, respectively. The effective tax rate for the three and six months ended June 30, 2016 was lower than the U.S. statutory tax rate primarily due to the geographic mix of income and profits earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate, the federal research credit and the deduction for domestic production activities offset by non-deductible acquisition related costs and state income taxes. During the three and six months ended June 30, 2016, the geographic mix of our pre-tax income was impacted by additional acquisition related costs associated with the Newport Merger, amortization of intangibles, reversal of other purchase accounting related charges and interest expense primarily located in the U.S. tax jurisdiction. The acquisition-related costs are treated as expenses in the financial reports but are largely capitalized for tax purposes. This reduction in overall taxable income as a result of the Newport Merger causing the reduction in US pre-tax income relative to the pre-tax income earned by our international subsidiaries served to reduce the overall effective tax rate. These effects of the acquisition on the tax rate are expected to diminish in future periods. Our effective tax rate for the three and six months ended June 30, 2015 was 29.1% and 29.0%, respectively. The effective tax rate for the three and six months ended June 30, 2015 was lower than the U.S. statutory tax rate primarily due to the geographic mix of income and profits earned by the Company's international subsidiaries being taxed at rates lower than the U.S. statutory tax rate and the impact of the deduction for domestic production activities.

Our future effective tax rate depends on various factors, including the impact of tax legislation, the geographic composition of our pre-tax income, and changes in tax reserves for unrecognized tax benefits. We monitor these factors and timely adjust our estimates of the effective tax rate accordingly. We expect that the geographic mix of pre-tax income will continue to have a favorable impact on our effective tax rate, however the geographic mix of pre-tax income can change based on multiple factors resulting in changes to the effective tax rate in future periods.

Additionally, the effective tax rate could be adversely affected by changes in the valuation of deferred tax assets and liabilities. In particular, the carrying value of deferred tax assets, which are predominantly in the United States, is dependent on our ability to generate sufficient future taxable income in the United States.

While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could materially differ from our accrued positions as a result of uncertain and complex application of tax law and regulations. We and our subsidiaries are subject to examination by U.S. federal, state and foreign tax authorities. The United States Internal Revenue Service commenced an examination of our U.S. federal tax filings for open tax years 2011 through 2013 during the three months ended March 31, 2015. This audit was effectively settled during the three months ended December 31, 2015 upon our acceptance of the income tax examination changes. Additionally, the recognition and measurement of certain tax benefits include estimates and judgment by management. Accordingly, we could record additional provisions or benefits for U.S. federal, state, and foreign taxes matters in future periods as new information becomes available.

Liquidity and Capital Resources

Cash and cash equivalents and short-term investments totaled \$425.6 million at June 30, 2016, compared to \$658.2 million at December 31, 2015.

Net cash provided by operating activities was \$49.4 million for the six months ended June 30, 2016 and resulted from net income of \$26.8 million, which included non-cash charges of \$54.3 million, offset by a net increase in working capital of \$31.7 million. The net increase in working capital was primarily due to an increase in trade accounts receivable of \$35.9 million, related to an increase in business activities, and an increase in other current assets and non-current assets of \$13.0 million. These increases in working capital were offset by an increase in accounts payable of \$7.4 million, an increase in income taxes of \$6.4 million and a decrease in inventories of \$3.9 million.

Net cash provided by operating activities was \$58.2 million for the six months ended June 30, 2015 and resulted mainly from net income of \$67.0 million, which included non-cash charges of \$23.8 million, partially offset by a net increase in working capital of \$32.6 million. The net increase in working capital was primarily due to an increase in trade accounts receivable of \$18.8 million and an increase in inventories of \$18.5 million, both related to an increase in business activities, an increase in other current assets of \$6.0 million and a decrease in accrued compensation of \$2.4 million. These increases in working capital were offset by an increase in other current and non-current liabilities of \$6.9 million and an increase in income taxes of \$6.4 million.

Net cash used in investing activities was \$595.6 million for the six months ended June 30, 2016 and resulted primarily from the Newport Merger for \$937.0 million and the purchase of production-related equipment of \$7.3 million, partially offset by the net sale and maturities of investments of \$351.3 million, which was used to partially finance the Newport Merger. Net cash used in investing

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activities of \$162.7 million for the six months ended June 30, 2015 resulted primarily from the net purchase of investments of \$147.5 million, cash primarily used for the acquisition of Precise of \$9.9 million and the purchase of production-related equipment of \$5.3 million.

Net cash provided by financing activities was \$677.0 million for the six months ended June 30, 2016 and resulted primarily from net proceeds of \$703.6 million related to the Credit Agreement used to finance the Newport Merger, partially offset by dividend payments made to common stockholders of \$18.1 million, restricted cash of \$5.6 million for collateral cash deposits relating to letters of credit and net payments related to tax payments made for employee stock awards of \$2.9 million.

Net cash used in financing activities was \$22.5 million for the six months ended June 30, 2015 and consisted primarily of dividend payments made to common stockholders of \$17.9 million, the repurchase of common stock for \$4.3 million and net payments related to tax payments made for employee stock awards of \$1.1 million.

On July 25, 2011, our Board of Directors approved a share repurchase program for the repurchase of up to an aggregate of \$200 million of our outstanding common stock from time to time in open market purchases, privately negotiated transactions or through other appropriate means. The timing and quantity of any shares repurchased depends upon a variety of factors, including business conditions, stock market conditions and business development activities, including but not limited to merger and acquisition opportunities. These repurchases may be commenced, suspended or discontinued at any time without prior notice.

During the six months ended June 30, 2016, we repurchased approximately 45,000 shares of our common stock for \$1.5 million, or an average price of \$34.50 per share. During the six months ended June 30, 2015, we repurchased approximately 116,000 shares of our common stock for \$4.3 million, or an average price of \$37.55 per share.

During the six months ended June 30, 2016, our Board of Directors declared a cash dividend of \$0.17 per share during the first and second quarters of 2016 that totaled \$18.1 million. During the six months ended June 30, 2015, our Board of Directors declared a cash dividend of \$0.165 per share during the first quarter of 2015 and a cash dividend of \$0.17 per share during the second quarter of 2015, which totaled \$17.9 million.

On July 25, 2016, our Board of Directors declared a quarterly cash dividend of \$0.17 per share to be paid on September 9, 2016 to shareholders of record as of August 29, 2016. Future dividend declarations, if any, as well as the record and payment dates for such dividends, are subject to the final determination of our Board of Directors. In addition, under the terms of our senior secured term loan facility and our senior secured asset-based revolving credit facility, we may be restricted from paying dividends under certain circumstances.

On April 27, 2016, we invested \$9.3 million for a minority interest in Reno Sub-Systems, Inc., a Delaware corporation, which operates in the field of semiconductor process equipment instrumentation. We accounted for this investment using the cost method of accounting.

Acquisition of Newport Corporation

On April 29, 2016, we completed the Newport Merger. At the effective time of the Newport Merger and pursuant to the terms and conditions of the Newport Merger Agreement, each share of Newport's common stock issued and outstanding as of immediately prior to the effective time of the Newport Merger was converted into the right to receive \$23.00 in cash, without interest and subject to deduction for any required withholding tax. We paid to the former Newport stockholders aggregate consideration of approximately \$905 million, excluding related transaction fees and expenses and repaid approximately \$93 million of Newport's U.S. indebtedness outstanding as of immediately prior to the effective time of the Newport Merger. We funded the payment of the aggregate consideration with a combination of our available cash on hand of approximately \$240 million and the proceeds from the senior secured term loan facility of \$780 million described below.

Term Loan Credit Agreement

In connection with the completion of the Newport Merger, we entered into the Credit Agreement with Barclays Bank PLC, as administrative agent and collateral agent, and the Lenders, that provided senior secured financing of \$780 million, subject to increase in accordance with the Credit Agreement (the "Term Loan Facility"). Borrowings under the Term Loan Facility bear interest per annum at one of the following rates selected by us: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the "prime rate" quoted in The Wall Street Journal, (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, and (4) a floor of 1.75%, plus, in each case, an applicable margin of 3.00%; or (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, subject to a LIBOR rate floor of 0.75%, plus an applicable margin of 4.00%. The Term Loan Facility was issued with original issue discount of 1.00% of the principal amount thereof.

On June 9, 2016, we entered into the Repricing Amendment to the Credit Agreement, dated as of April 29, 2016, by and among us, the Lenders, and Barclays Bank PLC, as administrative agent and collateral agent for the Lenders. The Repricing Amendment decreased the

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applicable margin for borrowings under our Term Loan Facility to 2.50% for base rate borrowings and 3.50% for LIBOR borrowings and extended the period during which a prepayment premium may be required for a “Repricing Transaction” (as defined in the Credit Agreement) until six months after the effective date of the Repricing Amendment. In connection with the execution of the Repricing Amendment, we paid a prepayment premium of 1.00%, or \$7.3 million, as well as certain fees and expenses of the administrative agent and the Lenders, in accordance with the terms of the Credit Agreement. Immediately prior to the effectiveness of the Repricing Amendment, we prepaid \$50 million of principal under the Credit Agreement, reducing the outstanding principal under the Credit Agreement from \$780 million to \$730 million.

Under the Credit Agreement, we are required to prepay outstanding term loans, subject to certain exceptions, with portions of its annual excess cash flow as well as with the net cash proceeds of certain asset sales, certain casualty and condemnation events and the incurrence or issuance of certain debt. We are also required to make scheduled quarterly payments each equal to 0.25% of the original principal amount of the term loans made on the closing date with such original principal amount reduced by any prepayments (such as the \$50 million prepaid to date), with the balance due on the seventh anniversary of the closing date.

All obligations under the Term Loan Facility are guaranteed by certain of our domestic subsidiaries, and are secured by substantially all of our assets and the assets of such subsidiaries, subject to certain exceptions and exclusions.

The Credit Agreement contains customary representations and warranties, affirmative and negative covenants and provisions relating to events of default. If an event of default occurs, the Lenders under the Term Loan Facility will be entitled to take various actions, including the acceleration of amounts due under the Term Loan Facility and all actions permitted to be taken by a secured creditor.

Senior Secured Asset-Based Revolving Credit Facility

In connection with our completion of the Newport Merger, we also entered into an asset-based credit agreement with Deutsche Bank AG New York Branch, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto (the “ABL Facility”), that provides senior secured financing of up to \$50 million, subject to a borrowing base limitation. The borrowing base for the ABL Facility at any time equals the sum of: (a) 85% of certain eligible accounts; plus (b) subject to certain notice and field examination and appraisal requirements, the lesser of (i) the lesser of (A) 65% of the lower of cost or market value of certain eligible inventory and (B) 85% of the net orderly liquidation value of certain eligible inventory and (ii) 30% of the borrowing base; minus (c) reserves established by the administrative agent; provided that until the administrative agent’s receipt of a field examination of accounts receivable the borrowing base shall be equal to 70% of the book value of certain eligible accounts. The ABL Facility includes borrowing capacity in the form of letters of credit up to \$15 million. We have not drawn against the ABL Facility.

Borrowings under the ABL Facility bear interest per annum at one of the following rates selected by us: (a) a base rate determined by reference to the highest of (1) the federal funds effective rate plus 0.50%, (2) the “prime rate” quoted in The Wall Street Journal, and (3) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for an interest period of one month adjusted for certain additional costs, plus 1.00%, plus, in each case, an initial applicable margin of 0.75%; and (b) a LIBOR rate determined by reference to the costs of funds for U.S. dollar deposits for the interest period relevant to such borrowing adjusted for certain additional costs, plus an initial applicable margin of 1.75%. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the applicable margin for borrowings thereunder is subject to upward or downward adjustment each fiscal quarter, based on the average historical excess availability during the preceding quarter.

In addition to paying interest on outstanding principal under the ABL Facility, we are required to pay a commitment fee in respect of the unutilized commitments thereunder. The initial commitment fee is 0.375% per annum. Commencing with the completion of the first fiscal quarter ending after the closing of the ABL Facility, the commitment fee is subject to downward adjustment based on the amount of average unutilized commitments for the three-month period immediately preceding such adjustment date. We must also pay customary letter of credit fees and agency fees.

Lines of Credit and Short-Term Borrowing Arrangements

One of our Japanese subsidiaries has lines of credit and short-term borrowing arrangements with two financial institutions which arrangements generally expire and are renewed at three-month intervals. The lines of credit provided for aggregate borrowings as of June 30, 2016 of up to an equivalent of \$22.4 million U.S. dollars. One of the borrowing arrangements has an interest rate based on the Tokyo Interbank Offer Rate at the time of borrowing and the other has an interest rate based on the Japanese Short-term Prime Lending Rate. There were no borrowings outstanding under these arrangements at June 30, 2016 and December 31, 2015.

We assumed various revolving lines of credit and a financing facility with the completion of the Newport Merger. These revolving lines of credit and financing facility have no expiration date and provided for aggregate borrowings as of June 30, 2016 of up to an equivalent of \$9.7 million U.S. dollars. Both revolving lines of credit have a base interest rate of 1.25% plus a Japanese Yen overnight LIBOR rate.

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One of our Austrian subsidiaries has four outstanding loans from the Austrian government to fund research and development. These loans are unsecured and do not require principal repayment as long as certain conditions are met. Interest on these loans is payable semi-annually. The interest rates associated with these loans range from 0.75%-2.00%.

Our total cash and cash equivalents and short-term marketable investments at June 30, 2016 consisted of \$73.7 million held in the United States and \$351.9 million held by our foreign subsidiaries, substantially all of which would be subject to tax in the United States if returned to the United States. We believe our existing United States cash and short-term investment balances and ability to borrow against our ABL Facility are adequate for us to meet domestic operating needs, including estimated working capital, planned capital expenditure requirements and any future cash dividends, if declared, during the next twelve months and the foreseeable future.

Off-Balance Sheet Arrangements

We do not have any financial partnerships with unconsolidated entities, such as entities often referred to as structured finance, special purpose entities or variable interest entities, which are often established for the purpose of facilitating off-balance sheet arrangements or for other contractually narrow or limited purposes. Accordingly, we have no off-balance sheet arrangements that have or are reasonably expected to have a current or future effect on our financial condition, results of operations, liquidity, capital expenditures or capital resources that are material to investors.

Contractual Obligations

In connection with the Newport Merger, in addition to debt obligations and pension obligations as described within this document, we have also assumed contractual capital and operating lease obligations and purchase obligations.

Recently Issued Accounting Pronouncements

In January 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2016-01, “Financial Instruments — Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities.” This ASU provides guidance for the recognition, measurement, presentation, and disclosure of financial instruments. The new pronouncement revises accounting related to equity investments and the presentation of certain fair value changes for financial assets and liabilities measured at fair value. Among other things, it amends the presentation and disclosure requirements of equity securities that do not result in consolidation and are not accounted for under the equity method. Changes in the fair value of these equity securities will be recognized directly in net income. This pronouncement is effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. We do not expect adoption of this ASU to have a material impact on our consolidated statements of financial position and results of operations.

In March 2016, the FASB issued ASU 2016-09 “Compensation - Stock Compensation (Topic 718)—Improvements to Employee Share-Based Payment Accounting.” This standard simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. The provisions of this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years and early adoption is permitted. We are currently evaluating the requirements of this ASU and have not yet determined its impact on our consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842).” This standard requires the recognition of lease assets and liabilities for all leases, with certain exceptions, on the balance sheet. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. This ASU is effective for annual periods beginning after December 15, 2018, including interim periods within those fiscal years. We are currently evaluating the requirements of this ASU and have not yet determined its impact on our consolidated financial statements.

In July 2015, the FASB issued ASU 2015-11, “Inventory (Topic 330)—Simplifying the Measurement of Inventory.” The amendments in this ASU apply to all inventory that is measured using first-in, first-out or average cost. This standard requires that an entity measure inventory within the scope of this update at the lower of cost and net realizable value. Net realizable value is the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. The amendments in this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years. We do not expect adoption of this ASU to have a material impact on our consolidated statements of financial position and results of operations.

In August 2014, the FASB issued ASU 2014-15, “Presentation of Financial Statements—Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity’s Ability to Continue as a Going Concern.” Under this guidance, management will be required to assess an entity’s ability to continue as a going concern, and to provide related footnote disclosures in certain circumstances. The provisions of this ASU are effective for annual periods beginning after December 15, 2016, including interim periods within those fiscal years. We do not expect adoption of this ASU to have a material impact on our consolidated statements of financial position and results of operations.

In May 2014 the FASB issued ASU 2014-09, “Revenue from Contracts with Customers (Topic 606),” which supersedes all existing revenue recognition requirements, including most industry-specific guidance. This standard requires a company to recognize revenue when it transfers goods and services to customers in an amount that reflects the consideration that the company expects to be entitled to in exchange for those goods or services. The ASU also requires additional disclosure about the nature, amount, timing and uncertainty of revenue and

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cash flows arising from customer contracts, including significant judgments and assets recognized from costs incurred to obtain or fulfill a contract. This pronouncement is effective for annual periods beginning after December 15, 2017, including interim periods within those fiscal years. The two permitted transition methods under the new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. We have not yet selected a transition method. We are currently evaluating the requirements of this ASU and have not yet determined its impact on our consolidated financial statements or disclosures.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

Market Risk and Sensitivity Analysis

Our primary exposures to market risks include fluctuations in interest rates on our Term Loan Facility and investment portfolio, as well as fluctuations in foreign currency exchange rates.

Interest Rate Risk

We hold our cash, cash equivalents and short-term investments for working capital purposes. Some of the securities we invest in are subject to market risk. This means that a change in prevailing interest rates may cause the principal amount of such investments to fluctuate. To minimize this risk, we maintain our portfolio of cash, cash equivalents and short-term investments in a variety of securities, including money market funds and government debt securities. The risk associated with fluctuating interest rates is limited to our investment portfolio. Due to the short-term nature of these instruments, we believe that we do not have any material exposure to changes in the fair value of our investment portfolio as a result of changes in interest rates. Declines in interest rates, however, would reduce future interest income. The effect of a hypothetical 10% increase or decrease in overall interest rates would not have had a material impact on our operating results or the total fair value of the portfolio.

We are exposed to market risks related to fluctuations in interest rates related to our Term Loan Facility. As of June 30, 2016, we owed \$723 million on this loan with an interest rate of 4.25%. We performed a sensitivity analysis on the outstanding portion of our debt obligation as of June 30, 2016. Should the current average interest rate increase or decrease by 10%, the resulting annual increase or decrease to interest expense would be approximately \$3.1 million as of June 30, 2016.

From time to time, we have outstanding lines of credit and short-term borrowings with variable interest rates, primarily denominated in Japanese Yen. As of June 30, 2016, the outstanding balance of these borrowings was \$5.4 million with interest rates ranging from 0.75% to 2.0%. A 10% change in interest rates would not have had a material impact on our operating results.

Foreign Exchange Rate Risk

We mainly enter into forward exchange contracts to reduce currency exposure arising from intercompany sales of inventory. We also enter into forward exchange contracts to reduce foreign exchange risks arising from the change in fair value of certain foreign currency denominated assets and liabilities.

We had forward exchange contracts with notional amounts totaling approximately \$66 million outstanding and a net fair value liability of \$2.3 million at June 30, 2016. The potential fair value loss for a hypothetical 10% adverse change in the currency exchange rate on our forward exchange contracts at June 30, 2016 would be immaterial.

ITEM 4. CONTROLS AND PROCEDURES.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of June 30, 2016. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), means controls and other procedures of an issuer that are designed to ensure that information required to be disclosed by the issuer in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by an issuer in the reports that it files or submits under the Exchange Act is accumulated and communicated to the issuer’s management, including its principal executive and principal financial officers, or persons performing similar functions as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of June 30, 2016, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and

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forms and is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer as appropriate to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the quarter ended June 30, 2016 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS.

On March 9, 2016, a putative class action lawsuit captioned *Dixon Chung v. Newport Corp., et al*, Case No. A-16-733154-C, was filed in the District Court, Clark County, Nevada on behalf of a putative class of stockholders of Newport for claims related to the February 22, 2016 Agreement and Plan of Merger (the “Merger Agreement”) between the Company, Newport and PSI Equipment, Inc., a Nevada corporation and a wholly owned subsidiary of the Company, (“Merger Sub”). The complaint filed on March 9, 2016 named as defendants the Company, Newport, Merger Sub, and certain members of Newport’s former board of directors. The complaint alleges that the named directors breached their fiduciary duties to Newport’s stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, and by agreeing to unfair deal protection devices. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors’ alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, monetary damages, and an award of attorneys’ and other fees and costs, among other relief. On March 25, 2016, the plaintiff in the Chung action filed an amended complaint, which adds certain allegations, including that the preliminary proxy statement filed by Newport on March 15, 2016 (the “Proxy”) omitted material information. The amended complaint also names as defendants the Company, Newport, Merger Sub, and then-current members of Newport’s board of directors.

Also on March 25, 2016, a second putative class action complaint captioned *Hubert C. Pincon v. Newport Corp., et al.*, Case No. A-16-734039-B, was filed in the District Court, Clark County, Nevada, on behalf of a putative class of the Newport’s stockholders for claims related to the Merger Agreement. The complaint names as defendants the Company, Newport, and Merger Sub and the then-current members of Newport’s former board of directors. It alleges that the named directors breached their fiduciary duties to Newport’s stockholders by agreeing to sell Newport through an inadequate and unfair process, which led to inadequate and unfair consideration, by agreeing to unfair deal protection devices, and by omitting material information from the Proxy. The complaint also alleges that the Company, Newport, and Merger Sub aided and abetted the named directors’ alleged breaches of their fiduciary duties. The complaint seeks injunctive relief, including to enjoin or rescind the Merger Agreement, and an award of attorneys’ and other fees and costs, among other relief.

On April 14, 2016, the Court granted plaintiffs’ motion to consolidate the Pincon and Chung actions and appointed counsel in the Pincon action as lead counsel. Also on April 14, 2016, the Court granted plaintiffs’ motion for expedited discovery and scheduled a hearing on plaintiffs’ anticipated motion for a preliminary injunction for April 25, 2016. On April 20, 2016, plaintiffs filed a motion to vacate the hearing on their anticipated motion for a preliminary injunction and notified the Court that they did not presently intend to file a motion for a preliminary injunction regarding the Merger Agreement. On April 22, 2016, the Court vacated the hearing on plaintiffs’ anticipated motion for a preliminary injunction.

We believe that the claims asserted in the complaints have no merit and we, Newport, Merger Sub and the named directors intend to defend vigorously against these claims.

We are also subject to various other legal proceedings and claims, which have arisen in the ordinary course of business. In our opinion, the ultimate disposition of these matters will not have a material adverse effect on our results of operations, financial condition or cash flows.

ITEM 1A. RISK FACTORS.

The following describes certain risks we face in our business. Additional risks that we do not yet know of or that we currently believe are immaterial may also impair our business. If any of the events or circumstances described in the following risks actually occurs, our

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business, financial condition or results of operations could suffer, and the trading price of our common stock could decline. In assessing these risks, investors should also refer to the other information contained or incorporated by reference in this report and our other filings with the Securities and Exchange Commission.

Our business depends substantially on capital spending in the semiconductor industry, which is characterized by periodic fluctuations that may cause a reduction in demand for our products.

Approximately 69%, 70% and 68% of our net revenues for the years 2015, 2014 and 2013, respectively, were from sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers. On a pro forma basis, assuming the acquisition of Newport occurred at the beginning of 2016, approximately 51% of our combined net revenues for the first six months of 2016 were from such customers. While our acquisition of Newport has reduced our concentration of customers in these markets, we anticipate that sales to such customers will continue to account for a substantial portion of our sales. Our business depends upon the capital expenditures of semiconductor device manufacturers, which in turn depends upon the demand for semiconductors.

The semiconductor industry is characterized by rapid technological change, frequent product introductions, changing customer requirements and evolving industry standards. Because our customers face uncertainties with regard to the growth and requirements of these markets, their products and components may not achieve, or continue to achieve, anticipated levels of market acceptance. If our customers are unable to deliver products that gain market acceptance, it is likely that these customers will not purchase our products or will purchase smaller quantities of our products. We often invest substantial resources in developing our products and subsystems in advance of significant sales of these products and subsystems to such customers. A failure on the part of our customers' products to gain market acceptance, or a failure of the semiconductor market to grow would have a significant negative effect on our business, financial condition and results of operations.

The semiconductor industry has historically been characterized by sudden and severe cyclical variations in product supply and demand. The timing, severity and duration of these market cycles are difficult to predict, and we may not be able to respond effectively to these cycles. The cyclicity of the semiconductor market is demonstrated by the changes in sales to semiconductor capital equipment and device manufacturers in past years. For example, our sales to semiconductor capital equipment manufacturers and semiconductor device manufacturers increased compared to the prior year by 3%, 19% and 14% in 2015, 2014 and 2013, respectively.

During semiconductor market downturns, periods of overcapacity have resulted in rapid and significantly reduced demand for our products, which may result in lower gross margins due to reduced absorption of manufacturing overhead, as our ability to rapidly and effectively reduce our cost structure in response to such downturns is limited by the fixed nature of many of our expenses in the near term. Further, our ability to reduce our long-term expenses is constrained by our need to continue our investment in next-generation product technology and to support and service our products. In addition, due to the relatively long manufacturing lead times for some of the products and subsystems we sell to this market, we may incur expenditures or purchase raw materials or components for products we are unable to sell. Accordingly, downturns in the semiconductor capital equipment market may materially harm our business, financial condition and operating results. Conversely, when upturns in this market occur, we may have difficulty rapidly and effectively increasing our manufacturing capacity to meet sudden increases in customer demand. If we fail to do so we may lose business to our competitors and our relationships with our customers may be harmed. In addition, many semiconductor manufacturers have operations and customers in Asia, a region that in past years has experienced serious economic problems including currency devaluations, debt defaults, lack of liquidity and recessions.

