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

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

Commission File Number: 001-37824

IMPINJ, INC.
(Exact name of registrant as specified in its charter)

Delaware	**91-2041398**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
400 Fairview Avenue North, Suite 1200, Seattle, Washington	**98109**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (206) 517-5300

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

Title of each class	Trading symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.001 per share	PI	The Nasdaq Global Select Market

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 ☑

As of July 14, 2023, 26,859,563 shares of common stock were outstanding.

IMPINJ, INC.
QUARTERLY REPORT ON FORM 10-Q

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Risk Factor Summary

Our business is subject to numerous risks and uncertainties, including those highlighted in the section of this report captioned "Risk Factors." These risks include, but are not limited to, the following:

- we operate in a very competitive market;
- RAIN RFID ("RAIN") adoption is concentrated in key industries and the extent and pace of RAIN market adoption beyond those industries is uncertain;
- our abilities to deliver platform solutions at scale are nascent;
- poor product quality could result in significant costs to us and impair our ability to sell our products;
- end users and partners must design our products into their products and business processes;
- an inability or limited ability of end user systems to exploit RAIN information may adversely affect the market for our products;
- alternative technologies may enable products and services that compete with ours;
- we obtain the products we sell through a limited number of third parties with whom we do not have long-term supply contracts;
- shortages of silicon wafers and components used in our readers and gateways may adversely affect our ability to meet demand for our products and adversely affect our revenue and/or gross margins;
- we rely on a small number of customers for a large share of our revenue;
- our ability to affect or determine end-user demand is limited in part because we sell and fulfill primarily through partners and rarely to end users;
- our growth strategy depends in part on the success of strategic relationships with third parties and their continued performance and alignment;
- if we are unable to protect our intellectual property, then our business could be adversely affected;
- we may become party to intellectual property disputes which could be time consuming, costly to prosecute, defend or settle, result in the loss of significant rights, and adversely affect RAIN adoption or adoption of our products or platform;
- we have a history of losses and have only achieved profitability intermittently and we cannot be certain that we will attain or sustain profitability in the future;
- we have a history of significant fluctuations in our quarterly and annual operating results;
- our executive officers, directors and principal stockholders, together with their affiliates, beneficially owned approximately 51.1% of our outstanding common stock as of June 30, 2023, and as a result are able to exercise significant influence over matters subject to stockholder approval; and
- we may not have sufficient cash flow or access to cash necessary to satisfy our obligations under the $287.5 million aggregate principal amount 1.125% convertible senior notes due 2027, or the 2021 Notes, and our current and future indebtedness may restrict our business.

PART I — FINANCIAL INFORMATION

Item 1. Financial Statements (unaudited)

IMPINJ, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except par value, unaudited)

	June 30, 2023	December 31, 2022
Assets:		
Current assets:		
Cash and cash equivalents	$ 45,244	$ 19,597
Short-term investments	63,656	154,148
Accounts receivable, net	58,945	49,996
Inventory	112,323	46,397
Prepaid expenses and other current assets	3,455	5,032
Total current assets	283,623	275,170
Long-term investments	5,995	19,200
Property and equipment, net	45,077	39,027
Intangible assets, net	16,587	—
Operating lease right-of-use assets	11,004	10,490
Other non-current assets	1,744	1,969
Goodwill	19,516	3,881
Total assets	$ 383,546	$ 349,737
Liabilities and stockholders' equity:		
Current liabilities:		
Accounts payable	$ 27,627	$ 25,024
Accrued compensation and employee related benefits	7,746	9,048
Accrued and other current liabilities	9,681	2,925
Current portion of operating lease liabilities	3,301	3,122
Current portion of deferred revenue	2,523	2,250
Total current liabilities	50,878	42,369
Long-term debt	281,046	280,244
Operating lease liabilities, net of current portion	11,071	11,066
Deferred tax liabilities, net	3,415	118
Deferred revenue, net of current portion	341	349
Total liabilities	346,751	334,146
Commitments and contingencies (Note 6)		
Stockholders' equity:		
Preferred stock, $0.001 par value — 5,000 shares authorized, no shares issued and outstanding at June 30, 2023 and December 31, 2022	—	—
Common stock, $0.001 par value — 495,000 shares authorized, 26,819 and 26,098 shares issued and outstanding at June 30, 2023 and December 31, 2022, respectively	27	26
Additional paid-in capital	436,302	403,599
Accumulated other comprehensive loss	(325)	(1,249)
Accumulated deficit	(399,209)	(386,785)
Total stockholders' equity	36,795	15,591
Total liabilities and stockholders' equity	$ 383,546	$ 349,737

See accompanying notes to condensed consolidated financial statements.

IMPINJ, INC.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(in thousands, except per share data, unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Revenue	$ 85,986	$ 59,796	$ 171,883	$ 112,940
Cost of revenue	42,172	28,294	84,539	52,659
Gross profit	43,814	31,502	87,344	60,281
Operating expenses:				
Research and development	23,403	18,369	45,838	36,358
Sales and marketing	10,632	9,614	20,605	18,913
General and administrative	16,002	11,995	31,566	22,801
Amortization of intangibles	2,146	—	2,146	—
Total operating expenses	52,183	39,978	100,155	78,072
Loss from operations	(8,369)	(8,476)	(12,811)	(17,791)
Other income, net	1,165	429	2,530	593
Induced conversion expense	—	(2,232)	—	(2,232)
Interest expense	(1,211)	(1,250)	(2,420)	(2,511)
Loss before income taxes	(8,415)	(11,529)	(12,701)	(21,941)
Income tax benefit (expense)	349	6	277	(43)
Net loss	$ (8,066)	$ (11,523)	$ (12,424)	$ (21,984)
Net loss per share — basic and diluted	$ (0.30)	$ (0.45)	$ (0.47)	$ (0.87)
Weighted-average shares outstanding — basic and diluted	26,713	25,429	26,499	25,204

See accompanying notes to condensed consolidated financial statements.

IMPINJ, INC.
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(in thousands, unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Net loss	$ (8,066)	$ (11,523)	$ (12,424)	$ (21,984)
Other comprehensive gain (loss), net of tax:				
Unrealized gain (loss) on investments	193	(510)	837	(1,187)
Foreign currency translation adjustments	87	—	87	—
Total other comprehensive gain (loss)	280	(510)	924	(1,187)
Comprehensive loss	$ (7,786)	$ (12,033)	$ (11,500)	$ (23,171)

See accompanying notes to condensed consolidated financial statements.

IMPINJ, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands, unaudited)

	Six Months Ended June 30,	
	2023	2022
Operating activities:		
Net loss	$ (12,424)	$ (21,984)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation and amortization	6,066	2,973
Stock-based compensation	23,372	22,173
Accretion of discount or amortization of premium on investments	(1,285)	419
Amortization of debt issuance costs	802	806
Induced conversion expense related to convertible notes	—	2,232
Deferred tax expense	(399)	—
Changes in operating assets and liabilities, net of amounts acquired:		
Accounts receivable	(7,755)	(4,679)
Inventory	(64,733)	(10,089)
Prepaid expenses and other assets	2,277	1,463
Accounts payable	6,113	(2,201)
Accrued compensation and employee related benefits	(1,879)	(437)
Accrued and other liabilities	2,043	(106)
Operating lease right-of-use assets	1,331	1,623
Operating lease liabilities	(1,661)	(2,034)
Deferred revenue	(972)	2,202
Net cash used in operating activities	(49,104)	(7,639)
Investing activities:		
Purchases of investments	—	(115,697)
Proceeds from sales of investments	13,372	—
Proceeds from maturities of investments	92,424	46,805
Purchases of intangible assets	(250)	—
Purchases of property and equipment	(13,198)	(3,724)
Business acquisitions, net of cash acquired	(23,357)	—
Net cash provided by (used in) investing activities	68,991	(72,616)
Financing activities:		
Proceeds from exercise of stock options and employee stock purchase plan	5,753	6,496
Payment of 2019 Notes	—	(17,564)
Net cash provided by (used in) financing activities	5,753	(11,068)
Effect of exchange rate changes on cash and cash equivalents	7	—
Net increase (decrease) in cash and cash equivalents	25,647	(91,323)
Cash and cash equivalents		
Beginning of period	19,597	123,903
End of period	$ 45,244	$ 32,580
Supplemental disclosure of cashflow information:		
Cash paid for interest	$ 1,617	$ 1,803
Purchases of property and equipment not yet paid	1,973	891
Operating lease liabilities arising from obtaining ROU assets	979	—
Lease liabilities arising from remeasurement of ROU assets	159	—
26,396 shares of common stock issued for Voyantic Oy acquisition	3,579	—
Acquisition-related contingent consideration liability	4,602	—

See accompanying notes to condensed consolidated financial statements.

IMPINJ, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY
(in thousands, unaudited)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (loss)	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2022	26,098	26	403,599	(386,785)	(1,249)	$ 15,591
Issuance of common stock	483	1	4,519	—	—	4,520
Stock-based compensation	—	—	10,224	—	—	10,224
Net loss	—	—	—	(4,358)	—	(4,358)
Other comprehensive loss	—	—	—	—	644	644
Balance at March 31, 2023	26,581	$ 27	$ 418,342	$ (391,143)	$ (605)	$ 26,621
Issuance of common stock	211		1,233			1,233
Stock-based compensation			13,148			13,148
Net loss				(8,066)		(8,066)
Common stock issued for Voyantic acquisition (Note 4)	27		3,579			3,579
Other comprehensive loss					280	280
Balance at June 30, 2023	26,819	$ 27	$ 436,302	$ (399,209)	$ (325)	$ 36,795

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (loss)	Total Stockholders' Equity (Deficit)
	Shares	Amount				
Balance at December 31, 2021	24,737	$ 25	$ 351,422	$ (362,484)	$ (39)	$ (11,076)
Issuance of common stock	483	—	4,611	—	—	4,611
Stock-based compensation	—	—	11,314	—	—	11,314
Net loss	—	—	—	(10,461)	—	(10,461)
Other comprehensive loss	—	—	—	—	(677)	(677)
Balance at March 31, 2022	25,220	$ 25	$ 367,347	$ (372,945)	$ (716)	$ (6,289)
Issuance of common stock	327	1	1,884	—	—	1,885
Stock-based compensation	—	—	10,859	—	—	10,859
Net loss	—	—	—	(11,523)	—	(11,523)
Other comprehensive loss	—	—	—	—	(510)	(510)
Induced conversion on 2019 Notes	—	—	(5,681)	—	—	(5,681)
Balance at June 30, 2022	25,547	26	374,409	(384,468)	(1,226)	(11,259)

See accompanying notes to condensed consolidated financial statements.

