UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

FORM 10-Q

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

For the quarterly period ended June 30, 2023

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 000-52008

LUNA INNOVATIONS INCORPORATED
(Exact name of registrant as specified in its charter)

Delaware **(State or Other Jurisdiction of Incorporation or Organization)**	**54-1560050** **(I.R.S. Employer Identification Number)**

301 First Street SW, Suite 200
Roanoke, VA 24011
(Address of Principal Executive Offices)

(540) 769-8400
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, $0.001 par value per share	LUNA	The Nasdaq Stock Market LLC

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

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

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

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒	Smaller reporting company	☒

Emerging growth company ☐

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

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

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date: As of August 8, 2023, there were 33,924,727 shares of the registrant's common stock outstanding.

LUNA INNOVATIONS INCORPORATED
QUARTERLY REPORT ON FORM 10-Q
FOR THE QUARTER ENDED JUNE 30, 2023

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PART I. FINANCIAL INFORMATION

ITEM 1. *FINANCIAL STATEMENTS*

Luna Innovations Incorporated
Consolidated Balance Sheets (Unaudited)
(in thousands, except share data)

	June 30, 2023	December 31, 2022
Assets		
Current assets:		
Cash and cash equivalents	$ 3,277	$ 6,024
Accounts receivable, net	33,813	33,249
Contract assets	9,601	7,691
Inventory	42,003	36,582
Prepaid expenses and other current assets	5,159	4,328
Total current assets	93,853	87,874
Property and equipment, net	4,761	4,893
Intangible assets, net	17,371	18,750
Goodwill	27,313	26,927
Operating lease right-of-use assets	3,670	4,661
Other non-current assets	3,321	3,255
Deferred tax asset	4,842	4,647
Total assets	$ 155,131	$ 151,007
Liabilities and stockholders' equity		
Liabilities:		
Current liabilities:		
Current portion of long-term debt obligations	$ 3,000	$ 2,500
Accounts payable	10,306	8,109
Accrued and other current liabilities	11,375	16,694
Contract liabilities	3,463	4,089
Current portion of operating lease liabilities	1,899	2,239
Total current liabilities	30,043	33,631
Long-term debt obligations, net of current portion	27,734	20,726
Long-term portion of operating lease liabilities	2,062	2,804
Other long-term liabilities	419	444
Total liabilities	60,258	57,605
Commitments and contingencies (Note 10)		
Stockholders' equity:		
Common stock, par value $0.001, 100,000,000 shares authorized, 35,739,827 and 34,901,954 shares issued, 33,908,336 and 33,105,080 shares outstanding at June 30, 2023 and December 31, 2022, respectively	36	35
Treasury stock at cost, 1,831,491 and 1,796,862 shares at June 30, 2023 and December 31, 2022, respectively	(5,960)	(5,607)
Additional paid-in capital	108,709	104,893
Accumulated deficit	(5,734)	(2,296)
Accumulated other comprehensive loss	(2,178)	(3,623)
Total stockholders' equity	94,873	93,402
Total liabilities and stockholders' equity	$ 155,131	$ 151,007

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

Luna Innovations Incorporated
Consolidated Statements of Operations (Unaudited)
(in thousands, except share and per share data)

	Three Months Ended June 30, 2023	Three Months Ended June 30, 2022	Six Months Ended June 30, 2023	Six Months Ended June 30, 2022
Revenue	$ 29,164	$ 26,162	$ 54,209	$ 48,642
Cost of revenue	12,299	10,199	22,371	18,400
Gross profit	16,865	15,963	31,838	30,242
Operating expense:				
Selling, general and administrative	13,439	14,768	26,736	28,056
Research, development and engineering	2,722	2,665	5,538	5,207
Amortization of intangible assets	918	992	1,910	1,806
Total operating expense	17,079	18,425	34,184	35,069
Operating loss	(214)	(2,462)	(2,346)	(4,827)
Other income/(expense):				
Other (expense)/income	(110)	53	(18)	73
Interest expense, net	(584)	(111)	(953)	(224)
Total other expense, net	(694)	(58)	(971)	(151)
Loss from continuing operations before income taxes	(908)	(2,520)	(3,317)	(4,978)
Income tax (benefit)/expense	(350)	422	(917)	(693)
Net loss from continuing operations	(558)	(2,942)	(2,400)	(4,285)
(Loss)/income from discontinued operations, net of income tax expense (benefit) of $(346), $(856), $(346), and $166.	(1,038)	591	(1,038)	594
Gain on sale of discontinued operations, net of tax of $3,117	—	—	—	10,921
Net (loss)/income from discontinued operations	(1,038)	591	(1,038)	11,515
Net (loss)/income	(1,596)	(2,351)	(3,438)	7,230
Net loss per share from continuing operations:				
Basic	$ (0.02)	$ (0.09)	$ (0.07)	$ (0.13)
Diluted	$ (0.02)	$ (0.09)	$ (0.07)	$ (0.13)
Net (loss)/income per share from discontinued operations:				
Basic	$ (0.03)	$ 0.02	$ (0.03)	$ 0.36
Diluted	$ (0.03)	$ 0.02	$ (0.03)	$ 0.36
Net loss per share attributable to common stockholders:				
Basic	$ (0.05)	$ (0.07)	$ (0.10)	$ 0.22
Diluted	$ (0.05)	$ (0.07)	$ (0.10)	$ 0.22
Weighted average shares:				
Basic	33,634,538	32,478,736	33,483,978	32,361,560
Diluted	33,634,538	32,478,736	33,483,978	32,361,560

Luna Innovations Incorporated
Consolidated Statements of Comprehensive Income (Unaudited)
(in thousands)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Net (loss)/income	$ (1,596)	$ (2,351)	$ (3,438)	$ 7,230
Other comprehensive income/(loss)	326	(3,227)	1,445	(3,597)
Total other comprehensive (loss)/income	$ (1,270)	$ (5,578)	$ (1,993)	$ 3,633

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

Luna Innovations Incorporated
Consolidated Statements of Changes in Stockholders' Equity (Unaudited)
(in thousands, except share data)

Three Months Ended June 30, 2023

	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total
	Shares	$	Shares	$	$	$	$	$
Balance, March 31, 2023	33,396,326	$ 35	1,831,491	$ (5,949)	$ 106,624	$ (4,138)	$ (2,504)	$ 94,068
Exercise of stock options	265,165	—	—	—	400	—	—	400
Share-based compensation	158,528	1	—	—	1,139	—	—	1,140
ESPP issuance	88,317	—	—	—	546	—	—	546
Purchase of treasury stock	—	—	—	(11)	—	—	—	(11)
Net loss	—	—	—	—	—	(1,596)	—	(1,596)
Foreign currency translation adjustment	—	—	—	—	—	—	326	326
Balance, June 30, 2023	33,908,336	$ 36	1,831,491	$ (5,960)	$ 108,709	$ (5,734)	$ (2,178)	$ 94,873

Three Months Ended June 30, 2022

	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total
	Shares	$	Shares	$	$	$	$	$
Balance, March 31, 2022	32,361,122	34	1,782,289	(5,526)	99,906	(1,994)	(403)	$ 92,017
Exercise of stock options	217,040	1	—	—	937	—	—	938
Share-based compensation	75,400	—	—	—	679	—	—	679
ESPP issuance	101,454	—	—	—	521	—	—	521
Purchase of treasury stock	(2,668)	—	2,668	(16)	—	—	—	(16)
Net loss	—	—	—	—	—	(2,351)	—	(2,351)
Foreign currency translation adjustment	—	—	—	—	—	—	(3,227)	(3,227)
Balance, June 30, 2022	32,752,348	$ 35	1,784,957	$ (5,542)	$ 102,043	$ (4,345)	$ (3,630)	$ 88,561

	Six Months Ended June 30, 2023							
	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total
	Shares	$	Shares	$	$	$	$	$
Balance, December 31, 2022	33,105,080	$ 35	1,796,862	$ (5,607)	$ 104,893	$ (2,296)	$ (3,623)	$ 93,402
Exercise of stock options	518,020	—	—	—	1,234	—	—	1,234
Share-based compensation	231,548	1	—	—	2,036	—	—	2,037
ESPP issuance	88,317	—	—	—	546	—	—	546
Purchase of treasury stock	(34,629)	—	34,629	(353)	—	—	—	(353)
Net loss	—	—	—	—	—	(3,438)	—	(3,438)
Foreign currency translation adjustment	—	—	—	—	—	—	1,445	1,445
Balance, June 30, 2023	33,908,336	$ 36	1,831,491	$ (5,960)	$ 108,709	$ (5,734)	$ (2,178)	$ 94,873

	Six Months Ended June 30, 2022							
	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total
	Shares	$	Shares	$	$	$	$	$
Balance at December 31, 2021	32,116,270	34	1,744,026	(5,248)	98,745	(11,575)	(33)	$ 81,923
Exercise of stock options	360,432	1	—	—	1,157	—	—	1,158
Share-based compensation	215,123	—	—	—	1,620	—	—	1,620
ESPP issuance	101,454	—	—	—	521	—	—	521
Purchase of treasury stock	(40,931)	—	40,931	(294)	—	—	—	(294)
Net income	—	—	—	—	—	7,230	—	7,230
Foreign currency translation adjustment	—	—	—	—	—	—	(3,597)	(3,597)
Balance, June 30 2022	32,752,348	$ 35	1,784,957	$ (5,542)	$ 102,043	$ (4,345)	$ (3,630)	$ 88,561

Luna Innovations Incorporated
Consolidated Statements of Cash Flows (Unaudited)
(in thousands, except share data)

	Six Months Ended June 30,	
	2023	2022
Cash flows used in by operating activities		
Net (loss)/income	$ (3,438)	$ 7,230
Adjustments to reconcile net (loss)/income to net cash used in operating activities		
Depreciation and amortization	2,740	2,694
Share-based compensation	2,172	2,177
Loss on disposal of property and equipment	278	—
Gain on sale of discontinued operations, net of tax	—	(10,921)
Deferred taxes	(194)	(124)
Change in assets and liabilities		
Accounts receivable	(168)	(6,555)
Contract assets	(1,815)	140
Inventory	(4,798)	(4,281)
Other current assets	(804)	(3,870)
Other long-term assets	(93)	646
Accounts payable and accrued and other current liabilities	(3,653)	6,123
Contract liabilities	(693)	1,196
Other long-term liabilities	—	(1,523)
Net cash used in operating activities	(10,466)	(7,068)
Cash flows used in investing activities		
Acquisition of property and equipment	(1,180)	(1,657)
Acquisition of intangible property	(63)	—
Proceeds from sale of property and equipment	—	25
Proceeds from sale of discontinued operations	—	12,973
Acquisition of Luna Innovations Germany GmbH	—	(22,085)
Other	—	4
Net cash used in investing activities	(1,243)	(10,740)
Cash flows provided by financing activities		
Payments on finance lease obligations	(25)	(24)
Proceeds from borrowings under debt obligations	8,500	21,150
Payments of debt obligations	(1,000)	(15,772)
Repurchase of common stock	(353)	(294)
Proceeds from ESPP	546	521
Proceeds from the exercise of stock options	1,234	1,158
Net cash provided by financing activities	8,902	6,739
Effect of exchange rate changes on cash and cash equivalents	60	(1,195)
Net decrease in cash and cash equivalents	(2,747)	(12,264)
Cash and cash equivalents—beginning of period	6,024	17,128
Cash and cash equivalents—end of period	$ 3,277	$ 4,864
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 956	$ 183
Cash paid for income tax	$ 3,175	$ 787

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

Luna Innovations Incorporated
Notes to Unaudited Consolidated Financial Statements

1. Basis of Presentation and Significant Accounting Policies

Nature of Operations

Luna Innovations Incorporated ("we," "our" or the "Company"), headquartered in Roanoke, Virginia, was incorporated in the Commonwealth of Virginia in 1990 and reincorporated in the State of Delaware in April 2003.

We are a leader in advanced optical technology, providing high performance fiber optic test, measurement and control products for the telecommunications and photonics industries, and distributed fiber optic sensing solutions that measure, or "sense" the structures for industries ranging from aerospace, automotive, oil and gas, security and infrastructure. Our communications test and control products help customers test their fiber optic networks and assemblies with speed and precision in both lab and production environments. Our test and measurement products accelerate the development of high speed fiber optic components like photonic integrated circuits, coherent receivers and short-run fiber networks. Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by measuring stress, strain, and temperature at a high resolution for new designs or manufacturing processes. Our distributed fiber optic sensing products ensure the safety and structural integrity or operational health of critical assets in the field, by monitoring stress, strain, temperature and vibration in large civil and industrial infrastructure such as bridges, roads, pipelines and borders. We manufacture and sell "terahertz" (THz) products for layer thickness measurements for materials like plastics, rubber, and paint. Our THz products are used in the aerospace and automotive/EV sector. We also provide applied research services, primarily under federally funded development programs, that leverage our sensing and instrumentation technologies to meet the specific needs and applications of our customers.

Unaudited Interim Financial Information

The accompanying unaudited consolidated interim financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") for interim financial statements and Article 10 of Regulation S-X of the Securities Exchange Act of 1934, as amended. Accordingly, they do not include all of the information and footnotes required by U.S. GAAP for annual financial statements. The unaudited consolidated interim financial statements have been prepared on the same basis as the annual financial statements and in the opinion of management reflect all adjustments, consisting of only normal recurring adjustments considered necessary to present fairly our financial position at June 30, 2023, results of operations, comprehensive income/(loss) and changes in stockholders' equity for the three and six months ended June 30, 2023 and 2022, and cash flows for the six months ended June 30, 2023 and 2022. The results of operations for the three and six months ended June 30, 2023 are not necessarily indicative of the results that may be expected for the year ending December 31, 2023. The consolidated balance sheet as of December 31, 2022 was derived from our audited consolidated financial statements.

The consolidated interim financial statements, including our significant accounting policies, should be read in conjunction with the audited consolidated financial statements and the notes thereto for the year ended December 31, 2022, included in our Annual Report on Form 10-K as filed with the Securities and Exchange Commission ("SEC") on March 16, 2023.

Goodwill and Intangible Assets

Goodwill and intangible assets with indefinite lives are not amortized but are tested for impairment on an annual basis, as of October 1 of each year, or whenever events or changes in circumstances indicate that the carrying amount of these assets may not be recoverable. Purchased intangible assets with finite useful lives are amortized using the straight-line method over their estimated useful lives. We analyze the reasonableness of the remaining useful life whenever events or circumstances indicate that the carrying amount may not be recoverable to determine whether the carrying value has been impaired.

Fair Value Measurements

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in the principal or most advantageous market in an orderly transaction between marketplace participants. Various valuation approaches can be used to determine fair value, each requiring different valuation inputs. The following hierarchy classifies the inputs used to determine fair value into three levels:

- Level 1—Quoted prices for identical instruments in active markets.

- Level 2—Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which significant value drivers are observable.
- Level 3—Valuations derived from valuation techniques in which significant value drivers are unobservable.

The carrying values of cash and cash equivalents, accounts receivable, accounts payable and accrued and other liabilities approximate fair value because of the short-term nature of these instruments. The carrying amount of lease liabilities approximate fair value because these financial instruments bear interest at rates that approximate current market rates for similar agreements with similar maturities and credit. We consider the terms of the PNC Bank, National Association debt facility, including its floating per annum interest rate of the daily simple secured overnight financing rate ("SOFR"), plus an SOFR adjustment, plus a margin ranging from 1.75% to 2.75%, to be at market based upon similar instruments that would be available to us. The Company has certain assets and liabilities that have been recorded at fair value on a non-recurring basis following an acquisition.