The Newport Merger involves numerous risks, and we may not be able to effectively integrate Newport's business and operations or realize the expected benefits from the acquisition, which could materially harm our operating results.

Our recent acquisition of Newport has significantly increased our size, including with respect to revenue, product offerings, number of employees and facilities. Newport's products and technology, and certain of its markets and customer base, are significantly different from our historical experience. Combining our businesses could make it more difficult to maintain relationships with customers, employees or suppliers. Integrating Newport's business and operations with ours will be complex, challenging and time-consuming and will require significant efforts and expenditures, and we may not be able to achieve the integration in an effective, complete, timely or cost-efficient manner.

Potential risks related to our acquisition of Newport include our ability to:

- expand our financial and management controls and reporting systems and procedures to integrate and manage Newport;
- integrate our information technology systems to enable the management and operation of the combined business;

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- realize expected synergies and cost savings resulting from the acquisition;
- maintain and improve Newport's operations while integrating our combined manufacturing organization;
- avoid lost sales due to customer confusion and misinformation regarding the transaction, and retain and expand Newport's customer base while aligning our sales efforts;
- avoid lost revenue resulting from the distraction or confusion of our personnel as a consequence of the acquisition and ongoing integration efforts;
- retain key Newport personnel;
- recognize and capitalize on anticipated product sales and technology enhancement opportunities presented by our combined businesses;
- adequately familiarize ourselves with Newport's products and technology and certain of its markets and customer base such that we can manage Newport's business effectively; and
- successfully integrate our respective corporate cultures such that we achieve the benefits of acting as a unified company.

Other potential risks related to our acquisition of Newport include:

- the assumption of unknown or contingent liabilities, or other unanticipated events or circumstances; and
- the potential to incur or record significant cash or non-cash charges or write down the carrying value of intangible assets obtained in the Newport acquisition, which could adversely impact our cash flow or lower our earnings in the period or periods for which we incur such charges or write down such assets.

If we are unable to successfully or timely integrate the operations of Newport's business into our business, we may be unable to realize the revenue growth, synergies and other anticipated benefits resulting from the acquisition and our business could be adversely affected. Additionally, we have incurred and will continue to incur transaction-related costs, including legal, regulatory and other costs associated with closing the transaction and formulating and implementing integration plans, including facilities and systems consolidation costs and employment-related costs. Although we expect that the elimination of duplicative costs, as well as the realization of other efficiencies related to the integration of the businesses, should allow us to offset transaction and integration-related costs over time, this net benefit may not be achieved in the near term, or at all. Further, we may not realize the expected benefits from the acquisition. Newport's business and operations may not achieve the anticipated revenues and operating results. We may in the future choose to close or divest certain sectors or divisions of Newport, which could require us to record losses and/or spend cash relating to such closures or divestitures. Any of the foregoing risks could materially harm our business, financial conditions and results of operations.

The terms of our term loan credit facility and asset-based revolving credit facility impose significant financial obligations and risks upon us, limit our ability to take certain actions, and could discourage a change in control.

In April 2016, we obtained a term loan credit facility and a revolving credit facility in connection with financing our acquisition of Newport, and amended it in June 2016. The term loan credit facility as amended provides us with senior secured financing of \$730 million, with a term of seven years. The revolving credit facility provides us with senior secured financing of up to \$50 million, subject to a borrowing base limitation.

Our indebtedness under these credit facilities will increase our interest expense and could have the effect, among other things, of reducing our flexibility to respond to changing business and economic conditions. Our indebtedness could also reduce funds available for working capital, capital expenditures, acquisitions and other general corporate purposes and may create competitive disadvantages relative to other companies with lower debt levels. If we do not achieve the expected benefits and cost savings from the acquisition, or if the financial performance of the combined company does not meet current expectations, then our ability to service our indebtedness may be adversely impacted.

Amounts outstanding under the credit facilities bear interest at variable interest rates. If interest rates increase, variable rate debt will create higher debt service requirements, which could adversely affect our cash flows. In addition, our credit ratings affect the cost and availability of future borrowings and, accordingly, our cost of capital. Our ratings of our indebtedness reflect each nationally recognized statistical rating organization's opinion of our financial strength, operating performance and ability to meet our debt obligations. There can be

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no assurance that we will achieve a particular rating or maintain a particular rating in the future. Moreover, we may be required to raise substantial additional financing to fund working capital, capital expenditures, acquisitions or other general corporate requirements. Our ability to arrange additional financing or refinancing will depend on, among other factors, our financial position and performance, as well as prevailing market conditions and other factors beyond our control. There can be no assurance that we will be able to obtain additional financing or refinancing on terms acceptable to us or at all.

The term loan credit facility and the asset-based revolving credit facility contain a number of negative covenants that, among other things and subject to certain exceptions, restrict our ability and/or our subsidiaries' ability to:

- incur additional indebtedness;
- pay certain dividends on our capital stock or redeem, repurchase or retire certain capital stock or certain other indebtedness;
- make certain investments, loans and acquisitions;
- engage in certain transactions with our affiliates;
- sell assets, including capital stock of our subsidiaries;
- materially alter the business we conduct;
- consolidate or merge;
- incur liens; and
- engage in sale-leaseback transactions

These covenants restrict our ability to engage in or benefit from these actions, thereby limiting our flexibility in planning for, or reacting to, changes and opportunities in the markets in which we compete, such as limiting our ability to engage in mergers and acquisitions. This could place us at a competitive disadvantage.

The term loan credit agreement and the asset-based credit agreement contain customary events of default, including:

- failure to make required payments;
- failure to comply with certain agreements or covenants;
- materially breaching any representation or warranty made or deemed made in connection with the respective credit facility;
- failure to pay, or cause acceleration of, certain other indebtedness;
- certain events of bankruptcy and insolvency;
- failure to pay certain judgments; and
- a change in control of us.

Our ability to repay any amounts owed under these credit facilities will depend upon our future cash balances. The amount of cash available for repayment of these amounts will depend on our usage of our existing cash balances and our operating performance and ability to generate cash flow from operations in future periods, which will be subject to financial, business and other factors affecting our operations, many of which are beyond our control. We cannot provide any assurances that we will generate sufficient cash flow from operations to service our debt obligations. Any failure to repay these obligations as they become due would result in an event of default under the credit facilities.

Further, because a change in control of us constitutes an event of default under these credit facilities, this would likely be a significant deterrent to a potential acquirer, as any potential acquisition would trigger an event of default, unless the lenders agreed to waive such event of default. We cannot guarantee that any such waiver would be obtained.

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If an event of default occurs, the lenders may end their obligation to make loans to us under the credit facilities, and may declare any outstanding indebtedness under the credit facilities immediately due and payable. In such case, we would need to obtain additional financing or significantly deplete our available cash, or both, in order to repay this indebtedness. Any additional financing may not be available on reasonable terms or at all, and significant depletion of our available cash could harm our ability to fund our operations or execute our broader corporate objectives. If we were unable to repay outstanding indebtedness following an event of default, then in addition to other available rights and remedies, the lenders could initiate foreclosure proceedings on substantially all of our assets. Any such foreclosure proceedings or other rights and remedies successfully implemented by the lenders in an event of default would have a material adverse effect on our business, financial condition and results of operations.

Our quarterly operating results have fluctuated, and are likely to continue to vary significantly, which may result in volatility in the market price of our common stock.

A substantial portion of our shipments occurs shortly after an order is received and therefore, we operate with a low level of backlog. As a result, a decrease in demand for our products from one or more customers could occur with limited advance notice and could have a material adverse effect on our results of operations in any particular period. Further, with respect to certain of our business lines, we often recognize a significant portion of net revenues in the last month of each fiscal quarter, due in part to the tendency of customers to wait until late in a quarter to commit to purchase certain of our products as a result of capital expenditure approvals and constraints occurring at the end of a quarter, or the hope of obtaining more favorable pricing from a competitor seeking the business. Thus, variations in timing of sales can cause significant fluctuations in our quarterly sales, gross margin and profitability. Orders expected to ship in one period could shift to another period due to changes in the timing of our customers' purchase decisions, rescheduled delivery dates requested by our customers, manufacturing capacity constraints or logistics delays. Our operating results for a particular quarter or year may be adversely affected if our customers, particularly our largest customers, cancel or reschedule orders, or if we cannot fill orders in time due to capacity constraints or unexpected delays in manufacturing, testing, shipping or product acceptance. Also, we base our manufacturing plans on our forecasted product mix. If the actual product mix varies significantly from our forecast, we may not be able to fill some orders, which would result in delays in the shipment of our products and could shift sales to a subsequent period. A significant percentage of our expenses are fixed and based in part on expectations of future net revenues. The inability to adjust spending quickly enough to compensate for any shortfall would magnify the adverse impact of a shortfall in net revenues on our results of operations. Factors that could cause fluctuations in our net revenues include:

- a worldwide economic slowdown or disruption in the global financial markets;
- fluctuations in our customers' capital spending, industry cyclicality (particularly in the semiconductor industry), market seasonality (particularly in the scientific research market), levels of government funding available to our customers (particularly in the life sciences and research markets) and other economic conditions within the markets we serve;
- the timing of the receipt of orders within a given period and the level of orders from major customers;
- demand for our products and the products sold by our customers;
- shipment delays;
- disruption in sources of supply;
- production capacity constraints;
- specific features requested by customers;
- the timing and level of cancellations and delays of orders in backlog for our products;
- the timing of product shipments and revenue recognition within a given quarter;
- variations in the mix of products we sell;
- changes in our pricing practices or in the pricing practices of our competitors or suppliers;
- our timing in introducing new products;

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- engineering and development investments relating to new product introductions, and significant changes to our manufacturing and outsourcing operations;
- market acceptance of any new or enhanced versions of our products;
- timing of new product introductions by our competitors;
- timing and level of inventory obsolescence, scrap and warranty expenses;
- the availability, quality and cost of components and raw materials we use to manufacture our products;
- changes in our effective tax rates;
- changes in our capital structure, including cash, marketable securities and debt balances, and changes in interest rates;
- changes in bad debt expense based on the collectability of our accounts receivable;
- timing, type, and size of acquisitions and divestitures, and related expenses and charges;
- fluctuations in currency exchange rates, particularly the Korean won, Japanese yen and Euro as compared with the U.S. dollar;
- our expense levels;
- impairment of goodwill and amortization of intangible assets; and
- fees, expenses and settlement costs or judgments against us relating to litigation.

As a result of the factors discussed above, it is likely that we may in the future experience quarterly or annual fluctuations and that, in one or more future quarters, our operating results may fall below the expectations of public market analysts or investors. In any such event, the price of our common stock could fluctuate or decline significantly. Consequently, we believe that quarter-to-quarter and year-to-year comparisons of our results of operations, or any other similar period-to-period comparisons, may not be reliable indicators of our future performance.

The loss of net revenues from any one of our major customers would likely have a material adverse effect on us.

Our top ten customers accounted for approximately 49%, 50% and 46% of our net revenues for the years 2015, 2014 and 2013, respectively. One customer, Applied Materials, Inc., accounted for approximately 18%, 19% and 17% of our net revenues for the years 2015, 2014 and 2013, respectively, and another customer, Lam Research Corporation, accounted for 13%, 13% and 12% of our net revenues for the years 2015, 2014 and 2013, respectively. In any one reporting period, a single customer or several customers may contribute even a larger percentage of our consolidated revenues. Although our acquisition of Newport in 2016 has reduced our customer concentration somewhat, the loss of a major customer or any reduction in orders by these customers, including reductions due to market or competitive conditions, would likely have a material adverse effect on our business, financial condition and results of operations. None of our significant customers has entered into an agreement with us requiring it to purchase any minimum quantity of our products. The demand for our products from our semiconductor capital equipment customers depends on the cyclicity of our served markets, specifically semiconductor device manufacturer customers.

Attempts to lessen the adverse effect of any loss or reduction of net revenues through the rapid addition of new customers could be difficult because a relatively small number of companies dominate the semiconductor equipment market. Further, prospective customers typically require lengthy qualification periods prior to placing volume orders with a new supplier. Our future success will continue to depend upon:

- our ability to maintain relationships with existing key customers;
- our ability to attract new customers and satisfy any required qualification periods;
- our ability to introduce new products in a timely manner for existing and new customers; and

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- the successes of our customers in creating demand for their capital equipment products that incorporate our products.

As part of our business strategy, we have entered into and may enter into or seek to enter into business combinations and acquisitions that may be difficult to identify and complete, challenging and costly to integrate, disruptive to our business and our management, and/or dilutive to stockholder value.

Since our inception, we have made acquisitions and, as a part of our business strategy, we may enter into additional business combinations and acquisitions. Our ability to successfully identify suitable acquisition targets, complete acquisitions on acceptable terms, and efficiently and effectively integrate our acquired businesses into our organization is critical to our growth. We may not be able to identify target companies that meet our strategic objectives or successfully negotiate and complete acquisitions with companies we have identified on acceptable terms. Additionally, credit facilities only permit us to make acquisitions under certain circumstances, and restrict our ability to incur additional indebtedness. Further, the process of integrating acquired companies into our operations requires significant resources and is time consuming, expensive and disruptive to our business. We may not realize the benefits we anticipate from these acquisitions because of the following significant challenges:

- the difficulty of integrating the operations, technology and personnel of the acquired companies;
- the potential disruption of our ongoing business and distraction of management;
- possible internal control weaknesses of the acquired companies;
- significant expenses related to the acquisitions;
- potential unknown liabilities associated with acquired businesses.
- potentially incompatible cultural differences between the two companies;
- incorporating the acquired company's technology and products into our current and future product lines, and successfully generating market demand for these expanded product lines;
- potential additional geographic dispersion of operations;
- the difficulty in achieving anticipated synergies and efficiencies;
- the difficulty in leveraging the acquired company's and our combined technologies and capabilities across our product lines and customer base;
- potential sales disruptions as a result of integrating the acquired company's sales channels with our sales channels; and
- our ability to retain key customers, suppliers and employees of an acquired company.

We may also be placed at a competitive disadvantage by selling products in markets and geographies that are new to us. In addition, if we are not successful in completing acquisitions that we may pursue in the future, we may be required to re-evaluate our growth strategy, and we may incur substantial expenses and devote significant management time and resources in seeking to complete proposed acquisitions that may not generate benefits for us.

In addition, with future acquisitions, we could use substantial portions of our available cash as all or a portion of the purchase price. We could also issue additional securities as consideration for these acquisitions, which could cause significant stockholder dilution, or obtain additional debt financing, which could reduce our future cash flow, without achieving the desired accretion to our business. Further, our prior acquisitions and any future acquisitions may not ultimately help us achieve our strategic goals and may pose other risks to us.

As a result of our previous acquisitions, we have several different decentralized operating and accounting systems. We will need to continue to modify our accounting policies, internal controls, procedures and compliance programs to provide consistency across all of our operations. In order to increase efficiency and operating effectiveness and improve corporate visibility into our decentralized operations, we are currently implementing a worldwide Enterprise Resource Planning ("ERP") system. We expect to continue to implement the ERP system in phases over the next few years. Any future implementations may risk potential disruption of our operations during the conversion periods and the implementations could require significantly more management time and higher implementation costs than currently estimated.

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An inability to convince semiconductor device manufacturers to specify the use of our products to our customers that are semiconductor capital equipment manufacturers would weaken our competitive position.

The markets for our products, in particular the semiconductor capital equipment market, are highly competitive. Our competitive success often depends upon factors outside of our control. For example, in some cases, particularly with respect to mass flow controllers, semiconductor device manufacturers may direct semiconductor capital equipment manufacturers to use a specified supplier's product in their equipment. Accordingly, for such products, our success will depend in part on our ability to have semiconductor device manufacturers specify that our products be used at their semiconductor fabrication facilities. In addition, we may encounter difficulties in changing established relationships of competitors that already have a large installed base of products within such semiconductor fabrication facilities.

If our products are not designed into successive generations of our customers' products, we will lose significant net revenues during the lifespan of those products.

New products designed by capital equipment manufacturers typically have a lifespan of five to ten years. Our success depends on our products being designed into new generations of equipment. We must develop products that are technologically advanced so that they are positioned to be chosen for use in each successive generation of capital equipment. If customers do not choose our products, our net revenues may be reduced during the lifespan of our customers' products. In addition, we must make a significant capital investment to develop products for our customers well before our products are introduced and before we can be sure that we will recover our capital investment through sales to the customers in significant volume. We are thus also at risk during the development phase that our products may fail to meet our customers' technical or cost requirements and may be replaced by a competitive product or alternative technology solution. If that happens, we may be unable to recover our development costs.

The semiconductor industry is subject to rapid demand shifts which are difficult to predict. As a result, our inability to expand our manufacturing capacity or reduce our fixed costs in response to these rapid shifts may cause a reduction in our market share.

Our ability to increase sales of certain products depends in part upon our ability to expand our manufacturing capacity for such products in a timely manner. If we are unable to expand our manufacturing capacity on a timely basis or to manage such expansion effectively, our customers could implement our competitors' products and, as a result, our market share could be reduced. Because the semiconductor industry is subject to rapid demand shifts, which are difficult to foresee, we may not be able to increase capacity quickly enough to respond to a rapid increase in demand. Additionally, capacity expansion could increase our fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, our business, financial condition and results of operations could be materially adversely affected.

Many of the markets and industries that we serve are subject to rapid technological change, and if we fail to introduce new and innovative products or improve our existing products, or if the adoption or applications we serve is not successful, our business, financial condition and results of operations will be harmed.

Many of our markets are characterized by rapid technological advances, evolving industry standards, shifting customer needs, new product introductions and enhancements, and the periodic introduction of disruptive technology that displaces current technology due to a combination of price, performance and reliability. As a result, many of the products in our markets can become outdated quickly and without warning. We depend, to a significant extent, upon our ability to enhance our existing products, to anticipate and address the demands of the marketplace for new and improved and disruptive technologies, either through internal development or by acquisitions, and to be price competitive. If we or our competitors introduce new or enhanced products, it may cause our customers to defer or cancel orders for our existing products. If we or our competitors introduce disruptive technology that displaces current technology, existing product platforms or lines of business from which we generate significant revenue may be rendered obsolete.

Because many of our products are sophisticated and complex, they can be difficult to design and manufacture, and we may experience delays in introducing new products or enhancements to our existing products. If we do not introduce our new products or enhancements into the marketplace in a timely fashion, our customers may choose to purchase our competitors' products. Certain of our markets, in particular the semiconductor capital equipment market, experience severe cyclicalities in capital spending, so if we fail to introduce new products in a timely manner we may miss market upturns, or may fail to have our products or subsystems designed into our customers' products. We may not be successful in acquiring, developing, manufacturing or marketing new products and technologies on a timely or cost-effective basis. If we fail to adequately introduce new, competitive products and technologies on a timely basis, our business, financial condition and results of operations will be harmed.

Further, we are constantly investing in products for emerging applications, and we expect to generate increasingly significant revenue levels from sales of products for these applications. These applications are evolving, and the extent to which they achieve widespread adoption or significant growth is uncertain. Many factors may affect the viability of widespread adoption or growth of these applications, including their cost-effectiveness, performance and reliability compared to alternatives. If these applications or our products for these applications are not widely adopted or fail to grow as we project, we will not generate the revenue growth we anticipate from sales of our products for these emerging applications, and our results of operations could be harmed.

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Because the sales cycle for some of our products is long and difficult to predict, and certain of our orders are subject to rescheduling or cancellation, we may experience fluctuations in our operating results.

Many of our products are complex, and customers for these products require substantial time to qualify our products and make purchase decisions. In addition, some of our sales to defense and security customers are under major defense programs that involve lengthy competitive bidding and qualification processes. These customers often perform, or require us to perform, extensive configuration, testing and evaluation of our products before committing to purchasing them, which can require a significant upfront investment by us. The sales cycle for these products from initial contact through shipment varies significantly, is difficult to predict and can last more than a year. If we fail to anticipate the likelihood, costs, or timing associated with sales of these products, our business and results of operations would be harmed.

Our orders are generally subject to rescheduling without penalty or cancellation without penalty other than reimbursement for certain labor and material costs. We from time to time experience order rescheduling and cancellations, which can result in fluctuation of our operating results from period to period.

Certain of our markets, sales regions and customers may be adversely affected by a lack of government funding and the availability of credit.

Our worldwide sales to customers in the scientific research, defense and life and health sciences markets rely to a large extent on government funding for research and defense-related programs. Any decline in government funding as a result of reduced budgets in connection with fiscal austerity measures or other causes would likely result in reduced sales of our products that are purchased either directly or indirectly with government funding, which would have an adverse impact on our results of operations.

Ongoing concerns regarding the global availability of credit also may make it more difficult for our customers to raise capital, whether debt or equity, to finance their projects and purchases of capital equipment. Delays in our customers' ability to obtain such financing, or the unavailability of such financing, could adversely affect sales of our products and systems, including, but not limited to, high-value lasers and systems, and therefore harm our business and operating results.

We offer products for multiple markets and must face the challenges of supporting the distinct needs of each of the markets we serve.

We offer products for a number of markets. Because we operate in multiple markets, we must work constantly to understand the needs, standards and technical requirements of many different applications within these markets, and must devote significant resources to developing different products for these markets. Product development is costly and time consuming. We must anticipate trends in our customers' industries and develop products before our customers' products are commercialized. If we do not accurately predict our customers' needs and future activities, we may invest substantial resources in developing products that do not achieve broad market acceptance. Our decision to continue to offer products to a given market or to penetrate new markets is based in part on our judgment of the size, growth rate and other factors that contribute to the attractiveness of a particular market. If our product offerings in any particular market are not competitive or our analyses of a market are incorrect, our business, financial condition and results of operations would be harmed.

Manufacturing interruptions or delays could affect our ability to meet customer demand and lead to higher costs, while the failure to estimate customer demand accurately could result in excess or obsolete inventory.

Our business depends on its timely supply of equipment, services and related products that meet the rapidly changing technical and volume requirements of our customers, which depends in part on the timely delivery of parts, components and subassemblies (collectively, "parts") from suppliers, including contract manufacturers. Cyclical industry conditions and the volatility of demand for manufacturing equipment increase capital, technical, operational and other risks for us and for companies throughout our supply chain. We may also experience significant interruptions of our manufacturing operations, delays in our ability to deliver products or services, increased costs or customer order cancellations as a result of:

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- volatility in the availability and cost of materials, including rare earth elements;
- information technology or infrastructure failures; and
- natural disasters or other events beyond our control (such as earthquakes, floods or storms, regional economic downturns, pandemics, social unrest, political instability, terrorism, or acts of war), particularly where we or our subcontractors and contract manufacturers conduct manufacturing.

In addition, if we need to rapidly increase our business and manufacturing capacity to meet increases in demand or expedited shipment schedules, this may exacerbate any interruptions in our manufacturing operations and supply chain and the associated effect on our working capital. Moreover, if actual demand for our products is different than expected, we may purchase more/fewer parts than necessary or incur costs for canceling, postponing or expediting delivery of parts. If we purchase inventory in anticipation of customer demand that does not materialize, or if our customers reduce or delay orders, we may incur excess inventory charges. Any or all of these factors could materially and adversely affect our business, financial condition and results of operations.

A material amount of our assets represents goodwill and intangible assets, and our net income would be reduced if our goodwill or intangible assets become impaired.

As of June 30, 2016, our goodwill and intangible assets, net, represented approximately \$1,020 million, or 45% of our total assets. Goodwill is generated in our acquisitions when the cost of an acquisition exceeds the fair value of the net tangible and identifiable intangible assets we acquire. Goodwill is subject to an impairment analysis at least annually based on the fair value of the reporting unit. Intangible assets relate primarily to the developed technologies, customer relationships and patents and trademarks acquired by us as part of our acquisitions of other companies and are subject to an impairment analysis whenever events or changes in circumstances exist that indicate that the carrying value of the intangible asset might not be recoverable. We will continue to monitor and evaluate the carrying value of goodwill and intangible assets. If market and economic conditions or business performance deteriorate, the likelihood that we would record an impairment charge would increase, which impairment charge could materially and adversely affect our results of operations.

We operate in a highly competitive industry.

The markets for our products are intensely competitive, and we believe that competition from both new and existing competitors will increase in the future. Principal competitive factors include:

- historical customer relationships;
- product quality, performance and price;
- breadth of product line;
- manufacturing capabilities; and
- customer service and support.

Although we believe that we compete favorably with respect to these factors, we may not be able to continue to do so. We encounter substantial competition in most of our product lines. Certain of our competitors may enjoy greater name recognition and have greater financial, technical, marketing and other resources than we have, and some may have lower material costs than ours due to their control over sources of components and raw materials. In some cases, competitors are smaller than we are, but well established in specific product niches. We may encounter difficulties in changing established relationships of competitors with a large installed base of products at such customers' fabrication facilities. In addition, our competitors can be expected to continue to improve the design and performance of their products. Competitors may develop products that offer price, performance or technological features superior to those of our products. If our competitors develop superior products, we may lose existing customers and market share. Further, technological advances in our served markets may cause one or more of our portfolio of products to be displaced over time. We also face competition in some of our markets from our existing and potential customers who have developed or may develop products that are competitive to ours, or who engage subcontract manufacturers or system integrators to manufacture products or systems on their behalf.

We face significant risks from doing business internationally.