IMPINJ, INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(unaudited)

Note 1. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying condensed consolidated financial statements include Impinj, Inc. and its wholly owned subsidiaries. We have eliminated intercompany balances and transactions in consolidation. We have prepared these condensed consolidated financial statements in conformity with U.S. generally accepted accounting principles, or GAAP, and applicable rules and regulations of the Securities and Exchange Commission, or SEC, regarding interim financial reporting. Certain information and note disclosures normally included in the financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations. Accordingly, these interim condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and accompanying notes as of and for the year ended December 31, 2022 included in Impinj, Inc.'s Annual Report on Form 10-K, which was filed with the SEC on February 13, 2023. We have reclassified certain amounts on our consolidated statement of cash flows in the prior period to conform to current period presentation.

The unaudited condensed consolidated interim financial statements, in the opinion of management, reflect all adjustments, comprising normal recurring adjustments, necessary to state fairly our financial position, results of operations and our cash flows for the periods presented. Interim results are not necessarily indicative of the results for a full year or for any other future period.

Business combinations and intangible assets including goodwill — We account for business combinations using the acquisition method which involves allocating the purchase price paid to assets acquired and liabilities assumed at their acquisition-date fair values. While we use our best estimates and assumptions to accurately estimate the fair value of assets acquired, liabilities assumed and contingent consideration, our estimates are inherently uncertain. On April 3, 2023, we completed the acquisition of Voyantic Oy and applied judgement in estimating the fair value of the intangible assets from the acquisition. These estimates involved using assumptions related to revenue growth rates, discount rates, underlying product or technology life cycles, and expenses necessary to support the acquired technology and estimated sales cycle for customer relationships.

The acquisition-date fair value of total consideration includes cash, shares and contingent consideration. Because we are contractually obligated to pay contingent consideration upon Voyantic achieving certain specified objectives, we record a contingent consideration liability at the acquisition date. We review assumptions related to the fair value of the contingent consideration liability each reporting period and revalue the contingent consideration liability based on the revised assumptions, until the contingency is satisfied. We recognize the change in fair value of the contingent consideration liability in "General and administrative" expense on the consolidated statements of comprehensive income for the period in which the fair value changes.

We calculate goodwill as the excess of the acquisition-date fair value of total consideration over the acquisition-date fair value of net assets, including the amount assigned to identifiable intangible assets. We perform an impairment assessment at least once annually, or more frequently if indicators of potential impairment exist, which includes evaluating qualitative and quantitative factors to assess the likelihood of an impairment of a reporting unit's goodwill.

We amortize identifiable intangible assets with finite lives over their useful lives on a straight-line basis. We expense acquisition-related costs, including advisory, legal, accounting, valuation, and other similar costs, in the periods in which the costs are incurred. We include the results of operations of acquired businesses in the consolidated financial statements from the acquisition date.

Foreign currencies — We translate the assets and liabilities of our non-U.S. dollar functional currency subsidiary into U.S. dollars using exchange rates in effect at the end of each period. Revenue and expenses for this subsidiary are translated using rates that approximate those in effect during the period. We recognize gains and losses from these translations as a component of accumulated other comprehensive income (loss) in stockholders' equity. Our subsidiaries that use the U.S. dollar as their functional currency re-measure monetary assets and liabilities at exchange rates in effect at the end of each period, and non-monetary assets and liabilities at historical rates. We have included the gains or losses from foreign currency remeasurement in earnings.

Use of Estimates

Preparing financial statements in conformity with GAAP requires management to make certain estimates, judgments and assumptions that affect the reported amounts of assets and liabilities and related disclosures as of the date of the financial statements, as well as the reported revenue and expenses during the periods presented. On an ongoing basis, we evaluate our estimates, including those related to revenue recognition, sales incentives, percentage completion of development contracts, inventory excess and obsolescence, income taxes and fair value of stock awards. To the extent there are material differences between our estimates, judgments, or assumptions and actual results, our financial statements will be affected.

Recently Adopted Accounting Standards

In October 2021, the FASB issued ASU 2021-08, Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers. Under ASU 2021-08, an acquirer must recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with Topic 606. The guidance is effective for interim and annual periods beginning after December 15, 2022, with early adoption permitted. The impact of adoption of this standard on our consolidated financial statements, including accounting policies and processes, was not material.

Recently Issued Accounting Standards Not Yet Adopted

Recent accounting pronouncements issued by the FASB (including its Emerging Issues Task Force), the American Institute of Certified Public Accountants, and the SEC did not have, or are not expected to have, a material impact on our present or future consolidated financial statements.

Note 2. Fair Value Measurements

Accounting standards define fair value as the price that would be received to sell an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market in an orderly transaction between market participants on the measurement date. The standards also establish a fair value hierarchy, which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. There are three levels of inputs that may be used to measure fair value:

- Level 1 — Quoted prices in active markets for identical assets or liabilities.
- Level 2 — Assets and liabilities valued based on observable market data for similar instruments, such as quoted prices for similar assets or liabilities.
- Level 3 — Unobservable inputs that are supported by little or no market activity; instruments valued based on the best available data, some of which is internally developed, and considers risk premiums that a market participant would require.

We applied the following methods and assumptions in estimating our fair value measurements:

Cash Equivalents — Cash equivalents comprise highly liquid investments, including money market funds with original maturities of less than three months at the acquisition date. We record the fair value measurement of these assets based on quoted market prices in active markets.

Investments — Our investments comprise fixed income securities, which include U.S. government agency securities, corporate notes and bonds, commercial paper, treasury bills and asset-backed securities. The fair value measurement of these assets is based on observable market-based inputs or inputs that are derived principally from or corroborated by observable market data by correlation or other means.

Long-term Debt — See Note 7 for the carrying amount and estimated fair value of the Notes.

Contingent Consideration — The contingent consideration liability is related to the acquisition of Voyantic Oy (see "Note 4: Goodwill and Intangible Assets"), and the related payments are expected to occur in 2024. As of June 30, 2023, we could be required to pay up to 10 million euros or $10.9 million contingent upon revenue and gross margin performance over a one-year period from the acquisition date. We recorded the contingent consideration at its fair value using unobservable inputs and used the Monte Carlo simulation option pricing framework, incorporating contractual terms and assumptions regarding financial forecasts, discount rates, and volatility of forecasted revenue and gross margins. A decrease in estimated revenues and gross margins or an increase in the discount rate would decrease the fair value of the contingent consideration liability. The estimated revenues and gross margins are not interrelated inputs. The development and determination of the unobservable inputs for Level 3 fair value measurements and fair value calculations is management's responsibility with the assistance of a third-party valuation specialist. As of June 30, 2023, we recorded approximately $4.6 million in "Accrued expenses and other current liabilities" on the consolidated balance sheet.

The following table presents the balances of assets and liabilities measured at fair value on a recurring basis, by level within the fair value hierarchy, as of the dates presented (in thousands):

	June 30, 2023				December 31, 2022		
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Total
Cash equivalents:							
Money market funds	$ 30,062	$ —	$ —	$ 30,062	$ 14,620	$ —	$ 14,620
Total cash equivalents	30,062	—	—	30,062	14,620	—	14,620
Short-term investments:							
U.S. government agency securities	—	40,433	—	40,433	—	78,621	78,621
Corporate notes and bonds	—	3,998	—	3,998	—	26,953	26,953
Commercial paper	—	8,218	—	8,218	—	24,073	24,073
Treasury bill	—	—	—	—	—	11,359	11,359
Yankee bonds	—	1,980	—	1,980	—	1,939	1,939
Agency bonds	—	5,908	—	5,908	—	2,882	2,882
Asset-backed securities	—	3,119	—	3,119	—	8,321	8,321
Total short-term investments	—	63,656	—	63,656	—	154,148	154,148
Long-term investments:							
U.S. government agency securities	—	3,411	—	3,411	—	13,462	13,462
Yankee bonds	—	1,900	—	1,900	—	1,869	1,869
Agency bonds	—	—	—	—	—	2,983	2,983
Asset-backed securities	—	684	—	684	—	886	886
Total long-term investments	—	5,995	—	5,995	—	19,200	19,200
Total assets at fair value	30,062	69,651	—	99,713	14,620	173,348	187,968
Acquisition-related contingent consideration liability	—	—	4,602	4,602	—	—	—
Total liabilities at fair value	—	—	4,602	4,602	—	—	—

A reconciliation of Level 3 items measured at fair value on a recurring basis is as follows (in thousands):

	June 30, 2023
Contingent consideration liability:	
Balance at beginning of period	$ —
Initial estimate upon acquisition	4,602
Remeasurement of fair value of contingent consideration liability	—
Total	$ 4,602

We did not have any Level 3 assets nor did we measure any liabilities at fair value as of December 31, 2022. There were no transfers into or out of Level 3 of the fair value hierarchy as of June 30, 2023 or as of December 31, 2022. We expect short-term investments to mature within 1 year of the reporting date. We expect long-term investments to mature between 1 and 2 years from the reporting date. See Note 7 for the carrying amount and estimated fair value of our convertible senior notes due 2027.

Investments

The following tables present the cost or amortized cost, gross unrealized gains, gross unrealized losses and total estimated fair value of our financial assets as of the dates presented (in thousands):

	June 30, 2023			
	Cost or Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Total Estimated Fair Value
Description:				
Money market funds	$ 30,062	$ —	$ —	$ 30,062
U.S. government agency securities	44,187	—	(343)	43,844
Corporate notes and bonds	3,998	—	—	3,998
Yankee bonds	3,898	—	(18)	3,880
Commercial paper	8,218	—	—	8,218
Treasury bill	—	—	—	—
Agency bond	5,936	—	(28)	5,908
Asset-backed securities	3,826	—	(23)	3,803
Total	$ 100,125	$ —	$ (412)	$ 99,713

	December 31, 2022			
	Cost or Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Total Estimated Fair Value
Description:				
Money market funds	$ 14,620	$ —	$ —	$ 14,620
U.S. government agency securities	93,065	—	(982)	92,083
Corporate notes and bonds	27,133	6	(186)	26,953
Yankee bonds	3,815	—	(7)	3,808
Commercial paper	24,073	—	—	24,073
Treasury bill	11,361	2	(4)	11,359
Agency bond	5,863	4	(2)	5,865
Asset-backed securities	9,287	2	(82)	9,207
Total	$ 189,217	$ 14	$ (1,263)	$ 187,968

Marketable securities in a continuous loss position for less than 12 months had an estimated fair value of $40.4 million and $125.6 million and unrealized losses of $0.3 million and $1.2 million as of June 30, 2023 and December 31, 2022, respectively. Marketable securities in a continuous loss position for greater than 12 months had an estimated fair value of $19.3 million and $13.9 million and unrealized losses of $0.2 million and $0.1 million as of June 30, 2023 and December 31, 2022, respectively.