Reportable Segments

We have one reportable segment that develops, manufactures and markets distributed fiber optic sensing products and fiber optic communications test and control products.

Net Income/(Loss) Per Share

Basic per share data is computed by dividing our net income/(loss) by the weighted average number of shares outstanding during the period. Diluted per share data is computed by dividing net income/(loss) by the weighted average shares outstanding during the period increased to include, if dilutive, the number of additional common share equivalents that would have been outstanding if potential shares of common stock had been issued using the treasury stock method. Diluted per share data would also include the potential common share equivalents relating to convertible securities by application of the if-converted method. There were no adjustments for common stock equivalents for the diluted per share data for the three and six months ended June 30, 2023 and 2022.

The following shares could potentially dilute basic EPS in the future and have been excluded from the computation of diluted weighted average shares outstanding because the effect would be anti-dilutive:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Stock options	331,000	679,000	401,000	790,000
Restricted stock units	1,162,000	1,162,000	1,161,000	1,150,000

Foreign Currency

For our non-U.S. dollar functional currency subsidiaries, assets and liabilities are translated into U.S. dollars using fiscal period end exchange rates. Sales and expenses are translated at average monthly exchange rates. Foreign currency translation gains and losses are included as a component of accumulated other comprehensive loss within equity. Gains and losses resulting from foreign currency transactions are included in earnings.

Recently Issued Pronouncements

In June 2016, the FASB issued ASU 2016-13 *Financial Instruments - Credit Losses (Topic 326) - Measurement of Credit Losses on Financial Instruments,* which requires companies to measure financial assets at an amortized cost basis to be presented at the net amount expected to be collected. The new accounting rules eliminate the probable initial recognition threshold and, instead, reflect an entity's current estimate of all expected credit losses. ASU 2016-13 is applicable to our trade receivables and convertible note. This pronouncement was amended under ASU 2019-10 to allow an extension on the adoption date for entities that qualify as a small reporting company. We adopted ASU 2016-13, effective January 1, 2023. The adoption of ASU 2016-13 did not have a significant impact on our consolidated financial statements.

2. Discontinued Operations

During the fourth quarter of 2022, we recorded revenue and an unbilled receivable of $1.3 million related to our annual Incurred Cost Submission for the year ended 2021 for projects from our Luna Labs business sold on March 7, 2022. As of June 30, 2023, we no longer believe we will be able to collect the majority of the Luna Labs portion of the unbilled receivables and have therefore revised our estimated collection from $1.3 million to $0.1 million, resulting in a loss recorded in discontinuing operations of $1.0 million, net of tax, during the three months ended June 30, 2023.

3. Intangible assets, net

Intangible assets, net at June 30, 2023 and December 31, 2022 consisted of the following:

	Estimated Life	June 30, 2023	December 31, 2022
(in thousands)			
Patent costs	1 - 5 years	$ 9,464	$ 9,086
Developed technology	5 - 10 years	15,900	15,924
In-process research and development	N/A	2,631	2,631
Customer relationships	5 - 15 years	4,294	4,117
Trade names	3 - 5 years	877	880
Backlog	1 - 3 years	436	331
		33,602	32,969
Patent costs		(4,622)	(4,128)
Developed technology		(8,188)	(6,830)
In-process research and development		(1,531)	(1,763)
Customer relationships		(843)	(574)
Trade names		(611)	(586)
Backlog		(436)	(338)
Accumulated amortization		(16,231)	(14,219)
		$ 17,371	$ 18,750

Amortization expense for the three and six months ended June 30, 2023 was $0.9 million and $1.9 million, respectively. Estimated aggregate amortization, based on the net value of intangible assets at June 30, 2023, for each of the next five years and beyond is as follows *(in thousands)*:

Year Ending December 31,	
2023 (remaining 6 months)	$ 2,008
2024	3,568
2025	3,252
2026	3,154
2027	2,376
2028 & beyond	3,013
Total	$ 17,371

4. Goodwill

The change in the carrying value of goodwill during the six months ended June 30, 2023 was as follows:

(in thousands)		
Balance as of December 31, 2022	$	26,927
Foreign currency translation		386
Balance as of June 30, 2023	$	27,313

5. Inventory

Inventory consists of finished goods, work-in-process and raw materials valued at the lower of cost (determined on the first-in, first-out basis) or net realizable value.

Components of inventory were as follows:

	June 30, 2023		December 31, 2022	
(in thousands)				
Finished goods	$	10,886	$	9,930
Work-in-process		3,803		3,113
Raw materials		27,314		23,539
Total inventory	$	42,003	$	36,582

6. Accrued Liabilities

Accrued liabilities consisted of the following:

	June 30, 2023		December 31, 2022	
(in thousands)				
Accrued compensation	$	7,538	$	8,962
Accrued professional fees		786		720
Accrued income tax		—		3,788
Current portion of finance lease liability		50		50
Accrued interest		100		64
Accrued liabilities - other		2,901		3,110
Total accrued and other current liabilities	$	11,375	$	16,694

7. Debt

Long-term debt consisted of the following:

	June 30, 2023		December 31, 2022	
(in thousands)				
Term Loan (net of debt issuance costs of $66 and $74, 7.40% and 6.65% at June 30, 2023 and December 31, 2022, respectively)	$	17,934	$	18,926
Revolving Loan (7.40% and 6.65% at June 30, 2023 and December 31, 2022)		12,800		4,300
		30,734		23,226
Less: Current portion of long-term debt obligations		(3,000)		(2,500)
Long-term debt obligations	$	27,734	$	20,726

PNC Bank Facility

On January 31, 2023, the Company entered into a Loan Modification Agreement (the "Third Amendment") in respect of the Loan Agreement and previous amendments discussed hereafter to slightly modify its net leverage ratio and interest rate applicable margin. On June 21, 2022 (the “Effective Date”), the Company entered into a Loan Modification Agreement (the “Second Amendment”) in respect of its Loan Agreement, dated as of December 1, 2020 (the “Original Loan Agreement” and as amended by that certain First Amendment to Loan Agreement, dated as of March 10, 2022, the Second Amendment, and the Third Amendment the “Loan Agreement”) with PNC Bank, National Association, as lender (the “Lender”) and certain of the Company’s domestic subsidiaries as guarantors, to, among other things, extend the maturity date of the Term Loan and Revolving Line (each as defined below) to June 21, 2027 and increase the total commitments to the Company.

The Loan Agreement provides a $15.0 million revolving credit facility (the “Revolving Line”) and a $20 million term loan facility (the “Term Loan”). On the Effective Date, we borrowed the full amount of the Term Loan from the Lender according to a term note (the “Term Note”), a portion of the proceeds of which were used to refinance the remaining principal amount of the $12.5 million in term loans issued under the Original Loan Agreement, and the remainder of which were used to pay down approximately $13.7 million of the $15.0 million in revolving loans outstanding under the Revolving Line (the “Revolving Loan”) according to a revolving line of credit note (the “Revolving Line of Credit Note”). We may repay and reborrow advances under the Revolving Line from time to time according to the Revolving Line of Credit Note. The unused Revolving Line totaled $2.2 million at June 30, 2023.

The Term Loan matures on June 21, 2027. The Term Loan amortizes at a rate equal to 10% for the first year, 15% for years two and three, 20% in year four and 15% in year five, in each case payable on a quarterly basis. The remaining balance is due on maturity. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest will be due and payable on June 21, 2027. The Term Loan bears interest at a floating per annum rate equal to the sum of (a) the daily simple secured overnight finance rate ("Daily Simple SOFR"), plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.75% per annum, depending on our Net Leverage Ratio (as defined in the Loan Agreement). We may prepay the Term Loan without penalty or premium.

The Revolving Line expires on June 21, 2027. Borrowings under the Revolving Line bear interest at a floating per annum rate equal to the sum of (a) the Daily Simple SOFR, plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.75% per annum, depending on our Net Leverage Ratio. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest is due and payable on June 21, 2027. The unused portion of the Revolving Line accrues a fee equal to 0.20% per annum multiplied by the quarterly average unused amount.

The Loan Agreement includes a number of affirmative and restrictive covenants applicable to us and our subsidiaries, including, among others, financial covenants regarding minimum net leverage and fixed charge coverage, affirmative covenants regarding delivery of financial statements, payment of taxes, and maintenance of government compliance, and restrictive covenants regarding dispositions of property, acquisitions, incurrence of additional indebtedness or liens, investments and transactions with affiliates. We are also restricted from paying dividends or making other distributions or payments on our capital stock, subject to limited exceptions. We were in compliance with these covenants as of June 30, 2023.

Upon the occurrence of certain events, including failure to satisfy our payment obligations under the Loan Agreement, failure to adhere to the financial covenants, the breach of certain of our other covenants under the Loan Agreement, cross defaults to other indebtedness or material agreements, judgment defaults and defaults related to failure to maintain governmental approvals, the Lender will have the right, among other remedies, to declare all principal and interest immediately due and payable, and to exercise secured party remedies.

Maturities on debt are as follows (*in thousands)*:

Year Ending December 31,		**Amount**
2023 (remaining 6 months)	$	1,500
2024		3,000
2025		3,500
2026		4,000
2027		18,800
Total maturities		30,800
Less: deferred issuance costs		(66)
Total	$	30,734

8. Capital Stock and Share-Based Compensation

Stock Options

For the three and six months ended June 30, 2023, we recognized $24.2 thousand and $93.9 thousand, respectively, in share-based compensation expense related to stock options, which is included in our selling, general and administrative expense in the accompanying consolidated statement of operations. Share-based compensation expense related to stock options for the three and six months ended June 30, 2022 totaled $0.2 million and $0.4 million, respectively. We expect to recognize $0.1 million in share-based compensation expense over the weighted-average remaining service period of 1.3 years for stock options outstanding as of June 30, 2023.

Restricted Stock Units

During the three and six months ended June 30, 2023, we granted 23,048 and 303,129 time-based restricted stock units ("RSUs"), respectively. During the three and six months ended June 30, 2022, we granted 376,436 and 623,842 time-based RSUs, respectively. The general terms of the RSUs are similar to awards previously granted by us. The weighted average fair value of the time-based RSUs granted during the three and six months ended June 30, 2023 was $6.04 and $8.19 per share, respectively. The fair value of each RSU was determined based on the market price of our stock on the date of grant.

In addition, pursuant to our Deferred Compensation Plan, non-employee directors can elect to defer the receipt of some or all of the equity compensation that they receive for board and committee service. During the three and six months ended June 30, 2023, we granted 50,540 and 57,937 RSUs, respectively, pursuant to the Deferred Compensation Plan. During the three and six months ended June 30, 2022, we granted 89,825 and 98,261 RSUs, respectively, pursuant to the Deferred Compensation Plan. The general terms of these RSUs are similar to awards previously granted by us. The weighted average fair value of these RSUs granted during the three and six months ended June 30, 2023, was $8.54 and $8.60 per share, respectively. The fair value of each RSU was determined based on the market price of our stock on the date of grant.

For the three and six months ended June 30, 2023, we recognized $0.8 million and $1.6 million, respectively, in share-based compensation expense related to RSUs, which is included in our selling, general and administrative expense in the accompanying consolidated statement of operations. Share-based compensation related to RSUs for the three and six months ended June 30, 2022 totaled $0.5 million and $1.2 million, respectively. We expect to recognize $6.3 million in share-based compensation expense over the weighted-average remaining service period of 1.3 years for RSUs outstanding as of June 30, 2023.

Employee Stock Purchase Plan ("ESPP")

For each of the three and six months ended June 30, 2023 and 2022, we recognized $0.1 million and $0.2 million, respectively, in share-based compensation expense related to the ESPP, which is included in our selling, general and administrative expense in the accompanying consolidated statement of operations.

9. Revenue Recognition

Disaggregation of Revenue

We disaggregate our revenue from contracts with customers by geographic locations, customer type, contract type, timing of recognition, and major categories, as we believe it best depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors. We disaggregate revenue on the basis of where the physical goods are shipped. We also classify revenue by the customer type of entity for which it does business, which is an indicator of the diversity of our client base. We attribute revenues generated from being a subcontractor to a commercial company as government revenue when the ultimate client is a government agency or department. Disaggregation by contract mix provides insight in terms of the degree of performance risk that we have assumed. Fixed-price contracts are considered to provide the highest amount of performance risk as we are required to deliver a scope of work or level of effort for a negotiated fixed price. Cost-based contracts are considered to provide the lowest amount of performance risk since we are generally reimbursed for all contract costs incurred in performance of contract deliverables with only the amount of incentive or award fees (if applicable) dependent on the achievement of negotiated performance requirements. By classifying revenue by major product and service, we attribute revenue from a client to the major product or service that we believe to be the client's primary market.

The details are listed in the table below for the three and six months ended June 30, 2023 and 2022:

	Three Months Ended June 30,				Six Months Ended June 30,			
	2023		2022		2023		2022	
(in thousands)	*(unaudited)*				*(unaudited)*			
Total Revenue by Geographic Location								
United States	$	13,135	$	10,249		26,042	$	20,764
Asia		5,394		4,187		9,382		9,017
Europe		6,985		7,558		13,299		12,465
Canada, Central and South America		2,373		3,957		3,822		6,185
All Others		1,277		211		1,664		211
Total	$	29,164	$	26,162	$	54,209	$	48,642
Total Revenue by Major Customer Type								
Sales to the U.S. government	$	1,256	$	2,156	$	3,225	$	3,791
U.S. direct commercial sales and other		11,879		8,093		22,817		16,974
Foreign commercial sales & other		16,029		15,913		28,167		27,877
Total	$	29,164	$	26,162	$	54,209	$	48,642
Total Revenue by Contract Type								
Fixed-price contracts	$	28,355	$	25,501	$	52,524	$	47,353
Cost-type contracts		809		661		1,685		1,289
Total	$	29,164	$	26,162	$	54,209	$	48,642
Total Revenue by Timing of Recognition								
Goods transferred at a point in time	$	25,813	$	22,885		47,840	$	41,493
Goods/services transferred over time		3,351		3,277		6,369		7,149
Total	$	29,164	$	26,162	$	54,209	$	48,642
Total Revenue by Major Products/Services								
Technology development	$	1,352	$	1,539		3,128	$	3,136
Test, measurement and sensing systems		27,529		24,022		50,566		44,117
Other		283		601		515		1,389
Total	$	29,164	$	26,162	$	54,209	$	48,642

Contract Balances

Our contract assets consist of unbilled amounts for research contracts as well as custom product contracts. Contract liabilities include excess billings, subcontractor accruals, and customer deposits. During the three and six months ended June 30, 2023, we recognized $2.0 million and $2.6 million of revenue, respectively, that was included in contract liabilities as of December 31, 2022.