Our business is subject to risks inherent in conducting business globally. International revenues account for a significant portion of total net sales, with a substantial portion of such sales originating in Asia (especially Korea, Japan, China and Taiwan) and Europe. We expect that international revenues will continue to account for a significant percentage of total net sales for the foreseeable future, and that in particular, the proportion of our sales to Asian customers will continue to increase. Additionally, we have substantial international manufacturing, sales and administrative operations, with significant facilities and employee populations in Europe, Israel and Asia. Our international operations expose us to various risks, which include:

- adverse changes or instability in the political or economic conditions in countries or regions where we manufacture or sell our products;
- challenges of administering our diverse business and product lines globally;
- the actions of government regulatory authorities, including embargoes, import and export restrictions, tariffs, currency controls, trade restrictions and trade barriers, license requirements, environmental and other regulatory requirements and other rules and regulations applicable to the manufacture, import and export of our products, all of which are complicated and potentially conflicting, often require significant investments in cost, time and resources for compliance, and may impose strict and severe penalties for noncompliance;
- greater risk of violations of applicable U.S. and international anti-corruption laws by our employees, sales representatives, distributors or other agents;
- longer accounts receivable collection periods and longer payment cycles;
- overlapping, differing or more burdensome tax structures;
- adverse currency exchange rate fluctuations;
- reduced or inconsistent protection of intellectual property;
- shipping and other logistics complications;
- the imposition of restrictions on currency conversion or the transfer of funds;
- costs associated with the repatriation of our overseas earnings; and
- the expropriation of private enterprises.
- more complex and burdensome labor laws and practices in countries where we have employees;
- cultural and management style differences;
- preference for locally-produced products;
- changes in labor conditions and difficulties in staffing and managing foreign operations, including, but not limited to, the formation of labor unions;
- difficulties in staffing and managing each of our individual international operations; and
- increased risk of exposure to civil unrest, terrorist and military activities.

If we experience any of the risks associated with international business, our business, financial condition and results of operations could be significantly harmed.

In particular, we have significant facilities and operations and a considerable number of employees in Israel. A number of our products are manufactured in facilities located in Israel. The Middle East remains a volatile region, and the future of peace efforts between Israel and neighboring countries remains extremely uncertain. Any armed conflicts or significant political instability in the region is likely to negatively affect business conditions and could significantly disrupt our operations in Israel, which would negatively impact our business. Further, many

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of our employees in Israel are subject to being called for active duty under emergency circumstances. If a military conflict or war arises, these individuals could be required to serve in the military for extended periods of time, and our operations in Israel could be disrupted by the absence of one or more key employees or a significant number of other employees for a significant period of time. Any such disruption could adversely affect our business.

Our failure to successfully manage our offshore manufacturing locations or the transition of certain of our manufacturing operations to other locations and/or to contract manufacturers could harm our business, financial condition and results of operations.

As part of our continuous cost-reduction efforts, we have outsourced a portion of our manufacturing and service to a subcontractor in Mexico, and we continue to relocate the manufacture of certain of our existing product lines and subassemblies to, and initiate the manufacture of certain new products in, our facilities in China, Israel and Romania and selected contract manufacturers in Asia. In the future, we may expand the level of manufacturing and certain other operations that we perform offshore in order to take advantage of cost efficiencies available to us in those countries. However, we may not achieve the significant cost savings or other benefits that we would anticipate from moving manufacturing and other operations to a lower cost region. Additionally, if we are unable to successfully manage the relocation or initiation of the manufacture of these products, our business, financial condition and results of operations could be harmed.

In particular, transferring product lines to other manufacturing locations and/or to our contract manufacturers' facilities often requires us to transplant complex manufacturing equipment and processes across a large geographical distance and to train a completely new workforce concerning the use of this equipment and these processes. In addition, certain of our customers may require the requalification of products supplied to them in connection with the relocation of manufacturing operations. If we are unable to manage this transfer and training smoothly and comprehensively, or if we are unable to complete the requalification of products in a timely manner, we could suffer manufacturing and supply chain delays, excessive product defects, harm to our results of operations and our reputation with our customers, and loss of customers. We also may not realize the cost and tax advantages that we currently anticipate from locating operations in Mexico, China, Israel and Romania. For example, we are experiencing rising material, labor and shipping costs in China.

Additionally, qualifying contract manufacturers and commencing volume production are expensive and time-consuming activities, and there is no guarantee we will continue to do so successfully. Further, our reliance on contract manufacturers reduces our control over the assembly process, quality assurance, production costs and material and component supply for our products. If we fail to manage our relationship with our contract manufacturers, or if any of the contract manufacturers experience financial difficulty, or delays, disruptions, capacity constraints or quality control problems in their operations, our ability to ship products to our customers could be impaired and our competitive position and reputation could be harmed. Further, if we or our contract manufacturers are unable to negotiate with suppliers for reduced component costs, our operating results could be harmed.

In addition, our contract manufacturers may terminate our agreements with them upon prior notice to us or immediately for reasons such as if we become insolvent, or if we fail to perform a material obligation under the agreements. If we are required to change contract manufacturers or assume internal manufacturing operations for any reason, including the termination of one of our contracts, we will likely suffer manufacturing and shipping delays, lost revenue, increased costs and damage to our customer relationships, any of which could harm our business, financial condition and results of operations.

Our products could contain defects, which would increase our costs and seriously harm our business, operating results, financial condition and customer relationships.

Many of our products are inherently complex in design and, in some cases, require ongoing regular maintenance. Further, the manufacture of these products often involves a highly complex and precise process and the utilization of specially qualified components that conform to stringent specifications. As a result of the technical complexity of these products, design defects, changes in our or our suppliers' manufacturing processes or the inadvertent use of defective or nonconforming materials by us or our suppliers could adversely affect our manufacturing yields and product reliability. This could in turn harm our business, operating results, financial condition and customer relationships.

We provide warranties for our products, and we accrue allowances for estimated warranty costs at the time we recognize revenue for the sale of the products. The determination of such allowances requires us to make estimates of product return rates and expected costs to repair or replace the products under warranty. We establish warranty reserves based on historical warranty costs for our products. If actual return rates or repair and replacement costs differ significantly from our estimates, our results of operations could be negatively impacted.

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Our customers may discover defects in our products after the products have been fully deployed and operated under peak stress conditions. In addition, some of our products are combined with products from other suppliers, which may contain defects. As a result, should problems occur, it may be difficult to identify the source of the problem. If we are unable to identify and fix defects or other problems, we could experience, among other things:

- loss of customers;
- increased costs of product returns and warranty expenses;
- increased costs required to analyze and mitigate the defects or problems;
- damage to our reputation;
- failure to attract new customers or achieve market acceptance;
- diversion of development and engineering resources; and/or
- legal action by our customers.

The occurrence of any one or more of the foregoing factors could seriously harm our business, financial condition and results of operations.

Our products are subject to potential product liability claims which, if successful, could have a material adverse effect on our business, financial condition and results of operations.

Certain of our products may be hazardous if not operated properly or if defective. In addition, some of our products, such as certain ultrafast lasers, are used in medical applications where malfunctions could result in serious injury. We are exposed to significant risks for product liability claims if death, personal injury or property damage results from the use of our products. We may experience material product liability losses in the future. We currently maintain insurance against product liability claims. However, our insurance coverage may not continue to be available on terms that we accept, if at all. This insurance coverage also may not adequately cover liabilities that we incur. Further, if our products are defective, we may be required to recall or redesign these products. A successful claim against us that exceeds our insurance coverage level or that is not covered by insurance, or any product recall, could have a material adverse effect on our business, financial condition and results of operations.

We are subject to international trade compliance regulations, and violations of those regulations could result in fines or trade restrictions, which could have a material adverse effect on us.

We are subject to trade compliance laws in both the United States and other jurisdictions where we operate. For example, exports of our products and technology developed or manufactured in the U.S. are subject to export controls imposed by the U.S. Government and administered by the U.S. Departments of Commerce, State and Treasury. Similar export regulations govern exports of our products and technology developed or manufactured in certain other countries, including Austria, France, Germany, Israel and Romania. In certain instances, these regulations may require obtaining licenses from the administering agency prior to exporting products or technology to international locations or foreign nationals, including foreign nationals employed by us in the United States and abroad. For products and technology subject to the U.S. Export Administration Regulations administered by the U.S. Department of Commerce's Bureau of Industry and Security, the requirement for a license is dependent on the type and end use of the product and technology, the final destination and the identity and nationality of the end user. Virtually all exports from the United States of defense articles subject to the International Traffic in Arms Regulations, administered by the Department of State's Directorate of Defense Trade Controls, require a license. The Israeli Ministry of Economy and the Defense Export Control Agency of the Israeli Ministry of Defense administer similar export regulations and license requirements, which apply to many of our products and technology developed or manufactured in Israel. Obtaining export licenses can be difficult and time-consuming, and we may not be successful in obtaining them. Failure to obtain export licenses to enable product and technology exports could reduce our revenue, harm our relationships with our customers and could adversely affect our business, financial condition and results of operations. Compliance with export regulations may also subject us to additional fees and costs. The absence of comparable export restrictions on competitors in other countries may adversely affect our competitive position. In addition, if we or our international representatives or distributors fail to comply with any of these export regulations, we or they could be subject to civil and criminal, monetary and non-monetary penalties, disruptions to our business, restrictions on our ability to export products and technology and damage to our reputation, and our business and results of operations could be significantly harmed. While we have implemented policies and

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procedures to comply with these laws, we cannot assure you that our employees, contractors, suppliers or agents will not violate such laws or our policies. For example, as a result of a 2012 U.S. government investigation, a former employee of our Shanghai office and a third party not affiliated with us were imprisoned for export violations relating to the sale of certain of our products. We were not a target of the government's investigation and we cooperated fully with the government's investigation. In addition, although we conducted our own internal investigation and took corrective human resources actions and have, since 2012, implemented additional export compliance procedures, we cannot be certain these efforts will be sufficient to avoid similar situations in the future.

Unfavorable currency exchange rate fluctuations may lead to lower operating margins or may cause us to raise or reduce prices, which could result in reduced sales.

Currency exchange rate fluctuations could have an adverse effect on our net revenues and results of operations and we could experience losses with respect to our hedging activities. Unfavorable currency fluctuations could require us to increase or decrease prices to foreign customers, which could result in lower net revenues by us to such customers. Alternatively, if we do not adjust the prices for our products in response to unfavorable currency fluctuations, our results of operations could be adversely affected by declining net revenues or profit margins for our products in international markets when the sales are translated into U.S. dollars. Such exchange rate fluctuations could also increase the costs and expenses of our non-U.S. operations when translated into U.S. dollars or require us to modify our current business practices. In addition, most sales made by our foreign subsidiaries are denominated in the currency of the country in which these products are sold and the currency they receive in payment for such sales could be less valuable at the time of receipt as a result of exchange rate fluctuations. We enter into forward foreign exchange contracts to reduce a portion of our currency exposure arising from intercompany sales of inventory as well as intercompany accounts receivable and intercompany loans. However, we cannot be certain that our efforts will be adequate to protect us against significant currency fluctuations or that such efforts will not expose us to additional exchange rate risks.

Changes in tax rates or tax regulation could affect results of operations.

As a global company, we are subject to taxation in the United States and various other countries. Significant judgment is required to determine and estimate worldwide tax liabilities. Our future annual and quarterly effective tax rates could be affected by numerous factors, including changes in the applicable tax laws; composition of pre-tax income in countries with differing tax rates; and/or valuation of our deferred tax assets and liabilities. In addition, we are subject to regular examination by the United States Internal Revenue Service and state, local and foreign tax authorities. We regularly assess the likelihood of favorable or unfavorable outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. Although we believe our tax estimates are reasonable, there can be no assurance that any final determination will not be materially different from the treatment reflected in our historical income tax provisions and accruals, which could materially and adversely affect our financial condition and results of operations.

Key personnel may be difficult to attract and retain.

Our ability to maintain and grow our business is directly related to the service of our employees in each area of our business. Our future performance will be directly tied to our ability to hire, train, motivate and retain qualified personnel, including highly skilled technical, financial, managerial and sales and marketing personnel. Competition for personnel in the technology marketplace is intense, and we cannot be certain that we will be successful in attracting and retaining such personnel. We have from time to time in the past experienced attrition in certain key positions, and we expect to continue to experience this attrition in the future. The absence of incentive plan bonuses and equity award vesting as a result of not meeting certain financial performance targets could adversely affect our ability to attract new employees and to retain and motivate our existing employees. If we are unable to hire sufficient numbers of employees with the experience and skills we need or to retain and motivate our existing employees, our business and results of operations would be harmed.

A breach of our operational or security systems could negatively affect our business and results of operations.

We rely on various information technology networks and systems, some of which are managed by third parties, to process, transmit and store electronic information, including confidential data, and to carry out and support a variety of business activities, including manufacturing, research and development, supply chain management, sales and accounting. A failure in or a breach of our operational or security systems or infrastructure, or those of our suppliers and other service providers, including as a result of cyber-attacks, could disrupt our business, result in the disclosure or misuse of proprietary or confidential information, damage our reputation, cause losses and increase our costs.

Our proprietary technology is important to the continued success of our business. Our failure to protect this proprietary technology may significantly impair our competitive position.

Our success and ability to compete depend in large part upon protecting our proprietary technology. We rely on a combination of patent, trademark and trade secret protection and nondisclosure agreements to protect our proprietary rights. The steps we have taken may not

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be sufficient to prevent the misappropriation of our intellectual property, particularly in countries outside the United States, where the laws may not protect our proprietary rights as fully as in the United States. Patent and trademark laws and trade secret protection may not be adequate to deter third party infringement or misappropriation of our patents, trademarks and similar proprietary rights. In addition, patents issued to us may be challenged, invalidated or circumvented. Our rights granted under those patents may not provide competitive advantages to us, and the claims under our patent applications may not be allowed. We have in the past and may in the future be subject to or may initiate interference proceedings in the United States Patent and Trademark Office, which can demand significant financial and management resources. The process of seeking patent protection can be time consuming and expensive and patents may not be issued from currently pending or future applications. Moreover, our existing patents or any new patents that may be issued may not be sufficient in scope or strength to provide meaningful protection or any commercial advantage to us. We may initiate claims or litigation against third parties for infringement of our proprietary rights in order to determine the scope and validity of our proprietary rights or the proprietary rights of our competitors, which claims could result in costly litigation, the diversion of our technical and management personnel and the assertion of counterclaims by the defendants, including counterclaims asserting invalidity of our patents. We will take such actions where we believe that they are of sufficient strategic or economic importance to us to justify the cost. For example, in 2012 we filed a lawsuit against Lighthouse Photonics Incorporated asserting infringement of certain of our patents by that company's laser products, which we settled on confidential terms in August 2014. If we are unsuccessful at effectively protecting our intellectual property, our business, financial condition and results of operations could be harmed.

We have experienced, and may in the future experience, intellectual property infringement claims, which could be costly and time consuming to defend and may produce outcomes that could have a material adverse effect on our business, financial condition or results of operations.

We have from time to time received claims from third parties alleging that we are infringing certain trademarks, patents or other intellectual property rights held by them. Such infringement claims have in the past and may in the future result in litigation. Any such litigation could be protracted and costly, and we could become subject to damages for infringement, or to an injunction preventing us from selling one or more of our products or using one or more of our trademarks. Such claims could also result in the necessity of obtaining a license relating to one or more of our products or current or future technologies, which may not be available on commercially reasonable terms or at all. Any intellectual property litigation and the failure to obtain necessary licenses or other rights or develop substitute technology may divert management's attention from other matters and could have a material adverse effect on our business, financial condition and results of operations. In addition, the terms of our customer contracts typically require us to indemnify the customer in the event of any claim of infringement brought by a third party based on our products. Any claims of this kind may have a material adverse effect on our business, financial condition or results of operations.

The market price of our common stock has fluctuated and may continue to fluctuate for reasons over which we have no control.

The stock market has from time to time experienced, and is likely to continue to experience, extreme price and volume fluctuations. Prices of securities of technology companies have been especially volatile and have often fluctuated for reasons that are unrelated to the operating performance of the companies. Historically, the market price of shares of our common stock has fluctuated greatly and could continue to fluctuate due to a variety of factors. In the past, companies that have experienced volatility in the market price of their stock have been the objects of securities class action litigation. If we were the object of securities class action litigation, it could result in substantial costs and a diversion of our management's attention and resources.

We may not pay dividends on our common stock.

Holders of our common stock are only entitled to receive such dividends when and if they are declared by our board of directors. Although we have declared cash dividends on our common stock since 2011, we are not required to do so and we may reduce or eliminate our cash dividend in the future. This could adversely affect the market price of our common stock.

Our dependence on sole, limited source suppliers, and international suppliers, could affect our ability to manufacture products and systems.

We rely on sole, limited source suppliers and international suppliers for a few of our components and subassemblies that are critical to the manufacturing of our products due to unique component designs as well as specialized quality and performance requirements needed to manufacture our products. This reliance involves several risks, including the following:

- the potential inability to obtain an adequate supply of required components;
- reduced control over pricing and timing of delivery of components; and
- the potential inability of our suppliers to develop technologically advanced products to support our growth and development of new systems.

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We believe we could obtain and qualify alternative sources for most sole, limited source and international supplier parts; however, the transition time may be long if we were required to obtain alternative sources. Seeking alternative sources for these parts could require us to redesign our systems, resulting in increased costs and likely shipping delays. In such an event, any inability to redesign our systems could result in further costs and shipping delays. These increased costs would decrease our profit margins if we could not pass the costs to our customers. Further, shipping delays could damage our relationships with current and potential customers and have a material adverse effect on our business and results of operations.

In addition, we obtain some of the critical capital equipment we use to manufacture certain of our products from sole or limited sources due to the unique nature of the equipment. In some cases, such equipment can only be serviced by the manufacturer or a very limited number of service providers due to the complex and specialized nature of the equipment. If service and/or spare parts for such equipment become unavailable, such equipment could be rendered inoperable, which could cause delays in the production of our products, and could require us to procure alternate equipment, if available, which would likely involve long lead times and significant additional cost, and could harm our results of operations.

We are subject to environmental regulations. If we fail to comply with these regulations, our business could be harmed.

Our operations are subject to various federal, state, local and international regulations relating to the protection of the environment, including those governing discharges of pollutants into the air and water, the management and disposal of hazardous substances and waste and the cleanup of contaminated sites. In the United States, we are subject to the federal regulation and control of the Environmental Protection Agency (“EPA”), and we are subject to comparable authorities in other countries. Some of our operations require environmental permits and controls to prevent and reduce air and water pollution, and these permits are subject to modification, renewal and revocation by issuing authorities. Future developments, administrative actions or liabilities relating to environmental matters could have a material adverse effect on our business, results of operations or financial condition.

Although we believe that our safety procedures for using, handling, storing and disposing of such materials comply with the standards required by state and federal laws and regulations, we cannot completely eliminate the risk of accidental contamination or injury from these materials. We have been, and may in the future be, subject to claims by employees or third parties alleging such contamination or injury, and could be liable for damages, which liability could exceed the amount of our liability insurance coverage (if any) and the resources of our business.

Certain portions of the soil at Spectra-Physics’ former facility located in Mountain View, California, and certain portions of the aquifer surrounding the facility, through which contaminated groundwater flowed, are part of an EPA-designated Superfund site and are subject to a cleanup and abatement order from the California Regional Water Quality Control Board. Spectra-Physics, which Newport acquired in 2004, along with other entities with facilities located near the Mountain View, California facility, were identified as Responsible Parties with respect to this Superfund site, due to releases of hazardous substances during the 1960s, 1970s and 1980s. Spectra-Physics and the other Responsible Parties entered into a cost-sharing agreement covering the costs of remediating the off-site groundwater impact. The site is mature, and investigations, monitoring and remediation efforts by the Responsible Parties have been ongoing for approximately 30 years. However, we will likely be subject to additional remediation obligations in the future if the EPA and the California Regional Water Quality Control Board determine that the site cleanup requires additional measures to ensure that it meets current standards for environmental contamination. In addition to our investigation, monitoring and remediation obligations, we may be liable for property damage or personal injury claims relating to this site. While we are not aware of any material claims at this time, such claims could be made against us in the future. We have certain ongoing costs related to investigation, monitoring and remediation of the site that have been fairly consistent and not material in the recent past. However, our ultimate costs of remediation and other potential liabilities are difficult to predict. If significant costs or other liability relating to this site arise in the future, our business, financial condition and results of operations could be adversely affected.

The environmental regulations that we are subject to include a variety of federal, state, local and international environmental regulations that restrict the use and disposal of materials used in the manufacture of our products or require design changes or recycling of our products. If we fail to comply with any present or future regulations, we could be subject to future liabilities, the suspension of manufacturing or a prohibition on the sale of products we manufacture. In addition, such regulations could restrict our ability to equip our facilities or could require us to acquire costly equipment, or to incur other significant expenses to comply with environmental regulations, including expenses associated with the recall of any non-compliant product and the management of historical waste.

Governmental entities at all levels are continuously enacting new environmental regulations, and it is initially difficult to anticipate how such regulations will be implemented and enforced. We continue to evaluate the requirements for compliance with such regulations as they are enacted. For example, the European Union has enacted the Restriction on the Use of Certain Hazardous Substances in Electrical and

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Electronic Equipment Directive (“RoHS”) and the Waste Electrical and Electronic Equipment Directive (“WEEE”) for implementation in each European Union member country. RoHS regulates the use of certain hazardous substances in certain products, and WEEE requires the collection, reuse and recycling of waste from certain products. Effective January 2013, RoHS was recast to expand the scope of equipment subject to the directive and impose new compliance requirements, and most European Union member states implemented the recast directive during 2013. WEEE was also recast to expand the scope of equipment subject to the directive and impose increased combined reuse/recycling and collection targets, among other revisions, and European Union member states began to implement the recast directive in 2014. Certain of our products sold in these countries are or will become subject to RoHS and WEEE requirements. We will continue to monitor RoHS and WEEE guidance in individual jurisdictions to determine our responsibilities. In some instances, we are not directly responsible for compliance with RoHS and WEEE because certain of our products are currently outside the scope of the directives. However, because the scope of the directives continues to expand, we will likely be directly or contractually subject to certain provisions of such regulations in the case of many of our products. In addition, certain of our customers, particularly OEM customers whose end products may be subject to these directives, may require that the products we supply to them comply with these directives. Further, final legislation from individual jurisdictions that have not yet implemented the directives may impose different or additional responsibilities upon us. We are also aware of similar legislation that is currently in force or being considered in various states within the United States, as well as other countries, such as Japan, China and South Korea. These regulations may require us to redesign our products or source alternative components to ensure compliance with applicable requirements, for example by mandating the use of different types of materials in certain components. Any such redesign or alternative sourcing may increase the cost of our products, adversely impact the performance of our products, add greater testing lead-times for product introductions, or in some cases limit the markets for certain products. Our failure to comply with any of such regulatory requirements or contractual obligations could result in our being directly or indirectly liable for costs, fines or penalties and third-party claims, and could jeopardize our ability to conduct business in certain countries.

Regulations and customer demands related to conflict minerals and hazardous materials may adversely affect us.

The Dodd-Frank Wall Street Reform and Consumer Protection Act and the implementing regulations subsequently adopted by the SEC impose disclosure requirements regarding the use in our products of “conflict minerals” mined from the Democratic Republic of Congo and adjoining countries, whether or not the components of our products are manufactured by us or third parties. In addition, certain of our customers have requested that we disclose to them our use of numerous hazardous materials in our products. Our supply chain is very complex and the implementation of these requirements could adversely affect the sourcing, availability and pricing of materials used in the manufacture of our products. In addition, there are additional costs associated with complying with the disclosure requirements and customer requests, such as costs related to our due diligence to determine the source of any “conflict minerals” or the identity of any hazardous materials used in our products. We face the additional challenge that many of our suppliers, both domestic and foreign, are not obligated by the new “conflict minerals” law to investigate their own supply chain. Despite our due diligence efforts, we may be unable to verify the origin of all “conflict minerals” used in our products and/or the use of one or more hazardous materials in our products. As a result, we may be unable to certify that our products are “conflict-free” and/or free of certain hazardous materials. If we are unable to meet our customer requirements, customers may discontinue purchasing from us, which could adversely impact our business, financial condition or operating results.

Some provisions of our restated articles of organization, as amended, our amended and restated by-laws and Massachusetts law could discourage potential acquisition proposals and could delay or prevent a change in control.

Anti-takeover provisions could diminish the opportunities for stockholders to participate in tender offers, including tender offers at a price above the then current market price of our common stock. Such provisions may also inhibit increases in the market price of our common stock that could result from takeover attempts. For example, while we have no present plans to issue any preferred stock, our board of directors, without further stockholder approval, may issue preferred stock that could have the effect of delaying, deterring or preventing a change in control of us. The issuance of preferred stock could adversely affect the voting power of the holders of our common stock, including the loss of voting control to others. In addition, our amended and restated by-laws provide for a classified board of directors consisting of three classes. Our classified board could also have the effect of delaying, deterring or preventing a change in control of our Company.

Changes in financial accounting standards may adversely affect our reported results of operations.

A change in accounting standards or practices could have a significant effect on our reported results (such as the new revenue recognition rules which are scheduled to go into effect in 2018) and may even affect our reporting of transactions completed before the change is effective. New accounting pronouncements and varying interpretations of existing accounting pronouncements have occurred and may occur in the future. Such changes may adversely affect our reported financial results or may impact our related business practice.

ITEM 6. EXHIBITS.

The exhibits filed as part of this quarterly report on Form 10-Q are listed in the exhibit index immediately preceding the exhibits and are incorporated herein.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

August 3, 2016

MKS INSTRUMENTS, INC.