Unrealized losses from our fixed-income securities are primarily attributable to changes in interest rates and not to lower credit ratings of the issuers. In determining whether an unrealized loss is other-than-temporary, for the periods presented, we determined we do not have plans to sell the securities nor is it more likely than not that we would be required to sell the securities before their anticipated recovery. We used the specific identification method to determine cost of securities sold.

Note 3. Inventory

The following table presents the detail of inventories as of the dates presented (in thousands):

	June 30, 2023	December 31, 2022
Raw materials	$ 25,630	$ 14,678
Work-in-process	45,369	14,525
Finished goods	41,324	17,194
Total inventory	$ 112,323	$ 46,397

Note 4. Goodwill and Intangible Assets

On April 3, 2023, we acquired all of the outstanding equity of Voyantic Oy, for an aggregate purchase price of $32.7 million. The acquisition of Voyantic Oy adds label design, manufacturing and test systems, within our systems product offering, which advance the quality, reliability, and readability of partner inlays. The consideration comprised (i) $3.6 million in shares of our common stock valued using the market price on the date of the acquisition, (ii) $4.6 million in deferred payments included within accrued and other current liabilities, that is contingent upon revenue and gross margin performance over a one-year period from the acquisition date, and (iii) the remainder in cash paid at closing.

We recorded the assets acquired and liabilities assumed at their estimated fair values as of the acquisition date. We recorded the excess of the purchase price over the assets acquired and liabilities assumed as goodwill. As part of the preliminary purchase price allocation, the fair value of net assets acquired, goodwill, intangible assets and deferred tax liability were $2.4 million, $15.6 million $18.4 million, and $3.7 million respectively. The goodwill amount represents synergies expected to be realized from this business combination and assembled workforce. The goodwill was allocated to our one reporting unit and reportable segment. The acquired goodwill and intangible assets were not deductible for tax purposes.

The transaction-related costs for the acquisition were $630,000 and are included in general and administrative expenses in the consolidated statements of operations for the three and six months ended June 30, 2023.

This acquisition did not have a material impact on our reported revenue or net loss amounts for any period presented; therefore, we have not presented historical and pro forma disclosures.

Goodwill represents the excess of the purchase price over the fair value of the net assets acquired in business combinations accounted for under the purchase method of accounting. The following table presents goodwill as of June 30, 2023 (in thousands):

	June 30, 2023
Balance at beginning of period	$ 3,881
Additions from acquisition	15,590
Foreign currency translation adjustment	45
Total	$ 19,516

As of June 30, 2023, intangible assets comprised of the following (in thousands):

	Estimated Useful Life in Years	Gross Carrying Amount	Accumulated Amortization	Net
Definite-lived intangible assets:				
Backlog	0.25	764	(764)	—
Customer Relationships	1	3,656	(914)	2,742
Developed Technology	7.25	12,876	(443)	12,433
Patent	3	250	—	250
Tradename	8	1,200	(38)	1,162
Total definite-lived intangible assets [(1)]		18,746	(2,159)	16,587

(1) Foreign intangible asset carrying amounts are affected by foreign currency translation

We amortize identifiable intangible assets with finite lives over their useful lives on a straight-line basis. The weighted average life of our intangible assets is approximately six years. Amortization of intangible assets was $2.1 million for the three and six months ended June 30, 2023, respectively.

As of June 30, 2023, the estimated intangible asset amortization expense for the next five years and thereafter is as follows:

		Estimated Amortization (in thousands)
Remainder of 2023	$	2,833
2024		2,923
2025		2,009
2026		1,968
2027		1,926
Thereafter		4,928
Total	$	16,587

Note 5. Stock-Based Awards

Restricted Stock Units

We grant restricted stock units, or RSUs, with a service condition, and RSUs with market and service conditions, or MSUs. Historically we granted RSUs with performance and service conditions, or PSUs, as part of our annual bonus plan to our senior executives and other bonus-eligible employees, however, in fiscal year 2023, our bonus plan is solely cash-based

The following table summarizes activity for RSUs, PSUs and MSUs for the six months ended June 30, 2023 (in thousands):

	Number of Underlying Shares		
	RSUs	MSUs	PSUs
Outstanding at December 31, 2022	1,310	110	74
Granted	396	126	—
Vested	(388)	(58)	(57)
Forfeited	(21)	—	(17)
Outstanding at June 30, 2023	1,297	178	—

Stock-Based Compensation Expense

The following table presents the detail of stock-based compensation expense amounts included in our condensed consolidated statements of operations for the periods presented (in thousands):

	Three Months Ended June 30,				Six Months Ended June 30,			
	2023		2022		2023		2022	
Cost of revenue	$	472	$	299	$	889	$	898
Research and development expense		5,879		4,336		10,448		9,111
Sales and marketing expense		2,790		2,642		4,929		5,394
General and administrative expense		4,007		3,582		7,106		6,770
Total stock-based compensation expense	$	13,148	$	10,859	$	23,372	$	22,173

Note 6. Commitments and Contingencies

For information on our commitments and contingencies, see Part II, Item 8 (Financial Statements and Supplementary Data, Note 11. Commitments and Contingencies) of our Annual Report on Form 10-K for the year ended December 31, 2022. There have been no material changes to our commitments and contingencies, outside of the ordinary course of our business, as previously disclosed in our Annual Report on Form 10-K for the year ended December 31, 2022, except for "Obligations with Third-Parties" and "Litigation" as discussed below.

Obligations with Third Parties

We manufacture products with third-party manufacturers. We are committed to purchase $43.7 million of inventory as of June 30, 2023.

Litigation

From time to time, we are subject to various legal proceedings or claims that arise in the ordinary course of business. We accrue a liability when management believes that it is both probable that we have incurred a liability and we can reasonably estimate the amount of loss. As of June 30, 2023 and December 31, 2022, we did not have accrued contingency liabilities. The following is a description of our significant legal proceedings. Although we believe that resolving these claims, individually or in aggregate, will not have a material adverse impact on our financial statements, these matters are subject to inherent uncertainties.

Patent Infringement Claims and Counterclaims

Impinj Patent Infringement Claims Against NXP in California

On June 6, 2019, we filed a patent infringement lawsuit against NXP USA, Inc., a Delaware corporation and subsidiary of NXP Semiconductors N.V., or NXP, in the U.S. District Court for the Northern District of California, or the Court. Our original complaint alleged that certain NXP endpoint ICs infringe 26 of our U.S. patents. At the order of the Court, we filed an amended complaint limited to eight of the original 26 patents. We subsequently elected to go forward with asserting infringement of six of those eight patents. We are seeking, among other things, past damages, including lost profits; no less than a reasonable royalty; enhanced damages for willful infringement; and reasonable attorneys' fees and costs. We are also seeking an injunction against NXP making, selling, using, offering for sale or importing UCODE 8 and UCODE 9 ICs. NXP responded to our complaint on September 30, 2019 citing numerous defenses including denying infringement and claiming our asserted patents are invalid.

After various post-trial motions, the Court narrowed the case to two patents—U.S. patent nos. 9,633,302 (the "'302 patent") and 8,115,597 (the "'597 patent"). Before trial, the Court granted summary judgment of infringement on the '302 patent. The Court conducted a trial on those two patents beginning on July 5, 2023, and concluding on July 13, 2023. The issues on the '302 patent were validity, damages and willful infringement. The issues on the '597 patent were infringement, validity, damages and willful infringement.

On July 14, 2023, the jury returned a verdict in our favor finding that: (1) that some, but not all, of the asserted claims of the '302 patent were proven to be obvious, and hence invalid; (2) that NXP's infringement of the asserted claims of the '302 patent that were not proven to be invalid was willful; (3) none of the asserted claims of the '597 patent were proven to be invalid; and (4) NXP infringed the asserted claims of the '597 patent. The jury awarded approximately $18.2 million and $18.4 million in damages for infringement of the '302 patent and the '597 patent, respectively. The majority of these damages were for lost profits and are therefore overlapping. The Court will approve any final award after deciding post-trial motions. If the Court upholds damages for both patents as determined by the jury, total damages will be approximately $18.9 million. We recognize contingent gains in our financial statements upon resolution of all contingencies related to the award.

NXP Patent Infringement Claims Against Impinj in Washington

On October 4, 2019, NXP USA, Inc. and NXP filed a patent infringement lawsuit against us in the U.S. District Court for the District of Delaware. The complaint alleged that certain of our products infringe eight U.S. patents owned by NXP or NXP USA, Inc. The plaintiffs sought, among other things, past damages adequate to compensate them for our alleged infringement of each of the patents-in-suit and reasonable attorneys' fees and costs. They also sought an injunction against us. We denied we are infringing any of the patents and we have asserted both that our wafer supplier is licensed under four of them and that all eight are invalid. On September 23, 2020, the District of Delaware granted Impinj's motion to transfer the case to the U.S. District Court for the Western District of Washington in Seattle.

On December 11, 2020, we moved to stay the case with respect to six of the eight patents in suit pending final resolution of IPR petitions we filed with the PTAB. On February 12, 2021, the Court granted our motion to stay the case as to these six patents. The PTAB instituted IPRs on two of the six challenged patents but denied them on the other four. The Court subsequently removed the stay on the four against which IPRs were not instituted. The Court ultimately narrowed the case to seven patents.

Following the close of fact discovery, the parties each moved for summary judgment on various issues. The Court ultimately granted summary judgment of noninfringement to us on six of the seven patents, and the final patent went to a jury trial beginning on June 5, 2023. The jury found that we did not infringe the patent and a final judgment was entered in our favor. We moved for attorneys' fees on July 12, 2023 and that motion is pending.

Impinj Patent Infringement Claims Against NXP in Texas

On May 25, 2021, we filed a new patent infringement lawsuit against NXP USA in the United States District Court for the Western District of Texas (Waco), asserting that NXP has infringed nine of our patents, including seven that we originally asserted in the Northern California case. We also later added NXP Semiconductor Netherlands B.V. as a defendant.

We are seeking among other things, past damages, including lost profits; no less than a reasonable royalty; enhanced damages for willful infringement; and reasonable attorney's fees and costs. We are also seeking an injunction against NXP making, selling, using, offering for sale or importing its UCODE 7, 8 and 9 endpoint ICs.