The following table shows the components of our contract balances as of June 30, 2023 and December 31, 2022:

	June 30, 2023	December 31, 2022
(in thousands)		
Contract assets	$ 9,601	$ 7,691
Contract liabilities	3,463	4,089
Net contract assets	$ 6,138	$ 3,602

Performance Obligations

Unfulfilled performance obligations represent amounts expected to be earned on executed contracts. Indefinite delivery and quantity contracts and unexercised options are not reported in total unfulfilled performance obligations. Unfulfilled performance obligations include funded obligations, which is the amount for which money has been directly authorized by the U.S. government and for which a purchase order has been received by a commercial customer, and unfunded obligations represent firm orders for which funding has not yet been appropriated. The approximate value of our unfulfilled performance obligations was $52.4 million at June 30, 2023. We expect to satisfy 73% of the performance obligations in 2023, 22% in 2024 and the remainder by 2027.

10. Income Taxes

Our provision for income taxes is based upon the estimated annual effective tax rate for the year applied to the current period income plus the tax effect of any significant or unusual items, discrete events or changes in tax law. Fluctuations in the distribution of pre-tax income among our operating subsidiaries can lead to fluctuations of the effective tax rate in the consolidated financial statements. We and our subsidiaries file U.S. federal income tax returns and income tax returns in various state, local, and foreign jurisdictions.

For the six months ended June 30, 2023, our effective income tax rate was 27.6% compared to 13.9% for the six months ended June 30, 2022. Historically, our tax rate can vary significantly from the federal statutory rate of 21% due to losses generated in jurisdictions where the benefit is not expected to be recognized partially offset by favorable impacts from stock award vesting and exercises, foreign-derived intangible income deduction and research and development tax credits.

11. Commitments and Contingencies

We are from time to time involved in certain legal proceedings in the ordinary course of conducting our business. While the ultimate liability pursuant to these actions cannot currently be determined, we believe it is not reasonably possible that these legal proceedings will have a material adverse effect on our financial position or results of operations.

We executed multiple non-cancelable purchase orders totaling $3.1 million in the second quarter of 2022, a non-cancelable purchase order totaling $4.6 million in the fourth quarter of 2022, and a non-cancelable purchase order totaling $0.6 million in the first quarter of 2023 for multiple shipments of tunable lasers to be delivered over a 12-15 month period. At June 30, 2023, approximately $6.1 million of non-cancelable purchase order commitments remained and are expected to be delivered by December 29, 2024.

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

CAUTIONARY NOTE REGARDING FORWARD LOOKING STATEMENTS

This Quarterly Report on Form 10-Q, including the sections entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Quantitative and Qualitative Disclosures About Market Risk" under Items 2 and 3, respectively, of Part I of this report, and the section entitled "Risk Factors" under Item 1A of Part II of this report, may contain forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended, and Section 27A of the Securities Act of 1933, as amended. All statements other than statements of historical fact are "forward-looking statements" for purposes of these statutes, including those relating to future events or our future financial performance. In some cases, you can identify these forward looking statements by words such as "intends," "will," "plans," "anticipates," "expects," "may," "might," "estimates," "believes," "should," "projects," "predicts," "potential" or "continue," or the negative of those words and other comparable words, and other words or terms of similar meaning in connection with any discussion of future operating or financial performance. Similarly, statements that describe our business strategy, goals, prospects, opportunities, outlook, objectives, plans or intentions are also forward-looking statements. These statements are only predictions and may relate to, but are not limited to, expectations of future operating results or financial performance, capital expenditures, introduction of new products, regulatory compliance and plans for growth and future operations, the potential benefits of past acquisitions and dispositions, as well as assumptions relating to the foregoing.

These statements are based on current expectations and assumptions regarding future events and business performance and involve known and unknown risks, uncertainties and other factors that may cause actual events or results to be materially different from any future events or results expressed or implied by these statements. These factors include those set forth in the following discussion and within Item 1A "Risk Factors" of this Quarterly Report on Form 10-Q and elsewhere within this report.

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the related notes to those statements included elsewhere in this report. In addition to historical financial information, the following discussion and analysis contains forward-looking statements that involve risks, uncertainties and assumptions. Our actual results and timing of selected events may differ materially from those anticipated in these forward-looking statements as a result of many factors, including those discussed under "Risk Factors" and elsewhere in this report.

Overview of Our Business

We are a leader in advanced optical technology, providing high performance fiber optic test, measurement and control products for the telecommunications and photonics industries, and distributed fiber optic sensing solutions that measure, or "sense," the structures for industries ranging from aerospace, automotive, oil and gas, security and infrastructure. We operate in one reportable segment.

Our communications test and control products help customers test their fiber optic networks and assemblies with speed and precision in both lab and production environments. Our test and measurement products accelerate the development of high speed fiber optic components like photonic integrated circuits ("PICs"), coherent receivers and short-run fiber networks. Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by measuring stress, strain, and temperature at a high resolution for new designs or manufacturing processes. In addition, our distributed fiber optic sensing products ensure the safety and structural integrity or operational health of critical assets in the field, by monitoring stress, strain, temperature and vibration in large civil and industrial infrastructure such as bridges, roads, pipelines and borders. We manufacture and sell "terahertz" (THz) products for layer thickness measurements for materials like plastics, rubber and paint. Our THz products are used in the aerospace and automotive/EV sectors. We also provide applied research services, primarily under federally funded development programs, that leverage our sensing and instrumentation technologies to meet the specific needs and applications of our customers.

As we develop and commercialize new products, our revenues will reflect a broader and more diversified mix of products. Our key initiative for long term growth is to become a leading provider of fiber optic communications test, measurement, control and sensing equipment. Recent acquisitions have added strategic technologies and products that complement our existing suite of sensing products and provided for expansion into high-growth markets such as security and perimeter detection, smart infrastructure monitoring and oil and gas. Our products have historically been strong in long-range, discrete sensing and short range, fully distributed sensing which are best when specific, known locations need to be monitored. Additional product offerings from these strategic acquisitions have helped us fill a gap for long range, fully distributed acoustic, temperature and strain measurement, which is best for applications where signals can occur anywhere along the length of the sensor.

We may incur increasing expenses as we seek to expand our business, including expenses for research and development, sales and marketing and manufacturing capabilities. We may continue to grow our business in part through acquisitions of additional companies and complementary technologies, which could cause us to incur transaction expenses, amortization or write-offs of intangible assets and goodwill and other acquisition-related expenses. As a result, we may incur net losses in future periods, and these losses could be substantial.

Backlog

We define backlog as the dollar amount of obligations payable to us under negotiated contracts upon completion of a specified portion of work that has not yet been completed, exclusive of revenues previously recognized for work already performed under these contracts, if any. Total backlog includes funded backlog, which is the amount for which money has been directly authorized by the U.S. government or for which a purchase order has been received from a commercial customer, and unfunded backlog, which represents firm orders for which funding has not yet been appropriated. Our backlog of purchase orders received for which the related goods have not been shipped or recognized as revenue was $52.4 million and $52.9 million at June 30, 2023 and December 31, 2022, respectively.

Description of Revenues, Costs and Expenses

Revenues

We generate revenues from product sales and commercial product development and, to a lesser degree, fees paid to us in connection with licenses or sub-licenses of certain patents and other intellectual property. We also generate revenue from providing research and development services to third parties, including government entities and corporations.

Cost of Revenues

Cost of revenues associated with our product revenues consists of license fees for use of certain technologies, product manufacturing costs including all direct material and direct labor costs, amounts paid to our contract manufacturers, manufacturing, shipping and handling, provisions for product warranties, and inventory obsolescence as well as overhead allocated to each of these activities. Cost of revenues associated with our contract research revenues consists of costs associated with performing the related research activities including direct labor, amounts paid to subcontractors and allocate overhead.

Operating Expense

Operating expense consists of selling, general and administrative expenses, as well as expenses related to research, development and engineering, depreciation of fixed assets, amortization of intangible assets and costs related to merger and acquisition activities. These expenses also include compensation for employees in executive and operational functions including certain non-cash charges related to expenses from equity awards, facilities costs, professional fees, salaries, commissions, travel expense and related benefits of personnel engaged in sales, marketing and administrative activities, costs of marketing programs and promotional materials, salaries, bonuses and related benefits of personnel engaged in our own research and development, product development activities not provided under contracts with third parties, and overhead costs related to these activities.

Interest Expense

Interest expense is composed of interest paid under our term and revolving loans as well as interest accrued on our finance lease obligations.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition and results of operations are based on our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires us to make estimates, assumptions and judgments that affect the amounts reported in our financial statements and the accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Actual results may differ from these estimates under different assumptions or judgments.

Our critical accounting policies are described in the Management’s Discussion and Analysis section and the notes to our audited consolidated financial statements previously included in our Annual Report on Form 10-K for the year ended December 31, 2022, as filed with the Securities and Exchange Commission ("SEC") on March 16, 2023.

Results of Operations

Three Months Ended June 30, 2023 Compared to Three Months Ended June 30, 2022

Revenues

Revenues for the three months ended June 30, 2023 increased $3.0 million, or 11%, to $29.2 million compared to $26.2 million for the three months ended June 30, 2022. The increase in revenues for the three months ended June 30, 2023, compared to the three months ended June 30, 2022, was primarily due to revenue growth in sales of our sensing products.

Cost of Revenues and Gross Profit

Cost of revenues increased by $2.1 million, or 21%, to $12.3 million for the three months ended June 30, 2023, compared to $10.2 million for the three months ended June 30, 2022. The increase in cost of revenue slightly outpaced our sales growth. Our overall gross margin for the three months ended June 30, 2023 was 58%, compared to 61% for the three months ended June 30, 2022. The decrease in gross margin was primarily due to an unfavorable product mix.

Operating Expense

	Three Months Ended June 30,			
(in thousands)	2023	2022	$ Difference	% Difference
Operating expense:				
Selling, general and administrative	$ 13,439	$ 14,768	$ (1,329)	(9)%
Research, development and engineering	2,722	2,665	57	2 %
Amortization of intangible assets	918	992	(74)	(7)%
Total operating expense	$ 17,079	$ 18,425	$ (1,346)	(7)%

Our selling, general and administrative expense decreased $1.3 million, or 9%, to $13.4 million for the three months ended June 30, 2023, compared to $14.8 million for the three months ended June 30, 2022. The decrease in selling, general and administrative expense reflects efforts to remove redundant expenses on a global basis, partially offset by an increase in variable costs to support our sales growth.

Research, development and engineering expense was $2.7 million for each of the three months ended June 30, 2023 and June 30, 2022.

Amortization of intangible assets decreased $0.1 million, or 7%, to $0.9 million for the three months ended June 30, 2023, compared to $1.0 million for the three months ended June 30, 2022.

Loss from Continuing Operations Before Income Taxes

During the three months ended June 30, 2023, we recognized a loss from continuing operations before income taxes of $0.9 million compared to loss from continuing operations before income taxes of $2.5 million for the three months ended June 30, 2022.

Income Tax (Benefit)/Expense

During the three months ended June 30, 2023 and 2022, we recognized an income tax benefit of $0.4 million and an income tax expense of $0.4 million, respectively. The income tax benefit for the three months ended June 30, 2023 was related to the pre-tax loss and favorable benefit from certain discrete tax adjustments. The income tax expense for the three months ended June 30, 2022 was primarily due to an unfavorable impact from the net Global Intangible Low Taxed Inclusion ("GILTI") and losses for which no benefit can be recorded partially offset by Research & Development ("R&D") tax credits.

Net (Loss)/Income from Discontinued Operations

For the three months ended June 30, 2023, we recognized a loss from discontinued operations, net of income taxes, of $1.0 million. For the three months ended June 30, 2022, we recognized income from discontinued operations, net of income taxes, of $0.6 million. The results of our discontinued operations for the three months ended June 30, 2023 included a change in estimate related to collection of an outstanding unbilled receivable balance previously recorded at December 31, 2022.

Six Months Ended June 30, 2023 Compared to Six Months Ended June 30, 2022

Revenues

Revenues for the six months ended June 30, 2023 increased $5.6 million, or 11%, to $54.2 million compared to $48.6 million for the six months ended June 30, 2022. The majority of the increase in revenues for the six months ended June 30, 2023, compared to the six months ended June 30, 2022, was due to the revenues from Luna Innovations GmbH and its wholly owned subsidiary Lios Technology, Inc. ("Lios"), which was acquired on March 10, 2022, and growth in sales of our sensing and communications test products.

Cost of Revenues and Gross Profit

Cost of revenues increased $4.0 million, or 22%, to $22.4 million for the six months ended June 30, 2023, compared to $18.4 million for the six months ended June 30, 2022. This increase in cost of revenues slightly outpaced our sales growth. Our overall gross margin for the six months ended June 30, 2023 was 59%, compared to 62% for the six months ended June 30, 2022. The decrease in gross margin was primarily due to an unfavorable sales mix.

Operating Expense

	Six Months Ended June 30,			
(in thousands)	**2023**	**2022**	**$ Difference**	**% Difference**
Operating expense:				
Selling, general and administrative	$ 26,736	$ 28,056	$ (1,320)	(5)%
Research, development and engineering	5,538	5,207	331	6 %
Amortization of intangible assets	1,910	1,806	104	6 %
Total operating expense	$ 34,184	$ 35,069	$ (885)	(3)%

Selling, general and administrative expense decreased $1.3 million, or 5%, to $26.7 million for the six months ended June 30, 2023, compared to $28.1 million for the six months ended June 30, 2022. Selling, general and administrative expense decreased primarily due to efforts to remove redundant expenses on a global basis, partially offset by an increase in variable costs to support our sales growth and expenses from the acquired Lios operations.

Research, development and engineering expense increased $0.3 million, or 6%, to $5.5 million for the six months ended June 30, 2023, compared to $5.2 million for the six months ended June 30, 2022.

Amortization of intangible assets increased $0.1 million, or 6%, to $1.9 million for the six months ended June 30, 2023, compared to $1.8 million for the six months ended June 30, 2022.

Loss from Continuing Operations Before Income Taxes

During the six months ended June 30, 2023, we recognized a loss from continuing operations before income taxes of $3.3 million compared to a loss from continuing operations before income taxes of $5.0 million for the six months ended June 30, 2022.

Income Tax Benefit

For the six months ended June 30, 2023 and 2022 we recognized an income tax benefit from continuing operations of $0.9 million and $0.7 million, respectively. The income tax benefit for the six months ended June 30, 2023 was primarily due to the pre-tax loss and favorable benefit from certain discrete tax adjustments. The income tax benefit for the six months ended June 30, 2022 was primarily due to the pre-tax loss and R&D tax credits, which was partially offset by an unfavorable GILTI impact and losses for which no benefit can be recorded due to valuation allowances.

Net (Loss)/Income from Discontinued Operations

For the six months ended June 30, 2023, we recognized a loss from discontinued operations, net of income taxes, of $1.0 million which was due to a change in estimate related to the collection of an outstanding unbilled receivable balance previously recorded at December 31, 2022. For the six months ended June 30, 2022, we recognized income from discontinued operations, net of income taxes, of $11.5 million, which primarily consisted of a gain of $10.9 million, net of tax, on the sale of Luna Labs.

Liquidity and Capital Resources

At June 30, 2023, our total cash and cash equivalents were $3.3 million. We require cash to: (i) fund our operating expenses, working capital requirements, and outlays for strategic acquisitions and investments; (ii) service our debt, including principal and interest; (iii) conduct research and development; (iv) incur capital expenditures; and (v) repurchase our common stock. As part of our business strategy, we review acquisition and divestiture opportunities on a regular basis.

We believe that the key factors that could affect our internal and external sources of cash include:

- Changes in demand for our products, competitive pricing pressures, supply chain constraints, effective management of our manufacturing capacity, our ability to achieve further reductions in operating expenses, our ability to make progress on the achievement of our business strategy goals, and our ability to make the research and development expenditures required to remain competitive in our business.