By: /s/ Seth H. Bagshaw
Seth H. Bagshaw
Vice President, Chief Financial Officer and Treasurer (Principal
Financial Officer)

EXHIBIT INDEX

<u>Exhibit No.</u>	<u>Exhibit Description</u>
+3.1(1)	Restated Articles of Organization of the Registrant
+3.2(2)	Articles of Amendment to Restated Articles of Organization, as filed with the Secretary of State of Massachusetts on May 18, 2001
+3.3(3)	Articles of Amendment to Restated Articles of Organization, as filed with the Secretary of State of Massachusetts on May 16, 2002
+3.4(4)	Amended and Restated By-Laws of the Registrant
+10.1(5)	Term Loan Credit Agreement, by and among the Registrant, Barclays Bank PLC, as administrative agent and collateral agent, and the lenders from time to time party thereto, dated April 29, 2016
+10.2(8)	Amendment No. 1 to Term Loan Credit Agreement, dated as of June 9, 2016 among the Company, the other loan parties party thereto, Barclays Bank PLC, as administrative agent and collateral agent, and each participating lender party thereto
+10.3(5)	ABL Credit Agreement, by and among the Registrant, Deutsche Bank AG New York Branch, as administrative agent and collateral agent, the other borrowers from time to time party thereto, and the lenders and letters of credit issuers from time to time party thereto, dated April 29, 2016
+10.4(6)*	Letter Agreement between the Registrant and Robert J. Phillippy, dated May 2, 2016
+10.5(7)*	Newport Corporation's 2006 Performance-Based Stock Incentive Plan
+10.6(7)*	Form of Stock Appreciation Right Award Agreement under Newport Corporation's 2006 Performance-Based Stock Incentive Plan
+10.7(7)*	Newport Corporation's 2011 Stock Incentive Plan
+10.8(7)*	Newport Corporation's Amended and Restated 2011 Stock Incentive Plan
+10.9(7)*	Form of Restricted Stock Unit Award Agreement (with performance-based vesting) used under Newport Corporation's 2011 Stock Incentive Plan and Amended and Restated 2011 Stock Incentive Plan
+10.10(7)*	Form of Stock Appreciation Right Award Agreement used under Newport Corporation's 2011 Stock Incentive Plan and the Amended and Restated 2011 Stock Incentive Plan
+10.11(7)*	Form of Indemnification Agreement between Newport Corporation and Robert J. Phillippy
+10.12(7)*	Form of the Registrant's RSU Assumption Agreement for U.S. Employees Relating to Newport Corporation's Amended and Restated 2011 Stock Incentive Plan and 2011 Stock Incentive Plan
+10.13(7)*	Form of the Registrant's RSU Assumption Agreement for Employees Outside of the United States Relating to Newport Corporation's Amended and Restated 2011 Stock Incentive Plan and 2011 Stock Incentive Plan
+10.14(7)*	Form of the Registrant's SAR Assumption Agreement for U.S. Employees Relating to Newport Corporation's Amended and Restated 2011 Stock Incentive Plan, 2011 Stock Incentive Plan and 2006 Performance-Based Stock Incentive Plan
+10.15(7)*	Form of the Registrant's SAR Assumption Agreement for Employees Outside of the United States Relating to Newport Corporation's Amended and Restated 2011 Stock Incentive Plan, 2011 Stock Incentive Plan and 2006 Performance-Based Stock Incentive Plan
10.16*	Employment Agreement dated August 1, 2016 between Seth Bagshaw and the Registrant
10.17*	Employment Agreement dated August 1, 2016 between John Abrams and the Registrant
10.18*	Employment Agreement dated August 1, 2016 between John Lee and the Registrant
10.19*	Employment Agreement dated August 1, 2016 between Brian Quirk and the Registrant
10.20*	Employment Agreement dated August 1, 2016 between Dennis Werth and Newport Corporation
10.21*	Summary of 2016 Cash Incentive Bonus Arrangements with Dennis Werth
10.22*	Form of Indemnification Agreement between Newport Corporation and Dennis L. Werth
31.1	Certification of Principal Executive Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended
31.2	Certification of Principal Financial Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934, as amended
32.1	Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS	XBRL Instance Document.
101.SCH	XBRL Taxonomy Extension Schema Document.
101.CAL	XBRL Taxonomy Calculation Linkbase Document.
101.LAB	XBRL Taxonomy Labels Linkbase Document.
101.PRE	XBRL Taxonomy Presentation Linkbase Document.
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.

+ Previously filed

* Management contract or compensatory plan arrangement.

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- (1) Incorporated by reference to the Registration Statement on Form S-4 (File No. 333-49738) filed with the Securities and Exchange Commission on November 13, 2000.
- (2) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2001.
- (3) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2002.
- (4) Incorporated by reference to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on May 6, 2014.
- (5) Incorporated by reference to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on April 29, 2016.
- (6) Incorporated by reference to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on May 2, 2016.
- (7) Incorporated by reference to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2016.
- (8) Incorporated by reference to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on June 9, 2016.

EMPLOYMENT AGREEMENT

MKS Instruments, Inc., a Massachusetts corporation (the “Company”), and Seth Bagshaw of Boxford, MA (“Employee”) agree, effective August 1, 2016, as follows.

1. **Employment.** The Company is employing Employee on an at-will basis in the position of Vice President and Chief Financial Officer. Employee agrees to comply with the Company’s policies.

2. **Confidential Information Agreement.** Employee will sign and deliver to the Company, at the same time that Employee executes this Employment Agreement, the Confidential Information, Intellectual Property and Non-Solicitation Agreement of MKS Instruments, Inc. (“Confidential Information Agreement”) that is Attachment 1 to this Employment Agreement.

3. **Duty to The Company.** While employed by the Company, Employee: (a) will devote his or her full working time and best efforts to the business of the Company; and (b) will not (without the prior, express, written consent of the Chief Executive Officer of the Company) engage in any business activity (whether or not for gain) that interferes with Employee’s work for the Company. Notwithstanding the previous sentence, this Employment Agreement does not prohibit Employee from managing his or her personal investments or engaging in charitable and unpaid professional activities (including serving on charitable and professional boards), so long as doing so does not materially interfere with Employee’s work for the Company or violate Section 7 of this Employment Agreement.

4. **Compensation.**

(a) **Base Salary.** The Company will pay Employee base salary at the rate of \$475,000 per year (the “Base Salary”), in accordance with the Company’s normal payroll practices. The Company may review and adjust the amount of the Base Salary from time to time in its sole discretion.

(b) **Incentive Compensation Plan.** Employee will be entitled to participate in the Company’s Annual Corporate Management/Key Employee Bonus Plan, to the extent applicable to Employee’s position.

(c) **Stock Incentive Plan.** Employee will be entitled to participate in the Company’s stock incentive plan to the extent applicable to Employee’s position.

(d) **Benefits.** Employee will be eligible to participate in the Company’s generally available employee benefit plans, which currently include medical, dental, vision, life, accidental death and dismemberment, short-term disability and long-term disability insurance, a 401(k) savings plan and an employee stock purchase plan, subject to the terms and conditions of each plan.

(e) **Paid Time Off.** Employee will be eligible for 20 days of paid vacation per year, plus paid sick time and holidays, all subject to the terms and conditions of the Company’s policies.

(f) **Expenses.** The Company will reimburse Employee for expenses Employee reasonably incurs in performing his or her duties, to the extent provided in the Company's expense reimbursement policies. Reimbursement of expenses in one tax year will not affect reimbursement of expenses in any other tax year.

5. End of Employment. Either Employee or the Company may end the employment relationship at any time, for any reason, with or without notice or cause. The employment relationship will end automatically and immediately upon Employee's death or entitlement to long-term disability benefits under the Company's long-term disability program. The date on which Employee's employment ends, whether as the result of a resignation by Employee, a termination of employment by the Company or an automatic termination of employment upon death or disability, is referred to in this Employment Agreement as the "Employment End Date." If Employee resigns or the Company terminates Employee's employment, the Company will (in either case) have the right at any time, for any reason in its sole discretion to decide the Employment End Date. In no event will the Company's deciding the Employment End Date following Employee's resignation be considered termination by the Company of Employee's employment.

6. Company Obligations Upon End of Employment. When the employment relationship ends, the Company will have no obligation to pay or provide Employee at any time any compensation, payment or benefit of any kind, except as expressly provided in Sections 6(a) through 6(e) below.

(a) **Minimum Obligations.** When the employment relationship ends, no matter how it ends: (i) the Company will pay Employee any unpaid Base Salary through the Employment End Date; (ii) Employee will be entitled to accrued, vested benefits under the Company's benefit plans and programs to the extent provided in Section 4(d); (iii) the Company will pay Employee for any accrued but unused vacation; and (iv) the Company will reimburse Employee for any unreimbursed expenses incurred through the Employment End Date to the extent provided in Section 4(f).

(b) **30 Days' Base Salary After Certain Resignations.** If Employee provides the Company at least 30 days' advance written notice of resignation of employment, is an active employee in good standing at the time of such notice and continues to perform his or her duties diligently and professionally to the extent requested thereafter, the Company will pay Employee his or her Base Salary for at least 30 days after such notice, even if the Employment End Date is earlier.

(c) **30 Days' Base Salary After Certain Terminations.** If the Company terminates Employee's employment other than for Cause, as defined below, the Company will provide Employee with written notice of termination and pay Employee his or her Base Salary for at least 30 days after such notice of termination, even if the Employment End Date is earlier.

(d) **Eligibility for Ordinary Severance Pay.** If the Company terminates Employee's employment, Employee will be eligible for severance pay in a lump sum in an amount equal to a minimum of 6 months of Base Salary or two weeks of Base Salary per year of service, whichever is greater, in either case provided that all of

the following conditions are satisfied: (i) the Company's primary reason for terminating Employee's employment was a change to the Company's business needs (such as reduction in force or elimination of position) and not Cause as defined below; (ii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iii) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a general release of claims in a form satisfactory to the Company ("General Release"). The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(e) **Eligibility for Enhanced Severance Compensation.** Employee will become eligible for the "Enhanced Severance Compensation," as described below, instead of severance pay under Section 6(d) above or under any other program or policy of the Company, if and only if all of the following conditions are satisfied: (i) the Company terminates Employee's employment without "Cause" (as defined below) or Employee resigns for "Good Reason" (as defined below); (ii) the Employment End Date is within 24 months after the effective date of a Change in Control (as defined below); (iii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iv) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a General Release. The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(f) **"Enhanced Severance Compensation."** If Employee becomes eligible for the Enhanced Severance Compensation:

(i) **Base Salary.** The Company will pay Employee, within 14 days after the General Release become irrevocable, a lump sum in an amount equal to two times annual Base Salary (determined without regard to any reduction in Base Salary giving rise to "Good Reason," as defined below).

(ii) **Incentive Compensation.** The Company will pay Employee, within 14 days after the General Release becomes irrevocable, a lump sum equal to two times the annual amount of incentive compensation for which Employee was eligible under any Incentive Compensation Plan of the Company then in effect for the year containing the Employment End Date. Additionally, the Employee will receive a payment for target bonus, prorated for the current year.

(iii) **Continuation of Benefits.** For a period of 24 months after the Employment End Date, to the extent Employee elects to continue group medical, vision, or dental insurance coverage under COBRA and timely remits the amount of premium assessed to similarly situated active employees for comparable coverage, the Company will pay the Company's usual share of such premiums. Benefits payable under this Section 6(f)(iii) will terminate to the extent Employee ceases to be eligible for COBRA coverage under the Company's medical benefits plan. Notwithstanding the foregoing, the Company will not pay the contribution toward COBRA coverage described above to the extent that the

Company reasonably determines that doing so would subject the Company to the excise tax under Section 4980D of the Internal Revenue Code (the "Code") (as a result of discriminatory coverage under a group health plan).

(iv) **Restricted Stock Units or Stock Appreciation Rights** Employee's unvested equity awards as of the Employment End Date will be subject to accelerated vesting to the extent provided in the respective equity award agreement issued to Employee under the then effective MKS Instruments, Inc. equity incentive plan (including the MKS Instruments, Inc. 2014 Stock Incentive Plan).

(vi) **No Obligation to Mitigate Damages; Effect on Other Contractual Rights.** Employee will not be required to mitigate damages or the amount of any payment provided for under this Employment Agreement by seeking other employment or otherwise, nor will any payment provided for under this Employment Agreement be reduced by any compensation earned by Employee as the result of employment by an employer other than the Company or a direct or indirect parent, subsidiary or affiliate of the Company after the Employment End Date, or otherwise.

(g) **"Cause."** "Cause" to terminate Employee's employment will exist if Employee:

(i) commits a felony or engages in fraud, misappropriation or embezzlement;

(ii) knowingly fails or refuses to perform Employee's duties in a material way and, to the extent that the Company determines such failure or refusal can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the failure or refusal;

(iii) knowingly causes, or knowingly creates a serious risk of causing, material harm to the Company's business or reputation; or

(iv) breaches, in a material way, this Employment Agreement, the Confidential Information Agreement or any other agreement between Employee and the Company, and, to the extent that the Company determines such breach can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the breach.

(h) **"Good Reason."** "Good Reason" for Employee to resign will exist if, without Employee's express written consent:

(i) the Company materially reduces Employee's position, duties or responsibilities;

(ii) the Company reduces Employee's Base Salary as in effect on the date hereof or as the same may be increased from time to time during the term of this Employment Agreement;

(iii) the Company changes Employee's principal place of work to a location more than 50 miles from Employee's current principal place of work.

Notwithstanding the foregoing, an action described above will not constitute Good Reason unless: (A) Employee, within 30 days after the he or she learns, or with reasonable diligence should have learned, of such action, delivers to the Company written notice identifying the action as Good Reason and demanding its correction; (B) the Company fails to correct such event within 30 days after receipt of such notice; and (C) Employee resigns for Good Reason within 90 days after the date Employee learned, or with reasonable diligence should have learned, of such action.

(i) **"Change in Control."** For purposes of this Employment Agreement, the term "Change in Control" will mean the first to occur of any of the following events: (i) any "person" (as that term is used in Section 13 and 14(d)(2) of the Securities Exchange Act of 1934 ("Exchange Act")) becomes the beneficial owner (as that term is used in Section 13(d) of the Exchange Act), directly or indirectly, of fifty percent (50%) or more of MKS' capital stock entitled to vote in the election of directors; (ii) the shareholders of MKS approve any consolidation or merger of MKS other than a consolidation or merger of MKS in which the holders of the common stock of MKS immediately prior to the consolidation or merger hold more than fifty percent (50%) of the common stock of the surviving corporation immediately after the consolidation or merger; or (iii) the shareholders of MKS approve the sale or transfer of all or substantially all of the assets of MKS to parties that are not within a "controlled group of corporations" (as defined in Code Section 1563) in which MKS is a member.

7. Non-Competition.

(a) During Employee's MKS Employment (as defined below) and for 12 months immediately thereafter (together, the "Non-Compete Period"), Employee will not engage in or otherwise carry on, directly or indirectly anywhere in the world (as principal, agent, employee, employer, investor, shareholder (except for holdings of no greater than 1% of the total outstanding shares in a publicly-traded company), consultant, partner, member, manager, financier or in any other individual or representative capacity of any kind whatsoever), any Competitive Activity (as defined below).

(b) "MKS Employment" means the period beginning on the first day that Employee is employed by the Company and ending on the first day on which Employee is no longer employed by any MKS Entity (as defined below).

(c) "MKS Entity" means (i) the Company; (ii) any current or future parent, subsidiary or affiliate of the Company; or (iii) any successor or assign of (i) or (ii).

(d) "Competitive Activity" means business or activity competitive with an MKS Entity but only to the extent that business or activity is related to, similar to or competitive with the activities of the business unit(s), division(s), laborator(y)(ies), facilit(y)(ies) and other operational unit(s) in or for which Employee performed work for an MKS Entity or about which Employee acquired Proprietary Information (as defined in the Confidential Information Agreement).

(e) The Non-Compete Period will be extended for any period during which Employee is in breach of this Employment Agreement or the Confidential Information Agreement.

(f) If any court of competent jurisdiction determines that this Section 7 is unenforceable because the Non-Compete Period is too long or because Competitive Activity includes too great a range of activities or too wide a geographic scope, the parties agree that this Section 7 should be interpreted to extend only over the maximum period of time or range of activities or geographic scope as to which it may be enforceable.

(g) The post-employment restrictions on Employee's conduct contained in this Employment Agreement and in the Confidential Information Agreement: (i) will continue to apply even if Employee's duties, title, compensation, location or other terms or conditions of employment change, and even if such change or changes are material; and (ii) will apply regardless of how or why Employee's employment ends.

(h) The Company and Employee agree that violation by Employee of any of the provisions of this Section 7 of this Employment Agreement would cause the Company irreparable harm beyond what could reasonably or adequately be compensated in damages, and that the Company would therefore be entitled (in addition to the Company's other remedies) to an injunction, declaratory judgment or restraining order against any such violation or threatened violation.

8. Code Section 409A Compliance.

(a) Where this Employment Agreement refers to Employee's termination of employment for purposes of receiving any payment, whether such a termination has occurred will be determined in accordance with Section 409A of the Internal Revenue Code (the "Code") and Treasury Regulation Section 1.409A-1(h) (or any successor provisions) to the extent required by law.

(b) To the extent that benefits under Section 6 are contingent upon Employee providing a General Release, Employee will sign and return the General Release within the reasonable time period designated by the Company, which will not be more than 45 days. If the period for Employee to review a General Release plus any revocation period crosses calendar years, payments contingent upon the Release will be made in the later calendar year. Any payments contingent upon the General Release that would otherwise be made during the period for review and revocation of the General Release will be made, provided that the General Release is timely executed and returned to the Company and not revoked, on the first scheduled payment date after such period ends. Each payment in respect of Employee's termination of employment under Section 6 of the Employment Agreement is designated as a separate payment for Section 409A purposes.

(c) If Employee is designated as a “specified Executive” within the meaning of Code Section 409A (while the Company is publicly traded), any deferred compensation payment subject to Section 409A to be made during the six-month period following Employee’s termination of employment will be withheld and the amount of the payments withheld will be paid in a lump sum, without interest, during the seventh month after Employee’s termination; provided, however, that if Employee dies prior to the expiration of such six month period, payment to Employee’s beneficiary will be made as soon as reasonably practicable following Employee’s death. The Company will identify in writing delivered to Employee any payments it reasonably determines are subject to delay under this Section 8(c). In no event will the Company have any liability or obligation with respect to taxes for which Employee may become liable as a result of the application of Code Section 409A.

9. Code Sections 280G/4999. If (a) any payments or benefits to Employee in connection with this Employment Agreement (“Payments”) would be subject to the excise tax imposed by Code Section 4999 (the “Parachute Tax”), (b) paying Employee a lesser amount would avoid the Parachute Tax entirely and (c) payment of such lesser amount would, after taking into account applicable federal, state and local income taxes and the Parachute Tax, result in Employee receiving a greater after-tax payment than if the Company made the Payments in full, then the Company will pay Employee such lesser amount instead of making the Payments in full. The reporting and payment of any Parachute Tax will in all events be Employee’s responsibility. The Company will not in any event provide a gross-up or any other payment to compensate Employee for the payment of the Parachute Tax or for any reduction in the Payments. The Company will withhold from the Payments any amounts it reasonably determines are required under Code Section 4999(c) and the Treasury Regulations thereunder.

10. Withholding. The Company will deduct from the amounts payable to Employee pursuant to this Employment Agreement all withholding amounts and deductions required by law or authorized by Employee.

11. Changes to Plans and Policies. Nothing in this Employment Agreement will: (a) require the Company or its affiliates to establish, maintain or continue any incentive compensation plan, stock incentive plan or other benefit plan, policy or arrangement; (b) restrict the right of the Company or any of its affiliates to amend, modify or terminate any such plan, policy or arrangement; (c) entitle Employee to participate in any such plan policy or arrangement at any specified level (or at all) in any year; or (d) prevent any future change to any such plan, policy or arrangement from applying to Employee in accordance with the terms of the change.

12. Assignment. The rights and obligations of the Company under this Employment Agreement will inure to the benefit of, and be binding upon, the Company’s successors and assigns. The rights and obligations of Employee under this Employment Agreement will inure to the benefit of, and will be binding upon, Employee’s heirs, executors and legal representatives. Employee may not delegate or assign any obligations under this Employment Agreement.

13. Entire Agreement and Severability. This Employment Agreement and the Confidential Information Agreement supersede any and all other agreements, either

oral or in writing, between Employee and the Company with respect to the Company's employment of Employee. They contain all of the covenants and agreements between the parties with respect to such employment. Neither party is entering into this Employment Agreement on the basis of any representation, inducement, promise or agreement, oral or otherwise, by any party, or by any one acting on behalf of any party, which is not stated herein. Any modification of this Employment Agreement will be effective only if it is in writing and signed by both parties to this Employment Agreement. If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect without being impaired or invalidated in any way.

14. Miscellaneous. This Employment Agreement and the rights and obligations of the parties hereunder will be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts, excluding (but only to the extent permitted by law) its conflict of laws and choice of law rules. The parties agree that service of any process, summons, notice or document by U.S. certified mail or overnight delivery by a generally recognized commercial courier service to Employee's last known address (or any mode of service recognized to be effective by applicable law) will be effective service of process for any action, suit or proceeding brought against Employee. The failure of either party hereto to enforce any right under this Employment Agreement will not be considered a waiver of that right, or of damages caused thereby, or of any other rights under this Employment Agreement.

15. Arbitration and Waiver of Jury Trial.

(a) Any "Legal Dispute" (as defined below) between Employee and any MKS Entity (or between Employee and any employee or agent of any MKS Entity, to the extent directly or indirectly arising from or relating in any way to Employee's employment with or separation from the Company) will be resolved by final and binding arbitration. Notwithstanding the foregoing sentence, the Company may, in its sole discretion, obtain preliminary injunctive relief enforcing the provisions of the Confidential Information Agreement or Section 7 of this Employment Agreement from any court of competent jurisdiction.

(b) "Legal Dispute" means a dispute about legal rights or legal obligations, including but not limited to any rights or obligations arising under this Employment Agreement; the Confidential Information Agreement; any other agreement; any applicable legal or equitable doctrine; any applicable common law theory; or any applicable federal, state or local, statute, regulation or other legal requirement.

(c) The arbitration will be held in the Commonwealth of Massachusetts. It will be conducted in accordance with the then-prevailing Employment Arbitration Rules of the American Arbitration Association.

(d) Notwithstanding any other provision of this Employment Agreement or any other agreement or of any arbitration rules, no Legal Dispute involving any MKS Entity may be included in any class or collective arbitration or any other class or collective proceeding. The exclusive method for resolving any such Legal Dispute will be arbitration on an individual basis.

(e) Any issues about whether a dispute is subject to arbitration will be determined by a court of competent jurisdiction and not by an arbitrator. Any issues about the meaning or enforceability of Section 15(d) will be decided by a court of competent jurisdiction and not by an arbitrator.

(f) The Company, Employee and the arbitrator will treat all aspects of the arbitration proceedings, including without limitation, discovery, testimony and other evidence, briefs and the award, as strictly confidential, except that the arbitration award may be disclosed to the extent necessary to enforce the award, the provisions of the Confidential Information Agreement or the provisions of this Employment Agreement.

(g) Employee and the Company understand and acknowledge that by agreeing to arbitrate the disputes covered by this Section 15, they are waiving the right to resolve those disputes in court and waiving any right to a jury trial with respect to those disputes.

16. Knowing and Voluntary Agreement. Employee understands that Employee has the right to consult counsel before signing this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Gerald G. Colella
Name: Gerald G. Colella
Title: CEO & President

Dated: 8/1/16

/s/ Seth H. Bagshaw
[EMPLOYEE]

Dated: July 27, 2016

EMPLOYMENT AGREEMENT

MKS Instruments, Inc., a Massachusetts corporation (the “Company”), and John Abrams of Lowell, MA (“Employee”) agree, effective August 1, 2016, as follows.

1. **Employment.** The Company is employing Employee on an at-will basis in the position of Senior Vice President of Global Sales and Service. Employee agrees to comply with the Company’s policies.

2. **Confidential Information Agreement.** Employee will sign and deliver to the Company, at the same time that Employee executes this Employment Agreement, the Confidential Information, Intellectual Property and Non-Solicitation Agreement of MKS Instruments, Inc. (“Confidential Information Agreement”) that is Attachment 1 to this Employment Agreement.

3. **Duty to The Company.** While employed by the Company, Employee: (a) will devote his or her full working time and best efforts to the business of the Company; and (b) will not (without the prior, express, written consent of the Chief Executive Officer of the Company) engage in any business activity (whether or not for gain) that interferes with Employee’s work for the Company. Notwithstanding the previous sentence, this Employment Agreement does not prohibit Employee from managing his or her personal investments or engaging in charitable and unpaid professional activities (including serving on charitable and professional boards), so long as doing so does not materially interfere with Employee’s work for the Company or violate Section 7 of this Employment Agreement.

4. **Compensation.**

(a) **Base Salary.** The Company will pay Employee base salary at the rate of \$335,000 per year (the “Base Salary”), in accordance with the Company’s normal payroll practices. The Company may review and adjust the amount of the Base Salary from time to time in its sole discretion.

(b) **Incentive Compensation Plan.** Employee will be entitled to participate in the Company’s Annual Corporate Management/Key Employee Bonus Plan, to the extent applicable to Employee’s position.

(c) **Stock Incentive Plan.** Employee will be entitled to participate in the Company’s stock incentive plan to the extent applicable to Employee’s position.

(d) **Benefits.** Employee will be eligible to participate in the Company’s generally available employee benefit plans, which currently include medical, dental, vision, life, accidental death and dismemberment, short-term disability and long-term disability insurance, a 401(k) savings plan and an employee stock purchase plan, subject to the terms and conditions of each plan.