On July 26, 2021, NXP filed an answer to our complaint and counterclaimed that we infringe nine patents, one of which NXP owns and eight of which NXP recently licensed from a third party. NXP has denied infringement, asserted our patents are invalid and asserted that some are unenforceable and/or subject to a license under our commitments to license "necessary" patents to certain standards.

A claim construction hearing was held on February 10, 2022 and fact discovery has closed. The Patent Office has instituted reexamination proceedings on five of the nine patents asserted by NXP and has issued a final office action rejecting all asserted claims on three of those patents. The Court has ordered that a first trial will involve three patents asserted by each side and is scheduled to begin on October 30, 2023. The parties have selected those patents and various summary judgment motions have been filed relating to many of the asserted patents. There is no hearing date yet for those motions.

NXP Patent Infringement Claims Against Impinj in China

On December 7, 2020, Impinj Radio Frequency Technology (Shanghai) Co., Ltd., or Impinj Shanghai, was served with patent infringement lawsuits filed in the Intellectual Property Court in Shanghai, China, or Shanghai Intellectual Property Court, in which NXP B.V. asserted that certain of our products infringe three Chinese patents owned by NXP B.V., that closely correspond to three of the eight U.S. patents NXP asserted in the U.S. District Court described above. The plaintiffs are seeking, among other things, past damages and reasonable attorneys' fees and costs. They are also seeking an injunction against us, enjoining continuing acts of infringement of the patents-in-suit. Impinj Shanghai objected to the jurisdiction of the Shanghai Intellectual Property Court and filed a motion to stay the proceedings. The jurisdictional challenge was rejected by the Shanghai court in March 2021; a subsequent appeal filed by Impinj Shanghai was denied before the IP Tribunal of the Supreme People's Court in third-quarter 2021. Impinj, Inc. was formally served in July 2021, officially adding Impinj, Inc. to the suit.

On December 22, 2022, Impinj Shanghai filed invalidity requests against all three Chinese patents before the China National Intellectual Property Administration, or CNIPA. In July 2021, the CNIPA issued decisions upholding the validity of all three Chinese patents. In October 2021, Impinj Shanghai filed for judicial review of all the CNIPA decisions by the Beijing Intellectual Property Court, which has docketed its review for all three patents. In December 2022, the Beijing Intellectual Property Court issued the first-instance administrative judgment, upholding the invalidity decision for one of the three Chinese patents. On January 11, 2023, Impinj Shanghai filed a subsequent appeal to the IP Tribunal of the Supreme People's Court, which is pending. For the remaining two Chinese patent cases, the Beijing Intellectual Property Court held a hearing on July 14th, 2023, and the decisions are still pending.

In May 2022, the Shanghai court held a hearing for all three patents, but the panel did not address the merits of any case in the hearing. In November 2022, we filed with the Shanghai court motions to dismiss two patent cases to which we assert a license defense (parallel to our arguments in Washington). Decisions on the motions are pending. In January 2023, the Shanghai Intellectual Property Court held a supplemental evidentiary hearing to review the admissions of evidence, but the panel did not address the merits of any case in that hearing. For the two Chinese patents for which we argue a license defense, the Shanghai court has requested NXP to withdraw in view of the existing wafer supplier license and the favorable summary judgment regarding the corresponding U.S. Patents in the Western District of Washington. For the third Chinese patent, the Shanghai court has not yet set a date for any further hearings while the completion of its technical evaluation remains pending.

Note 7. Long-term debt

Convertible Senior Notes

In November 2021, we issued $287.5 million aggregate principal amount of convertible promissory notes due May 15, 2027 (the “2021 Notes”).

The following table presents the outstanding principal amount and carrying value of the 2021 Notes as of the dates indicated (in thousands):

	June 30, 2023			December 31, 2022		
	Principal Amount	Unamortized debt issuance costs	Net Carrying Amount	Principal Amount	Unamortized debt issuance costs	Net Carrying Amount
2021 Notes	$ 287,500	$ (6,454)	$ 281,046	$ 287,500	$ (7,256)	$ 280,244

Further details of the 2021 Notes are as follows:

Issuance	Maturity Date	Interest Rate	First Interest Payment Date	Effective Interest Rate	Semi-Annual Interest Payment Dates	Initial Conversion Rate per $1,000 Principal	Initial Conversion Price	Number of Shares (in millions)
2021 Notes	May 15, 2027	1.125%	May 15, 2022	1.72%	May 15; November 15	9.0061	$ 111.04	2.6

The 2021 Notes are senior unsecured obligations, do not contain any financial covenants and are governed by indentures (the Indentures). The total net proceeds from the 2021 Notes, after deducting initial debt issuance costs, fees and expenses, was $278.4 million. We used approximately $183.6 million of the 2021 Notes net proceeds, excluding accrued interest, to repurchase approximately $76.4 million aggregate principal amount of convertible notes due 2026 (the “2019 Notes” and, together with the 2021 Notes, the “Notes”) through individual privately negotiated transactions concurrent with us offering the 2021 Notes. We used approximately $17.6 million, excluding accrued interest, to repurchase the remaining $9.85 million aggregate principal amount of the 2019 Notes in June 2022. We will use the remainder of the net proceeds from the 2021 Notes for general corporate purposes.

Terms of the 2021 Notes

The holders of the 2021 Notes may convert their respective 2021 Notes at their option at any time prior to the close of business on the business day immediately preceding the respective conversion dates under the following circumstances:

- during any fiscal quarter commencing after the fiscal quarter ending on March 31, 2022 (and only during such fiscal quarter), if the last reported sale price of our common stock, for at least 20 trading days (whether or not consecutive) during a period of 30 consecutive trading days ending on, and including, the last trading day of the immediately preceding fiscal quarter is greater than or equal to 130% of the conversion price on each applicable trading day;
- during the five business day period after any five consecutive trading day period in which the trading price per $1,000 principal amount of the 2021 Notes for each trading day was less than 98% of the product of the last reported sale price of our common stock and the conversion rate on each such trading day;
- prior to the close of business on the second scheduled trading day immediately preceding the redemption date if we call the 2021 Notes for redemption; or
- upon the occurrence of specified corporate events, as described in the indenture.

None of the circumstances described in the above paragraphs were met during the six months ended June 30, 2023.

Regardless of the foregoing circumstances, holders may convert all or any portion of the 2021 Notes, in increments of $1,000 principal amount, on or after February 15, 2027, until the close of business on the second scheduled trading day immediately preceding the maturity date.

We may redeem all or a portion of the 2021 Notes for cash, at our option, on or after November 20, 2024, if the last reported sale price of our common stock has been at least 130% of the conversion price at least 20 trading days (whether or not consecutive) during any 30 consecutive trading day period at a redemption price equal to 100% of the principal amount of the 2021 Notes being redeemed, plus any accrued and unpaid interest to, but excluding, the redemption date.

Holders who convert their 2021 Notes in connection with certain corporate events that constitute a make-whole fundamental change (as defined in the indenture) are, under certain circumstances, entitled to an increase in the conversion rate. Additionally in the event of a corporate event constituting a fundamental change (as defined in the indenture), holders of the 2021 Notes may require us to repurchase all or a portion of their 2021 Notes at a repurchase price equal to 100% of the principal amount of the 2021 Notes being repurchased, plus any accrued and unpaid interest to, but excluding, the repurchase date.

Interest expense related to the Notes was as follows (in thousands):

	Three Months Ended June 30, 2023	Three Months Ended June 30, 2022		
	2021 Notes	2019 Notes	2021 Notes	Total
Amortization of debt issuance costs	$ 402	$ 8	$ 395	$ 403
Cash interest expense	809	38	809	847
Total interest expense	$ 1,211	$ 46	$ 1,204	$ 1,250

	Six Months Ended June 30, 2023	Six Months Ended June 30, 2022		
	2021 Notes	2019 Notes	2021 Notes	Total
Amortization of debt issuance costs	$ 802	$ 19	$ 788	$ 807
Cash interest expense	1,618	87	1,617	1,704
Total interest expense	$ 2,420	$ 106	$ 2,405	$ 2,511

Accrued interest related to the 2021 Notes as of June 30, 2023 and December 31, 2022 was $404,000 for both periods, respectively. We record accrued interest in accrued liabilities in our consolidated balance sheet.

We estimate the fair value of the 2021 Notes to be $312.6 million and $347.4 million as of June 30, 2023 and December 31, 2022, respectively, which we determined through consideration of quoted market prices. The fair value for the 2021 Notes is classified as Level 2, as defined in Note 2.

Capped Calls

In connection with the issuance of the 2019 Notes, we entered into privately negotiated capped-call transactions with certain financial counterparties. The capped call transactions are generally designed to reduce the potential dilution to our common stock upon any conversion or settlement of the 2019 Notes, or to offset any cash payments we are required to make in excess of the principal amount upon conversion of the 2019 Notes, as the case may be, with the reduction or offset subject to a cap based on the cap price. If, however, the market price per share of our common stock exceeds the cap price of the capped-call transactions, then our stock would experience some dilution and/or the capped call would not fully offset the potential cash payments, in each case, to the extent then-market price per share of our common stock exceeds the cap price. The capped call remains outstanding even though we have repurchased the 2019 Notes. The initial cap price of the capped call transactions is $54.20 per share, subject to certain adjustments under the terms of the capped call transactions. The capped call transactions expire over 40 consecutive scheduled trading days ending on December 11, 2026. The capped call transactions meet the criteria for classification in equity, are not accounted for as derivatives and are not remeasured each reporting period.

Note 8. Net Loss Per Share

For the periods presented, the following table provides a reconciliation of the numerator and denominator used in computing basic and diluted net loss per share (in thousands, except per share amounts):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Numerator:				
Net loss	$ (8,066)	$ (11,523)	$ (12,424)	$ (21,984)
Denominator:				
Weighted-average shares outstanding — basic and diluted	26,713	25,429	26,499	25,204
Net loss per share — basic and diluted	$ (0.30)	$ (0.45)	$ (0.47)	$ (0.87)

The following table presents the outstanding shares of our common stock equivalents excluded from the computation of diluted net loss per share as of the dates presented because their effect would have been antidilutive (in thousands):

	Three and Six Months Ended June 30,	
	2023	2022
Stock options	1,543	2,047
RSUs, MSUs and PSUs	1,475	1,714
Employee stock purchase plan shares	23	29
2021 Notes	2,589	2,589

Note 9. Segment Information

We have one reportable and operating segment: the development and sale of our RAIN products and services. We identified our operating segment based on how our chief operating decision-maker manages our business, makes operating decisions and evaluates our operating performance. Our chief executive officer acts as the chief operating decision-maker and reviews financial and operational information on an entity-wide basis. We have one business activity and there are no segment managers who are held accountable for operations, operating results or plans for levels or components. Accordingly, we have determined that we have a single reportable and operating segment.