- Our access to bank financing and the debt and equity capital markets that could impair our ability to obtain needed financing on acceptable terms or to respond to business opportunities and developments as they arise, including interest rate fluctuations, macroeconomic conditions, sudden reductions in the general availability of lending from banks or the related increase in cost to obtain bank financing and our ability to maintain compliance with covenants under our debt agreements in effect from time to time.

As of June 30, 2023, we had outstanding borrowings under our Term Loan and Revolving Line of $17.9 million and $12.8 million, respectively. We may repay and reborrow advances under the Revolving Line from time to time pursuant to the Revolving Line of Credit Note. The unused Revolving Line totaled $2.2 million at June 30, 2023.

The Term Loan matures on June 21, 2027. The Term Loan amortizes at a rate equal to 10% for the first year, 15% for years two and three, 20% in year four and 15% in year five, in each case payable on a quarterly basis. The remaining balance is due on maturity. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest will be due and payable on June 21, 2027. The Term Loan bears interest at a floating per annum rate equal to the sum of (a) the daily simple secured overnight financing rate, or Daily Simple SOFR, plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.75% per annum, depending on the Net Leverage Ratio (as defined in the Loan Agreement). We may prepay the Term Loan without penalty or premium.

The Revolving Line expires on June 21, 2027. Borrowings under the Revolving Line bear interest at a floating per annum rate equal to the sum of (a) Daily Simple SOFR, plus (b) a SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.75% per annum, depending on the Net Leverage Ratio. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest is due and payable on June 21, 2027. The unused portion of the Revolving Line accrues a fee equal to 0.20% per annum multiplied by the quarterly average unused amount.

Additional details of our Loan Agreement can be found in Note 7, "Debt" in the notes to our unaudited condensed consolidated financial statements included elsewhere in this Form 10-Q.

We believe that our cash and cash equivalents and availability under our revolver as of June 30, 2023 will provide adequate liquidity for us to meet our working capital needs over the next twelve months from the date of issuance of the consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q. Additionally, we believe that should we have the need for increased capital spending to support our planned growth, we will be able to fund such growth through either third-party financing on competitive market terms or through our available cash. However, these estimates are based on assumptions that may prove to be incorrect, including as a result of changes in the macroeconomic environment and their potential impact to our business. If we require additional capital beyond our current balances of cash and cash equivalents, this additional capital may not be available when needed, on reasonable terms, or at all. Moreover, our ability to raise additional capital may be adversely impacted by potential worsening global economic conditions and disruptions to and volatility in the credit and financial markets in the United States and worldwide.

Discussion of Cash Flows

(in thousands)	Six Months Ended June 30, 2023 2023	2022
Net cash used in operating activities	$ (10,466)	$ (7,068)
Net cash used in investing activities	(1,243)	(10,740)
Net cash provided by financing activities	8,902	6,739
Effect of exchange rate changes on cash and cash equivalents	60	(1,195)
Net decrease in cash and cash equivalents	$ (2,747)	$ (12,264)

During the six months ended June 30, 2023, net cash used in operating activities was $10.5 million compared to net cash used in operations of $7.1 million for the comparable period of 2022. Overall, this net increase in use of operating cash was driven by an increase in working capital, including higher inventory levels to support our sales growth and to mitigate longer order lead times because of global supply chain issues.

During the six months ended June 30, 2023, cash used in investing activities was $1.2 million which decreased by $9.5 million from 2022. The decrease in net cash used in investing activities was primarily due to acquisition related activity during the prior year. The cash outflow for the acquisition of Lios in the 2022 period totaled $22.1 million, and was partially offset from the proceeds from the sale of discontinued operations totaling $13.0 million. Excluding acquisitions and sales transactions, cash used in investing decreased by $0.4 million primarily due to reduced capital expenditures for normal business needs.

During the six months ended June 30, 2023, cash provided by financing activities was $8.9 million, compared to cash provided by financing activities of $6.7 million for the comparable period in 2022. Cash provided during the 2023 period consisted primarily of net proceeds of $7.5 million from new borrowings used to support operating activities. Cash provided by financing activities during the 2022 period consisted primarily of net borrowings used to partially fund the acquisition of Lios.

ITEM 3. *QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK*

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. We do not hold or issue financial instruments for trading purposes or have any derivative financial instruments. Our exposure to market risk is limited to interest rate fluctuations, due to changes in the general level of U.S. interest rates, and foreign currency exchange rates.

Interest Rate Risk

We do not use derivative financial instruments as a hedge against interest rate fluctuations, and, as a result, we are subject to interest rate risk on our Term Loan and Revolving Line with interest rates at a floating per annum rate equal to the sum of (a) Daily Simple SOFR, plus (b) a SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.75% per annum, depending on the Net Leverage Ratio as defined in the credit agreement governing the Term Loan and Revolving Line. As of June 30, 2023, we had outstanding borrowings under our Term Loan and Revolving Line of $17.9 million and $12.8 million, respectively, at the weighted-average variable interest rate of 7.40%. At this borrowing level, a 0.25% increase in interest rates would have had an unfavorable annual impact on our pre-tax earnings and cash flows in the amount of approximately $77 thousand.

Foreign Currency Exchange Rate Risk

Our foreign currency exposure is primarily related to our net investment in foreign subsidiaries. Foreign exchange rate gains or losses resulting from the translation of our foreign operations into U.S. dollars are reflected as a cumulative translation adjustment and do not affect our results of operations.

ITEM 4. *CONTROLS AND PROCEDURES*

Evaluation of Disclosure Controls and Procedures

We maintain “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"), which are controls and other procedures that are designed to provide reasonable assurance that information required to be disclosed by a company 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 also include, without limitation, controls and procedures designed to provide reasonable assurance that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, 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. In addition, the design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a control system, misstatements due to error or fraud may occur and not be detected.

Under the supervision and with the participation of our management, including our President and Chief Executive Officer and our Chief Financial Officer, we evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this quarterly report. Based on this evaluation, our President and Chief Executive Officer and our Chief Financial Officer have concluded that, as of June 30, 2023, our disclosure controls and procedures were effective.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) that occurred during the three months ended June 30, 2023 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. *LEGAL PROCEEDINGS*

From time to time, we may become involved in litigation or claims arising out of our operations in the normal course of business. Management currently believes the amount of ultimate liability, if any, with respect to these actions will not materially affect our financial position, results of operations, or liquidity.

ITEM 1A. *RISK FACTORS*

You should carefully consider the risks described below before deciding whether to invest in our common stock. The risks described below are not the only ones we face. Additional risks not presently known to us or that we currently believe are immaterial may also impair our business operations and financial results. If any of the following risks actually occurs, our business, financial condition or results of operations could be adversely affected. In such case, the trading price of our common stock could decline and you could lose all or part of your investment. Our filings with the SEC also contain forward-looking statements that involve risks or uncertainties. Our actual results could differ materially from those anticipated or contemplated by these forward-looking statements as a result of a number of factors, including the risks we face described below, as well as other variables that could affect our operating results. Past financial performance should not be considered to be a reliable indicator of future performance, and investors should not use historical trends to anticipate results or trends in future periods.

RISK FACTORS SUMMARY

Our business is subject to a number of risks and uncertainties, including those risks discussed at-length below. These risks include, among others, the following:

- Risks Relating to our Business
  - We depend on third-party vendors for specialized components in our manufacturing operations, making us vulnerable to supply shortages and price fluctuations that could harm our business.
  - As a provider of contract research to the U.S. government, we are subject to federal rules, regulations, audits and investigations, the violation or failure of which could adversely affect our business.
  - Some of our technology is in-licensed from Intuitive Surgical, Inc., which is revocable in certain circumstances. Without this license, we cannot continue to market, manufacture or sell a portion of our fiber-optic products.
  - Our products must meet exacting specifications, and defects and failures may occur, which may cause customers to return or stop buying our products.
  - The markets for many of our products are characterized by changing technology which could cause obsolescence of our products, and we may incur substantial costs in delivering new products.

- Risks Relating to our Operations and Business Strategy
  - If we fail to properly evaluate and execute our strategic initiatives, it could have an adverse effect on our future results and the market price of our common stock.
  - We are experiencing impacts from inflationary pressures, including with respect to labor and materials costs, which could adversely impact our profitability and cash flow.
  - Health epidemics, including the COVID-19 pandemic, have had, and could in the future have, an adverse impact on our business, operations, and the markets and communities in which we and our customers and suppliers operate.

- Risks Relating to our Regulatory Environment
  - Our operations are subject to domestic and foreign laws, regulations and restrictions, and noncompliance with these laws, regulations and restrictions could expose us to fines, penalties, suspension or debarment, which could have a material adverse effect on our profitability and overall financial position.
  - We are or may become subject to a variety of privacy and data security laws, and our failure to comply with them could harm our business.

- Risks Relating to our Intellectual Property
  - Our proprietary rights may not adequately protect our technologies.
  - Third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result.

- Risks Relating to our Common Stock

- Our common stock price has been volatile and we expect that the price of our common stock will fluctuate substantially in the future, which could cause you to lose all or a substantial part of your investment.
- Anti-takeover provisions in our amended and restated certificate of incorporation and bylaws and Delaware law could discourage or prevent a change in control, even if an acquisition would be beneficial to our stockholders, which could affect our stock price adversely and prevent attempts by our stockholders to replace or remove our current management.

RISKS RELATING TO OUR BUSINESS

We depend on third-party vendors for specialized components in our manufacturing operations, making us vulnerable to supply shortages and price fluctuations that could harm our business.

We primarily rely on third-party vendors for the manufacture of the specialized components used in our products. The highly specialized nature of our supply requirements poses risks that we may not be able to locate additional sources of the specialized components required in our business. For example, there are few manufacturers who produce the special lasers used in our optical test equipment. Our reliance on these vendors subjects us to a number of risks that could negatively affect our ability to manufacture our products and harm our business, including interruption of supply. Although we are now manufacturing tunable lasers in low-rate initial production, we expect our overall reliance on third-party vendors to continue. Any significant delay or interruption in the supply of components, or our inability to obtain substitute components or materials from alternate sources at acceptable prices and in a timely manner could impair our ability to meet the demand of our customers and could harm our business.

We depend upon outside contract manufacturers for a portion of the manufacturing process for some of our products. Our operations and revenue related to these products could be adversely affected if we encounter problems with these contract manufacturers.

Many of our products are manufactured internally. However, we also rely upon contract manufacturers to produce the finished portion of certain products and lasers. Our reliance on contract manufacturers for these products makes us vulnerable to possible capacity constraints and reduced control over delivery schedules, manufacturing yields, manufacturing quality control and costs. If the contract manufacturer for our products were unable or unwilling to manufacture our products in required volumes and at high quality levels or to continue our existing supply arrangement, we would have to identify, qualify and select an acceptable alternative contract manufacturer or move these manufacturing operations to internal manufacturing facilities. An alternative contract manufacturer may not be available to us when needed or may not be in a position to satisfy our quality or production requirements on commercially reasonable terms, including price. Any significant interruption in manufacturing our products would require us to reduce the supply of products to our customers, which in turn would reduce our revenue, harm our relationships with the customers of these products and cause us to forego potential revenue opportunities.

As a U.S. government contractor, we are subject to federal rules, regulations, audits and investigations, the violation or failure of which could adversely affect our business.

We must comply with and are affected by laws and regulations relating to the award, administration and performance of U.S. government contracts. Government contract laws and regulations affect how we do business with our government customers and, in some instances, impose added costs on our business. A violation of a specific law or regulation could result in the imposition of fines and penalties, termination of our contracts or debarment from bidding on future contracts. In some instances, these laws and regulations impose terms or rights that are more favorable to the government than those typically available to commercial parties in negotiated transactions. Such terms or rights many allow government customers, among others, to:

- terminate existing contracts for convenience with short notice;
- reduce orders or otherwise modify contracts;
- for contracts subject to the Truth in Negotiations Act, reduce the contract price or cost where it was increased because a contractor or subcontractor furnished cost or pricing data during negotiations that was not complete, accurate, and current;
- for some contracts, (i) demand a refund, make a forward price adjustment, or terminate a contract for default if a contractor provided inaccurate or incomplete data during the contract negotiation process, and (ii) reduce the contract price under triggering circumstances, including the revision of price lists or other documents upon which the contract award was predicated;

- cancel multi-year contracts and related orders if funds for contract performance for any subsequent year become unavailable;
- decline to exercise an option to renew a multi-year contract or issue task orders in connection with indefinite delivery/indefinite quantity contracts;
- claim rights in solutions, systems, or technology produced by us, appropriate such work-product for their continued use without continuing to contract for our services, and disclose such work-product to third parties, including other government agencies and our competitors, which could harm our competitive position;
- prohibit future procurement awards with a particular agency due to a finding of organizational conflicts of interest based upon prior related work performed for the agency that would give a contractor an unfair advantage over competing contractors, or the existence of conflicting roles that might bias a contractor's judgment; and
- subject the award of contracts to protest by competitors, which may require the contracting federal agency or department to suspend our performance pending the outcome of the protest and may also result in a requirement to resubmit offers for the contract or in the termination, reduction, or modification of the awarded contract; and suspend or debar us from doing business with the applicable government.

In addition, U.S. government agencies, including the Defense Contract Audit Agency and the Department of Labor, routinely audit and investigate government contractors. These agencies review a contractor's performance under its contracts, cost structure and compliance with applicable laws, regulations and standards. The U.S. government also may review the adequacy of, and a contractor's compliance with, its internal control systems and policies, including the contractor's purchasing, property, estimating, compensation and management information systems. Any costs found to be improperly allocated to a specific contract will not be reimbursed, while such costs already reimbursed must be refunded. If an audit uncovers the inclusion of certain claimed costs deemed to be expressly unallowable, or improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions, including termination of contracts, forfeiture of profits, suspension of payments, fines and suspension or prohibition from doing business with the U.S. government. In addition, our reputation could suffer serious harm if allegations of impropriety were made against us.

In addition to the risk of government audits and investigations, U.S. government contracts and grants impose requirements on contractors and grantees relating to ethics and business practices, which carry civil and criminal penalties including monetary fines, assessments, loss of the ability to do business with the U.S. government and certain other criminal penalties.

We may also be prohibited from using certain foreign-sourced parts, components, materials, or other items in the performance of our government contracts or from commercially selling certain products that we develop if the U.S. government determines that the commercial availability of those products could pose a risk to national security.

Some of our technology is in-licensed from Intuitive Surgical, Inc., which is revocable in certain circumstances. Without this license, we cannot continue to market, manufacture or sell a portion of our fiber-optic products.

As a part of the sale of certain assets to Intuitive Surgical, Inc. ("Intuitive") in 2014, we entered into a license agreement with Intuitive pursuant to which we received rights to use all of our transferred technology outside the field of medicine and in respect of our existing non-shape sensing products in certain non-robotic medical fields. This license back to us generally covers our Phoenix laser, OVA, OBR and ODiSI products. This license is revocable if after notice and certain time periods, we were to (i) challenge the validity or enforceability of the transferred patents and patent applications, (ii) commercialize our fiber optical shape sensing and localization technology in the field of medicine, (iii) violate our obligations related to our ability to sublicense in the field of medicine or (iv) violate our confidentiality obligations in a manner that advantages a competitor in the field of medicine and not cure such violation. Maintaining this license is necessary for us to conduct our business related to the aforementioned products. If this license were to be revoked by Intuitive, we would no longer be able to market, manufacture or sell these products, which could have a material adverse effect on our operations.