(e) **Paid Time Off.** Employee will be eligible for 15 days of paid vacation per year, plus paid sick time and holidays, all subject to the terms and conditions of the Company’s policies.

(f) **Expenses.** The Company will reimburse Employee for expenses Employee reasonably incurs in performing his or her duties, to the extent provided in the Company's expense reimbursement policies. Reimbursement of expenses in one tax year will not affect reimbursement of expenses in any other tax year.

5. **End of Employment.** Either Employee or the Company may end the employment relationship at any time, for any reason, with or without notice or cause. The employment relationship will end automatically and immediately upon Employee's death or entitlement to long-term disability benefits under the Company's long-term disability program. The date on which Employee's employment ends, whether as the result of a resignation by Employee, a termination of employment by the Company or an automatic termination of employment upon death or disability, is referred to in this Employment Agreement as the "Employment End Date." If Employee resigns or the Company terminates Employee's employment, the Company will (in either case) have the right at any time, for any reason in its sole discretion to decide the Employment End Date. In no event will the Company's deciding the Employment End Date following Employee's resignation be considered termination by the Company of Employee's employment.

6. **Company Obligations Upon End of Employment.** When the employment relationship ends, the Company will have no obligation to pay or provide Employee at any time any compensation, payment or benefit of any kind, except as expressly provided in Sections 6(a) through 6(e) below.

(a) **Minimum Obligations.** When the employment relationship ends, no matter how it ends: (i) the Company will pay Employee any unpaid Base Salary through the Employment End Date; (ii) Employee will be entitled to accrued, vested benefits under the Company's benefit plans and programs to the extent provided in Section 4(d); (iii) the Company will pay Employee for any accrued but unused vacation; and (iv) the Company will reimburse Employee for any unreimbursed expenses incurred through the Employment End Date to the extent provided in Section 4(f).

(b) **30 Days' Base Salary After Certain Resignations.** If Employee provides the Company at least 30 days' advance written notice of resignation of employment, is an active employee in good standing at the time of such notice and continues to perform his or her duties diligently and professionally to the extent requested thereafter, the Company will pay Employee his or her Base Salary for at least 30 days after such notice, even if the Employment End Date is earlier.

(c) **30 Days' Base Salary After Certain Terminations.** If the Company terminates Employee's employment other than for Cause, as defined below, the Company will provide Employee with written notice of termination and pay Employee his or her Base Salary for at least 30 days after such notice of termination, even if the Employment End Date is earlier.

(d) **Eligibility for Ordinary Severance Pay.** If the Company terminates Employee's employment, Employee will be eligible for severance pay in a lump sum in an amount equal to a minimum of 6 months of Base Salary or two weeks of Base Salary per year of service, whichever is greater, in either case provided that all of

the following conditions are satisfied: (i) the Company's primary reason for terminating Employee's employment was a change to the Company's business needs (such as reduction in force or elimination of position) and not Cause as defined below; (ii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iii) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a general release of claims in a form satisfactory to the Company ("General Release"). The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(e) **Eligibility for Enhanced Severance Compensation.** Employee will become eligible for the "Enhanced Severance Compensation," as described below, instead of severance pay under Section 6(d) above or under any other program or policy of the Company, if and only if all of the following conditions are satisfied: (i) the Company terminates Employee's employment without "Cause" (as defined below) or Employee resigns for "Good Reason" (as defined below); (ii) the Employment End Date is within 24 months after the effective date of a Change in Control (as defined below); (iii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iv) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a General Release. The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(f) **"Enhanced Severance Compensation."** If Employee becomes eligible for the Enhanced Severance Compensation:

(i) **Base Salary.** The Company will pay Employee, within 14 days after the General Release become irrevocable, a lump sum in an amount equal to one and one half times annual Base Salary (determined without regard to any reduction in Base Salary giving rise to "Good Reason," as defined below).

(ii) **Incentive Compensation.** The Company will pay Employee, within 14 days after the General Release becomes irrevocable, a lump sum equal to one and one half times the annual amount of incentive compensation for which Employee was eligible under any Incentive Compensation Plan of the Company then in effect for the year containing the Employment End Date. Additionally, the Employee will receive a payment for target bonus, prorated for the current year.

(iii) **Continuation of Benefits.** For a period of 18 months after the Employment End Date, to the extent Employee elects to continue group medical, vision, or dental insurance coverage under COBRA and timely remits the amount of premium assessed to similarly situated active employees for comparable coverage, the Company will pay the Company's usual share of such premiums. Benefits payable under this Section 6(f)(iii) will terminate to the extent Employee ceases to be eligible for COBRA coverage under the Company's medical benefits plan. Notwithstanding the foregoing, the Company will not pay the

contribution toward COBRA coverage described above to the extent that the Company reasonably determines that doing so would subject the Company to the excise tax under Section 4980D of the Internal Revenue Code (the "Code") (as a result of discriminatory coverage under a group health plan).

(iv) **Restricted Stock Units or Stock Appreciation Rights.** Employee's unvested equity awards as of the Employment End Date will be subject to accelerated vesting to the extent provided in the respective equity award agreement issued to Employee under the then effective MKS Instruments, Inc. equity incentive plan (including the MKS Instruments, Inc. 2014 Stock Incentive Plan.

(vi) **No Obligation to Mitigate Damages; Effect on Other Contractual Rights.** Employee will not be required to mitigate damages or the amount of any payment provided for under this Employment Agreement by seeking other employment or otherwise, nor will any payment provided for under this Employment Agreement be reduced by any compensation earned by Employee as the result of employment by an employer other than the Company or a direct or indirect parent, subsidiary or affiliate of the Company after the Employment End Date, or otherwise.

(g) **"Cause."** "Cause" to terminate Employee's employment will exist if Employee:

(i) commits a felony or engages in fraud, misappropriation or embezzlement;

(ii) knowingly fails or refuses to perform Employee's duties in a material way and, to the extent that the Company determines such failure or refusal can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the failure or refusal;

(iii) knowingly causes, or knowingly creates a serious risk of causing, material harm to the Company's business or reputation; or

(iv) breaches, in a material way, this Employment Agreement, the Confidential Information Agreement or any other agreement between Employee and the Company, and, to the extent that the Company determines such breach can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the breach.

(h) **"Good Reason."** "Good Reason" for Employee to resign will exist if, without Employee's express written consent:

(i) the Company materially reduces Employee's position, duties or responsibilities;

(ii) the Company reduces Employee's Base Salary as in effect on the date hereof or as the same may be increased from time to time during the term of this Employment Agreement;

(iii) the Company changes Employee's principal place of work to a location more than 50 miles from Employee's current principal place of work.

Notwithstanding the foregoing, an action described above will not constitute Good Reason unless: (A) Employee, within 30 days after the he or she learns, or with reasonable diligence should have learned, of such action, delivers to the Company written notice identifying the action as Good Reason and demanding its correction; (B) the Company fails to correct such event within 30 days after receipt of such notice; and (C) Employee resigns for Good Reason within 90 days after the date Employee learned, or with reasonable diligence should have learned, of such action.

(i) **"Change in Control."** For purposes of this Employment Agreement, the term "Change in Control" will mean the first to occur of any of the following events: (i) any "person" (as that term is used in Section 13 and 14(d)(2) of the Securities Exchange Act of 1934 ("Exchange Act")) becomes the beneficial owner (as that term is used in Section 13(d) of the Exchange Act), directly or indirectly, of fifty percent (50%) or more of MKS' capital stock entitled to vote in the election of directors; (ii) the shareholders of MKS approve any consolidation or merger of MKS other than a consolidation or merger of MKS in which the holders of the common stock of MKS immediately prior to the consolidation or merger hold more than fifty percent (50%) of the common stock of the surviving corporation immediately after the consolidation or merger; or (iii) the shareholders of MKS approve the sale or transfer of all or substantially all of the assets of MKS to parties that are not within a "controlled group of corporations" (as defined in Code Section 1563) in which MKS is a member.

7. Non-Competition.

(a) During Employee's MKS Employment (as defined below) and for 12 months immediately thereafter (together, the "Non-Compete Period"), Employee will not engage in or otherwise carry on, directly or indirectly anywhere in the world (as principal, agent, employee, employer, investor, shareholder (except for holdings of no greater than 1% of the total outstanding shares in a publicly-traded company), consultant, partner, member, manager, financier or in any other individual or representative capacity of any kind whatsoever), any Competitive Activity (as defined below).

(b) "MKS Employment" means the period beginning on the first day that Employee is employed by the Company and ending on the first day on which Employee is no longer employed by any MKS Entity (as defined below).

(c) "MKS Entity" means (i) the Company; (ii) any current or future parent, subsidiary or affiliate of the Company; or (iii) any successor or assign of (i) or (ii).

(d) "Competitive Activity" means business or activity competitive with an MKS Entity but only to the extent that business or activity is related to, similar to or competitive with the activities of the business unit(s), division(s), laborator(y)(ies), facilit(y)(ies) and other operational unit(s) in or for which Employee performed work for an MKS Entity or about which Employee acquired Proprietary Information (as defined in the Confidential Information Agreement).

(e) The Non-Compete Period will be extended for any period during which Employee is in breach of this Employment Agreement or the Confidential Information Agreement.

(f) If any court of competent jurisdiction determines that this Section 7 is unenforceable because the Non-Compete Period is too long or because Competitive Activity includes too great a range of activities or too wide a geographic scope, the parties agree that this Section 7 should be interpreted to extend only over the maximum period of time or range of activities or geographic scope as to which it may be enforceable.

(g) The post-employment restrictions on Employee's conduct contained in this Employment Agreement and in the Confidential Information Agreement: (i) will continue to apply even if Employee's duties, title, compensation, location or other terms or conditions of employment change, and even if such change or changes are material; and (ii) will apply regardless of how or why Employee's employment ends.

(h) The Company and Employee agree that violation by Employee of any of the provisions of this Section 7 of this Employment Agreement would cause the Company irreparable harm beyond what could reasonably or adequately be compensated in damages, and that the Company would therefore be entitled (in addition to the Company's other remedies) to an injunction, declaratory judgment or restraining order against any such violation or threatened violation.

8. Code Section 409A Compliance.

(a) Where this Employment Agreement refers to Employee's termination of employment for purposes of receiving any payment, whether such a termination has occurred will be determined in accordance with Section 409A of the Internal Revenue Code (the "Code") and Treasury Regulation Section 1.409A-1(h) (or any successor provisions) to the extent required by law.

(b) To the extent that benefits under Section 6 are contingent upon Employee providing a General Release, Employee will sign and return the General Release within the reasonable time period designated by the Company, which will not be more than 45 days. If the period for Employee to review a General Release plus any revocation period crosses calendar years, payments contingent upon the Release will be made in the later calendar year. Any payments contingent upon the General Release that would otherwise be made during the period for review and revocation of the General Release will be made, provided that the General Release is timely executed and returned to the Company and not revoked, on the first scheduled payment

date after such period ends. Each payment in respect of Employee's termination of employment under Section 6 of the Employment Agreement is designated as a separate payment for Section 409A purposes.

(c) If Employee is designated as a "specified Executive" within the meaning of Code Section 409A (while the Company is publicly traded), any deferred compensation payment subject to Section 409A to be made during the six-month period following Employee's termination of employment will be withheld and the amount of the payments withheld will be paid in a lump sum, without interest, during the seventh month after Employee's termination; provided, however, that if Employee dies prior to the expiration of such six month period, payment to Employee's beneficiary will be made as soon as reasonably practicable following Employee's death. The Company will identify in writing delivered to Employee any payments it reasonably determines are subject to delay under this Section 8(c). In no event will the Company have any liability or obligation with respect to taxes for which Employee may become liable as a result of the application of Code Section 409A.

9. Code Sections 280G/4999. If (a) any payments or benefits to Employee in connection with this Employment Agreement ("Payments") would be subject to the excise tax imposed by Code Section 4999 (the "Parachute Tax"), (b) paying Employee a lesser amount would avoid the Parachute Tax entirely and (c) payment of such lesser amount would, after taking into account applicable federal, state and local income taxes and the Parachute Tax, result in Employee receiving a greater after-tax payment than if the Company made the Payments in full, then the Company will pay Employee such lesser amount instead of making the Payments in full. The reporting and payment of any Parachute Tax will in all events be Employee's responsibility. The Company will not in any event provide a gross-up or any other payment to compensate Employee for the payment of the Parachute Tax or for any reduction in the Payments. The Company will withhold from the Payments any amounts it reasonably determines are required under Code Section 4999(c) and the Treasury Regulations thereunder.

10. Withholding. The Company will deduct from the amounts payable to Employee pursuant to this Employment Agreement all withholding amounts and deductions required by law or authorized by Employee.

11. Changes to Plans and Policies. Nothing in this Employment Agreement will: (a) require the Company or its affiliates to establish, maintain or continue any incentive compensation plan, stock incentive plan or other benefit plan, policy or arrangement; (b) restrict the right of the Company or any of its affiliates to amend, modify or terminate any such plan, policy or arrangement; (c) entitle Employee to participate in any such plan policy or arrangement at any specified level (or at all) in any year; or (d) prevent any future change to any such plan, policy or arrangement from applying to Employee in accordance with the terms of the change.

12. Assignment. The rights and obligations of the Company under this Employment Agreement will inure to the benefit of, and be binding upon, the Company's successors and assigns. The rights and obligations of Employee under this Employment Agreement will inure to the benefit of, and will be binding upon, Employee's heirs, executors and legal representatives. Employee may not delegate or assign any obligations under this Employment Agreement.

13. Entire Agreement and Severability. This Employment Agreement and the Confidential Information Agreement supersede any and all other agreements, either oral or in writing, between Employee and the Company with respect to the Company's employment of Employee. They contain all of the covenants and agreements between the parties with respect to such employment. Neither party is entering into this Employment Agreement on the basis of any representation, inducement, promise or agreement, oral or otherwise, by any party, or by any one acting on behalf of any party, which is not stated herein. Any modification of this Employment Agreement will be effective only if it is in writing and signed by both parties to this Employment Agreement. If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect without being impaired or invalidated in any way.

14. Miscellaneous. This Employment Agreement and the rights and obligations of the parties hereunder will be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts, excluding (but only to the extent permitted by law) its conflict of laws and choice of law rules. The parties agree that service of any process, summons, notice or document by U.S. certified mail or overnight delivery by a generally recognized commercial courier service to Employee's last known address (or any mode of service recognized to be effective by applicable law) will be effective service of process for any action, suit or proceeding brought against Employee. The failure of either party hereto to enforce any right under this Employment Agreement will not be considered a waiver of that right, or of damages caused thereby, or of any other rights under this Employment Agreement.

15. Arbitration and Waiver of Jury Trial.

(a) Any "Legal Dispute" (as defined below) between Employee and any MKS Entity (or between Employee and any employee or agent of any MKS Entity, to the extent directly or indirectly arising from or relating in any way to Employee's employment with or separation from the Company) will be resolved by final and binding arbitration. Notwithstanding the foregoing sentence, the Company may, in its sole discretion, obtain preliminary injunctive relief enforcing the provisions of the Confidential Information Agreement or Section 7 of this Employment Agreement from any court of competent jurisdiction.

(b) "Legal Dispute" means a dispute about legal rights or legal obligations, including but not limited to any rights or obligations arising under this Employment Agreement; the Confidential Information Agreement; any other agreement; any applicable legal or equitable doctrine; any applicable common law theory; or any applicable federal, state or local, statute, regulation or other legal requirement.

(c) The arbitration will be held in the Commonwealth of Massachusetts. It will be conducted in accordance with the then-prevailing Employment Arbitration Rules of the American Arbitration Association.

(d) Notwithstanding any other provision of this Employment Agreement or any other agreement or of any arbitration rules, no Legal Dispute involving any MKS Entity may be included in any class or collective arbitration or any other class or collective proceeding. The exclusive method for resolving any such Legal Dispute will be arbitration on an individual basis.

(e) Any issues about whether a dispute is subject to arbitration will be determined by a court of competent jurisdiction and not by an arbitrator. Any issues about the meaning or enforceability of Section 15(d) will be decided by a court of competent jurisdiction and not by an arbitrator.

(f) The Company, Employee and the arbitrator will treat all aspects of the arbitration proceedings, including without limitation, discovery, testimony and other evidence, briefs and the award, as strictly confidential, except that the arbitration award may be disclosed to the extent necessary to enforce the award, the provisions of the Confidential Information Agreement or the provisions of this Employment Agreement.

(g) Employee and the Company understand and acknowledge that by agreeing to arbitrate the disputes covered by this Section 15, they are waiving the right to resolve those disputes in court and waiving any right to a jury trial with respect to those disputes.

16. Knowing and Voluntary Agreement. Employee understands that Employee has the right to consult counsel before signing this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Gerald G. Colella
Name: Gerald G. Colella
Title: CEO & President

Dated: 8/1/16

/s/ John R. Abrams
[EMPLOYEE]

Dated: 27 Jul 16

EMPLOYMENT AGREEMENT

MKS Instruments, Inc., a Massachusetts corporation (the “Company”), and John Lee of Lexington, MA (“Employee”) agree, effective August 1, 2016, as follows.

1. **Employment.** The Company is employing Employee on an at-will basis in the position of Senior Vice President of Business Units. Employee agrees to comply with the Company’s policies.

2. **Confidential Information Agreement.** Employee will sign and deliver to the Company, at the same time that Employee executes this Employment Agreement, the Confidential Information, Intellectual Property and Non-Solicitation Agreement of MKS Instruments, Inc. (“Confidential Information Agreement”) that is Attachment 1 to this Employment Agreement.

3. **Duty to The Company.** While employed by the Company, Employee: (a) will devote his or her full working time and best efforts to the business of the Company; and (b) will not (without the prior, express, written consent of the Chief Executive Officer of the Company) engage in any business activity (whether or not for gain) that interferes with Employee’s work for the Company. Notwithstanding the previous sentence, this Employment Agreement does not prohibit Employee from managing his or her personal investments or engaging in charitable and unpaid professional activities (including serving on charitable and professional boards), so long as doing so does not materially interfere with Employee’s work for the Company or violate Section 7 of this Employment Agreement.

4. **Compensation.**

(a) **Base Salary.** The Company will pay Employee base salary at the rate of \$468,795 per year (the “Base Salary”), in accordance with the Company’s normal payroll practices. The Company may review and adjust the amount of the Base Salary from time to time in its sole discretion.

(b) **Incentive Compensation Plan.** Employee will be entitled to participate in the Company’s Annual Corporate Management/Key Employee Bonus Plan, to the extent applicable to Employee’s position.

(c) **Stock Incentive Plan.** Employee will be entitled to participate in the Company’s stock incentive plan to the extent applicable to Employee’s position.

(d) **Benefits.** Employee will be eligible to participate in the Company’s generally available employee benefit plans, which currently include medical, dental, vision, life, accidental death and dismemberment, short-term disability and long-term disability insurance, a 401(k) savings plan and an employee stock purchase plan, subject to the terms and conditions of each plan.

(e) **Paid Time Off.** Employee will be eligible for 18 days of paid vacation per year, plus paid sick time and holidays, all subject to the terms and conditions of the Company’s policies.

(f) **Expenses.** The Company will reimburse Employee for expenses Employee reasonably incurs in performing his or her duties, to the extent provided in the Company's expense reimbursement policies. Reimbursement of expenses in one tax year will not affect reimbursement of expenses in any other tax year.

5. **End of Employment.** Either Employee or the Company may end the employment relationship at any time, for any reason, with or without notice or cause. The employment relationship will end automatically and immediately upon Employee's death or entitlement to long-term disability benefits under the Company's long-term disability program. The date on which Employee's employment ends, whether as the result of a resignation by Employee, a termination of employment by the Company or an automatic termination of employment upon death or disability, is referred to in this Employment Agreement as the "Employment End Date." If Employee resigns or the Company terminates Employee's employment, the Company will (in either case) have the right at any time, for any reason in its sole discretion to decide the Employment End Date. In no event will the Company's deciding the Employment End Date following Employee's resignation be considered termination by the Company of Employee's employment.

6. **Company Obligations Upon End of Employment.** When the employment relationship ends, the Company will have no obligation to pay or provide Employee at any time any compensation, payment or benefit of any kind, except as expressly provided in Sections 6(a) through 6(e) below.

(a) **Minimum Obligations.** When the employment relationship ends, no matter how it ends: (i) the Company will pay Employee any unpaid Base Salary through the Employment End Date; (ii) Employee will be entitled to accrued, vested benefits under the Company's benefit plans and programs to the extent provided in Section 4(d); (iii) the Company will pay Employee for any accrued but unused vacation; and (iv) the Company will reimburse Employee for any unreimbursed expenses incurred through the Employment End Date to the extent provided in Section 4(f).

(b) **30 Days' Base Salary After Certain Resignations.** If Employee provides the Company at least 30 days' advance written notice of resignation of employment, is an active employee in good standing at the time of such notice and continues to perform his or her duties diligently and professionally to the extent requested thereafter, the Company will pay Employee his or her Base Salary for at least 30 days after such notice, even if the Employment End Date is earlier.

(c) **30 Days' Base Salary After Certain Terminations.** If the Company terminates Employee's employment other than for Cause, as defined below, the Company will provide Employee with written notice of termination and pay Employee his or her Base Salary for at least 30 days after such notice of termination, even if the Employment End Date is earlier.

(d) **Eligibility for Ordinary Severance Pay.** If the Company terminates Employee's employment, Employee will be eligible for severance pay in a lump sum in an amount equal to a minimum of 6 months of Base Salary or two weeks of Base Salary per year of service, whichever is greater, in either case provided that all of

the following conditions are satisfied: (i) the Company's primary reason for terminating Employee's employment was a change to the Company's business needs (such as reduction in force or elimination of position) and not Cause as defined below; (ii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iii) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a general release of claims in a form satisfactory to the Company ("General Release"). The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(e) **Eligibility for Enhanced Severance Compensation.** Employee will become eligible for the "Enhanced Severance Compensation," as described below, instead of severance pay under Section 6(d) above or under any other program or policy of the Company, if and only if all of the following conditions are satisfied: (i) the Company terminates Employee's employment without "Cause" (as defined below) or Employee resigns for "Good Reason" (as defined below); (ii) the Employment End Date is within 24 months after the effective date of a Change in Control (as defined below); (iii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iv) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a General Release. The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(f) **"Enhanced Severance Compensation."** If Employee becomes eligible for the Enhanced Severance Compensation:

(i) **Base Salary.** The Company will pay Employee, within 14 days after the General Release become irrevocable, a lump sum in an amount equal to one and one half times annual Base Salary (determined without regard to any reduction in Base Salary giving rise to "Good Reason," as defined below).

(ii) **Incentive Compensation.** The Company will pay Employee, within 14 days after the General Release becomes irrevocable, a lump sum equal to one and one half times the annual amount of incentive compensation for which Employee was eligible under any Incentive Compensation Plan of the Company then in effect for the year containing the Employment End Date. Additionally, the Employee will receive a payment for target bonus, prorated for the current year.

(iii) **Continuation of Benefits.** For a period of 18 months after the Employment End Date, to the extent Employee elects to continue group medical, vision, or dental insurance coverage under COBRA and timely remits the amount of premium assessed to similarly situated active employees for comparable coverage, the Company will pay the Company's usual share of such premiums. Benefits payable under this Section 6(f)(iii) will terminate to the extent Employee ceases to be eligible for COBRA coverage under the Company's medical benefits plan. Notwithstanding the foregoing, the Company will not pay the

contribution toward COBRA coverage described above to the extent that the Company reasonably determines that doing so would subject the Company to the excise tax under Section 4980D of the Internal Revenue Code (the "Code") (as a result of discriminatory coverage under a group health plan).

(iv) **Restricted Stock Units or Stock Appreciation Rights.** Employee's unvested equity awards as of the Employment End Date will be subject to accelerated vesting to the extent provided in the respective equity award agreement issued to Employee under the then effective MKS Instruments, Inc. equity incentive plan (including the MKS Instruments, Inc. 2014 Stock Incentive Plan).

(vi) **No Obligation to Mitigate Damages; Effect on Other Contractual Rights.** Employee will not be required to mitigate damages or the amount of any payment provided for under this Employment Agreement by seeking other employment or otherwise, nor will any payment provided for under this Employment Agreement be reduced by any compensation earned by Employee as the result of employment by an employer other than the Company or a direct or indirect parent, subsidiary or affiliate of the Company after the Employment End Date, or otherwise.

(g) **"Cause."** "Cause" to terminate Employee's employment will exist if Employee:

(i) commits a felony or engages in fraud, misappropriation or embezzlement;

(ii) knowingly fails or refuses to perform Employee's duties in a material way and, to the extent that the Company determines such failure or refusal can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the failure or refusal;

(iii) knowingly causes, or knowingly creates a serious risk of causing, material harm to the Company's business or reputation; or

(iv) breaches, in a material way, this Employment Agreement, the Confidential Information Agreement or any other agreement between Employee and the Company, and, to the extent that the Company determines such breach can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the breach.

(h) **"Good Reason."** "Good Reason" for Employee to resign will exist if, without Employee's express written consent:

(i) the Company materially reduces Employee's position, duties or responsibilities;

(ii) the Company reduces Employee's Base Salary as in effect on the date hereof or as the same may be increased from time to time during the term of this Employment Agreement;

(iii) the Company changes Employee's principal place of work to a location more than 50 miles from Employee's current principal place of work.

Notwithstanding the foregoing, an action described above will not constitute Good Reason unless: (A) Employee, within 30 days after the he or she learns, or with reasonable diligence should have learned, of such action, delivers to the Company written notice identifying the action as Good Reason and demanding its correction; (B) the Company fails to correct such event within 30 days after receipt of such notice; and (C) Employee resigns for Good Reason within 90 days after the date Employee learned, or with reasonable diligence should have learned, of such action.