Our chief executive officer reviews information about our revenue categories, endpoint ICs and systems, the latter defined as reader ICs, readers, gateways, test and measurement solutions and software and cloud services. The following table presents our revenue categories for the indicated periods (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Endpoint ICs	$ 64,905	$ 42,854	$ 131,954	$ 81,649
Systems	21,081	16,942	39,929	31,291
Total revenue	$ 85,986	$ 59,796	$ 171,883	$ 112,940

Note 10. Deferred Revenue

Deferred revenue, comprising individually immaterial amounts for extended warranty, enhanced product maintenance and advance payments on non-recurring engineering ("NRE") services contracts, represents contracted revenue that has not yet been recognized. We recognized $2.0 million of revenue related to amounts included in deferred revenue as of December 31, 2022 for the six months ended June 30, 2023. We recognized $270,000 of revenue related to amounts included in deferred revenue as of December 31, 2021 for the six months ended June 30, 2022.

The following table presents the changes in deferred revenue for the indicated periods (in thousands):

	Six Months Ended June 30,	
	2023	2022
Balance at beginning of period	$ 2,599	$ 794
Opening balance from Voyantic acquisition	1,233	—
Deferral of revenue	1,672	2,661
Recognition of deferred revenue	(2,640)	(459)
Balance at end of period	$ 2,864	$ 2,996

Note 11. Related-Party Transactions

We have been party to a consulting agreement with a limited liability company owned by Cathal Phelan, a member of our board of directors, pursuant to which Mr. Phelan provided advisory and consulting services to us. We recognized and paid $134,000 and $269,000 in consulting fees to the limited liability company owned by Mr. Phelan for the three and six months ended June 30, 2022, respectively. On January 1, 2023, Mr. Phelan joined our company as Chief Innovation Officer and ceased to provide us with consulting services. Mr. Phelan remains on our board of directors as a non-independent director.

On June 23, 2023, we acquired a patent from a related party in which a member of our board of directors holds an executive leadership position. The patent pertains to our endpoint IC products and the acquisition price was $250,000. The patent expires on July 17, 2026 and does not have renewal rights.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations.

This report contains certain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Statements containing words such as "may," "believe," "anticipate," "expect," "intend," "plan," "project," "projections," "business outlook," "estimate," or similar expressions constitute forward-looking statements. You should read these statements carefully because they discuss future expectations, contain projections of future results of operations or financial condition or state other "forward-looking" information. These statements relate to our future plans, objectives, expectations, intentions and financial performance and the assumptions that underlie these statements. They include, but are not limited to, statements about:

- *our market opportunity; the adoption of RAIN technology and solutions; our ability to compete effectively against competitors and competing technologies; our market share and product leadership; and our business model, strategic plans and product-development plans;*
- *the impact of Covid-19, including on our business, operations and financial condition as well as on macroeconomic conditions;*
- *our future financial performance, including our average selling prices ("ASPs"), gross margins and the dependency of our future financial performance on macroeconomic conditions;*
- *the performance of third parties on which we rely for product development, manufacturing, assembly and testing; and our relationship with other third parties on which we rely for product distribution, sales, integration and deployment;*
- *our ability to adequately protect our intellectual property;*
- *the regulatory environment for our products and services; and*
- *our leadership in industry and standards-setting bodies.*

Our actual results may differ materially from those contained in or implied by any forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this report, including those factors discussed in Part II, Item 1A (Risk Factors).

Considering the significant uncertainties and risks inherent in these forward-looking statements, you should not regard these statements as a representation or warranty by us or anyone else that we will achieve our objectives and plans in any specified time frame, or at all, or as predictions of future events. Moreover, neither we nor any other person assumes responsibility for the accuracy and completeness of the forward-looking statements. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

Our Business

Our vision is a boundless Internet of Things, in which every physical item that businesses manufacture, transport and sell, and that people own, use and recycle, is wirelessly connected to a digital counterpart – a digital twin – in the cloud. Our mission is to connect every thing. We design and sell a platform that enables that wireless item-to-cloud connectivity and with which we and our partners innovate Internet of Things, or IoT, solutions.

Today, our platform connects tens of billions of everyday physical items. That connectivity helps businesses discover, engage and protect those items from manufacturing through point-of-sale. It improves efficiencies for retailers, supply chain and logistics ("SC&L") providers, airlines, automobile manufacturers, healthcare companies and more. We believe the IoT we are driving will, in the future, provide business and people ubiquitous access to digital twins of every item, each storing the item's history and current owner, and helping people explore and learn about the item. We envision broadening our platform's reach from billions of items to trillions, and extending that item connectivity to consumer use and end-of-life recycling, thereby allowing not just businesses, but also people, to derive value from their connected items. We believe that that connectivity will transform the world.

Our platform comprises endpoint ICs, systems and our partner ecosystem. Our endpoint ICs are miniature radio integrated circuits, or ICs, that store a serialized number – an identifier – that wirelessly identifies the item to which the IC is attached. Our partners embed an endpoint IC into an item or its packaging. Our systems, which comprise reader ICs, readers, gateways, software and cloud services, discover the item, which includes reading the item's identifier. They may then engage the item, for example by reading additional information that may be stored on the endpoint IC. They may also protect the item or the consumer, for example by authenticating the item as genuine or rendering the endpoint IC unresponsive without the system first providing a password. With the acquisition of Voyantic Oy, our systems also include test and measurement solutions.

Our partner ecosystem comprises original equipment manufacturers, or OEMs, service bureaus, original device manufacturers, or ODMs, systems integrators, or SIs, value-added resellers, or VARs, independent software vendors, or ISVs, and other solution partners. We sell our products, either individually or as a whole platform offering, primarily with or through our partner ecosystem.

Our platform uses a type of radio-frequency identification, or RFID, technology known as RAIN. We spearheaded developing the RAIN radio standard, lobbied governments to allocate spectrum and cofounded the RAIN industry alliance that today has more than 150 member companies. We believe RAIN's capabilities – endpoint ICs with serialized item identifiers, battery-free operation, 30-foot range, not line-of-sight readability, up to 1,000 reads per second, essentially unlimited life and available cryptographic authentication, all at a cost of pennies per item – position RAIN to be the leading item-to-cloud connectivity technology for the IoT. We engineer our platform to deliver capabilities and performance that surpasses mix-and-match solutions built from competitor products. We believe our platform success derives primarily from the visibility we give end users to items they manufacture, transport and sell.

Factors Affecting Our Performance

Inventory Supply

From time to time, we experience inventory overages or shortages, either due to us misestimating customer or end-user demand; insufficient manufacturing capacity or product availability; market fluctuations; competitive product availability; macroeconomic fluctuations; changes in regulations or tariffs; or for a host of other reasons. These inventory dynamics can impact some or all of our products. High inventory levels can increase expenses, cause product obsolescence and/or increase reserves, negatively affecting our business. Low inventory levels can cause lengthened lead times, missed opportunities, market-share loss and/or damaged customer relationships, also negatively affecting our business. For example, in 2021 and 2022 we experienced IC wafer shortages relative to our needs because of high worldwide demand for foundry capacity. These shortages prevented us from fully meeting customer demand and, in some cases, caused customers to cancel orders, qualify alternative suppliers or purchase from our competitors. If softness for demand in second half of 2023 accelerates, we could experience inventory overages until we adjust wafer receipts and/or demand increases.

In 2020, during the Covid-19 economic downturn, we built endpoint IC inventory. Beginning in fourth-quarter 2020, demand for our endpoint ICs increased dramatically. Worldwide wafer demand also increased dramatically, leading to wafer shortfalls in many industries, including ours. In 2021, we moderated our sales and inventory burndown, stretching our IC supply but constraining our ability to fully capitalize on the increasing endpoint IC demand, while we also expanded and matured our post-processing capacity.

In 2022, wafer shortfalls in our process nodes continued, preventing us from fully capitalizing on our demand in every quarter of 2022. Although we did receive wafer upsides from our foundry partner that supported sequential increases in endpoint IC revenue each quarter, demand exceeded supply throughout the year. And because many of those upside wafers were 200mm rather than 300mm, we transitioned some customers back from our 300mm M700 family to our prior-generation 200mm Monza R6 product family, despite M700 being our primary market demand. In fourth-quarter 2022, our foundry partner signaled improving wafer supply.

As of June 30, 2023, we have a sustainable level of 200mm and 300mm endpoint IC inventory. Sustainable inventory levels take into account our booked and forecasted demand, inventory needed to support key accounts, our expectations regarding future supply availability, and the salability of our inventory in the future.

Throughout 2022 we were also unable to obtain enough reader components to meet reader market demand. Although component availability has improved in 2023 we may see isolated component shortfalls for the remainder of the year.

In 2022 and 2023 we saw cost increases for our endpoint IC wafers and for all systems products, which caused us to raise prices and potentially negatively impact our market competitiveness. Overall, the supply, packaging and test shortfalls, as well as cost increases, may decrease sales and cause market-share losses if our partners and end users buy competing products over ours, or choose to not deploy at all, negatively impacting our operating results and prospects.

Investing for Growth

We have invested in, and plan to continue investing in, research and development to enhance and extend our platform, including enhancing existing products, introducing new products and advancing the unique capabilities and features our platform enables. Although we sell our products into many end markets, relying significantly on our partner channel, we are today focusing particular attention on retail self-checkout and loss prevention and SC&L package tracking.

Most of our investments precede any sales benefits from the investments and, in some instances, we may never see any benefit if the market is not receptive to our approach, our product development is late or fails, or for other reasons. We sometimes enter into arrangements with end users, suppliers or partners for them to fund part of our investment, but even in those instances the investment results remain uncertain, and in some cases we may be required to refund the investment if the development is unsuccessful or the market opportunity fails to materialize. In some instances, we delay or cancel investments without or until we obtain such funding. The outcome of an investment is almost always uncertain, and if our results do not meet expectations then our operating results, profitability and stock price may be adversely affected.

While our long-term plan to invest for growth remains unchanged, Covid-19 and a weaker global economy have introduced new uncertainty to our business. We will continue to monitor the impacts of both on our supply chain, market and opportunities and adjust our investment strategy as appropriate.