Our failure to attract, train and retain skilled employees or members of our senior management and to obtain necessary security clearances for such persons or maintain a facility security clearance would adversely affect our business and operating results.

The availability of highly trained and skilled technical and professional personnel is critical to our future growth and profitability. Competition for scientists, engineers, technicians and professional personnel is intense and our competitors aggressively recruit key employees. In the past, we have experienced difficulties in recruiting and hiring these personnel as a result of the tight labor market in certain fields. Any difficulty in hiring or retaining qualified employees, combined with our growth strategy and future needs for additional experienced personnel, particularly in highly specialized areas such as nanomaterial manufacturing and fiber optic sensing technologies, may make it more difficult to meet all of our needs for these employees in a timely manner. Although we intend to continue to devote significant resources to recruit, train and retain qualified employees, we may not be able to attract and retain these employees, especially in technical fields in which the supply of experienced qualified candidates is limited, or at the senior management level. Any failure to do so would have an adverse effect on our business. Any loss of key personnel could have a material adverse effect on our ability to meet key operational objectives, such as timely and effective project milestones and product introductions, which in turn could adversely affect our business, results of operations and financial condition.

We provide certain services to the U.S. government that require us to maintain a facility security clearance and for certain of our employees and board members to hold security clearances. In general, our failure for to obtain or retain sufficient security clearances, or any public reprimand related to security matters could result in a U.S. government customer terminating an existing contract, choosing not to renew a contract or prevent us from bidding on or winning certain new government contracts.

In addition, our future success depends in a large part upon the continued service of key members of our senior management team. We do not maintain any key-person life insurance policies on our officers. The loss of any members of our management team or other key personnel could seriously harm our business.

Our business is subject to the cyclical nature of the markets in which we compete and any future downturn may reduce demand for our products and revenue.

Many factors beyond our control affect our business, including consumer confidence in the economy, interest rates, inflation, fuel prices, health crises, such as the COVID-19 pandemic, international conflicts, such as the current hostilities between Russia and Ukraine, and the general availability of credit. The overall economic climate and changes in Gross National Product growth have a direct impact on some of our customers and the demand for our products. We cannot be sure that our business will not be adversely affected as a result of an industry or general economic downturn.

Our customers may reduce capital expenditures and have difficulty satisfying liquidity needs because of continued turbulence in the U.S. and global economies, resulting in reduced sales of our products and harm to our financial condition and results of operations.

In particular, our historical results of operations have been subject to substantial fluctuations, and we may experience substantial period-to-period fluctuations in future results of operations. Any future downturn in the markets in which we compete, could significantly reduce the demand for our products and therefore may result in a significant reduction in revenue or increase the volatility of the price of our common stock. Our revenue and results of operations may be adversely affected in the future due to changes in demand from customers or cyclical changes in the markets utilizing our products.

In addition, the telecommunications industry has, from time to time, experienced, and may again experience, a pronounced downturn. To respond to a downturn, many service providers may slow their capital expenditures, cancel or delay new developments, reduce their workforces and inventories and take a cautious approach to acquiring new equipment and technologies from original equipment manufacturers, which would have a negative impact on our business. Weakness in the global economy or a future downturn in the telecommunications industry may cause our results of operations to fluctuate from quarter-to-quarter and year-to-year, harm our business, and may increase the volatility of the price of our common stock.

Customer acceptance of our products is dependent on our ability to meet changing requirements, and any decrease in acceptance could adversely affect our revenue.

Customer acceptance of our products is significantly dependent on our ability to offer products that meet the changing requirements of our customers, including telecommunication, military, medical and industrial corporations, as well as government agencies. Any decrease in the level of customer acceptance of our products could harm our business.

Our products must meet exacting specifications, and defects and failures may occur, which may cause customers to return or stop buying our products.

Our customers generally establish demanding specifications for quality, performance and reliability that our products must meet. However, our products are highly complex and may contain defects and failures when they are first introduced or as new versions are released. Our products are also subject to rough environments as they are integrated into our customer products for use by the end customers. If defects and failures occur in our products, we could experience lost revenue, increased costs, including warranty expense and costs associated with customer support, delays in or cancellations or rescheduling of orders or shipments, product returns or discounts, diversion of management resources or damage to our reputation and brand equity, and in some cases consequential damages, any of which would harm our operating results. In addition, delays in our ability to fill product orders as a result of quality control issues may negatively impact our relationship with our customers. We cannot assure you that we will have sufficient resources, including any available insurance, to satisfy any asserted claims.

The markets for many of our products are characterized by changing technology which could cause obsolescence of our products, and we may incur substantial costs in delivering new products.

The markets for many of our products are characterized by changing technology, new product introductions and product enhancements, and evolving industry standards. The introduction or enhancement of products embodying new technology or the emergence of new industry standards could render existing products obsolete, and result in a write down to the value of our inventory, or result in shortened product life cycles. Accordingly, our ability to compete is in part dependent on our ability to continually offer enhanced and improved products.

The success of our new product offerings will depend upon several factors, including our ability to:

- accurately anticipate customer needs;
- innovate and develop new technologies and applications;
- successfully commercialize new technologies in a timely manner;
- price products competitively and manufacture and deliver products in sufficient volumes and on time; and
- differentiate our product offerings from those of our competitors.

Our inability to find new customers or retain existing customers could harm our business.

Our business is reliant on our ability to find new customers and retain existing customers. In particular, customers normally purchase certain of our products and incorporate them into products that they, in turn, sell in their own markets on an ongoing basis. As a result, the historical sales of these products have been dependent upon the success of our customers' products and our future performance is dependent upon our success in finding new customers and receiving new orders from existing customers.

In several markets, the quality and reliability of our products are a major concern for our customers, not only upon the initial manufacture of the product, but for the life of the product. Many of our products are used in remote locations for higher value assembly, making servicing of our products unfeasible. Any failure of the quality or reliability of our products could harm our business.

Customer demand for our products is difficult to accurately forecast and, as a result, we may be unable to optimally match production with customer demand, which could adversely affect our business and financial results.

We make planning and spending decisions, including determining the levels of business that we will seek and accept, production schedules, inventory levels, component procurement commitments, personnel needs and other resource requirements, based on our estimates of customer requirements. The short-term nature of commitments by many of our customers and the possibility of unexpected changes in demand for their products reduce our ability to accurately estimate future customer requirements. On occasion, customers may require rapid increases in production, which can strain our resources, cause our manufacturing to be negatively impacted by materials shortages, necessitate higher or more restrictive procurement commitments, increase our manufacturing yield loss and scrapping of excess materials, and reduce our gross margin. We may not have sufficient capacity at any given time to meet the volume demands of our customers, or one or more of our suppliers may not have sufficient capacity at any given time to meet our volume demands. Conversely, a downturn in the markets in which our customers compete can cause, and in the past have caused, our customers to significantly reduce or delay the amount of products ordered or to cancel existing orders, leading to lower utilization of our facilities. Because many of our costs and operating expenses are relatively fixed, reduction in customer demand due to market downturns or other reasons would have a negative effect on our gross margin, operating income and cash flow.

Rapidly changing standards and regulations could make our products obsolete, which would cause our revenue and results of operations to suffer.

We design products to conform to our customers' requirements and our customers' systems may be subject to regulations established by governments or industry standards bodies worldwide. Because some of our products are designed to conform to current specific industry standards, if competing or new standards emerge that are preferred by our customers, we would have to make significant expenditures to develop new products. If our customers adopt new or competing industry standards with which our products are not compatible, or the industry groups adopt standards or governments issue regulations with which our products are not compatible, our existing products would become less desirable to our customers and our revenue and results of operations would suffer.

The results of our operations could be adversely affected by economic and political conditions and the effects of these conditions on our customers' businesses and levels of business activity.

Global economic and political conditions affect our customers' businesses and the markets they serve. A severe or prolonged economic downturn, including during and following the COVID-19 pandemic, or a negative or uncertain political climate could adversely affect our customers' financial conditions and the timing or levels of business activity of our customers and the industries we serve. This may reduce the demand for our products or depress pricing for our products and have a material adverse effect on our results of operations. Changes in global economic conditions could also shift demand to products or services for which we do not have competitive advantages, and this could negatively affect the amount of business we are able to obtain. For example, inflation rates, particularly in the United States, the United Kingdom and Germany, have increased recently to levels not seen in years, and increased inflation may result in decreased demand for our products, increases in our operating costs (including our labor costs), reduced liquidity and limits on our ability to access credit or otherwise raise capital. In addition, the Federal Reserve has raised, and may again raise, interest rates in response to concerns about inflation, which coupled with reduced government spending and volatility in financial markets may have the effect of further increasing economic uncertainty and heightening these risks. Additionally, financial markets around the world have experienced volatility in connection with the current hostilities between Russia and the Ukraine. In addition, if we are unable to successfully anticipate changing economic and political conditions, we may be unable to effectively plan for and respond to those changes, and our business could be negatively affected as a result.

We have experienced net losses in the past, and because our strategy for expansion may be costly to implement, we may experience losses and may not maintain profitability or positive cash flow.

We have experienced net losses in the past. We expect to continue to incur significant expenses as we pursue our strategic initiatives, including increased expenses for research and development, sales and marketing and manufacturing. We may also grow our business in part through acquisitions of additional companies and complementary technologies which could cause us to incur greater than anticipated transaction expenses, amortization or write-offs of intangible assets and other acquisition-related expenses. As a result, we may incur net losses in the future, and these losses could be substantial. At a certain level, continued net losses could impair our ability to comply with Nasdaq continued listing standards, as described further below.

Our ability to generate additional revenues and remain profitable will depend on our ability to execute our key growth initiative regarding the development, marketing and sale of sensing products, develop and commercialize innovative technologies, expand our contract research capabilities and sell the products that result from those development initiatives. We may not be able to sustain or increase our profitability on a quarterly or annual basis.

We have obtained capital by borrowing money under a term loan and revolving line of credit and we might require additional capital to support and expand our business; our term loan and revolving line of credit have various covenants with which we must comply.

We intend to continue to make investments to support our business growth, including developing new products, enhancing our existing products, obtaining important regulatory approvals, enhancing our operating infrastructure, completing our development activities and building our commercial scale manufacturing facilities. To the extent that we are unable to remain profitable and to finance our activities from continuing operations, we may require additional funds to support these initiatives and to grow our business.

If we are successful in raising additional funds through issuances of equity or convertible debt securities, our existing stockholders could suffer significant dilution, including as the result of the issuance of warrants in connection with the financing, and any new equity securities we issue could have rights, preferences and privileges superior to those of our existing common stock. If we raise additional funds through debt financings, these financings may involve significant cash payment obligations and covenants that restrict our ability to operate our business and make distributions to our stockholders.

We have a term loan and borrowings under a revolving line of credit with PNC Bank, National Association ("PNC"), which require us to comply with a number of affirmative and restrictive covenants including, among others, financial covenants regarding minimum net leverage and fixed charge coverage, affirmative covenants regarding delivery of financial statements, payment of taxes, and maintenance of government compliance, and restrictive covenants regarding dispositions of property, acquisitions, incurrence of additional indebtedness or liens, investments and transactions with affiliates. We are also restricted from paying dividends or making other distributions or payments on our capital stock, subject to limited exceptions. Upon the occurrence of certain events, including our failure to satisfy its payment obligations, failure to adhere to the financial covenants, the breach of certain of our other covenants, cross defaults to other indebtedness or material agreements, judgment defaults and defaults related to failure to maintain governmental approvals, PNC will have the right, among other remedies, to declare all principal and interest immediately due and payable, and to exercise secured party remedies.

If we are unable to obtain adequate financing or financing terms satisfactory to us when we require it, our ability to continue to support our business growth and to respond to business challenges could be significantly limited.

We face and will face substantial competition in several different markets that may adversely affect our results of operations.

We face and will face substantial competition from a variety of companies in several different markets. As we focus on developing marketing and selling fiber optic sensing products, we may also face substantial and entrenched competition in that market.

Many of our competitors have longer operating histories, greater name recognition, larger customer bases and significantly greater financial, sales and marketing, manufacturing, distribution, technical and other resources than we do. These competitors may be able to adapt more quickly to new or emerging technologies and changes in customer requirements. In addition, current and potential competitors have established or may establish financial or strategic relationships among themselves or with existing or potential customers or other third parties. Accordingly, new competitors or alliances among competitors could emerge and rapidly acquire significant market share. We cannot assure you that we will be able to compete successfully against current or new competitors, in which case our revenues may fail to increase or may decline.

Intense competition in our markets could result in aggressive business tactics by our competitors, including aggressively pricing their products or selling older inventory at a discount. If our current or future competitors utilize aggressive business tactics, including those described above, demand for our products could decline, we could experience delays or cancellations of customer orders, or we could be required to reduce our sales prices.

Shifts in product mix may result in declines in gross profit.

Our gross profit margins vary among our product platforms and are generally highest on our test and measurement instruments. Our overall gross profit may fluctuate from period to period as a result of a variety of factors including shifts in product mix, the introduction of new products, and decreases in average selling prices for older products. If our customers decide to buy more of our products with low gross profit margins or fewer of our products with high gross profit margins, our total gross profits could be harmed.

RISKS RELATING TO OUR OPERATIONS AND BUSINESS STRATEGY

If we fail to properly evaluate and execute our strategic initiatives, including the integration of acquired businesses, it could have an adverse effect on our future results and the market price of our common stock.

We evaluate strategic opportunities related to products, technology and business transactions, including acquisitions and divestitures. In the past, we have acquired businesses to support our growth strategy, including the acquisition of Lios in March 2022. If we choose to enter into such transactions in the future, we face certain risks including:

- the failure of the acquired business to meet our performance and financial expectations;
- difficulty integrating an acquired business's operations, personnel and financial and reporting systems into our current business
- potential unknown liabilities associated with the acquisition;
- lost sales and customers as a result of customers deciding not to do business with us;
- complexities associated with managing the larger combined company with distant business locations;
- integrating personnel while maintaining focus on providing consistent, high quality products;
- loss of key employees; and
- performance shortfalls as a result of the division of management's attention caused by completing the acquisition and integrating operations.

If any of these events were to occur, our ability to maintain relationships with the customers, suppliers and employees or our ability to achieve the anticipated benefits of the acquisition could be adversely affected, or could reduce our future earnings or otherwise adversely affect our business and financial results and, as a result, adversely affect the market price of our common stock.

If we cannot successfully transition our revenue mix from contract research revenues to product sales and license revenues, we may not be able to fully execute our business model or grow our business.

Our business model and future growth depend on our ability to transition to a revenue mix that contains significantly larger product sales and revenues from the provision of services or from licensing. Product sales and these revenues potentially offer greater scalability than contract research revenues. Our current plan is to increase our sales of commercial products, our licensing revenues and our provision of non-research services to customers so as to represent a larger percentage of our total revenues. If we are unable to develop and grow our product sales and revenues from the provision of services or from licensing to augment our contract research revenues, however, our ability to execute our business model or grow our business could suffer. There can be no assurance that we will be able to achieve increased revenues in this manner.

Failure to develop, introduce and sell new products or failure to develop and implement new technologies, could adversely impact our financial results.