(i) **"Change in Control."** For purposes of this Employment Agreement, the term "Change in Control" will mean the first to occur of any of the following events: (i) any "person" (as that term is used in Section 13 and 14(d)(2) of the Securities Exchange Act of 1934 ("Exchange Act")) becomes the beneficial owner (as that term is used in Section 13(d) of the Exchange Act), directly or indirectly, of fifty percent (50%) or more of MKS' capital stock entitled to vote in the election of directors; (ii) the shareholders of MKS approve any consolidation or merger of MKS other than a consolidation or merger of MKS in which the holders of the common stock of MKS immediately prior to the consolidation or merger hold more than fifty percent (50%) of the common stock of the surviving corporation immediately after the consolidation or merger; or (iii) the shareholders of MKS approve the sale or transfer of all or substantially all of the assets of MKS to parties that are not within a "controlled group of corporations" (as defined in Code Section 1563) in which MKS is a member.

7. Non-Competition.

(a) During Employee's MKS Employment (as defined below) and for 12 months immediately thereafter (together, the "Non-Compete Period"), Employee will not engage in or otherwise carry on, directly or indirectly anywhere in the world (as principal, agent, employee, employer, investor, shareholder (except for holdings of no greater than 1% of the total outstanding shares in a publicly-traded company), consultant, partner, member, manager, financier or in any other individual or representative capacity of any kind whatsoever), any Competitive Activity (as defined below).

(b) "MKS Employment" means the period beginning on the first day that Employee is employed by the Company and ending on the first day on which Employee is no longer employed by any MKS Entity (as defined below).

(c) "MKS Entity" means (i) the Company; (ii) any current or future parent, subsidiary or affiliate of the Company; or (iii) any successor or assign of (i) or (ii).

(d) "Competitive Activity" means business or activity competitive with an MKS Entity but only to the extent that business or activity is related to, similar to or competitive with the activities of the business unit(s), division(s), laborator(y)(ies), facilit(y)(ies) and other operational unit(s) in or for which Employee performed work for an MKS Entity or about which Employee acquired Proprietary Information (as defined in the Confidential Information Agreement).

(e) The Non-Compete Period will be extended for any period during which Employee is in breach of this Employment Agreement or the Confidential Information Agreement.

(f) If any court of competent jurisdiction determines that this Section 7 is unenforceable because the Non-Compete Period is too long or because Competitive Activity includes too great a range of activities or too wide a geographic scope, the parties agree that this Section 7 should be interpreted to extend only over the maximum period of time or range of activities or geographic scope as to which it may be enforceable.

(g) The post-employment restrictions on Employee's conduct contained in this Employment Agreement and in the Confidential Information Agreement: (i) will continue to apply even if Employee's duties, title, compensation, location or other terms or conditions of employment change, and even if such change or changes are material; and (ii) will apply regardless of how or why Employee's employment ends.

(h) The Company and Employee agree that violation by Employee of any of the provisions of this Section 7 of this Employment Agreement would cause the Company irreparable harm beyond what could reasonably or adequately be compensated in damages, and that the Company would therefore be entitled (in addition to the Company's other remedies) to an injunction, declaratory judgment or restraining order against any such violation or threatened violation.

8. Code Section 409A Compliance.

(a) Where this Employment Agreement refers to Employee's termination of employment for purposes of receiving any payment, whether such a termination has occurred will be determined in accordance with Section 409A of the Internal Revenue Code (the "Code") and Treasury Regulation Section 1.409A-1(h) (or any successor provisions) to the extent required by law.

(b) To the extent that benefits under Section 6 are contingent upon Employee providing a General Release, Employee will sign and return the General Release within the reasonable time period designated by the Company, which will not be more than 45 days. If the period for Employee to review a General Release plus any revocation period crosses calendar years, payments contingent upon the Release will be made in the later calendar year. Any payments contingent upon the General Release that would otherwise be made during the period for review and revocation of the General Release will be made, provided that the General Release is timely executed and returned to the Company and not revoked, on the first scheduled payment

date after such period ends. Each payment in respect of Employee's termination of employment under Section 6 of the Employment Agreement is designated as a separate payment for Section 409A purposes.

(c) If Employee is designated as a "specified Executive" within the meaning of Code Section 409A (while the Company is publicly traded), any deferred compensation payment subject to Section 409A to be made during the six-month period following Employee's termination of employment will be withheld and the amount of the payments withheld will be paid in a lump sum, without interest, during the seventh month after Employee's termination; provided, however, that if Employee dies prior to the expiration of such six month period, payment to Employee's beneficiary will be made as soon as reasonably practicable following Employee's death. The Company will identify in writing delivered to Employee any payments it reasonably determines are subject to delay under this Section 8(c). In no event will the Company have any liability or obligation with respect to taxes for which Employee may become liable as a result of the application of Code Section 409A.

9. Code Sections 280G/4999. If (a) any payments or benefits to Employee in connection with this Employment Agreement ("Payments") would be subject to the excise tax imposed by Code Section 4999 (the "Parachute Tax"), (b) paying Employee a lesser amount would avoid the Parachute Tax entirely and (c) payment of such lesser amount would, after taking into account applicable federal, state and local income taxes and the Parachute Tax, result in Employee receiving a greater after-tax payment than if the Company made the Payments in full, then the Company will pay Employee such lesser amount instead of making the Payments in full. The reporting and payment of any Parachute Tax will in all events be Employee's responsibility. The Company will not in any event provide a gross-up or any other payment to compensate Employee for the payment of the Parachute Tax or for any reduction in the Payments. The Company will withhold from the Payments any amounts it reasonably determines are required under Code Section 4999(c) and the Treasury Regulations thereunder.

10. Withholding. The Company will deduct from the amounts payable to Employee pursuant to this Employment Agreement all withholding amounts and deductions required by law or authorized by Employee.

11. Changes to Plans and Policies. Nothing in this Employment Agreement will: (a) require the Company or its affiliates to establish, maintain or continue any incentive compensation plan, stock incentive plan or other benefit plan, policy or arrangement; (b) restrict the right of the Company or any of its affiliates to amend, modify or terminate any such plan, policy or arrangement; (c) entitle Employee to participate in any such plan policy or arrangement at any specified level (or at all) in any year; or (d) prevent any future change to any such plan, policy or arrangement from applying to Employee in accordance with the terms of the change.

12. Assignment. The rights and obligations of the Company under this Employment Agreement will inure to the benefit of, and be binding upon, the Company's successors and assigns. The rights and obligations of Employee under this Employment Agreement will inure to the benefit of, and will be binding upon, Employee's heirs, executors and legal representatives. Employee may not delegate or assign any obligations under this Employment Agreement.

13. Entire Agreement and Severability. This Employment Agreement and the Confidential Information Agreement supersede any and all other agreements, either oral or in writing, between Employee and the Company with respect to the Company's employment of Employee. They contain all of the covenants and agreements between the parties with respect to such employment. Neither party is entering into this Employment Agreement on the basis of any representation, inducement, promise or agreement, oral or otherwise, by any party, or by any one acting on behalf of any party, which is not stated herein. Any modification of this Employment Agreement will be effective only if it is in writing and signed by both parties to this Employment Agreement. If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect without being impaired or invalidated in any way.

14. Miscellaneous. This Employment Agreement and the rights and obligations of the parties hereunder will be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts, excluding (but only to the extent permitted by law) its conflict of laws and choice of law rules. The parties agree that service of any process, summons, notice or document by U.S. certified mail or overnight delivery by a generally recognized commercial courier service to Employee's last known address (or any mode of service recognized to be effective by applicable law) will be effective service of process for any action, suit or proceeding brought against Employee. The failure of either party hereto to enforce any right under this Employment Agreement will not be considered a waiver of that right, or of damages caused thereby, or of any other rights under this Employment Agreement.

15. Arbitration and Waiver of Jury Trial.

(a) Any "Legal Dispute" (as defined below) between Employee and any MKS Entity (or between Employee and any employee or agent of any MKS Entity, to the extent directly or indirectly arising from or relating in any way to Employee's employment with or separation from the Company) will be resolved by final and binding arbitration. Notwithstanding the foregoing sentence, the Company may, in its sole discretion, obtain preliminary injunctive relief enforcing the provisions of the Confidential Information Agreement or Section 7 of this Employment Agreement from any court of competent jurisdiction.

(b) "Legal Dispute" means a dispute about legal rights or legal obligations, including but not limited to any rights or obligations arising under this Employment Agreement; the Confidential Information Agreement; any other agreement; any applicable legal or equitable doctrine; any applicable common law theory; or any applicable federal, state or local, statute, regulation or other legal requirement.

(c) The arbitration will be held in the Commonwealth of Massachusetts. It will be conducted in accordance with the then-prevailing Employment Arbitration Rules of the American Arbitration Association.

(d) Notwithstanding any other provision of this Employment Agreement or any other agreement or of any arbitration rules, no Legal Dispute involving any MKS Entity may be included in any class or collective arbitration or any other class or collective proceeding. The exclusive method for resolving any such Legal Dispute will be arbitration on an individual basis.

(e) Any issues about whether a dispute is subject to arbitration will be determined by a court of competent jurisdiction and not by an arbitrator. Any issues about the meaning or enforceability of Section 15(d) will be decided by a court of competent jurisdiction and not by an arbitrator.

(f) The Company, Employee and the arbitrator will treat all aspects of the arbitration proceedings, including without limitation, discovery, testimony and other evidence, briefs and the award, as strictly confidential, except that the arbitration award may be disclosed to the extent necessary to enforce the award, the provisions of the Confidential Information Agreement or the provisions of this Employment Agreement.

(g) Employee and the Company understand and acknowledge that by agreeing to arbitrate the disputes covered by this Section 15, they are waiving the right to resolve those disputes in court and waiving any right to a jury trial with respect to those disputes.

16. Knowing and Voluntary Agreement. Employee understands that Employee has the right to consult counsel before signing this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Gerald G. Colella
Name: Gerald G. Colella
Title: CEO & President

Dated: 8/1/16

/s/ John Lee
[EMPLOYEE]

Dated: 7/29/16

EMPLOYMENT AGREEMENT

MKS Instruments, Inc., a Massachusetts corporation (the “Company”), and Brian Quirk of Belmont, MA (“Employee”) agree, effective August 1, 2016, as follows.

1. **Employment.** The Company is employing Employee on an at-will basis in the position of Senior Vice President of Global Operations. Employee agrees to comply with the Company’s policies.

2. **Confidential Information Agreement.** Employee will sign and deliver to the Company, at the same time that Employee executes this Employment Agreement, the Confidential Information, Intellectual Property and Non-Solicitation Agreement of MKS Instruments, Inc. (“Confidential Information Agreement”) that is Attachment 1 to this Employment Agreement.

3. **Duty to The Company.** While employed by the Company, Employee: (a) will devote his or her full working time and best efforts to the business of the Company; and (b) will not (without the prior, express, written consent of the Chief Executive Officer of the Company) engage in any business activity (whether or not for gain) that interferes with Employee’s work for the Company. Notwithstanding the previous sentence, this Employment Agreement does not prohibit Employee from managing his or her personal investments or engaging in charitable and unpaid professional activities (including serving on charitable and professional boards), so long as doing so does not materially interfere with Employee’s work for the Company or violate Section 7 of this Employment Agreement.

4. **Compensation.**

(a) **Base Salary.** The Company will pay Employee base salary at the rate of \$375,000 per year (the “Base Salary”), in accordance with the Company’s normal payroll practices. The Company may review and adjust the amount of the Base Salary from time to time in its sole discretion.

(b) **Incentive Compensation Plan.** Employee will be entitled to participate in the Company’s Annual Corporate Management/Key Employee Bonus Plan, to the extent applicable to Employee’s position.

(c) **Stock Incentive Plan.** Employee will be entitled to participate in the Company’s stock incentive plan to the extent applicable to Employee’s position.

(d) **Benefits.** Employee will be eligible to participate in the Company’s generally available employee benefit plans, which currently include medical, dental, vision, life, accidental death and dismemberment, short-term disability and long-term disability insurance, a 401(k) savings plan and an employee stock purchase plan, subject to the terms and conditions of each plan.

(e) **Paid Time Off.** Employee will be eligible for 20 days of paid vacation per year, plus paid sick time and holidays, all subject to the terms and conditions of the Company’s policies.

(f) **Expenses.** The Company will reimburse Employee for expenses Employee reasonably incurs in performing his or her duties, to the extent provided in the Company's expense reimbursement policies. Reimbursement of expenses in one tax year will not affect reimbursement of expenses in any other tax year.

5. End of Employment. Either Employee or the Company may end the employment relationship at any time, for any reason, with or without notice or cause. The employment relationship will end automatically and immediately upon Employee's death or entitlement to long-term disability benefits under the Company's long-term disability program. The date on which Employee's employment ends, whether as the result of a resignation by Employee, a termination of employment by the Company or an automatic termination of employment upon death or disability, is referred to in this Employment Agreement as the "Employment End Date." If Employee resigns or the Company terminates Employee's employment, the Company will (in either case) have the right at any time, for any reason in its sole discretion to decide the Employment End Date. In no event will the Company's deciding the Employment End Date following Employee's resignation be considered termination by the Company of Employee's employment.

6. Company Obligations Upon End of Employment. When the employment relationship ends, the Company will have no obligation to pay or provide Employee at any time any compensation, payment or benefit of any kind, except as expressly provided in Sections 6(a) through 6(e) below.

(a) **Minimum Obligations.** When the employment relationship ends, no matter how it ends: (i) the Company will pay Employee any unpaid Base Salary through the Employment End Date; (ii) Employee will be entitled to accrued, vested benefits under the Company's benefit plans and programs to the extent provided in Section 4(d); (iii) the Company will pay Employee for any accrued but unused vacation; and (iv) the Company will reimburse Employee for any unreimbursed expenses incurred through the Employment End Date to the extent provided in Section 4(f).

(b) **30 Days' Base Salary After Certain Resignations.** If Employee provides the Company at least 30 days' advance written notice of resignation of employment, is an active employee in good standing at the time of such notice and continues to perform his or her duties diligently and professionally to the extent requested thereafter, the Company will pay Employee his or her Base Salary for at least 30 days after such notice, even if the Employment End Date is earlier.

(c) **30 Days' Base Salary After Certain Terminations.** If the Company terminates Employee's employment other than for Cause, as defined below, the Company will provide Employee with written notice of termination and pay Employee his or her Base Salary for at least 30 days after such notice of termination, even if the Employment End Date is earlier.

(d) **Eligibility for Ordinary Severance Pay.** If the Company terminates Employee's employment, Employee will be eligible for severance pay in a lump sum in an amount equal to a minimum of 6 months of Base Salary or two weeks of Base Salary per year of service, whichever is greater, in either case provided that all of

the following conditions are satisfied: (i) the Company's primary reason for terminating Employee's employment was a change to the Company's business needs (such as reduction in force or elimination of position) and not Cause as defined below; (ii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iii) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a general release of claims in a form satisfactory to the Company ("General Release"). The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(e) **Eligibility for Enhanced Severance Compensation.** Employee will become eligible for the "Enhanced Severance Compensation," as described below, instead of severance pay under Section 6(d) above or under any other program or policy of the Company, if and only if all of the following conditions are satisfied: (i) the Company terminates Employee's employment without "Cause" (as defined below) or Employee resigns for "Good Reason" (as defined below); (ii) the Employment End Date is within 24 months after the effective date of a Change in Control (as defined below); (iii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iv) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a General Release. The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(f) **"Enhanced Severance Compensation."** If Employee becomes eligible for the Enhanced Severance Compensation:

(i) **Base Salary.** The Company will pay Employee, within 14 days after the General Release become irrevocable, a lump sum in an amount equal to one and one half times annual Base Salary (determined without regard to any reduction in Base Salary giving rise to "Good Reason," as defined below).

(ii) **Incentive Compensation.** The Company will pay Employee, within 14 days after the General Release becomes irrevocable, a lump sum equal to one and one half times the annual amount of incentive compensation for which Employee was eligible under any Incentive Compensation Plan of the Company then in effect for the year containing the Employment End Date. Additionally, the Employee will receive a payment for target bonus, prorated for the current year.

(iii) **Continuation of Benefits.** For a period of 18 months after the Employment End Date, to the extent Employee elects to continue group medical, vision, or dental insurance coverage under COBRA and timely remits the amount of premium assessed to similarly situated active employees for comparable coverage, the Company will pay the Company's usual share of such premiums. Benefits payable under this Section 6(f)(iii) will terminate to the extent Employee ceases to be eligible for COBRA coverage under the Company's medical benefits plan. Notwithstanding the foregoing, the Company will not pay the

contribution toward COBRA coverage described above to the extent that the Company reasonably determines that doing so would subject the Company to the excise tax under Section 4980D of the Internal Revenue Code (the "Code") (as a result of discriminatory coverage under a group health plan).

(iv) **Restricted Stock Units or Stock Appreciation Rights.** Employee's unvested equity awards as of the Employment End Date will be subject to accelerated vesting to the extent provided in the respective equity award agreement issued to Employee under the then effective MKS Instruments, Inc. equity incentive plan (including the MKS Instruments, Inc. 2014 Stock Incentive Plan.

(vi) **No Obligation to Mitigate Damages; Effect on Other Contractual Rights.** Employee will not be required to mitigate damages or the amount of any payment provided for under this Employment Agreement by seeking other employment or otherwise, nor will any payment provided for under this Employment Agreement be reduced by any compensation earned by Employee as the result of employment by an employer other than the Company or a direct or indirect parent, subsidiary or affiliate of the Company after the Employment End Date, or otherwise.

(g) **"Cause."** "Cause" to terminate Employee's employment will exist if Employee:

(i) commits a felony or engages in fraud, misappropriation or embezzlement;

(ii) knowingly fails or refuses to perform Employee's duties in a material way and, to the extent that the Company determines such failure or refusal can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the failure or refusal;

(iii) knowingly causes, or knowingly creates a serious risk of causing, material harm to the Company's business or reputation; or

(iv) breaches, in a material way, this Employment Agreement, the Confidential Information Agreement or any other agreement between Employee and the Company, and, to the extent that the Company determines such breach can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the breach.

(h) **"Good Reason."** "Good Reason" for Employee to resign will exist if, without Employee's express written consent:

(i) the Company materially reduces Employee's position, duties or responsibilities;

(ii) the Company reduces Employee's Base Salary as in effect on the date hereof or as the same may be increased from time to time during the term of this Employment Agreement;

(iii) the Company changes Employee's principal place of work to a location more than 50 miles from Employee's current principal place of work.

Notwithstanding the foregoing, an action described above will not constitute Good Reason unless: (A) Employee, within 30 days after the he or she learns, or with reasonable diligence should have learned, of such action, delivers to the Company written notice identifying the action as Good Reason and demanding its correction; (B) the Company fails to correct such event within 30 days after receipt of such notice; and (C) Employee resigns for Good Reason within 90 days after the date Employee learned, or with reasonable diligence should have learned, of such action.

(i) **"Change in Control."** For purposes of this Employment Agreement, the term "Change in Control" will mean the first to occur of any of the following events: (i) any "person" (as that term is used in Section 13 and 14(d)(2) of the Securities Exchange Act of 1934 ("Exchange Act")) becomes the beneficial owner (as that term is used in Section 13(d) of the Exchange Act), directly or indirectly, of fifty percent (50%) or more of MKS' capital stock entitled to vote in the election of directors; (ii) the shareholders of MKS approve any consolidation or merger of MKS other than a consolidation or merger of MKS in which the holders of the common stock of MKS immediately prior to the consolidation or merger hold more than fifty percent (50%) of the common stock of the surviving corporation immediately after the consolidation or merger; or (iii) the shareholders of MKS approve the sale or transfer of all or substantially all of the assets of MKS to parties that are not within a "controlled group of corporations" (as defined in Code Section 1563) in which MKS is a member.

7. Non-Competition.

(a) During Employee's MKS Employment (as defined below) and for 12 months immediately thereafter (together, the "Non-Compete Period"), Employee will not engage in or otherwise carry on, directly or indirectly anywhere in the world (as principal, agent, employee, employer, investor, shareholder (except for holdings of no greater than 1% of the total outstanding shares in a publicly-traded company), consultant, partner, member, manager, financier or in any other individual or representative capacity of any kind whatsoever), any Competitive Activity (as defined below).

(b) "MKS Employment" means the period beginning on the first day that Employee is employed by the Company and ending on the first day on which Employee is no longer employed by any MKS Entity (as defined below).

(c) "MKS Entity" means (i) the Company; (ii) any current or future parent, subsidiary or affiliate of the Company; or (iii) any successor or assign of (i) or (ii).

(d) "Competitive Activity" means business or activity competitive with an MKS Entity but only to the extent that business or activity is related to, similar to or competitive with the activities of the business unit(s), division(s), laborator(y)(ies), facilit(y)(ies) and other operational unit(s) in or for which Employee performed work for an MKS Entity or about which Employee acquired Proprietary Information (as defined in the Confidential Information Agreement).

(e) The Non-Compete Period will be extended for any period during which Employee is in breach of this Employment Agreement or the Confidential Information Agreement.

(f) If any court of competent jurisdiction determines that this Section 7 is unenforceable because the Non-Compete Period is too long or because Competitive Activity includes too great a range of activities or too wide a geographic scope, the parties agree that this Section 7 should be interpreted to extend only over the maximum period of time or range of activities or geographic scope as to which it may be enforceable.

(g) The post-employment restrictions on Employee's conduct contained in this Employment Agreement and in the Confidential Information Agreement: (i) will continue to apply even if Employee's duties, title, compensation, location or other terms or conditions of employment change, and even if such change or changes are material; and (ii) will apply regardless of how or why Employee's employment ends.

(h) The Company and Employee agree that violation by Employee of any of the provisions of this Section 7 of this Employment Agreement would cause the Company irreparable harm beyond what could reasonably or adequately be compensated in damages, and that the Company would therefore be entitled (in addition to the Company's other remedies) to an injunction, declaratory judgment or restraining order against any such violation or threatened violation.

8. Code Section 409A Compliance.

(a) Where this Employment Agreement refers to Employee's termination of employment for purposes of receiving any payment, whether such a termination has occurred will be determined in accordance with Section 409A of the Internal Revenue Code (the "Code") and Treasury Regulation Section 1.409A-1(h) (or any successor provisions) to the extent required by law.

(b) To the extent that benefits under Section 6 are contingent upon Employee providing a General Release, Employee will sign and return the General Release within the reasonable time period designated by the Company, which will not be more than 45 days. If the period for Employee to review a General Release plus any revocation period crosses calendar years, payments contingent upon the Release will be made in the later calendar year. Any payments contingent upon the General Release that would otherwise be made during the period for review and revocation of the General Release will be made, provided that the General Release is timely executed and returned to the Company and not revoked, on the first scheduled payment

date after such period ends. Each payment in respect of Employee's termination of employment under Section 6 of the Employment Agreement is designated as a separate payment for Section 409A purposes.

(c) If Employee is designated as a "specified Executive" within the meaning of Code Section 409A (while the Company is publicly traded), any deferred compensation payment subject to Section 409A to be made during the six-month period following Employee's termination of employment will be withheld and the amount of the payments withheld will be paid in a lump sum, without interest, during the seventh month after Employee's termination; provided, however, that if Employee dies prior to the expiration of such six month period, payment to Employee's beneficiary will be made as soon as reasonably practicable following Employee's death. The Company will identify in writing delivered to Employee any payments it reasonably determines are subject to delay under this Section 8(c). In no event will the Company have any liability or obligation with respect to taxes for which Employee may become liable as a result of the application of Code Section 409A.

9. Code Sections 280G/4999. If (a) any payments or benefits to Employee in connection with this Employment Agreement ("Payments") would be subject to the excise tax imposed by Code Section 4999 (the "Parachute Tax"), (b) paying Employee a lesser amount would avoid the Parachute Tax entirely and (c) payment of such lesser amount would, after taking into account applicable federal, state and local income taxes and the Parachute Tax, result in Employee receiving a greater after-tax payment than if the Company made the Payments in full, then the Company will pay Employee such lesser amount instead of making the Payments in full. The reporting and payment of any Parachute Tax will in all events be Employee's responsibility. The Company will not in any event provide a gross-up or any other payment to compensate Employee for the payment of the Parachute Tax or for any reduction in the Payments. The Company will withhold from the Payments any amounts it reasonably determines are required under Code Section 4999(c) and the Treasury Regulations thereunder.

10. Withholding. The Company will deduct from the amounts payable to Employee pursuant to this Employment Agreement all withholding amounts and deductions required by law or authorized by Employee.

11. Changes to Plans and Policies. Nothing in this Employment Agreement will: (a) require the Company or its affiliates to establish, maintain or continue any incentive compensation plan, stock incentive plan or other benefit plan, policy or arrangement; (b) restrict the right of the Company or any of its affiliates to amend, modify or terminate any such plan, policy or arrangement; (c) entitle Employee to participate in any such plan policy or arrangement at any specified level (or at all) in any year; or (d) prevent any future change to any such plan, policy or arrangement from applying to Employee in accordance with the terms of the change.

12. Assignment. The rights and obligations of the Company under this Employment Agreement will inure to the benefit of, and be binding upon, the Company's successors and assigns. The rights and obligations of Employee under this Employment Agreement will inure to the benefit of, and will be binding upon,

Employee's heirs, executors and legal representatives. Employee may not delegate or assign any obligations under this Employment Agreement.