Market Adoption

Our financial performance depends on the pace and scope of end-user adoption of our products in multiple industries, especially in retail apparel, which is our largest market. Covid-19 had a materially adverse impact on the retail industry, initially by shifting consumer shopping away from physical stores, then causing post-Covid supply shortfalls and retailer over-ordering and, in late 2022 and the first-half of 2023, inventory corrections at many retailers. Despite these retail macro trends, for the most part retail demand for our products exceeded our supply throughout 2022. Covid-19 also impacted other markets that use RAIN. For example, aviation, which had proposed widespread luggage tagging, saw delayed adoption. By contrast, SC&L experienced markedly increased shipment volumes which positively impacted adoption.

Given the uncertainties in our market and product supply, the negative impacts of our insufficient 2022 supply and end user perceptions of the risks associated with insufficient supply, we cannot be certain that RAIN adoption will continue; that we will have appropriate product inventory; that we will not experience future product inventory shortfalls or overages; or that Covid-19 and a weaker global economy will not materially impact our business going forward. We also cannot be certain we will be able to maintain or grow our market share for any of our products, whether because of insufficient inventory, Covid-19, competitors copying our products, insufficient wafer or other product supply, competition generally or for a host of other reasons, many of which are outside our control.

Regardless of the uneven pace of retail, SC&L and other industry adoption, we believe the underlying, long-term trend is continued RAIN adoption and we continue investing in new products. In our endpoint IC business, in 2020 we introduced the Impinj M700 family, with significant performance advantages over other endpoint ICs on the market. We continue expanding the M700 family, for example with the introduction of our large memory industrial ICs, the M780 and M781, in November 2022 and with the introduction of our cryptographic authentication IC, the M775, along with a cloud-based authentication service, in September 2022. In our systems business, in 2020 we introduced the Impinj R700 reader and in 2021 our Impinj E-family reader ICs, both of which likewise offer significant performance advantages over other readers and reader ICs on the market and for which we continue expanding the product families. Regardless, market adoption could be impacted by product availability—see the discussion of product availability under “Inventory Supply”.

We sell our products primarily through partners and distributors and therefore have limited visibility to end-user demand. Consequently, we may incorrectly forecast that demand or not identify market shifts in a timely manner, potentially adversely affecting our business. If RAIN market adoption, and adoption of our products specifically, does not meet our expectations, or if we are unable to meet partner or end-user volume or performance expectations, because of the impact of Covid-19, supply-chain disruption, macroeconomic conditions or otherwise, then our operating results and growth prospects will be adversely affected. If we reduce prices to win opportunities, then our gross margins may be negatively affected. In contrast, if our endpoint IC, reader IC, reader or gateway sales exceed expectations, then our revenue and profitability may be positively affected.

Timing and Complexity of End User Deployments

From 2010 to 2022, our endpoint IC sales volumes increased at a compounded annual growth rate of 26%. However, the pace has been uneven and unpredictable. For example, our endpoint IC unit sales volumes increased significantly in 2016, declined in second-half 2017 and in first-half 2018, returned to growth in second-half 2018 and in 2019 (the latter albeit not at the same pace as in 2016), declined again in second- and third-quarter 2020 due to Covid-19, and recovered in fourth-quarter 2020, in 2021 and in 2022. We expect short-term demand to remain unpredictable in scope and timing. Longer term, we believe our endpoint IC opportunity will continue to grow, but we cannot predict whether historical annual growth rates are indicative of the pace of future growth.

Our systems business, at least for our readers and gateways, is impacted by large-scale deployments at discrete end users. The timing of those large deployments causes large variability in our systems revenue. For example, we generated 14% of total 2019 revenue from a large North American SC&L provider in connection with a project-based gateway deployment. We did not have comparable new project-based revenue in 2020. As another example, in second-quarter 2021, we generated 13% of our quarterly revenue from a project-based gateway deployment for RAIN-based self-checkout and loss prevention at a large European-based global retailer.

Finally, although we promote our platform as an integrated offering, we sell our products individually, and end users often use only certain of our products. For any given end-user solution, whether an end user chooses to deploy our entire platform or only a portion will also affect our operating results.

Average Selling Price

Our product ASPs fluctuate based on competitive pressures and the discounting we offer to win opportunities, but generally decline over time. Historically, we have been able to compensate these ASP declines by reducing the per-unit cost of most of our products, by reducing supplier costs and implementing manufacturing and quality improvements, as well as by introducing newer and lower-cost products, but the timing of these cost reductions and new-product introductions fluctuates and may not materialize in any given quarter or year. Beginning in second-half 2021, due to wafer and component supply shortfalls at many of our suppliers, we began experiencing increasing rather than decreasing costs for both endpoint ICs and systems. In 2022 and 2023, we raised prices to offset the impact of those increased costs. Future price increases, if or when they occur, could cause us to pass the higher costs to our customers. If we are unable to successfully increase our prices or if our customers choose competitors' products due to our higher prices, then our product margins, operating results or both may suffer. In the near term, we expect product margins to be volatile based on product mix and the timing of our price changes.

Seasonality

We typically renegotiate pricing with most of our endpoint IC OEMs with an effective date of the first quarter of the calendar year, reducing revenue and gross margins in the first quarter compared to prior periods. Historically, the impact tends to decline in subsequent quarters as we reduce costs and, to the extent we can migrate our partners and end users to newer, lower-cost products, adjust product mix. Endpoint IC volumes also tend to be historically lower in the fourth quarter than in the third quarter. We did not see these historical trends in 2022 and may not see them in 2023.

System sales have historically tended to be stronger in the fourth quarter of the calendar year, and less strong in the first quarter. We believe this seasonality is due to the availability of residual funding for capital expenditures prior to the end of many end users' fiscal years. Like for our endpoint ICs, we did not see these historical trends in 2022 and may not see them in 2023.

While, over the long term, we expect these seasonal trends to continue, quarter-to-quarter revenue variability from factors including supply uncertainty, deployment timing, competitor products and supply-chain disruptions can all mask seasonality in any given period. These variabilities, as well as other risks and uncertainties, including but not limited to the impacts of Covid-19, can cause our actual results to differ significantly from our expectations, as described in greater detail in the sections of this report captioned "—Covid-19" and in Part II, Item 1A (Risk Factors).

Covid-19

We are actively monitoring and mitigating the impacts of Covid-19 in all aspects of our business, including for our employees, suppliers, partners and end users.

In 2021 and 2022, as the worldwide economy began recovering from the downturn caused by Covid-19, demand for all our products increased. Unfortunately, at the same time, we experienced supply constraints and higher costs that limited our ability to fully capitalize on the increased demand, as discussed above.

Given the ongoing uncertainty over Covid-19's epidemiological, economic and operational impacts we cannot reasonably estimate the extent or duration of Covid-19's continuing impact on our business. The extent to which Covid-19 impacts our future results will depend on developments that are inherently unpredictable, including the emergence of new Covid-19 variants and actions we and others take in response to Covid-19.

For more information on Covid-19's impact on our business, please refer to Part II, Item 1A (Risk Factors) of this report.

Results of Operations

The following table presents our results of operations for the periods indicated:

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands, except percentages)	**2023**	**2022**	**Change**	**2023**	**2022**	**Change**
Revenue	$ 85,986	$ 59,796	$ 26,190	$ 171,883	$ 112,940	$ 58,943
Gross profit	$ 43,814	$ 31,502	$ 12,312	$ 87,344	$ 60,281	$ 27,063
Gross margin	*51.0%*	*52.7%*	*(1.7)%*	*50.8%*	*53.4%*	*(2.6)%*
Loss from operations	$ (8,369)	$ (8,476)	$ 107	$ (12,811)	$ (17,791)	$ 4,980

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Revenue and gross profit increased, due primarily to higher endpoint IC and systems revenue. The endpoint IC revenue increase was driven primarily by higher shipment volumes partially offset by lower ASPs when compared to the prior year period. The systems revenue increase was driven primarily by sales from test and measurement solutions revenue. Gross margin decreased, due primarily to decreased product margins. The decreased product margins were driven by both endpoint IC margins due to lower revenue contribution from industrial and specialty ICs as well as mix within industrial and specialty ICs, and systems margins. Loss from operations decreased, due primarily to increased gross profit offset by increased operating expenses. The operating expense increase was due primarily to higher research and development, general and administrative costs and amortization of intangibles as a result of the acquisition of Voyantic Oy. See Note 4 Goodwill and Intangible Assets for further details regarding the Voyantic Oy acquisition.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Revenue and gross profit increased, due primarily to higher endpoint IC and systems revenue. The endpoint IC revenue increase was driven primarily by higher shipment volumes partially offset by lower ASPs when compared to the prior year period. Gross margin decreased, due primarily to decreased product margins. The decreased product margins were driven primarily by endpoint IC margins due to lower revenue contribution from industrial and specialty ICs as well as mix within industrial and specialty ICs. Loss from operations decreased, due primarily to increased gross profit offset by increased operating expenses. The operating expense increase was due primarily to higher research and development, general and administrative costs and amortization of intangibles as a result of the acquisition of Voyantic Oy. See Note 4 Goodwill and Intangible Assets for further details regarding the Voyantic Oy acquisition.

Revenue

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Endpoint ICs	$ 64,905	$ 42,854	$ 22,051	$ 131,954	$ 81,649	$ 50,305
Systems	21,081	16,942	4,139	39,929	31,291	8,638
Total revenue	$ 85,986	$ 59,796	$ 26,190	$ 171,883	$ 112,940	$ 58,943

We currently derive substantially all our revenue from sales of endpoint ICs, reader ICs, readers, gateways and test and measurement solutions. We sell our endpoint ICs and test and measurement solutions primarily to inlay manufacturers; our reader ICs primarily to OEMs and ODMs through distributors; and our readers and gateways to solutions providers, value-added resellers ("VARs") and system integrators ("SIs"), also primarily through distributors. We expect endpoint IC sales to represent the majority of our revenue for the foreseeable future.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Endpoint IC revenue increased $22.1 million due primarily to a $29.4 million increase from higher shipment volumes partially offset by a $7.3 million decrease from ASPs. The ASP decrease was due primarily to lower revenue contribution from industrial and specialty ICs as well as mix within industrial and specialty ICs.

Systems revenue increased $4.1 million, due primarily to increases of $2.5 million resulting from test and measurement solutions revenue and $1.3 million in gateway revenue The increased gateway revenue was due to increased shipment volumes.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Endpoint IC revenue increased $50.3 million due primarily to a $61.1 million increase from higher shipment volumes partially offset by a $10.8 million decrease from ASPs. The ASP decrease was due primarily to lower revenue contribution from industrial and specialty ICs as well as mix within industrial and specialty ICs.