Our success will depend on our ability to develop and introduce new products that customers choose to buy. The new products the market requires tend to be increasingly complex, incorporating more functions and operating at faster speeds than old products. If we fail to introduce new product designs or technologies in a timely manner or if customers do not successfully introduce new systems or products incorporating our products, our business, financial condition and results of operations could be materially harmed.

If we are unable to manage growth effectively, our revenues and net loss could be adversely affected.

We may need to expand our personnel resources to grow our business effectively. We believe that sustained growth at a higher rate will place a strain on our management as well as on our other human resources. To manage this growth, we must continue to attract and retain qualified management, professional, scientific and technical and operating personnel. If we are unable to recruit a sufficient number of qualified personnel, we may be unable to staff and manage projects adequately, which in turn may slow the rate of growth of our contract research revenues or our product development efforts.

We may not be successful in identifying market needs for new technologies or in developing new products.

Part of our business model depends on our ability to correctly identify market needs for new technologies. We intend to identify new market needs, but we may not always have success in doing so in part because our contract research largely centers on identification and development of unproven technologies, often for new or emerging markets. Furthermore, we must identify the most promising technologies from a sizable pool of projects. If our commercialization strategy process fails to identify projects with commercial potential or if management does not ensure that such projects advance to the commercialization stage, we may not successfully commercialize new products and grow our revenues.

Our growth strategy requires that we also develop successful commercial products to address market needs. We face several challenges in developing successful new products. Many of our existing products and those currently under development are technologically innovative and require significant and lengthy product development efforts. These efforts include planning, designing, developing and testing at the technological, product and manufacturing-process levels. These activities require us to make significant investments. Although there are many potential applications for our technologies, our resource constraints require us to focus on specific products and to forgo other opportunities. We expect that one or more of the potential products we choose to develop will not be technologically feasible or will not achieve commercial acceptance, and we cannot predict which, if any, of our products we will successfully develop or commercialize. The technologies we research and develop are new and steadily changing and advancing. The products that are derived from these technologies may not be applicable or compatible with the state of technology or demands in existing markets. Our existing products and technologies may become uncompetitive or obsolete if our competitors adapt more quickly than we do to new technologies and changes in customers' requirements. Furthermore, we may not be able to identify if and when new markets will open for our products given that future applications of any given product may not be readily determinable, and we cannot reasonably estimate the size of any markets that may develop. If we are not able to successfully develop new products, we may be unable to increase our product revenues.

We face risks associated with our international business.

We currently conduct business internationally and we might considerably expand our international activities in the future. Our international business operations are subject to a variety of risks associated with conducting business internationally, including:

- having to comply with U.S. and other export control and economic trade sanctions regulations and policies that restrict certain operations and work involving non-U.S. employees and sale and supply of our products to foreign customers;
- changes in or interpretations of foreign regulations that may adversely affect our ability to sell our products, perform services or repatriate profits to the United States;
- the imposition of tariffs;
- hyperinflation or economic or political instability in foreign countries;
- imposition of limitations on, or increase of withholding and other taxes on remittances and other payments by foreign subsidiaries or joint ventures;
- conducting business in places where business practices and customs are unfamiliar and unknown;
- the imposition of restrictive trade policies;
- the imposition of inconsistent laws or regulations;
- the imposition or increase of investment and other restrictions or requirements by foreign governments;
- uncertainties relating to foreign laws and legal proceedings;
- potential changes in a specific country's or region's political or economic climate, including the current hostilities between Russia and Ukraine;
- having to comply with anti-corruption and anti-money laundering laws, including the U.S. Foreign Corrupt Practices Act ("FCPA"), the UK Bribery Act 2010, and similar laws and regulations in other jurisdiction; and
- having to comply with licensing requirements.

We do not know the impact that these regulatory, geopolitical and other factors may have on our international business in the future. It is unknown how global supply chains may continue to be affected from the COVID-19 pandemic.

We may dispose of or discontinue existing product lines and technology developments, which may adversely impact our future results.

On an ongoing basis, we evaluate our various product offerings and technology developments in order to determine whether any should be discontinued or, to the extent possible, divested. In addition, if we are unable to generate the amount of cash needed to fund the future operations of our business, we may be forced to sell one or more of our product lines or technology developments.

We cannot guarantee that we have correctly forecasted, or that we will correctly forecast in the future, the right product lines and technology developments to dispose or discontinue or that our decision to dispose of or discontinue various investments, product lines and technology developments is prudent if market conditions change. In addition, there are no assurances that the discontinuance of various product lines will reduce operating expenses or will not cause us to incur material charges associated with such decision. Furthermore, the discontinuance of existing product lines entails various risks, including the risk that we will not be able to find a purchaser for a product line or the purchase price obtained will not be equal to at least the book value of the net assets for the product line. Other risks include managing the expectations of, and maintaining good relations with, our historical customers who previously purchased products from a disposed or discontinued product line, which could prevent us from selling other products to them in the future. We may also incur other significant liabilities and costs associated with disposal or discontinuance of product lines, including employee severance costs and excess facilities costs.

We are experiencing impacts from inflationary pressures, including with respect to labor and materials costs, which could adversely impact our profitability and cash flow.

We are experiencing, and may continue to experience, the general impact of inflationary market pressures on our business, particularly with respect to labor and materials costs. We are experiencing pressures on materials and certain labor costs as a result of the inflationary environment and current general labor shortage, which has resulted in increased competition for skilled labor and wage inflation. It is possible that our labor, fuel and materials costs could continue to increase as we expand our operations and volume of work. We have not been, and may not be able to, fully adjust our contract pricing to compensate for these cost increases, which has affected, and may continue to affect, our profitability and cash flows. Inflationary pressures and related recessionary concerns in light of governmental and central bank efforts to mitigate inflation could also cause uncertainties for our customers and affect the level of their project activity, which could also adversely affect our profitability and cash flows.

Health epidemics, including the COVID-19 pandemic, have had, and could in the future have, an adverse impact on our business, operations, and the markets and communities in which we and our customers and suppliers operate.

The ongoing global COVID-19 pandemic has impacted, and will likely continue to impact, the way we conduct our business, including the way in which we interface with customers, suppliers and our employees. The COVID-19 pandemic has affected how we interact with our customers by reducing face-to-face meetings and increasing our on-line and virtual presence. While increasing our on-line and virtual presence has proven effective, we are unsure of the impact if these conditions continue for an extended period. During 2021 and 2022, we experienced an increased level of disruption in our supply chain and from certain customers all of which have resulted in delayed revenue. While we believe these disruptions are temporary, there is no guarantee we will be able to manage through these disruptions. If the demand for our products, or our access to critical components were to be interrupted, it could have a material adverse impact on our results of operations.

In response to the COVID-19 pandemic, many state, local, and foreign governments have put in place, and others in the future may put in place, quarantines, executive orders, shelter-in-place orders, and similar government orders and restrictions in order to control the spread of the disease. Such orders or restrictions, or the perception that such orders or restrictions could occur, have resulted in business closures, work stoppages, slowdowns and delays, work-from-home policies, travel restrictions, and cancellation or postponement of events, among other effects that could negatively impact productivity and disrupt our operations and those of our customers and suppliers. We have implemented alternate work arrangements, including staggered schedules and shifts, distancing within our offices and working from home for most of our employees, and we may take further actions that alter our operations as may be required by federal, state, or local authorities, or which we determine are in our best interests. While most of our operations can be performed under these alternate work arrangements, there is no guarantee that we will be as effective while working under them because our team is dispersed, many employees may have additional personal needs to attend to (such as looking after children as a result of school closures or family who become sick), and employees may become sick themselves and be unable to work. Decreased effectiveness of our team could adversely affect our results due to our inability to meet in person with potential customers, longer time periods for supply, longer time periods for manufacturing and other decreases in productivity that could seriously harm our business.

In addition, while the potential impact and duration of the COVID-19 pandemic on the global economy and our business in particular may be difficult to assess or predict, the pandemic has resulted in, and may continue to result in, significant disruption of global financial markets, reducing our ability to access capital, which could negatively affect our liquidity in the future.

The global impact of COVID-19 continues to rapidly evolve, and we will continue to monitor the situation closely. The ultimate impact of the COVID-19 pandemic or a similar health epidemic is highly uncertain and subject to change. We do not yet know the full extent of potential delays or impacts on our business, operations, or the global economy as a whole. While the spread of COVID-19 may eventually be contained or mitigated, there is no guarantee that a future outbreak of this or any other widespread epidemics will not occur, or that the global economy will recover, either of which could seriously harm our business.

RISKS RELATING TO OUR REGULATORY ENVIRONMENT

Our operations are subject to domestic and foreign laws, regulations and restrictions, and noncompliance with these laws, regulations and restrictions could expose us to fines, penalties, suspension or debarment, which could have a material adverse effect on our profitability and overall financial position.

Our operations, particularly our international sales, subject us to numerous U.S. and foreign laws and regulations, including, without limitation, regulations relating to imports, exports (including the Export Administration Regulations and the International Traffic in Arms Regulations), technology transfer restrictions, anti-boycott provisions, economic sanctions and anti-corruption.

Our products and solutions are subject to export control and import laws and regulations, including the U.S. Export Administration Regulations, the U.S. International Traffic in Arms Regulations (ITAR), U.S. Customs regulations, and the economic and trade sanctions regulations administered by the U.S. Treasury Department’s Office of Foreign Assets Controls.

Exports of our products, services, and technology must be made in compliance with these laws and regulations, and in some cases, certain registration, licensing, authorization, or reporting requirements may need to be performed. In addition, these laws may restrict or prohibit altogether the sale or supply of certain of our products, services, and technologies to certain governments, persons, entities, countries, and territories, including those that are the target of comprehensive sanctions, unless there are license exceptions that apply or specific licenses are obtained. Any future changes in export control, import, or economic sanctions laws and regulations may adversely impact our ability to sell our products, services, and technologies in certain markets or, in some cases, prevent the export or import of our products, services, and technologies to or from certain countries, governments, or persons altogether, which could adversely affect our business, results of operations, and growth prospects.

Our products, services, and technologies may have in the past been provided, and could in the future be provided, in violation of export control, import, or sanctions laws and regulations, despite the precautions we take. As a result, we have submitted, and from time to time may continue to submit as warranted, voluntary self-disclosures regarding compliance with U.S. export control and sanctions laws and regulations to relevant governmental authorities. Any failure to comply with applicable export control and sanctions laws may materially affect us through reputational harm, as well as other negative consequences, including government investigations, substantial civil or criminal penalties, and possible loss of export or import privileges.

We are also subject to the FCPA, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act, the United Kingdom Bribery Act 2010, the Proceeds of Crime Act 2002, and possibly other state and national anti-bribery and anti-money laundering laws in countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, third-party intermediaries, and other associated persons from authorizing, promising, offering, providing, soliciting, or accepting directly or indirectly, improper payments or benefits to or from any person whether in the public or private sector. These laws also require us to make and keep books and records that accurately and fairly reflect our transactions and to devise and maintain an adequate system of internal accounting controls. We can be held liable for the corrupt or other illegal activities of our employees, representatives, contractors, business partners, and agents, even if we do not explicitly authorize or have actual knowledge of such activities.

Failure by us or our sales representatives or consultants to comply with the above laws and regulations could result in administrative, civil, or criminal liabilities and could result in suspension of our export privileges, which could have a material adverse effect on our business. Changes in regulation or political environment may affect our ability to conduct business in foreign markets including investment, procurement and repatriation of earnings.

Environmental regulations could increase operating costs and additional capital expenditures and delay or interrupt operations.

The photonics industry, as well as the semiconductor industry, are subject to governmental regulations for the protection of the environment, including those relating to air and water quality, solid and hazardous waste handling, and the promotion of occupational safety. Various federal, state and local laws and regulations require that we maintain certain environmental permits. While we believe that we have obtained all necessary environmental permits required to conduct our manufacturing processes, if we are found to be in violation of these laws, we could be subject to governmental fines and liability for damages resulting from such violations.

Changes in the aforementioned laws and regulations or the enactment of new laws, regulations or policies could require increases in operating costs and additional capital expenditures and could possibly entail delays or interruptions of our operations.

If our manufacturing facilities do not meet Federal, state or foreign country manufacturing standards, we may be required to temporarily cease all or part of our manufacturing operations, which would result in product delivery delays and negatively impact revenues.

Our manufacturing facilities are subject to periodic inspection by regulatory authorities and our operations will continue to be regulated by the FDA for compliance with Good Manufacturing Practice requirements contained in the quality systems regulations. We are also required to comply with International Organization for Standardization ("ISO"), quality system standards in order to produce certain of our products for sale in Europe. If we fail to continue to comply with Good Manufacturing Practice requirements or ISO standards, we may be required to cease all or part of our operations until we comply with these regulations. Obtaining and maintaining such compliance is difficult and costly. We cannot be certain that our facilities will be found to comply with Good Manufacturing Practice requirements or ISO standards in future inspections and audits by regulatory authorities. In addition, if we cannot maintain or establish manufacturing facilities or operations that comply with such standards or do not meet the expectations of our customers, we may not be able to realize certain economic opportunities in our current or future supply arrangements.

We are subject to additional significant foreign and domestic government regulations, including environmental and health and safety regulations, and failure to comply with these regulations could harm our business.

Our facilities and current and proposed activities involve the use of a broad range of materials that are considered hazardous under applicable laws and regulations. Accordingly, we are subject to a number of foreign, federal, state and local laws and regulations relating to health and safety, protection of the environment and the storage, use, disposal of, and exposure to, hazardous materials and wastes. We could incur costs, fines and civil and criminal penalties, personal injury and third-party property damage claims, or could be required to incur substantial investigation or remediation costs, if we were to violate or become liable under environmental, health and safety laws. Moreover, a failure to comply with environmental laws could result in fines and the revocation of environmental permits, which could prevent us from conducting our business. Liability under environmental laws can be joint and several and without regard to fault. There can be no assurance that violations of environmental and health and safety laws will not occur in the future as a result of the inability to obtain permits, human error, equipment failure or other causes. Environmental laws could become more stringent over time, imposing greater compliance costs and increasing risks and penalties associated with violations, which could harm our business. Accordingly, violations of present and future environmental laws could restrict our ability to expand facilities, pursue certain technologies, and could require us to acquire costly equipment or incur potentially significant costs to comply with environmental regulations.

Compliance with foreign, federal, state and local environmental laws and regulations represents a small part of our present budget. If we fail to comply with any such laws or regulations, however, a government entity may levy a fine on us or require us to take costly measures to ensure compliance. Any such fine or expenditure may adversely affect our development. We cannot predict the extent to which future legislation and regulation could cause us to incur additional operating expenses, capital expenditures or restrictions and delays in the development of our products and properties.

We are or may become subject to stringent and evolving U.S. and foreign laws, regulations, rules, contractual obligations, policies and other obligations related to data privacy and security. Our actual or perceived failure to comply with such obligations could lead to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; and other adverse business consequences.

In the ordinary course of business we collect, receive, store, process, generate, use, transfer, disclose, make accessible, protect, secure, dispose of, transmit, and share (collectively, processing) personal data and other sensitive information, including proprietary and confidential business data, intellectual property, sensitive third-party data, business plans, and transactions (collectively, sensitive data) in connection with our business customers and our employees.