13. Entire Agreement and Severability. This Employment Agreement and the Confidential Information Agreement supersede any and all other agreements, either oral or in writing, between Employee and the Company with respect to the Company's employment of Employee. They contain all of the covenants and agreements between the parties with respect to such employment. Neither party is entering into this Employment Agreement on the basis of any representation, inducement, promise or agreement, oral or otherwise, by any party, or by any one acting on behalf of any party, which is not stated herein. Any modification of this Employment Agreement will be effective only if it is in writing and signed by both parties to this Employment Agreement. If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect without being impaired or invalidated in any way.

14. Miscellaneous. This Employment Agreement and the rights and obligations of the parties hereunder will be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts, excluding (but only to the extent permitted by law) its conflict of laws and choice of law rules. The parties agree that service of any process, summons, notice or document by U.S. certified mail or overnight delivery by a generally recognized commercial courier service to Employee's last known address (or any mode of service recognized to be effective by applicable law) will be effective service of process for any action, suit or proceeding brought against Employee. The failure of either party hereto to enforce any right under this Employment Agreement will not be considered a waiver of that right, or of damages caused thereby, or of any other rights under this Employment Agreement.

15. Arbitration and Waiver of Jury Trial.

(a) Any "Legal Dispute" (as defined below) between Employee and any MKS Entity (or between Employee and any employee or agent of any MKS Entity, to the extent directly or indirectly arising from or relating in any way to Employee's employment with or separation from the Company) will be resolved by final and binding arbitration. Notwithstanding the foregoing sentence, the Company may, in its sole discretion, obtain preliminary injunctive relief enforcing the provisions of the Confidential Information Agreement or Section 7 of this Employment Agreement from any court of competent jurisdiction.

(b) "Legal Dispute" means a dispute about legal rights or legal obligations, including but not limited to any rights or obligations arising under this Employment Agreement; the Confidential Information Agreement; any other agreement; any applicable legal or equitable doctrine; any applicable common law theory; or any applicable federal, state or local, statute, regulation or other legal requirement.

(c) The arbitration will be held in the Commonwealth of Massachusetts. It will be conducted in accordance with the then-prevailing Employment Arbitration Rules of the American Arbitration Association.

(d) Notwithstanding any other provision of this Employment Agreement or any other agreement or of any arbitration rules, no Legal Dispute involving any MKS Entity may be included in any class or collective arbitration or any other class or collective proceeding. The exclusive method for resolving any such Legal Dispute will be arbitration on an individual basis.

(e) Any issues about whether a dispute is subject to arbitration will be determined by a court of competent jurisdiction and not by an arbitrator. Any issues about the meaning or enforceability of Section 15(d) will be decided by a court of competent jurisdiction and not by an arbitrator.

(f) The Company, Employee and the arbitrator will treat all aspects of the arbitration proceedings, including without limitation, discovery, testimony and other evidence, briefs and the award, as strictly confidential, except that the arbitration award may be disclosed to the extent necessary to enforce the award, the provisions of the Confidential Information Agreement or the provisions of this Employment Agreement.

(g) Employee and the Company understand and acknowledge that by agreeing to arbitrate the disputes covered by this Section 15, they are waiving the right to resolve those disputes in court and waiving any right to a jury trial with respect to those disputes.

16. Knowing and Voluntary Agreement. Employee understands that Employee has the right to consult counsel before signing this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Gerald G. Colella
Name: Gerald G. Colella
Title: CEO & President

Dated: 8/1/16

/s/ Brian C. Quirk
[EMPLOYEE]

Dated: 7/28/16

EMPLOYMENT AGREEMENT

Newport Corporation, a Nevada corporation (the "Company"); and Dennis Werth of Irvine, California ("Employee") agree, effective August 1, 2016, as follows.

WHEREAS, the Company is owned by MKS Instruments, Inc. ("MKS" or the "Parent Company");

WHEREAS, the Company and Employee desire to provide for the employment of Employee by the Company;

NOW, THEREFORE, in consideration of the premises and the mutual promises contained herein, the Company and Employee hereby agree as follows:

1. **Employment.** The Company is employing Employee on an at-will basis in the position of Senior Vice President, Newport Business Units. Employee agrees to comply with the Company's policies.

2. **Confidential Information Agreement.** Employee previously signed and delivered to the Company, a Confidential Information, Intellectual Property and Non-Solicitation Agreement of Newport Corporation ("Confidential Information Agreement"), which is reaffirmed by this Employment Agreement.

3. **Duty to The Company.** While employed by the Company, Employee: (a) will devote his full working time and best efforts to the business of the Company; and (b) will not (without the prior, express, written consent of the Chief Executive Officer of the Company) engage in any business activity (whether or not for gain) that interferes with Employee's work for the Company. Notwithstanding the previous sentence, this Employment Agreement does not prohibit Employee from managing his personal investments or engaging in charitable and unpaid professional activities (including serving on charitable and professional boards), so long as doing so does not materially interfere with Employee's work for the Company.

4. **Compensation.**

(a) **Retention Incentive.** To induce Employee to remain with the Company, an additional award of MKS restricted stock units with a total grant date value of \$150,000 (the "Retention Incentive") was granted to Employee on May 31, 2016. The award will vest over a three-year period, to the extent Employee's employment continues during that period, in installments of 20%, 30% and 50%, with vesting occurring on February 15 of each year. The award will be subject to the terms, conditions and restrictions set forth in the MKS Instruments, Inc. 2014 Stock Incentive Plan and the Restricted Stock Unit Agreement to be issued to Employee under such Plan.

(b) **Base Salary.** The Company will pay Employee base salary at the rate of \$400,000 per year (the "Base Salary"), in accordance with the Company's normal payroll practices. The Company may review and adjust the amount of the Base Salary from time to time in its sole discretion.

(c) **Incentive Compensation Plan.** Employee will be entitled to participate in the Company's annual incentive compensation plan as from time to time existing and applicable to Employee's position. For 2016 only, the following special provisions will apply to Employee's eligibility for incentive compensation: (i) Employee will be eligible, to the extent Employee's employment with the Company continues through the applicable dates, to receive incentive compensation in two installments; (ii) if Employee satisfies the eligibility requirements, the first installment will be made on or about August 31, 2016 in an amount determined in accordance with Exhibit A; (iii) if Employee satisfies the eligibility requirements, the second installment will be made on the date in or about February 2017 when MKS Instruments, Inc. pays 2016 incentive compensation to its executives, in an amount determined in accordance with Exhibits B and C.

(d) **2016 MKS Restricted Stock Unit Award.** Employee received on May 31, 2016, a 2016 MKS Restricted Stock Unit Award with a total grant date value of \$500,000 (the "Award"). The Award will vest over a three-year period, to the extent Employee's employment with the Company continues during that period, in three equal annual installments, with an installment vesting occurring on February 15 each year, provided, however, that half of each installment will vest only to the extent certain performance goals are achieved. The financial objectives for the performance-based half of the installment scheduled to vest on February 15, 2017 are set forth in the attached Exhibit C. The Award will be subject to the terms, conditions and restrictions set forth in the MKS Instruments, Inc. 2014 Stock Incentive Plan and the Restricted Stock Unit Agreement to be issued to Employee under such Plan.

(e) **Waiver of Amended and Restated Severance Compensation Agreement.** In recognition of Employee waiving all rights (including but not limited to all rights to severance and benefits) provided under the Amended and Restated Severance Compensation Agreement, signed on April 27, 2016, Employee will receive no later than May 31, 2016, an MKS Restricted Stock Unit Award with a total grant date value of \$554,400 (the "Waiver Award"). The Waiver Award will vest over a three-year period, to the extent Employee's employment with the Company continues during that period, in three installments of 20%, 30% and 50%, with vesting occurring on February 15 of each year. The Waiver Award will be subject to accelerated vesting to the extent provided in Section 6(d) or Section 6(f). The Waiver Award will be subject to the terms, conditions and restrictions set forth in the MKS Instruments, Inc. 2014 Stock Incentive Plan and the Restricted Stock Unit Agreement to be issued to Employee under such Plan.

(f) **Automobile.** Employee will receive the option of a leased company car or monthly car allowance. If Employee chooses the leased car option: car insurance, gasoline and upkeep will be provided; the personal use of the vehicle will represent imputed income and will be included on Employee's W-2 statement; and the leased car will be subject to an Automobile Policy, which the Company will provide separately. If Employee chooses the monthly car option, the monthly amount will be \$700, which will be an all-inclusive amount and will represent imputed income and will be included on Employee's W-2 statement.

(g) **Benefits.** Employee will be eligible to participate in the Company's generally available employee benefit plans, which currently include medical, dental, vision, life, accidental death and dismemberment, short-term disability and long-term disability insurance, a 401(k) savings plan and an employee stock purchase plan, subject to the terms and conditions of each plan.

(h) **Paid Time Off.** Employee will be eligible for 20 days of paid vacation per year, plus paid sick time and holidays, all subject to the terms and conditions of the Company's policies. Employee and Company agree that, as May 31, 2016, Employee had 20 accrued, unused vacation days.

(i) **Expenses.** The Company will reimburse Employee for expenses Employee reasonably incurs in performing his duties, to the extent provided in the Company's expense reimbursement policies. Reimbursement of expenses in one tax year will not affect reimbursement of expenses in any other tax year.

5. End of Employment. Either Employee or the Company may end the employment relationship at any time, for any reason, with or without notice or cause. The employment relationship will end automatically and immediately upon Employee's death or entitlement to long-term disability benefits under the Company's long-term disability program. The date on which Employee's employment ends, whether as the result of a resignation by Employee, a termination of employment by the Company or an automatic termination of employment upon death or disability, is referred to in this Employment Agreement as the "Employment End Date." If Employee resigns or the Company terminates Employee's employment, the Company will (in either case) have the right at any time, for any reason in its sole discretion to decide the Employment End Date. In no event will the Company's deciding the Employment End Date following Employee's resignation be considered termination by the Company of Employee's employment.

6. Company Obligations Upon End of Employment. When the employment relationship ends, the Company will have no obligation to pay or provide Employee at any time any compensation, payment or benefit of any kind, except as expressly provided in Sections 6(a) through 6(e) below.

(a) **Minimum Obligations.** When the employment relationship ends, no matter how it ends: (i) the Company will pay Employee any unpaid Base Salary through the Employment End Date; (ii) Employee will be entitled to accrued, vested benefits under the Company's benefit plans and programs to the extent provided in Section 4; (iii) the Company will pay Employee for any accrued but unused vacation; and (iv) the Company will reimburse Employee for any unreimbursed expenses incurred through the Employment End Date to the extent provided in Section 4.

(b) 30 Days' Base Salary After Certain Resignations. If Employee provides the Company at least 30 days' advance written notice of resignation of employment, is an active employee in good standing at the time of such notice and continues to perform his duties diligently and professionally to the extent requested thereafter, the Company will pay Employee his Base Salary for at least 30 days after such notice, even if the Employment End Date is earlier. Company will reimburse Employee through the balance of the 30 day notice period for the premiums (if any) Employee pays for continuation of life insurance should Employee elect to exercise the conversion feature (if any) of the Company's group life policy then in effect and for the premiums (if any) for such medical/dental insurance as Employee may then receive should Employee elect continuation under the federal COBRA program.

(c) 30 Days' Base Salary After Certain Terminations. If the Company terminates Employee's employment other than for Cause, as defined below, the Company will provide Employee with written notice of termination and pay Employee his Base Salary for at least 30 days after such notice of termination, even if the Employment End Date is earlier. Company will reimburse Employee through the balance of the 30 day notice period for the premiums (if any) Employee pays for continuation of life insurance should Employee elect to exercise the conversion feature (if any) of the Company's group life policy then in effect and for the premiums (if any) for such medical/dental insurance as Employee may then receive should Employee elect continuation under the federal COBRA program.

(d) Eligibility for Ordinary Severance Pay. If the Company terminates Employee's employment, Employee will be eligible for severance pay in a lump sum in an amount equal to a minimum of 6 months of Base Salary, or two weeks of Base Salary per year of service, whichever is greater, in either case provided that all of the following conditions are satisfied: (i) the Company's primary reason for terminating Employee's employment was a change to the Company's business needs (such as reduction in force or elimination of position) and not Cause as defined below; (ii) Employee has complied with and continues to comply with all of Employee's obligations under this Employment Agreement and the Confidential Information Agreement; and (iii) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a general release of claims in a form satisfactory to the Company ("General Release"). The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive. The Waiver Award shall become fully vested (if not already fully vested) as of the effective date of such termination.

(e) Eligibility for Enhanced Severance Compensation. Employee will become eligible for the "Enhanced Severance Compensation," as described below, instead of severance pay under Section 6(d) above or under any other program or policy of the Company, if and only if all of the following conditions are satisfied: (i) the Company terminates Employee's employment without "Cause" (as defined below) or Employee resigns for "Good Reason" (as defined below); (ii) the Employment End Date is within 24 months after the effective date of a Change in Control (as defined below); (iii) Employee has complied with and continues to comply with all of Employee's

obligations under this Employment Agreement and the Confidential Information Agreement; and (iv) Employee executes, provides to the Company within 45 days after the Employment End Date and does not thereafter revoke or attempt to revoke, a General Release. The Company's good-faith determination that one or more of the conditions listed above has not been satisfied will be binding and conclusive.

(f) **"Enhanced Severance Compensation."** If Employee becomes eligible for the Enhanced Severance Compensation:

(i) **Base Salary.** The Company will pay Employee, within 14 days after the General Release become irrevocable, a lump sum in an amount equal to 1.5 times annual Base Salary (determined without regard to any reduction in Base Salary giving rise to "Good Reason," as defined below).

(ii) **Incentive Compensation.** The Company will pay Employee, within 14 days after the General Release becomes irrevocable, a lump sum equal to 1.5 times the annual amount of incentive compensation for which Employee was eligible under any Incentive Compensation Plan of the Company then in effect for the year containing the Employment End Date. Additionally, the Employee will receive a payment for target bonus, prorated for current year.

(iii) **Continuation of Benefits.** For a period of 18 months after the Employment End Date, to the extent Employee elects to continue group medical, vision, or dental insurance coverage under COBRA and timely remits the amount of premium assessed to similarly situated active employees for comparable coverage, the Company will pay the Company's usual share of such premiums. Benefits payable under this Section 6(f)(iii) will terminate to the extent Employee ceases to be eligible for COBRA coverage under the Company's medical benefits plan. Notwithstanding the foregoing, the Company will not pay the contribution toward COBRA coverage described above to the extent that the Company reasonably determines that doing so would subject the Company to the excise tax under Section 4980D of the Internal Revenue Code (the "Code") (as a result of discriminatory coverage under a group health plan).

(iv) **Restricted Stock Units or Stock Appreciation Rights.** Employee's unvested equity awards as of the Employment End Date will be subject to accelerated vesting to the extent provided in the respective equity award agreement issued to Employee under the then effective MKS Instruments, Inc. equity incentive plan (including the MKS Instruments, Inc. 2014 Stock Incentive Plan). Notwithstanding the above, the reference in the last sentence of Section 2(a) of the Waiver Award to "Section 6(a) and 6(f) of the Employment Agreement dated May 23, 2016 by and between Participant and Newport Corporation" is superseded by Section 6(d) and 6(f)(v) to this Employment Agreement.

(v) **Waiver Award.** The Waiver Award shall become fully vested (if not already fully vested) as of the effective date of such termination.

(vi) **No Obligation to Mitigate Damages; Effect on Other Contractual Rights.** Employee will not be required to mitigate damages or the amount of any payment provided for under this Employment Agreement by seeking other employment or otherwise, nor will any payment provided for under this Employment Agreement be reduced by any compensation earned by Employee as the result of employment by an employer other than the Company or a direct or indirect parent, subsidiary or affiliate of the Company after the Employment End Date, or otherwise.

(g) **“Cause.”** “Cause” to terminate Employee’s employment will exist if Employee:

(i) commits a felony or engages in fraud, misappropriation or embezzlement;

(ii) knowingly fails or refuses to perform Employee’s duties in a material way and, to the extent that the Company determines such failure or refusal can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the failure or refusal;

(iii) knowingly causes, or knowingly creates a serious risk of causing, material harm to the Company’s business or reputation; or

(iv) breaches, in a material way, this Employment Agreement, the Confidential Information Agreement or any other agreement between Employee and the Company, and, to the extent that the Company determines such breach can reasonably be cured, fails or refuses to effect a cure within 10 days after the Company notifies Employee in writing of the breach.

(h) **“Good Reason.”** “Good Reason” for Employee to resign will exist if, without Employee’s express written consent:

(i) the Company materially reduces Employee’s position, duties or responsibilities;

(ii) the Company reduces Employee’s Base Salary as in effect on the date hereof or as the same may be increased from time to time during the term of this Employment Agreement;

(iii) the Company changes Employee’s principal place of work to a location more than 50 miles from Employee’s current principal place of work.

Notwithstanding the foregoing, an action described above will not constitute Good Reason unless: (A) Employee, within 30 days after he learns, or with reasonable diligence should have learned, of such action, delivers to the Company written notice identifying the action as Good Reason and demanding its correction; (B) the Company fails to correct such event within 30 days after receipt of such notice; and (C) Employee resigns for Good Reason within 90 days after the date Employee learned, or with reasonable diligence should have learned, of such action.

(i) **“Change in Control.”** For purposes of this Employment Agreement, the term “Change in Control” will mean the first to occur of any of the following events: (i) any “person” (as that term is used in Section 13 and 14(d)(2) of the Securities Exchange Act of 1934 (“Exchange Act”)) becomes the beneficial owner (as that term is used in Section 13(d) of the Exchange Act), directly or indirectly, of fifty percent (50%) or more of MKS’ capital stock entitled to vote in the election of directors; (ii) the shareholders of MKS approve any consolidation or merger of MKS other than a consolidation or merger of MKS in which the holders of the common stock of MKS immediately prior to the consolidation or merger hold more than fifty percent (50%) of the common stock of the surviving corporation immediately after the consolidation or merger; or (iii) the shareholders of MKS approve the sale or transfer of all or substantially all of the assets of MKS to parties that are not within a “controlled group of corporations” (as defined in Code Section 1563) in which MKS is a member.

7. Code Section 409A Compliance.

(a) Where this Employment Agreement refers to Employee’s termination of employment for purposes of receiving any payment, whether such a termination has occurred will be determined in accordance with Section 409A of the Internal Revenue Code (the “Code”) and Treasury Regulation Section 1.409A-1(h) (or any successor provisions) to the extent required by law.

(b) To the extent that benefits under Section 6 are contingent upon Employee providing a General Release, Employee will sign and return the General Release within the reasonable time period designated by the Company, which will not be more than 45 days. If the period for Employee to review a General Release plus any revocation period crosses calendar years, payments contingent upon the Release will be made in the later calendar year. Any payments contingent upon the General Release that would otherwise be made during the period for review and revocation of the General Release will be made, provided that the General Release is timely executed and returned to the Company and not revoked, on the first scheduled payment date after such period ends. Each payment in respect of Employee’s termination of employment under Section 6 of the Employment Agreement is designated as a separate payment for Section 409A purposes.

(c) If Employee is designated as a “specified Executive” within the meaning of Code Section 409A (while the Company is publicly traded), any deferred compensation payment subject to Section 409A to be made during the six-month period following Employee’s termination of employment will be withheld and the amount of the payments withheld will be paid in a lump sum, without interest, during the seventh month after Employee’s termination; provided, however, that if Employee dies prior to the expiration of such six month period, payment to Employee’s beneficiary will be made as soon as reasonably practicable following Employee’s death. The Company will identify in writing delivered to Employee any payments it reasonably determines are

subject to delay under this Section 7(c). In no event will the Company have any liability or obligation with respect to taxes for which Employee may become liable as a result of the application of Code Section 409A.

8. Code Sections 280G/4999. If (a) any payments or benefits to Employee in connection with this Employment Agreement (“Payments”) would be subject to the excise tax imposed by Code Section 4999 (the “Parachute Tax”), (b) paying Employee a lesser amount would avoid the Parachute Tax entirely and (c) payment of such lesser amount would, after taking into account applicable federal, state and local income taxes and the Parachute Tax, result in Employee receiving a greater after-tax payment than if the Company made the Payments in full, then the Company will pay Employee such lesser amount instead of making the Payments in full. The reporting and payment of any Parachute Tax will in all events be Employee’s responsibility. The Company will not in any event provide a gross-up or any other payment to compensate Employee for the payment of the Parachute Tax or for any reduction in the Payments. The Company will withhold from the Payments any amounts it reasonably determines are required under Code Section 4999(c) and the Treasury Regulations thereunder.

9. Withholding. The Company will deduct from the amounts payable to Employee pursuant to this Employment Agreement all withholding amounts and deductions required by law or authorized by Employee.

10. Changes to Plans and Policies. Nothing in this Employment Agreement will: (a) require the Company or its affiliates to establish, maintain or continue any incentive compensation plan, stock incentive plan or other benefit plan, policy or arrangement; (b) restrict the right of the Company or any of its affiliates to amend, modify or terminate any such plan, policy or arrangement; (c) entitle Employee to participate in any such plan policy or arrangement at any specified level (or at all) in any year; or (d) prevent any future change to any such plan, policy or arrangement from applying to Employee in accordance with the terms of the change.

11. Assignment. The rights and obligations of the Company under this Employment Agreement will inure to the benefit of, and be binding upon, the Company’s successors and assigns. The rights and obligations of Employee under this Employment Agreement will inure to the benefit of, and will be binding upon, Employee’s heirs, executors and legal representatives. Employee may not delegate or assign any obligations under this Employment Agreement.

12. Entire Agreement and Severability. This Employment Agreement and the Confidential Information Agreement supersede any and all other agreements, either oral or in writing, between Employee and the Company with respect to the Company’s employment of Employee, including the Employment Agreement dated May 23, 2016. They contain all of the covenants and agreements between the parties with respect to such employment. Neither party is entering into this Employment Agreement on the basis of any representation, inducement, promise or agreement, oral or otherwise, by any party, or by any one acting on behalf of any party, which is not stated herein. Any modification of this Employment Agreement will be effective only if it is in writing and

signed by both parties to this Employment Agreement. If any provision in this Employment Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force and effect without being impaired or invalidated in any way.

13. **Miscellaneous.** This Employment Agreement and the rights and obligations of the parties hereunder will be governed by, and construed in accordance with, the laws of the Commonwealth of Massachusetts, excluding (but only to the extent permitted by law) its conflict of laws and choice of law rules. The parties agree that service of any process, summons, notice or document by U.S. certified mail or overnight delivery by a generally recognized commercial courier service to Employee's last known address (or any mode of service recognized to be effective by applicable law) will be effective service of process for any action, suit or proceeding brought against Employee. The failure of either party hereto to enforce any right under this Employment Agreement will not be considered a waiver of that right, or of damages caused thereby, or of any other rights under this Employment Agreement.

14. Arbitration and Waiver of Jury Trial.

(a) Any "Legal Dispute" (as defined below) between Employee and any MKS Entity (or between Employee and any employee or agent of any MKS Entity, to the extent directly or indirectly arising from or relating in any way to Employee's employment with or separation from the Company) will be resolved by final and binding arbitration. Notwithstanding the foregoing sentence, the Company may, in its sole discretion, obtain preliminary injunctive relief enforcing the provisions of the Confidential Information Agreement from any court of competent jurisdiction.

(b) "Legal Dispute" means a dispute about legal rights or legal obligations, including but not limited to any rights or obligations arising under this Employment Agreement; the Confidential Information Agreement; any other agreement; any applicable legal or equitable doctrine; any applicable common law theory; or any applicable federal, state or local, statute, regulation or other legal requirement.

(c) The arbitration will be held in the State of California. It will be conducted in accordance with the then-prevailing Employment Arbitration Rules of the American Arbitration Association.

(d) Notwithstanding any other provision of this Employment Agreement or any other agreement or of any arbitration rules, no Legal Dispute involving any MKS Entity may be included in any class or collective arbitration or any other class or collective proceeding. The exclusive method for resolving any such Legal Dispute will be arbitration on an individual basis.

(e) Any issues about whether a dispute is subject to arbitration will be determined by a court of competent jurisdiction and not by an arbitrator. Any issues about the meaning or enforceability of Section 14(d) will be decided by a court of competent jurisdiction and not by an arbitrator.

(f) The Company, Employee and the arbitrator will treat all aspects of the arbitration proceedings, including without limitation, discovery, testimony and other evidence, briefs and the award, as strictly confidential, except that the arbitration award may be disclosed to the extent necessary to enforce the award, the provisions of the Confidential Information Agreement or the provisions of this Employment Agreement.

(g) Employee and the Company understand and acknowledge that by agreeing to arbitrate the disputes covered by this Section 14, they are waiving the right to resolve those disputes in court and waiving any right to a jury trial with respect to those disputes.

15. **Knowing and Voluntary Agreement.** Employee understands that Employee has the right to consult counsel before signing this Employment Agreement.

IN WITNESS WHEREOF, the parties hereto have executed, in the Commonwealth of Massachusetts, this Employment Agreement as a sealed instrument, all as of the day, month and year first written above.

MKS INSTRUMENTS, INC.

By: /s/ Gerald G. Colella
Name: Gerald G. Colella
Title: CEO & President

Dated: 8/1/16

/s/ Dennis Werth
[EMPLOYEE]

Dated: July 28, 2016

SUMMARY OF 2016 CASH INCENTIVE BONUS ARRANGEMENTS
WITH DENNIS WERTH

First Half 2016 Cash Incentive

Dennis Werth is entitled to a cash incentive which is tied to the achievement of financial performance goals of (i) Newport Corporation (which is a subsidiary of MKS Instruments, Inc. (the "Corporation"), which was acquired by the Corporation on April 29, 2016) and all of its subsidiaries (collectively, the "Newport Group"), and (ii) the Photonics group of the Newport Group, in each case for the period January 1, 2016 through June 30, 2016 ("First Half 2016").