Systems revenue increased $8.6 million, due primarily to increases of $5.9 million in gateway revenue, $2.5 million resulting from test and measurement solutions revenue, and $2.3 million in reader IC revenue offset by a decrease of $2.7 million in reader revenue. The increased gateway and reader IC revenue was due primarily to increased shipment volumes. The decreased reader revenue was due to decreased shipment volumes offset by higher ASPs.

Gross Profit and Gross Margin

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands, except percentages)	2023	2022	Change	2023	2022	Change
Cost of revenue	$ 42,172	$ 28,294	$ 13,878	$ 84,539	$ 52,659	$ 31,880
Gross profit	$ 43,814	$ 31,502	$ 12,312	$ 87,344	$ 60,281	$ 27,063
Gross margin	51.0 %	52.7 %	(1.7)%	50.8 %	53.4 %	(2.6)%

Cost of revenue includes costs associated with manufacturing our endpoint ICs, reader ICs, readers gateways and test and measurement solutions. including direct materials and outsourced manufacturing costs as well as associated overhead costs such as logistics, quality control, planning and procurement. Cost of revenue also includes charges for excess and obsolescence and warranty costs. Our gross margin varies from period to period based on mix of endpoint IC and systems, underlying product margins driven by changes in ASPs or costs, as well as from inventory excess and obsolescence charges.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Gross profit increased, due primarily to increased endpoint IC and systems revenue. Gross margin decreased, due primarily to decreased product margins. The decreased product margins were driven by both endpoint and systems, with endpoint IC margins decreasing due to product mix within industrial and specialty ICs and systems decreasing due to increased costs.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Gross profit increased, due primarily to increased endpoint IC and systems revenue. Gross margin decreased, due primarily to decreased product margins. The decreased product margins were driven primarily by endpoint IC margins due to product mix within industrial and specialty ICs.

Operating Expenses

Research and Development

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Research and development	$ 23,403	$ 18,369	$ 5,034	$ 45,838	$ 36,358	$ 9,480

Research and development expense comprises primarily personnel expenses (salaries, benefits and other employee related costs) and stock-based compensation expense for our product-development personnel; product development costs which include external consulting and service costs, prototype materials and other new-product development costs; and an allocated portion of infrastructure costs which include occupancy, depreciation and software costs. We expect research and development expense to increase in absolute dollars in future periods as we focus on new product development and introductions.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Research and development expense increased $5.0 million, due primarily to increases of $1.6 million in product development costs, $1.5 million in stock-based compensation expense primarily related to increased outstanding equity grants, and $1.2 million in personnel expenses primarily from higher headcount.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Research and development expense increased $9.5 million, due primarily to increases of $4.4 million in personnel expenses from higher headcount, increases in payroll taxes driven by employer taxes on the vesting of restricted stock units, and the change in bonus payment structure from 50% cash and 50% PSUs to 100% cash. Other major factors included $2.6 million in product development costs, $1.3 million in stock-based compensation expense primarily related to increased outstanding equity grants, and $991,000 in infrastructure costs.

Sales and Marketing

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Sales and marketing	$ 10,632	$ 9,614	$ 1,018	$ 20,605	$ 18,913	$ 1,692

Sales and marketing expense comprises primarily personnel expenses (salaries, incentive sales compensation, or commission, benefits and other employee-related costs) and stock-based compensation expense for our sales and marketing personnel; travel, advertising and promotional expenses; and an allocated portion of infrastructure costs which include occupancy, depreciation and software costs.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Sales and marketing expense increased $1 million, due primarily to increases of $353,000 in personnel expenses from an increase in headcount, $239,000 in increased travel expenses as well as $148,000 in stock-based compensation expense.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Sales and marketing expense increased $1.7 million, due primarily to increases of $1.4 million in personnel expenses from an increase in headcount and payroll taxes driven by employer taxes on the vesting of restricted stock units. Other major factors included $457,000 in increased travel expenses offset by a decrease of $465,000 in stock-based compensation expense due primarily to a decrease in outstanding awards.

General and Administrative

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
General and administrative	$ 16,002	$ 11,995	$ 4,007	$ 31,566	$ 22,801	$ 8,765

General and administrative expense comprises primarily personnel expenses (salaries, benefits and other employee related costs) and stock-based compensation expense for our executive, finance, human resources and information technology personnel; legal, accounting and other professional service fees; travel and insurance expense; and an allocated portion of infrastructure costs which include occupancy, depreciation and software costs.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

General and administrative expense increased $4.0 million, due primarily to increases of $2.9 million in professional services due primarily to increased legal expenses as well as transaction expenses for the Voyantic Oy acquisition detailed in Note 4 Goodwill and Intangible Assets. Other factors included $546,000 in personnel expenses from higher headcount and $425,000 in stock-based compensation expense primarily related to increased outstanding equity grants.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

General and administrative expense increased $8.8 million, due primarily to increases of $6.2 million in professional services due primarily to increased legal expenses as well as transaction expenses for the Voyantic Oy acquisition detailed in Note 4 Goodwill and Intangible Assets. Other factors included $2.1 million in personnel expenses from higher headcount, employer taxes on the vesting of restricted stock units, and the change in bonus payment structure from 50% cash and 50% PSUs to 100% cash. Other major factors include $335,000 in stock-based compensation expense primarily related to increased outstanding equity grants.

Amortization of Intangibles

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Amortization of intangibles	$ 2,146	$ —	$ 2,146	$ 2,146	$ —	$ 2,146

The increase in amortization expense relates to the intangibles acquired as part of our April 3, 2023 acquisition of Voyantic Oy, a global provider of RFID test and measurement solutions. See Note 4 Goodwill and Intangible Assets for further details.

Other Income, net

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Other income, net	$ 1,165	$ 429	$ 736	$ 2,530	$ 593	$ 1,937

Other income, net comprises primarily interest income on our short-term investments.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Other income, net increased from the prior periods due to an increase in interest rates.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Other income, net increased from the prior periods due to an increase in interest rates.

Induced Conversion Expense

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Induced conversion expense	$ —	$ (2,232)	$ 2,232	$ —	$ (2,232)	$ 2,232

In June 2022, we repurchased the remaining $9.85 million principal amount of the 2019 Notes ("2019 Note Repurchase"). We accounted for the 2019 Note Repurchase transaction as an induced conversion in accordance with Accounting Standards Codification 470-20, Debt with Conversion and Other Options (ASC 470-20). As a result of the induced conversion, we recorded $2.2 million in induced conversion expense which is included in the Consolidated Statements of Operations for the three and six months ended June 30, 2022. The induced conversion expense represents the fair value of the consideration issued upon conversion in excess of the fair value of the securities issuable under the original terms of the 2019 Notes.

Interest Expense

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Interest expense	$ 1,211	$ 1,250	$ (39)	$ 2,420	$ 2,511	$ (91)

Interest expense comprises primarily cash interest and amortization of debt issuance costs on our debt.

Three months ended June 30, 2023 compared with three months ended June 30, 2022

Interest expense decreased $39,000, due to the repayment of the 2019 Notes in June 2022.

Six months ended June 30, 2023 compared with six months ended June 30, 2022

Interest expense decreased $91,000, due to the repayment of the 2019 Notes in June 2022.

Income Tax Expense

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Income tax benefit (expense)	$ 349	$ 6	$ 343	$ 277	$ (43)	$ 320

We are subject to federal and state income taxes in the United States and foreign jurisdictions. Income tax expense remained comparable to the prior period.

Non-GAAP Financial Measures

Our key non-GAAP performance measures include adjusted EBITDA and non-GAAP net income (loss), as defined below. We use adjusted EBITDA and non-GAAP net income (loss) as key measures to understand and evaluate our core operating performance and trends, to prepare and approve our annual budget and to develop short- and long-term operating plans. We believe these measures provide useful information for period-to-period comparisons of our business to allow investors and others to understand and evaluate our operating results in the same manner as our management and board of directors. Our presentation of these non-GAAP financial measures is not meant to be considered in isolation or as a substitute for our financial results prepared in accordance with GAAP, and our non-GAAP measures may be different from similarly termed non-GAAP measures used by other companies.

Adjusted EBITDA

We define adjusted EBITDA as net income (loss) determined in accordance with GAAP, excluding, if applicable for the periods presented, the effects of stock-based compensation; depreciation; restructuring costs; settlement and related costs; induced conversion expense; other income, net; interest expense; loss on debt extinguishment; income tax benefit (expense); acquisition transaction expense and related purchase accounting adjustments. During the first quarter of 2023, we revised our definition of adjusted EBITDA to exclude acquisition transaction expenses and related purchase accounting adjustments in connection with our Voyantic Oy acquisition. We have excluded these costs and expenses because we do not believe they reflect our core operations and us excluding them enables more consistent evaluation of our operating performance. The revision to our definition of adjusted EBITDA did not impact adjusted EBITDA for any previously reported periods because there was no impact of a similar nature in such prior periods affecting comparability.

The following table presents a reconciliation of net loss to adjusted EBITDA:

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Net loss	$ (8,066)	$ (11,523)	$ 3,457	$ (12,424)	$ (21,984)	$ 9,560
Adjustments:						
Other income, net	(1,165)	(429)	(736)	(2,530)	(593)	(1,937)
Interest expense	1,211	1,250	(39)	2,420	2,511	(91)
Income tax expense (benefit)	(349)	(6)	(343)	(277)	43	(320)
Depreciation and amortization	4,273	1,465	2,808	6,066	2,973	3,093
Stock-based compensation	13,148	10,859	2,289	23,372	22,173	1,199
Purchase accounting adjustments	276	—	276	276	—	276
Induced conversion expense	—	2,232	(2,232)	—	2,232	(2,232)
Acquisition transaction expense	630	—	630	1,672	—	1,672
Adjusted EBITDA	$ 9,958	$ 3,848	$ 6,110	$ 18,575	$ 7,355	$ 11,220

Non-GAAP Net Income (Loss)

We define non-GAAP net income (loss) as net income (loss), adjusted for, if applicable for the periods presented, the effects of stock-based compensation; depreciation; restructuring costs; settlement and related costs; induced conversion expense; amortization of debt discount related to the equity component of our convertible notes; prepayment penalty on debt extinguishment; acquisition transaction expense; and the corresponding income tax impacts of adjustments to net income (loss).

During the first quarter of 2023, we revised our definition of non-GAAP net income (loss) to adjust for acquisition transaction expenses and related purchase accounting adjustments in connection with our Voyantic Oy acquisition. Excluding acquisition transaction expenses and related purchase accounting adjustments did not impact the non-GAAP net income (loss) previously reported for periods preceding the revision.