Our data processing activities may subject us to numerous data privacy and security obligations, such as various laws, regulations, guidance, industry standards, external and internal privacy and security policies, contractual requirements, and other obligations relating to data privacy and security.

In the United States, federal, state, and local governments have enacted numerous data privacy and security laws, including data breach notification laws, personal data privacy laws, consumer protection laws (e.g., Section 5 of the Federal Trade Commission Act), and other similar laws (e.g., wiretapping laws).

For example, the California Consumer Privacy Act, or the CCPA, requires businesses to provide specific disclosures in privacy notices and honor requests of California residents to exercise certain privacy rights. The CCPA provides for civil penalties of up to $7,500 per violation, as well as a private right of action for individuals affected by certain data breaches to recover significant statutory damages. Additionally, the California Privacy Rights Act, or CPRA, which became effective on January 1, 2023, expands the CCPA's requirements, including applying to personal information of business representatives and employees and creating a new regulatory agency that will be vested with authority to implement and enforce the CCPA and the CPRA.

Other states, such as Virginia and Colorado, have also passed comprehensive privacy laws, and similar laws are being considered in several other states, as well as at the federal and local levels. These developments may further complicate compliance efforts, and may increase legal risk and compliance costs for us and the third parties upon whom we rely. Outside the United States, an increasing number of laws, regulations, and industry standards may govern data privacy and security. For example, under the European Union's General Data Protection Regulation, or EU GDPR, and the United Kingdom's so-called 'UK GDPR' companies may face temporary or definitive bans on data processing and other corrective actions; fines of up to 20 million Euros under the EU GDPR / 17.5 million pounds sterling under the UK GDPR or 4% of annual global revenue, whichever is greater; or private litigation related to processing of personal data brought by classes of data subjects or consumer protection organizations authorized at law to represent their interests.

In addition, we may be unable to transfer personal data from Europe and other jurisdictions to the United States or other countries due to data localization requirements or limitations on cross-border data flows. Europe and other jurisdictions have enacted laws requiring data to be localized or limiting the transfer of personal data to other countries. In particular, the

European Economic Area, or EEA, and the United Kingdom, or UK, have significantly restricted the transfer of personal data to the United States and other countries whose privacy laws it believes are inadequate. Other jurisdictions may adopt similarly stringent interpretations of their data localization and cross-border data transfer laws. Although there are currently various mechanisms that may be used to transfer personal data from the EEA and UK to the United States in compliance with law, such as the EEA and UK's standard contractual clauses, these mechanisms are subject to legal challenges, and there is no assurance that we can satisfy or rely on these measures to lawfully transfer personal data to the United States. If there is no lawful manner for us to transfer personal data from the EEA, the UK, or other jurisdictions to the United States, or if the requirements for a legally-compliant transfer are too onerous, we could face significant adverse consequences, including the interruption or degradation of our operations, the need to relocate part of or all of our business or data processing activities to other jurisdictions at significant expense, increased exposure to regulatory actions, substantial fines and penalties, the inability to transfer data and work with partners, vendors and other third parties, and injunctions against our processing or transferring of personal data necessary to operate our business. Some European regulators have ordered certain companies to suspend or permanently cease certain transfers of personal data to recipients outside Europe for allegedly violating the EU GDPR's cross-border data transfer limitations. Additionally, companies that transfer personal data to recipients outside of the EEA and/or UK to other jurisdictions, particularly to the United States, are subject to increased scrutiny from regulators individual litigants and activist groups.

In addition to data privacy and security laws, we may be contractually subject to industry standards adopted by industry groups and may become subject to such obligations in the future. We may also be bound by other contractual obligations related to data privacy and security, and our efforts to comply with such obligations may not be successful.

We may publish privacy policies, marketing materials, and other statements, such as compliance with certain certifications or self-regulatory principles, regarding data privacy and security. If these policies, materials or statements are found to be deficient, lacking in transparency, deceptive, unfair, or misrepresentative of our practices, we may be subject to investigation, enforcement actions by regulators, or other adverse consequences.

Obligations related to data privacy and security are quickly changing, becoming increasingly stringent, and creating regulatory uncertainty. Additionally, these obligations may be subject to differing applications and interpretations, which may be inconsistent or conflict among jurisdictions. Preparing for and complying with these obligations may require us to; modify our data processing practices and policies; put in place additional mechanisms ensuring compliance with the new data protection rules; divert resources from other initiatives and projects; and restrict the way products and services involving data are offered, all of which could significantly harm our business, financial condition, results of operations and prospects.

Further, compliance with these and any other applicable privacy and data security laws and regulations is a rigorous and time-intensive process. Moreover, despite our efforts, our personnel or third parties on whom we rely may fail to comply with any such laws or regulations, which could adversely affect our business, financial condition and results of operations. If we or the third parties on which we rely fail, or are perceived to have failed, to address or comply with applicable data privacy and security obligations, we could face significant consequences, including but not limited to: government enforcement actions (e.g., investigations, fines, penalties, audits, inspections, and similar); litigation (including class-action claims); additional reporting requirements and/or oversight; bans on processing personal data; and orders to destroy or not use personal data. Any of these events could have a material adverse effect on our reputation, business, or financial condition, including but not limited to: loss of customers; inability to process personal data or to operate in certain jurisdictions; limited ability to develop or commercialize our products; expenditure of time and resources to defend any claim or inquiry; adverse publicity; or substantial changes to our business model or operations.

RISKS RELATING TO OUR INTELLECTUAL PROPERTY

Our proprietary rights may not adequately protect our technologies.

Our commercial success will depend in part on our obtaining and maintaining patent, trade secret, copyright and trademark protection of our technologies in the United States and other jurisdictions as well as successfully enforcing this intellectual property and defending it against third-party challenges. We will only be able to protect our technologies from unauthorized use by third parties to the extent that valid and enforceable intellectual property protections, such as patents or trade secrets, cover them. In particular, we place considerable emphasis on obtaining patent and trade secret protection for significant new technologies, products and processes. The degree of future protection of our proprietary rights is uncertain because legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep our competitive advantage. The degree of future protection of our proprietary rights is also uncertain for products that are currently in the early stages of development because we cannot predict which of these products will ultimately reach the commercial market or whether the commercial versions of these products will incorporate proprietary technologies.

Our patent position is highly uncertain and involves complex legal and factual questions. Accordingly, we cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. For example:

- we or our licensors might not have been the first to make the inventions covered by each of our pending patent applications and issued patents;
- we or our licensors might not have been the first to file patent applications for these inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies;
- it is possible that none of our pending patent applications or the pending patent applications of our licensors will result in issued patents;
- patents may issue to third parties that cover how we might practice our technology;
- our issued patents and issued patents of our licensors may not provide a basis for commercially viable technologies, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties; and
- we may not develop additional proprietary technologies that are patentable.

Patents may not be issued for any pending or future pending patent applications owned by or licensed to us, and claims allowed under any issued patent or future issued patent owned or licensed by us may not be valid or sufficiently broad to protect our technologies. Moreover, protection of certain of our intellectual property may be unavailable or limited in the United States or in foreign countries, and we have not sought to obtain foreign patent protection for certain of our products or technologies due to cost, concerns about enforceability or other reasons. Any issued patents owned by or licensed to us now or in the future may be challenged, invalidated, or circumvented, and the rights under such patents may not provide us with competitive advantages. In addition, competitors may design around our technology or develop competing technologies. Intellectual property rights may also be unavailable or limited in some foreign countries, and in the case of certain products no foreign patents were filed or can be filed. This could make it easier for competitors to capture or increase their market share with respect to related technologies. We could incur substantial costs to bring suits in which we may assert our patent rights against others or defend ourselves in suits brought against us. An unfavorable outcome of any litigation could have a material adverse effect on our business and results of operations.

We also rely on trade secrets to protect our technology, especially where we believe patent protection is not appropriate or obtainable. However, trade secrets are difficult to protect. We regularly attempt to obtain confidentiality agreements and contractual provisions with our collaborators, employees and consultants to protect our trade secrets and proprietary know-how. These agreements may be breached or may not have adequate remedies for such breach. While we use reasonable efforts to protect our trade secrets, our employees, consultants, contractors or scientific and other advisors, or those of our strategic partners, may unintentionally or willfully disclose our information to competitors. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, our enforcement efforts would be expensive and time consuming, and the outcome would be unpredictable. In addition, courts outside the United States are sometimes unwilling to protect trade secrets. Moreover, if our competitors independently develop equivalent knowledge, methods and know-how, it will be more difficult for us to enforce our rights and our business could be harmed.

If we are not able to defend the patent or trade secret protection position of our technologies, then we will not be able to exclude competitors from developing or marketing competing technologies and we may not generate enough revenues from product sales to justify the cost of developing our technologies and to achieve or maintain profitability.

We also rely on trademarks to establish a market identity for our company and our products. To maintain the value of our trademarks, we might have to file lawsuits against third parties to prevent them from using trademarks confusingly similar to or dilutive of our registered or unregistered trademarks. Also, we might not obtain registrations for our pending trademark applications, and we might have to defend our registered trademark and pending trademark applications from challenge by third parties. Enforcing or defending our registered and unregistered trademarks might result in significant litigation costs and damages, including the inability to continue using certain trademarks.

Third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result.

Various U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in our technology areas. Such third parties may claim that we infringe their patents. Because patent applications can take several years to result in a patent issuance, there may be currently pending applications, unknown to us, which may later result in issued patents that our technologies may infringe. For example, we are aware of competitors with patents in technology areas applicable to our optical test equipment products. Such competitors may allege that we infringe these patents. There could also be existing patents of which we are not aware that our technologies may inadvertently infringe. We have from time to time been, and may in the future be, contacted by third parties, including patent assertion entities or intellectual property advisors, about licensing opportunities that also contain claims that we are infringing on third party patent rights. If third parties assert these claims against us, we could incur extremely substantial costs and diversion of management resources in defending these claims, and the defense of these claims could have a material adverse effect on our business, financial condition and results of operations. Even if we believe we have not infringed on a third party's patent rights, we may have to settle a claim on unfavorable terms because we cannot afford to litigate the claim. In addition, if third parties assert claims against us and we are unsuccessful in defending against these claims, these third parties may be awarded substantial damages as well as injunctive or other equitable relief against us, which could effectively block our ability to make, use, sell, distribute or market our products and services in the United States or abroad.

In the event that a claim relating to intellectual property is asserted against us, or third parties not affiliated with us hold pending or issued patents that relate to our products or technology, we may seek licenses to such intellectual property or challenge those patents. However, we may be unable to obtain these licenses on commercially reasonable terms, if at all, and our challenge of the patents may be unsuccessful. Our failure to obtain the necessary licenses or other rights could prevent the sale, manufacture or distribution of our products and, therefore, could have a material adverse effect on our business, financial condition and results of operations.

A substantial portion of our technology is subject to retained rights of our licensors, and we may not be able to prevent the loss of those rights or the grant of similar rights to third parties.

A substantial portion of our technology is licensed from academic institutions, corporations and government agencies. Under these licensing arrangements, a licensor may obtain rights over the technology, including the right to require us to grant a license to one or more third parties selected by the licensor or that we provide licensed technology or material to third parties for non-commercial research. The grant of a license for any of our core technologies to a third party could have a material and adverse effect on our business. In addition, some of our licensors retain certain rights under the licenses, including the right to grant additional licenses to a substantial portion of our core technology to third parties for non-commercial academic and research use. It is difficult to monitor and enforce such non-commercial academic and research uses, and we cannot predict whether the third-party licensees would comply with the use restrictions of such licenses. We have incurred and could incur substantial expenses to enforce our rights against them. We also may not fully control the ability to assert or defend those patents or other intellectual property which we have licensed from other entities, or which we have licensed to other entities.

In addition, some of our licenses with academic institutions give us the right to use certain technology previously developed by researchers at these institutions. In certain cases, we also have the right to practice improvements on the licensed technology to the extent they are encompassed by the licensed patents and are within our field of use. Our licensors may currently own and may in the future obtain additional patents and patent applications that are necessary for the development, manufacture and commercial sale of our anticipated products. We may be unable to agree with one or more academic institutions from which we have obtained licenses whether certain intellectual property developed by researchers at these academic institutions is covered by our existing licenses. In the event that the new intellectual property is not covered by our existing licenses, we would be required to negotiate a new license agreement. We may not be able to reach agreement with current or future licensors on commercially reasonable terms, if at all, or the terms may not permit us to sell our products at a profit after payment of royalties, which could harm our business.

Some of our patents may cover inventions that were conceived or first reduced to practice under, or in connection with, U.S. government contracts or other federal funding agreements. With respect to inventions conceived or first reduced to practice under such agreement, the U.S. government may retain a non-exclusive, non-transferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the invention throughout the world. We may not succeed in our efforts to retain title in patents, maintain ownership of intellectual property or in limiting the U.S. government's rights in our proprietary technologies and intellectual property when an issue exists as to whether such intellectual property was developed in the performance of such agreement or developed at private expense.

If we fail to obtain the right to use the intellectual property rights of others which are necessary to operate our business, and to protect their intellectual property, our business and results of operations will be adversely affected.

In the past, we have licensed certain technologies for use in our products. In the future, we may choose, or be required, to license technology or intellectual property from third parties in connection with the development of our products. We cannot assure you that third-party licenses will be available on commercially reasonable terms, if at all. Our competitors may be able to obtain licenses, or cross-license their technology, on better terms than we can, which could put us at a competitive disadvantage. Also, we often enter into confidentiality agreements with such third parties in which we agree to protect and maintain their proprietary and confidential information, including at times requiring our employees to enter into agreements protecting such information. There can be no assurance that the confidentiality agreements will not be breached by any of our employees or that such third parties will not make claims that their proprietary information has been disclosed.

RISKS RELATING TO OUR COMMON STOCK

Our common stock price has been volatile and we expect that the price of our common stock will fluctuate substantially in the future, which could cause you to lose all or a substantial part of your investment.

The public trading price for our common stock is volatile and may fluctuate significantly. Since January 1, 2009, our common stock has traded between a high of $12.85 per share and a low of $0.26 per share. Among the factors, many of which we cannot control, that could cause material fluctuations in the market price for our common stock are:

- sales of our common stock by our significant stockholders, or the perception that such sales may occur;
- changes in earnings estimates, investors' perceptions, recommendations by securities analysts or our failure to achieve analysts' earnings estimates;
- quarterly variations in our or our competitors' results of operations;
- challenges integrating our recent or future acquisitions, including the inability to realize any expected synergies;
- general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors;
- announcements by us, or by our competitors, of acquisitions, new products, significant contracts, commercial relationships or capital commitments;
- pending or threatened litigation;
- any major change in our board of directors or management or any competing proxy solicitations for director nominees;
- changes in governmental regulations or in the status of our regulatory approvals;
- announcements related to patents issued to us or our competitors;
- a lack of, limited or negative industry or securities analyst coverage;
- health epidemics, including the COVID-19 pandemic;
- political, economic and social instability, including, for example, the military incursion of Russia into Ukraine, terrorist activities and any disruption these events may cause to the broader global industrial economy;
- discussions of our company or our stock price by the financial and scientific press and online investor communities; and
- general developments in our industry.

In addition, the stock prices of many technology companies have experienced wide fluctuations that have often been unrelated to the operating performance of those companies. These factors may materially and adversely affect the market price of our common stock.