The financial measures are based upon:

- the worldwide operating income for the Newport Group (15%)
- Photonics group operating income after tax (35%)
- Photonics group sales (30%)
- Photonics group cash flow (20%)

Mr. Werth's target cash incentive is set at 60% of his base salary for the First Half 2016. There are minimum, target and maximum achievement levels (corresponding to payout levels of 50%, 100% and 200%, respectively) for each financial measure. Payouts are prorated on a straight-line basis for achievement between the minimum and target levels or between the target and maximum levels. If the Newport Group does not exceed the minimum performance level for its measure, no payout would be made for that measure. In addition, the payout for all of the financial measures is conditioned upon the achievement of at least 90% of the minimum level for Mr. Werth's Photonics group operating income after tax.

Second Half 2016 Cash Incentive

Mr. Werth's cash incentive program for the period July 1, 2016 through December 31, 2016 ("Second Half 2016") with Newport Corporation is substantially similar to the cash incentive program in place for other Executive Officers of the Corporation, except that:

- Mr. Werth's program relates to performance during the Second Half 2016 only
- Mr. Werth's Target Bonus Amount is 75% of his Second Half 2016 eligible earnings
- Mr. Werth's Financial Performance Objectives is based solely on the operating income targets of the Newport Group for the Second Half 2016

INDEMNIFICATION AGREEMENT

This INDEMNIFICATION AGREEMENT is effective as of [date], between NEWPORT CORPORATION, a Nevada corporation (the “Company”), and [name] (“Indemnitee”), an officer and/or member of the Board of Directors of the Company.

WHEREAS, the Company desires the benefits of having Indemnitee serve as an officer and/or director secure in the knowledge that expenses, liabilities and losses incurred by him in his good faith service to the Company will be borne by the Company or its successors and assigns in accordance with applicable law; and

WHEREAS, the Company desires that Indemnitee resist and defend against what Indemnitee may consider to be unjustified investigations, claims, actions, suits and proceedings which have arisen or may arise in the future as a result of Indemnitee’s service to the Company notwithstanding that conditions in the insurance markets may make directors’ and officers’ liability insurance coverage unavailable or available only at premium levels which the Company may deem inappropriate to pay; and

WHEREAS, the parties believe it appropriate to memorialize and reaffirm the Company’s indemnification obligations to Indemnitee and, in addition, set forth the indemnification agreements contained herein.

NOW, THEREFORE, in consideration of the mutual agreements herein contained, the parties agree as follows:

1. Indemnification.

(a) Indemnification of Expenses. Indemnitee shall be indemnified and held harmless by the Company to the fullest extent permitted by its Articles of Incorporation, Bylaws and applicable law, as the same exist or may hereafter be amended, against all expenses, liabilities and losses (including attorneys’ fees, judgments, fines, and amounts paid or to be paid in any settlement approved in advance by the Company, such approval not to be unreasonably withheld) (collectively, “Indemnifiable Expenses”) actually and reasonably incurred or suffered by Indemnitee in connection with any present or future threatened, pending or contemplated investigation, claim, action, suit or proceeding, whether civil, criminal, administrative or investigative (collectively, “Indemnifiable Litigation”), (i) to which Indemnitee is or was a party or is threatened to be made a party by reason of any action or inaction in Indemnitee’s capacity as a director or officer of the Company, or as a member of any committee of the Board of Directors, or in his capacity as the Beneficiaries’ Representative, or (ii) with respect to which Indemnitee is otherwise involved by reason of the fact that Indemnitee is or was serving as a director, officer, employee or agent of the Company, or of any subsidiary or division, or is or was serving at the request of the Company as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise. Notwithstanding the foregoing, Indemnitee shall have no right to indemnification for expenses and the payment of profits arising from the purchase and sale by Indemnitee of securities in violation of Section 16(b) of the Securities Exchange Act of 1934, as amended.

(b) Contribution. If the indemnification provided for in Section 1(a) above for any reason is held by a court of competent jurisdiction to be unavailable to an Indemnitee in respect of any losses, claims, damages, expenses or liabilities referred to therein, then the Company, in lieu of indemnifying Indemnitee thereunder, shall contribute to the amount paid or payable by Indemnitee as a result of such losses, claims, damages, expenses or liabilities (i) in such proportion as is appropriate to

reflect the relative benefits received by the Company and the Indemnitee, or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company and the Indemnitee in connection with any action or inaction which resulted in such losses, claims, damages, expenses or liabilities, as well as any other relevant equitable considerations. In connection with any registration of the Company's securities, the relative benefits received by the Company and the Indemnitee shall be deemed to be in the same respective proportions that the net proceeds from the offering (before deducting expenses) received by the Company and the Indemnitee, in each case as set forth in the table on the cover page of the applicable prospectus, bear to the aggregate public offering price of the securities so offered. The relative fault of the Company and the Indemnitee shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company or the Indemnitee and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

The Company and the Indemnitee agree that it would not be just and equitable if contribution pursuant to this Section 1(b) were determined by pro rata or per capita allocation or by any other method of allocation which does not take account of the equitable considerations referred to in the immediately preceding paragraph. In connection with the registration of the Company's securities, in no event shall an Indemnitee be required to contribute any amount under this Section 1(b) in excess of the lesser of (i) that proportion of the total of such losses, claims, damages or liabilities indemnified against equal to the proportion of the total securities sold under such registration statement which is being sold by such Indemnitee or (ii) the proceeds received by Indemnitee from its sale of securities under such registration statement. No person found guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act of 1933, as amended) shall be entitled to contribution from any person who was not found guilty of such fraudulent misrepresentation.

(c) Survival Regardless of Investigation. The indemnification and contribution provided for in this Section 1 will remain in full force and effect regardless of any investigation made by or on behalf of the Indemnitee or any officer, director, employee, agent or controlling person of the Indemnitee.

(d) Change in Control. The Company agrees that if there is a Change in Control of the Company (other than a Change in Control which has been approved by a majority of the Company's Board of Directors who were directors immediately prior to such Change in Control) then, with respect to all matters thereafter arising concerning the rights of Indemnitee to payments of Indemnifiable Expenses under this Agreement or any other agreement or under the Company's Articles of Incorporation or Bylaws as now or hereafter in effect, Independent Legal Counsel (as defined in Section 8(d) hereof) shall be selected by the Indemnitee and approved by the Company (which approval shall not be unreasonably withheld). Such counsel, among other things, shall render its written opinion to the Company and Indemnitee as to whether and to what extent Indemnitee would be permitted to be indemnified under applicable law. The Company agrees to abide by such opinion and to pay the reasonable fees of the Independent Legal Counsel referred to above and to fully indemnify such counsel against any and all expenses (including attorneys' fees), claims, liabilities and damages arising out of or relating to this Agreement or its engagement pursuant hereto.

(e) Mandatory Payment of Expenses. Notwithstanding any other provision of this Agreement other than Section 7 hereof, to the extent that Indemnitee has been successful on the merits or otherwise, including, without limitation, the dismissal of an action without prejudice, in the defense of any action, suit, proceeding, inquiry or investigation referred to in Section (1)(a) hereof or in the defense of any claim, issue or matter therein, Indemnitee shall be indemnified against all Indemnifiable Expenses incurred by Indemnitee in connection therewith.

2. Interim Expenses. The Company agrees to pay Indemnifiable Expenses incurred by Indemnitee in connection with any Indemnifiable Litigation on a current basis, in advance of the final disposition thereof, provided that the Company has received an undertaking by or on behalf of Indemnitee, substantially in the form attached hereto as Exhibit A, to repay the amount so advanced to the extent that it is ultimately determined by court order or judgment from which no further right of appeal exists, that Indemnitee is not entitled to be indemnified by the Company under this Agreement or otherwise.

3. Trust Fund, Beneficiaries' Representative.

(a) The Company may establish or fund a trust, in the sole discretion of the Board of Directors of the Company and with no obligation to do so, to satisfy certain of the Company's obligations under this Agreement and similar agreements with other directors and/or officers (collectively, including Indemnitee, the "Beneficiaries"). Therefore, in addition to Indemnitee's rights under this Indemnification Agreement and any applicable insurance policy, Indemnitee shall, if such trust has been established and has remained funded, also have the right to seek indemnification payments from the trustee of the trust ("Trustee") in accordance with the terms of this Agreement and of the trust agreement.

(b) All communications or demands made by and among the Company, the Trustee, if any, and the Beneficiaries are to be made through the individual designated as the Beneficiaries' representative ("Beneficiaries' Representative"). The Beneficiaries' Representative as of the date of this Agreement is Robert L. Guyett. The Beneficiaries' Representative may be changed from time to time and at any time upon agreement of two-thirds of the Beneficiaries. In discharging his obligations hereunder, the Beneficiaries' Representative shall at all times act expeditiously and in a manner reasonably believed to be in the best interests of the Beneficiaries.

4. Procedure for Making Demand. In the event the trust contemplated by Section 3 is established, the Beneficiaries' Representative shall have the exclusive right and obligation to make demands on behalf of all Beneficiaries for payments for Indemnifiable Expenses, including advance payments as set forth in Section 2. In order to receive payment, Indemnitee shall make demand on the Beneficiaries' Representative, who then has the right and obligation first to make demand upon the Company to honor its indemnity obligations and pay the Indemnifiable Expenses. If the Company fails to do so within fifteen (15) days, the Beneficiaries' Representative shall then have the right and obligation to make demand under any applicable policy of directors' and officers' liability insurance then in effect upon the insurance company (the "Insurance Company") issuing such policy. If the Insurance Company fails to pay the demand within fifteen (15) days, then the Beneficiaries' Representative shall, if the trust is funded at such time, be entitled and obligated to make demand upon the Trustee for such payment. Indemnitee shall not be required to institute a lawsuit or take other actions against the Company, Insurance Company or any insurer to recover the unpaid amount prior to the Beneficiaries' Representative making a demand and receiving payment from the Trustee on his behalf, but the Beneficiaries' Representative shall deliver a certificate to the Trustee at the time of payment of each distribution certifying that no part of such payment has been previously received from the Company or any insurer. If the Beneficiaries' Representative fails to take any action required hereunder, Indemnitee may take the action directly.

5. Failure to Indemnify.

(a) If a claim under this Agreement, or any statute, or under any provision of the Company's Articles of Incorporation or Bylaws providing for indemnification, is not paid in full by the Company or the Insurance Company within forty-five (45) days after a written request for payment thereof has been received by the Company, Indemnitee may, but need not, at any time thereafter bring an action against the Company to recover the unpaid amount of the claim and, if successful in whole or in part, Indemnitee shall also be entitled to be paid for the expenses (including attorneys' fees) of bringing such action.

(b) It shall be a defense to any such action (other than an action brought to enforce a claim for expenses incurred in connection with any action, suit or proceeding in advance of its final disposition) that Indemnitee has not met the standards of conduct which make it permissible under applicable law for the Company to indemnify Indemnitee for the amount claimed, but the burden of proving such defense shall be on the Company and Indemnitee shall be entitled to receive interim payments of interim expenses pursuant to Section 2 hereof unless and until such defense may be finally adjudicated by court order or judgment from which no further right of appeal exists. It is the parties' intention that if the Company contests Indemnitee's right to indemnification, the question of Indemnitee's right to indemnification shall be for the court to decide, and neither the failure of the Company (including its board of directors, independent legal counsel, or its stockholders) to have made a determination that indemnification of Indemnitee is proper in the circumstances because Indemnitee has met the applicable standard of conduct required by applicable law, nor an actual determination by the Company (including its board of directors, any committee or subgroup of the board of directors, independent legal counsel, or its stockholders) that Indemnitee has not met such applicable standard of conduct, shall create a presumption that Indemnitee has or has not met the applicable standard of conduct.

6. Retention of Counsel.

(a) Whether Indemnitee is seeking payment of Indemnifiable Expenses directly from the Company, the Trustee, if any, or from the Insurance Company, the Beneficiaries' Representative shall have the right and obligation on behalf of Indemnitee and other Beneficiaries, to (i) select counsel to represent them with respect to any matter subject to indemnification and payment hereunder; (ii) coordinate the defense of any such matter; and (iii) approve the fees and other expenses of counsel selected by him pursuant hereto.

(b) Notwithstanding the foregoing, Indemnitee may retain different counsel than the other Beneficiaries, or may incur expenses not shared in common with the other Beneficiaries, in connection with any Indemnifiable Litigation if in the reasonable judgment of Indemnitee there may be legal defenses available to him which are different from or additional to those available to the other Beneficiaries and, as a consequence, an actual or potential conflict of interest with the other Beneficiaries exists, or if other facts or circumstances exist which would make the representation of Indemnitee and other Beneficiaries inappropriate due to conflicts of interest. Indemnitee must obtain the prior written approval of the Beneficiaries' Representative to retain such counsel, which consent shall not be unreasonably withheld. In the event that the Beneficiaries' Representative withholds such consent, Indemnitee shall then have the right to seek approval for such separate counsel from the Company, or the Trustee, if any, which approval shall not be unreasonably withheld.

(c) Nothing contain herein shall prohibit Indemnitee from retaining other counsel at Indemnitee's own expense.

7. Period of Limitations. No legal action shall be brought and no cause of action shall be asserted by or in the right of the Company against Indemnitee, Indemnitee's estate, spouse, heirs, executors or personal or legal representatives after the expiration of two years from the date of accrual of such cause of action, and any claim or cause of action of the Company shall be extinguished and deemed released unless asserted by the timely filing of a legal action within such two-year period; provided, however, that if any shorter period of limitations is otherwise applicable to any such cause of action, such shorter period shall govern.

8. Construction of Certain Phrases.

(a) For purposes of this Agreement, references to the "Company" shall include, in addition to the resulting corporation, any constituent corporation (including any constituent of a constituent) absorbed in a consolidation or merger which, if its separate existence had continued, would have had power and authority to indemnify its directors, officers, employees, agents or fiduciaries, so that if Indemnitee is or was a director, officer, employee, agent or fiduciary of such constituent corporation, or is or was serving at the request of such constituent corporation as a director, officer, employee, agent or fiduciary of another corporation, partnership, joint venture, employee benefit plan, trust or other enterprise, Indemnitee shall stand in the same position under the provisions of this Agreement with respect to the resulting or surviving corporation as Indemnitee would have with respect to such constituent corporation if its separate existence had continued.

(b) For purposes of this Agreement, references to "other enterprises" shall include employee benefit plans; references to "fines" shall include any excise taxes assessed on Indemnitee with respect to an employee benefit plan; and references to "serving at the request of the Company" shall include any service as a director, officer, employee, agent or fiduciary of the Company which imposes duties on, or involves services by, such director, officer, employee, agent or fiduciary with respect to an employee benefit plan, its participants or its beneficiaries; and if Indemnitee acted in good faith and in a manner Indemnitee reasonably believed to be in the interest of the participants and beneficiaries of an employee benefit plan, Indemnitee shall be deemed to have acted in a manner "not opposed to the best interests of the Company" as referred to in this Agreement.

(c) For purposes of this Agreement a "Change in Control" shall be deemed to have occurred if (i) there shall be consummated any consolidation or merger of the Company in which the Company is not the continuing or surviving corporation or pursuant to which shares of the Company's Voting Securities would be converted into cash, securities or other property, other than a merger of the Company in which the holders of the Company's Voting Securities immediately prior to the merger have the same proportionate ownership of at least eighty percent (80%) of common stock of the surviving corporation immediately after the merger; (ii) there shall be consummated any consolidation or merger of the Company in which the Company is the surviving corporation, but the holders of the Company's outstanding Voting Securities immediately prior to such merger or consolidation hold, in the aggregate, securities possessing less than eighty percent (80%) of the total combined voting power of all outstanding Voting Securities of the Company immediately after such merger or consolidation; (iii) there shall be consummated any sale, lease, exchange or other transfer (in one transaction or a series of related transactions) of all, or substantially all, of the assets of the Company; (iv) the stockholders of the Company approve any plan or proposal for the liquidation or dissolution of the Company; (v) any person (as such term is used in Sections 13(d) and 14(d)(2) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), shall become the beneficial owner (within the meaning of Rule 13d-3 under the Exchange Act) of 20% or more of the Company's outstanding Voting Securities (other than any such person who is

the record owner of at least 15% of the Company's outstanding Voting Securities on the date hereof, other than nominees); (vi) during any period of two consecutive years during the term of this Agreement, individuals who at the beginning of the two year period constituted the entire Board of Directors do not for any reason constitute a majority thereof unless the election, or the nomination for election by the Company's stockholders, of each new director was approved by a vote of at least two-thirds of the directors then still in office who were directors at the beginning of the period; (vii) an event shall occur constituting a "Business Combination" under the Company's Articles of Incorporation as amended to date.

(d) For purposes of this Agreement, "Independent Legal Counsel" shall mean an attorney or firm of attorneys, selected in accordance with the provisions of Section 1(d) hereof, who shall not have otherwise performed services for the Company or Indemnitee within the last three years (other than with respect to matters concerning the rights of Indemnitee under this Agreement, or of other indemnitees under similar indemnity agreements).

(e) For purposes of this Agreement, "Voting Securities" shall mean any securities of the Company that vote generally in the election of directors.

9. Binding Effect; Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of and be enforceable by the parties hereto and their respective successors, assigns, including any direct or indirect successor by purchase, merger, consolidation or otherwise to all or substantially all of the business and/or assets of the Company, spouses, heirs, and personal and legal representatives. The Company shall require and cause any successor (whether direct or indirect by purchase, merger, consolidation or otherwise) to all, substantially all, or a substantial part, of the business and/or assets of the Company, by written agreement in form and substance satisfactory to Indemnitee, expressly assume and agree to perform this Agreement in the same manner and to the same extent that the Company would be required to perform if no such succession had taken place. This Agreement shall continue in effect with respect to Indemnifiable Litigation regardless of whether Indemnitee continues to serve as a director, officer, employee, agent or fiduciary of the Company of any other enterprise at the Company's request.

10. Contract Rights Not Exclusive. Except as provided in Section 16, the contract rights conferred by this Agreement shall be in addition to, but not exclusive of, any other right which Indemnitee may have or may hereafter acquire under any statute, provision of the Company's Articles of Incorporation or Bylaws, agreement, vote of stockholders or disinterested directors, or otherwise.

11. Indemnitee's Obligations. The Indemnitee shall promptly advise the Company in writing of the institution of any investigation, claim, action, suit or proceeding which is or may be subject to this Agreement and keep the Company generally informed of, and consult with the Company with respect to, the status of any such investigation, claim, action, suit or proceeding. Notices to the Company shall be directed to Newport Corporation, 1791 Deere Avenue, Irvine, California 92606, Attn: President (or such other address as the Company shall designate in writing to Indemnitee). Notice shall be deemed received when delivered if delivery is in person or by courier, or three days after the date postmarked if sent by certified or registered mail, properly addressed. In addition, Indemnitee shall give the Company such information and cooperation as it may reasonably require and as shall be within Indemnitee's power.

12. No Presumptions; Burden of Proof. For purposes of this Agreement, the termination of any Indemnifiable Litigation by judgment, order, settlement (whether with or without court approval) or conviction, or upon a plea of nolo contendere, or its equivalent, shall not create a presumption that Indemnitee did not meet any particular standard of conduct or have any particular belief or that a court has determined that indemnification is not permitted by applicable law. In connection with any determination as to whether Indemnitee is entitled to be indemnified hereunder, the burden of proof shall be on the Company to establish that Indemnitee is not so entitled.

13. Notice to Insurers. If, at the time of the receipt by the Company of a notice of a Indemnifiable Litigation pursuant to Section 11 hereof, the Company has liability insurance in effect which may cover such Indemnifiable Litigation, the Company shall give prompt notice of the commencement of such Indemnifiable Litigation to the insurers in accordance with the procedures set forth in the respective policies. The Company shall thereafter take all necessary or desirable action to cause such insurers to pay, on behalf of Indemnatee, all amounts payable as a result of such action, suit, proceeding, inquiry or investigation in accordance with the terms of such policies.

14. Attorneys' Fees. In the event that any action is instituted by Indemnatee under this Agreement or under any liability insurance policies maintained by the Company to enforce or interpret any of the terms hereof or thereof, any Indemnatee shall be entitled to be paid all Indemnifiable Expenses incurred by Indemnatee with respect to such action, regardless of whether Indemnatee is ultimately successful in such action, and shall be entitled to the advancement of Indemnifiable Expenses with respect to such action, unless, as a part of such action, a court of competent jurisdiction over such action determines that each of the material assertions made by Indemnatee as a basis for such action was not made in good faith or was frivolous. In the event of an action instituted by or in the name of the Company under this Agreement to enforce or interpret any of the terms of this Agreement, the Indemnatee shall be entitled to be paid all Indemnifiable Expenses incurred by Indemnatee in defense of such action (including costs and expenses incurred with respect to Indemnatee counterclaims and cross-claims made in such action), and shall be entitled to the advancement of Indemnifiable Expenses with respect to such action, unless, as a part of such action, a court having jurisdiction over such action determines that each of Indemnatee's material defenses to such action was made in bad faith or was frivolous.

15. Severability. Should any provision of this Agreement, or any clause hereof, be held to be invalid, illegal or unenforceable, in whole or in part, the remaining provisions and clauses of the Agreement shall remain fully enforceable and binding on the parties.

16. Entire Agreement; Modification and Waiver. This Agreement constitutes the entire agreement between the Indemnatee and the Company with respect to the subject matter hereof and replaces and supersedes all prior indemnification agreements between Indemnatee and the Company. No supplement, modification or amendment of this Agreement shall be binding unless executed in writing by both of the parties hereto. No waiver of any of the provisions of this Agreement shall be deemed or shall constitute a waiver of any other provisions hereof (whether or not similar) nor shall such waiver constitute a continuing waiver.

17. Consent to Jurisdiction. The Company and Indemnatee each hereby irrevocably consent to the jurisdiction of the courts of the State of California for all purposes in connection with any action or proceeding which arises out of or relates to this Agreement and agree that any action instituted under this Agreement shall be commenced, prosecuted and continued only in the state and federal courts sitting in the County of Orange, State of California, which shall be the exclusive and only proper forum for adjudicating such a claim.

18. Choice of Law. The validity, interpretation, performance and enforcement of this Agreement shall be governed by the laws of the State of Nevada.

[signature page follows]

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first written above.

NEWPORT CORPORATION

By: _____
Name: _____
Title: _____

INDEMNITEE

[Name]

EXHIBIT A

UNDERTAKING AGREEMENT

This UNDERTAKING AGREEMENT is effective as of _____, 20____, between NEWPORT CORPORATION, a Nevada corporation (the "Company") and _____ ("Indemnitee"), an officer and/or member of the Board of Directors of the Company.

WHEREAS, Indemnitee may become involved in investigations, claims, actions, suits or proceedings which have arisen or may arise in the future as a result of Indemnitee's service to the Company;

WHEREAS, Indemnitee desires that the Company pay any and all expenses (including, but not limited to, attorneys' fees and court costs) actually and reasonably incurred by Indemnitee or on Indemnitee's behalf in defending or investigating any such suits or claims and that such payment be made in advance of the final disposition of such investigations, claims, actions, suits or proceedings to the extent that Indemnitee has not been previously reimbursed by insurance; and

WHEREAS, the Company is willing to make such payments but, in accordance with Article TENTH of the Bylaws of the Company and Section 78.751 of the Nevada Revised Statutes, the Company may make such payments only if it receives an undertaking to repay from Indemnitee; and

WHEREAS, Indemnitee is willing to give such an undertaking;

NOW, THEREFORE, in consideration of the mutual promises contained herein, the parties agree as follows:

1. In regard to any payments made by the Company to Indemnitee pursuant to the terms of the Indemnification Agreement dated _____, 20____, between the Company and Indemnitee, if it shall ultimately be determined by court order or judgment from which no further right of appeal exists, that the Indemnitee is not entitled to be indemnified by the Company pursuant to the Bylaws of the Company and Section 78.751 of the Nevada Revised Statutes, or other applicable law, Indemnitee hereby undertakes and agrees to repay to the Company any and all amounts so paid promptly and in any event within thirty (30) days after such determination.

2. This Agreement shall not affect in any manner rights which Indemnitee may have against the Company, any insurer or any other person to seek indemnification for or reimbursement of any expenses referred to herein or any judgment which may be rendered in any litigation or proceeding.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed on the date first above written.

NEWPORT CORPORATION

By: _____
Name: _____
Title: _____

INDEMNITEE

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO RULE 13a-14(a)/RULE 15d-14(a) OF THE
SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Gerald G. Colella, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of MKS Instruments, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 3, 2016

/s/ Gerald G. Colella

Gerald G. Colella
Chief Executive Officer and President
(Principal Executive Officer)

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO RULE 13a-14(a)/RULE 15d-14(a) OF THE
SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

I, Seth H. Bagshaw, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of MKS Instruments, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 3, 2016

/s/ Seth H. Bagshaw

Seth H. Bagshaw
Vice President, Chief Financial Officer and Treasurer
(Principal Financial Officer)

CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER

PURSUANT TO 18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of MKS Instruments, Inc. (the "Company") for the period ended June 30, 2016, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Gerald G. Colella, Chief Executive Officer and President of the Company, and Seth H. Bagshaw, Vice President, Chief Financial Officer and Treasurer of the Company, each hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, based on his knowledge:

- (1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: August 3, 2016

/s/ Gerald G. ColellaGerald G. Colella
Chief Executive Officer and President

Dated: August 3, 2016

/s/ Seth H. BagshawSeth H. Bagshaw
Vice President, Chief Financial Officer and Treasurer