If our estimates relating to our critical accounting policies are based on assumptions or judgments that change or prove to be incorrect, our operating results could fall below expectations of financial analysts and investors, resulting in a decline in our stock price.

The preparation of financial statements in conformity with U.S. GAAP requires our management to make estimates, assumptions and judgments that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. Our operating results may be adversely affected if our assumptions change or if actual circumstances differ from those in our assumptions, which could cause our operating results to fall below the expectations of financial analysts and investors, resulting in a decline in our stock price. Significant assumptions and estimates used in preparing our consolidated financial statements include those related to revenue recognition, stock-based compensation and income taxes. Moreover, the revenue recognition guidance, ASC Topic 606, Revenue from Contracts with Customers, requires more judgment than did the prior guidance.

Anti-takeover provisions in our amended and restated certificate of incorporation and bylaws and Delaware law could discourage or prevent a change in control, even if an acquisition would be beneficial to our stockholders, which could affect our stock price adversely and prevent attempts by our stockholders to replace or remove our current management.

Our amended and restated certificate of incorporation and bylaws and Delaware law contain provisions that might delay or prevent a change in control, discourage bids at a premium over the market price of our common stock and adversely affect the market price of our common stock and the voting and other rights of the holders of our common stock. These provisions include:

- a classified board of directors serving staggered terms;
- advance notice requirements to stockholders for matters to be brought at stockholder meetings;

- a supermajority stockholder vote requirement for amending certain provisions of our amended and restated certificate of incorporation and bylaws; and
- the right to issue preferred stock without stockholder approval, which could be used to dilute the stock ownership of a potential hostile acquirer.

We are also subject to provisions of the Delaware General Corporation law that, in general, prohibit any business combination with a beneficial owner of 15% or more of our common stock for three years unless the holder's acquisition of our stock was approved in advance by our board of directors or certain other conditions are satisfied.

The existence of these provisions could adversely affect the voting power of holders of common stock and limit the price that investors might be willing to pay in the future for shares of our common stock.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware and the U.S. federal district courts will be the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware is the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law:

- any derivative claim or cause of action brought on our behalf;
- any claim or cause of action asserting a breach of fiduciary duty;
- any claim or cause of action against us arising under DGCL;
- any claim or cause of action arising under or seeking to interpret our amended and restated certificate of incorporation or our amended and restated bylaws; and
- any claim or cause of action against us that is governed by the internal affairs doctrine.

The provisions would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our amended and restated bylaws further provide that, unless we consent to the selection of an alternate forum, the U.S. federal district courts will be the exclusive forum for resolving any complaint asserting a cause or causes of action arising under the Securities Act.

While the Delaware courts have determined that such choice of forum provisions are facially valid, a stockholder may nevertheless seek to bring a claim in a venue other than those designated in the exclusive forum provisions. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our amended and restated bylaws. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

These exclusive forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage lawsuits against us and our directors, officers and other employees. If a court were to find either exclusive-forum provision in our amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur further significant additional costs associated with resolving the dispute in other jurisdictions, all of which could seriously harm our business.

GENERAL RISK FACTORS

If our information technology systems or data, or those of third parties upon which we rely, are or were compromised, we could experience adverse consequences resulting from such compromise.

In the ordinary course of our business, we and the third parties upon which we rely, face a variety of evolving cybersecurity related threats, including but not limited to phishing, malware, or ransomware attacks, which could cause security incidents. Cyber-attacks, malicious internet-based activity, online and offline fraud, and other similar activities threaten the confidentiality, integrity, and availability of our sensitive data and information technology systems, and those of the third parties upon which we rely. Such threats are prevalent and continue to rise, are increasingly difficult to detect, and come from a variety of sources, including traditional computer "hackers," threat actors, "hacktivists," organized criminal threat actors, personnel (such as through theft or misuse), sophisticated nation states, and nation-state-supported actors. Any of these or similar threats could cause a security incident or other interruption that could result in unauthorized, unlawful, or accidental acquisition, modification, destruction, loss, alteration, encryption, disclosure of, or access to our sensitive data or our information technology systems, or those of the third parties upon whom we rely. A security incident or other interruption could disrupt our ability (and that of third parties upon whom we rely) to provide our services.

As the numerous and evolving cybersecurity threats continue to become increasingly more complex and sophisticated, it becomes necessary for us to become cyber incident resilient. We have experienced security incidents in the past, and may do so in the future, resulting in the unauthorized, unlawful, or inappropriate access to sensitive and/or confidential data. For example, in January 2023, we detected a cyber incident impacting certain of our technology systems. Promptly upon our detection of the incident, we launched an investigation, notified federal law enforcement and engaged the services of incident response professionals (including a nationally recognized third-party forensic investigator) and specialized cybersecurity legal counsel. Where necessary, we disclosed the incident to customers in accordance with our contractual requirements regarding cyber incident disclosure. While we were able to manage this incident without any significant disruption to our operations, there is no guarantee that we will have similar success with other attacks in the future should one occur.

In addition, our reliance on third-party service providers could introduce new cybersecurity risks and vulnerabilities, including supply-chain attacks, and other threats to our business operations. We rely on third-party service providers and technologies to operate critical business systems to process sensitive data in a variety of contexts, including, without limitation, cloud-based infrastructure, data center facilities, encryption and authentication technology, employee email, content delivery to customers, and other functions. We also rely on third-party service providers to provide other products, services, parts, or otherwise to operate our business. Our ability to monitor these third parties' information security practices is limited, and these third parties may not have adequate information security measures in place. If our third-party service providers experience a security incident or other interruption, we could experience adverse consequences.

If we (or a third party upon whom we rely) experience a security incident or are perceived to have experienced a security incident, we may experience adverse consequences such as government enforcement actions (for example, investigations, fines, penalties, audits, and inspections); additional reporting requirements and/or oversight; restrictions on processing sensitive data (including personal data); litigation (including class claims); indemnification obligations; negative publicity; reputational harm; monetary fund diversions; interruptions in our operations (including availability of data); financial loss; and other similar harms. Security incidents and attendant consequences may cause customers to stop using our services, deter new customers from using our services, and negatively impact our ability to grow and operate our business.

While we have implemented security measures designed to protect against security incidents and take steps to become increasingly cyber incident resilient, there can be no assurance that these measures will be effective against an ever-evolving cyber threat landscape. We take steps designed to detect and mitigate vulnerabilities, but we may not be able to detect and remediate all vulnerabilities because the threats and techniques used to exploit the vulnerability change frequently and are often sophisticated in nature. Therefore, such vulnerabilities could be exploited but may not be detected until after a security incident has occurred. Further, we may experience delays in developing and deploying remedial measures designed to address any such identified vulnerabilities. These vulnerabilities pose material risks to our business. While we maintain cyber insurance coverage to mitigate against the costs associated with a cyber incident, we cannot be certain that our cyber insurance coverage will be adequate or sufficient to protect us from or to mitigate liabilities arising out of our privacy and security practices, that such coverage will continue to be available on commercially reasonable terms or at all, or that such coverage will pay future claims.

If there are substantial sales of our common stock, or the perception that such sales may occur, our stock price could decline.

If any of our stockholders were to sell substantial amounts of our common stock, the market price of our common stock may decline, which might make it more difficult for us to sell equity or equity-related securities in the future at a time and price that we deem appropriate. Substantial sales of our common stock, or the perception that such sales may occur, may have a material adverse effect on the prevailing market price of our common stock.

We may become involved in securities class action litigation that could divert management's attention and harm our business and our insurance coverage may not be sufficient to cover all costs and damages.

The stock market has from time to time experienced significant price and volume fluctuations that have affected the market prices for the common stock of technology companies. These broad market fluctuations may cause the market price of our common stock to decline. In the past, following periods of volatility in the market price of a particular company's securities, securities class action litigation has often been brought against that company. Securities class litigation also often follows certain significant business transactions, such as the sale of a business division or a change in control transaction. We may become involved in this type of litigation in the future. Litigation often is expensive and diverts management's attention and resources, which could adversely affect our business.

We are obligated to develop and maintain proper and effective internal controls over financial reporting and any failure to maintain the adequacy of these internal controls may adversely affect investor confidence in our company and, as a result, the value of our common stock.

We are required, pursuant to Section 404 of the Sarbanes-Oxley Act to furnish a report by management on, among other things, the effectiveness of our internal control over financial reporting on an annual basis. This assessment includes disclosure of any material weaknesses identified by our management in our internal control over financial reporting.

During the evaluation and testing process of our internal controls, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. While we have established certain procedures and controls over our financial reporting processes, we cannot assure you that these efforts will prevent restatements of our financial statements in the future. We may not be able to remediate any future material weaknesses, or to complete our evaluation, testing and any required remediation in a timely fashion.

Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition or results of operations. If we are unable to conclude that our internal control over financial reporting is effective, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to sanctions or investigations by the Nasdaq Stock Market, the SEC or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

Uncertainties in the interpretation and application of existing, new and proposed tax laws and regulations could materially affect our tax obligations and effective tax rate.

The tax regimes to which we are subject or under which we operate are unsettled and may be subject to significant change. The issuance of additional guidance related to existing or future tax laws, or changes to tax laws or regulations proposed or implemented by the current or a future U.S. presidential administration, Congress, or taxing authorities in other jurisdictions, including jurisdictions outside of the United States, could materially affect our tax obligations and effective tax rate. To the extent that such changes have a negative impact on us, our suppliers, manufacturers, or our customers, including as a result of related uncertainty, these changes may adversely impact our business, financial condition, results of operations, and cash flows. For example, beginning in 2022, the Tax Cuts and Jobs Act of 2017 eliminated the option to deduct research and development expenditures immediately in the year incurred and requires taxpayers to amortize such expenditures over five years for tax purposes. While the most significant impact of this provision is to cash tax liability for 2022, the tax year in which the provision took effect, the impact will decline annually over the five-year amortization period to an immaterial amount in year six.

The amount of taxes we pay in different jurisdictions depends on the application of the tax laws of various jurisdictions, including the United States, to our international business activities, tax rates, new or revised tax laws, or interpretations of tax laws and policies, and our ability to operate our business in a manner consistent with our corporate structure and intercompany arrangements. The taxing authorities of the jurisdictions in which we operate may challenge our methodologies for pricing intercompany transactions pursuant to our intercompany arrangements or disagree with our determinations as to the income and expenses attributable to specific jurisdictions. If such a challenge or disagreement were to occur, and our position was not sustained, we could be required to pay additional taxes, interest, and penalties, which could result in one-time tax charges, higher effective tax rates, reduced cash flows, and lower overall profitability of our operations. Our financial statements could fail to reflect adequate reserves to cover such a contingency. Similarly, a taxing authority could assert that we are subject to tax in a jurisdiction where we believe we have not established a taxable connection, often referred to as a “permanent establishment” under international tax treaties, and such an assertion, if successful, could increase our expected tax liability in one or more jurisdictions.

Our ability to use our net operating loss carryforwards may be limited.

We have incurred net operating losses during our history. Subject to the limitations described below, unused net operating losses generally may carry forward to offset future taxable income if we achieve profitability in the future, unless such net operating losses expire under applicable tax laws. Under current law, unused U.S. federal net operating losses generated in tax years beginning after December 31, 2017, will not expire and may be carried forward indefinitely, but the deductibility of such federal net operating loss carryforwards is limited to 80% of taxable income. It is uncertain if and to what extent various states will conform to current federal tax law. In addition, our ability to utilize our federal net operating carryforwards may be limited under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code. The limitations apply if we experience an “ownership change,” which is generally defined as a greater than 50 percentage point change (by value) in the ownership of our equity by certain stockholders or groups of stockholders over a rolling three-year period. Similar provisions of state tax law may also apply to limit the use of our state net operating loss carryforwards. Past or future changes in our stock ownership, including as a result of our initial public offering, some of which may be outside of our control, may have triggered or may trigger an ownership change that materially impacts our ability to utilize pre-change net operating loss carryforwards. Moreover, there may be periods during which the use of net operating loss carryforwards in various jurisdictions is suspended or otherwise subject to additional limitations. Accordingly, our ability to use our net operating loss carryforwards to offset taxable income may be subject to such limitations or special rules that apply at the state level, which could adversely affect our results of operations.

ITEM 2. ***UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS***

(a) Unregistered Sales of Equity Securities during the Three Months Ended June 30, 2023

Not applicable.

(b) Use of Proceeds from Sale of Registered Equity Securities

Not applicable.

(c) Purchases of Equity Securities by the Registrant

Not applicable.

ITEM 3. ***DEFAULTS UPON SENIOR SECURITIES***

None.

ITEM 4. ***MINE SAFETY DISCLOSURES***

Not applicable.

ITEM 5. ***OTHER INFORMATION***

Not applicable.

ITEM 6. *EXHIBITS*

Exhibit Number	Description
4.1	2023 Equity Incentive Plan (incorporated by reference to Exhibit 4.5 to the Registrant's Registration Statement on Form S-8 (File No. 3 272181) filed on May 24, 2023).
4.2	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement under 2023 Equity Incentive Plan (incorporat by reference to Exhibit 4.6 to the Registrant's Current Report on Form 8-K (File No. 333-272181) filed on May 24, 2023).
31.1*	Certification of the Principal Executive Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of the Principal Financial Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Ox Act of 2002.
32.2**	Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Ox Act of 2002.
101	The following materials from the Registrant's Quarterly Report on Form 10-Q for the three months ended June 30, 2023, formatted in inline XBRL (eXtensible Business Reporting Language): (i) Consolidated Balance Sheets at June 30, 2023 and December 31, 2022, (ii Consolidated Statements of Operations for the three and six months ended June 30, 2023 and 2022, (iii) Consolidated Statements of Comprehensive Income/(Loss) for the three and six months ended June 30, 2023 and 2022, (iv) Consolidated Statements of Cash Flow for the six months ended June 30, 2023 and 2022 and (v) Notes to Unaudited Consolidated Financial Statements.
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

* Filed herewith.

** These certifications are being furnished solely to accompany this quarterly report pursuant to 18 U.S.C. Section 1350 and are not being filed for purposes of Section 18 of the Securities Exchange Act of 1934 and are not to be incorporated by reference into any filing of the registrant, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

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.

			Luna Innovations Incorporated
Date:	August 10, 2023	By:	/s/ Eugene J. Nestro
			Eugene J. Nestro
			Chief Financial Officer **(Principal Financial and Accounting Officer)**

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Scott A. Graeff, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Luna Innovations Incorporated;

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 10, 2023

/s/ Scott A. Graeff

Scott A. Graeff
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Eugene J. Nestro, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Luna Innovations Incorporated;

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 10, 2023

/s/ Eugene J. Nestro

Eugene J. Nestro
Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the quarterly report of Luna Innovations Incorporated (the “Company”) on Form 10-Q for the quarter ended June 30, 2023 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Scott A. Graeff, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my 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.

This certification accompanies this Report to which it relates, shall not be deemed “filed” with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

/s/ Scott A. Graeff

Scott A. Graeff
President and Chief Executive Officer
(Principal Executive Officer)

August 10, 2023

Exhibit 32.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the quarterly report of Luna Innovations Incorporated (the “Company”) on Form 10-Q for the quarter ended June 30, 2023 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Eugene J. Nestro, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my 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.

This certification accompanies this Report to which it relates, shall not be deemed “filed” with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

/s/ Eugene J. Nestro

Eugene J. Nestro
Chief Financial Officer
(Principal Financial and Accounting Officer)

August 10, 2023