During the second quarter of 2023, we further revised our definition of non-GAAP net income (loss) to adjust for income tax effects of adjustments to net income (loss), calculated at the statutory rate for current and historical periods. We have revised the prior period amounts to conform to our current period presentation.

The following table presents a reconciliation of net loss to non-GAAP net income (loss):

	Three Months Ended June 30,			Six Months Ended June 30,		
(in thousands)	2023	2022	Change	2023	2022	Change
Net loss	$ (8,066)	$ (11,523)	$ 3,457	$ (12,424)	$ (21,984)	$ 9,560
Adjustments:						
Depreciation and amortization	4,273	1,465	2,808	6,066	2,973	3,093
Stock-based compensation	13,148	10,859	2,289	23,372	22,173	1,199
Purchase accounting adjustments	276	—	276	276	—	276
Induced conversion expense	—	2,232	(2,232)	—	2,232	(2,232)
Acquisition transaction expense	630	—	630	1,672	—	1,672
Income tax effects of adjustments [1]	(965)	(285)	(680)	(1,783)	(507)	(1,276)
Non-GAAP net income	$ 9,296	$ 2,748	$ 6,548	$ 17,179	$ 4,887	$ 12,292

[1] The tax effects of the adjustments are calculated using the statutory rate, taking into consideration the nature of the item and relevant taxing jurisdiction.

Liquidity and Capital Resources

As of June 30, 2023, we had cash, cash equivalents and short-term investments of $108.9 million, comprising cash deposits held at major financial institutions and short-term investments in a variety of securities, including U.S. government securities, treasury bills, corporate notes and bonds, commercial paper, asset-backed securities and money market funds. As of June 30, 2023, we had working capital of $232.7 million.

Historically, we have funded our operations primarily through cash generated from operations and by issuing equity securities, convertible-debt offerings and/or borrowing under our prior senior credit facility. In 2023, our principal uses of cash were funding operations to capture our market opportunity and capital expenditures.

We believe, based on our current operating plan, that our existing cash, cash equivalents and short-term investments will be sufficient to meet our anticipated cash needs for at least the next 12 months. Over the longer term, we plan to continue investing to enhance and extend our platform. If our available funds are insufficient to fund our future activities or execute our strategy, then we may raise additional capital through equity, equity-linked or debt financing, to the extent such funding sources are available. Alternatively, we may need to reduce expenses to manage liquidity; however, any such reductions could adversely impact our business and competitive position.

Sources of Funds

From time to time, we may explore additional financing sources and ways to reduce our cost of capital, including equity, equity-linked and debt financing. In addition, in connection with any future acquisitions, we may pursue additional financing which may be debt, equity or equity-linked financing or a combination thereof. We can provide no assurance that any additional financing will be available to us on acceptable terms.

2021 Notes

In November 2021, we issued convertible notes due 2027 in an aggregate principal amount of $287.5 million which we refer to as the 2021 Notes. The 2021 Notes are our senior unsecured obligation, bearing interest at a fixed rate of 1.125% per year, payable semi-annually in arrears on May 15 and November 15 of each year, beginning on May 15, 2022. The 2021 Notes are convertible into cash, shares of our common stock or a combination thereof, at our election, and will mature on May 15, 2027 unless earlier repurchased, redeemed or converted in accordance with the indenture terms.

The net proceeds from the 2021 Notes were approximately $278.4 million after initial debt issuance costs, fees and expenses. We used approximately $183.6 million of the net proceeds to repurchase approximately $76.4 million aggregate principal amount of convertible notes due 2026, or the 2019 Notes through individual privately negotiated transactions concurrent with the 2021 Notes offering. We used $17.6 million to repurchase the remaining $9.85 million aggregate principal of the 2019 Notes through individual privately negotiated transactions in June 2022. We will use the rest of the net proceeds for general corporate purposes.

For further information on the terms of this debt, please refer to Note 7 to our condensed consolidated financial statements included elsewhere in this report.

Cash Flows

The following table shows a summary of our cash flows for the periods indicated:

	Six Months Ended June 30,	
(in thousands)	2023	2022
Net cash used in operating activities	$ (49,104)	$ (7,639)
Net cash provided by (used in) investing activities	68,991	(72,616)
Net cash provided by (used in) financing activities	5,753	(11,068)

Operating Cash Flows

For the six months ended June 30, 2023, we used $49.1 million of net cash from operating activities. This net cash usage was due primarily to $65.2 million in working capital due primarily to higher inventory and accounts receivable offset by higher accounts payable and $16.1 million of net loss adjusted for non-cash items.

For the six months ended June 30, 2022, we used $7.6 million of net cash from operating activities. This net cash usage was driven primarily by $14.2 million in working-capital, primarily from increased cash usage for inventory purchases, accounts receivable and accounts payable, and $6.6 million of net loss adjusted for non-cash items.

Investing Cash Flows

For the six months ended June 30, 2023, we generated $69 million of net cash from investing activities. These net cash proceeds were due primarily to investment maturities of $92.4 million and investment sales of $13.4 million, partially offset by cash paid for the Voyantic Oy acquisition of $23.4 million and net property and equipment purchases of $13.2 million.

For the six months ended June 30, 2022, we used $72.6 million of net cash from investing activities. This net cash usage was driven primarily by investment and property and equipment purchases of $115.7 million and $3.7 million, respectively, partially offset by investment maturities of $46.8 million.

Financing Cash Flows

For the six months ended June 30, 2023, we generated $5.8 million of net cash from financing activities. These net cash proceeds were due primarily to $5.8 million from stock-option exercises and our employee stock purchase plan.

For the six months ended June 30, 2022, we used $11.1 million of net cash from financing activities. This net cash usage was driven primarily by $6.5 million from stock-option exercises and our employee stock purchase plan. This amount was offset by $17.6 million for the cash repurchase of the remaining $9.85 million principal amount of the 2019 Notes.

Cash Requirements and Contractual Obligations

Our primary cash requirements are for operating expenses and capital expenditures. Our operating expenses have generally increased as we invest in sales and marketing and in developing products and technologies that we believe have the potential to drive long-term business growth.

Convertible Notes – As of June 30, 2023 the principal balance outstanding on the 2021 Notes is $287.5 million. Refer to Note 7 of our Notes to Condensed Consolidated Financial Statements in this Quarterly Report on Form 10-Q for maturity date, stated interest rate and additional information on our 2021 Notes.

Operating Lease Obligations – Our lease portfolio comprises primarily operating leases for our office space. For additional information regarding our operating leases, see Note 10 of our Notes to Consolidated Financial Statements of our Annual Report on Form 10-K for the year ended December 31, 2022 .

Purchase Commitments – Purchase commitments as of June 30, 2023 total $56.1 million and consist primarily of non-cancelable commitments to purchase $43.7 million of inventory.

Off-Balance-Sheet Arrangements

Since inception, we have not had any relationships with unconsolidated entities, such as entities often referred to as structured finance or special-purpose entities, or financial partnerships that would have been established for the purpose of facilitating off-balance-sheet arrangements or for another contractually narrow or limited purpose.

Critical Accounting Policies and Significant Estimates

We have prepared our condensed consolidated financial statements in accordance with GAAP. Our preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, expenses and related disclosures. We evaluate our estimates and assumptions on an ongoing basis. Our estimates are based on historical experience and various other assumptions that we believe to be reasonable under the circumstances. Our actual results could differ from these estimates and assumptions. For information on our critical accounting policies and estimates, see Part II, Item 7 (Management's Discussion and Analysis of Financial Condition and Results of Operations) of our Annual Report on Form 10-K for the year ended December 31, 2022.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risks in the ordinary course of our business. Some of these risks are related to fluctuations in interest rates.

Interest Rate Risk

Under our current investment policy, we invest our excess cash in money market funds, U.S. government securities, corporate bonds and notes and commercial paper. Our current investment policy seeks first to preserve principal, second to provide liquidity for our operating and capital needs and third to maximize yield without putting our principal at risk. We do not enter into investments for trading or speculative purposes.

We had cash, cash equivalents and short-term investments of $108.9 million as of June 30, 2023. Our investments are exposed to market risk due to fluctuations in prevailing interest rates, which may reduce the yield on our investments or their fair value. Because most of our investment portfolio is short-term in nature, we do not believe an immediate 10% increase in interest rates would have a material effect on the fair market value of our portfolio, and therefore we do not expect our results of operations or cash flows to be materially affected by a sudden change in market interest rates.

Our convertible notes have fixed interest rates, thus a hypothetical 100 basis point increase in interest rates would not impact interest expense.

Inflation Risk

We do not believe that inflation has had a material effect on our business, financial condition or results of operations. To date, we have been able to substantially offset higher product costs by increasing our product selling prices. If our product costs became subject to significant future inflationary pressures, then we may not be able to fully offset these higher costs through price increases. Our inability or failure to do so could adversely affect our business, financial condition and results of operations.

Foreign Currency Exchange Risk

We are subject to risks associated with transactions that are denominated in currencies other than our functional currency and the effects of translating amounts denominated in a foreign currency to the U.S. dollar as a normal part of our reporting process. The functional currency of the majority of our foreign subsidiaries is the U.S. dollar. Accordingly, gains and losses resulting from remeasuring transactions denominated in currencies other than U.S. dollars are included in other income, net on the consolidated statements of operations. One of our European subsidiaries utilize Euro as their functional currency, which results in a translation adjustment that is included as a component of accumulated other comprehensive income. For any of the periods presented, we did not have material impact from exposure to foreign currency fluctuation. As we grow operations, our exposure to foreign currency risk will likely become more significant.

Item 4. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Our management, including our chief executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures as of June 30, 2023. Disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is (1) recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and (2) accumulated and communicated to management, including its principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure. Based on the evaluation of our disclosure controls and procedures, our chief executive officer and principal financial officer concluded that our disclosure controls and procedures were effective at a reasonable assurance level as of June 30, 2023.

Changes in Internal Control over Financial Reporting

There were no changes that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting during the three months ended June 30, 2023.

Limitations on Controls

Our disclosure controls and procedures and internal control over financial reporting are designed to provide reasonable assurance of achieving the desired control objectives. Our management recognizes that any control system, no matter how well designed and operated, is based upon certain judgments and assumptions and cannot provide absolute assurance that its objectives will be met. Similarly, an evaluation of controls cannot provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, have been detected.

PART II — OTHER INFORMATION

Item 1. Legal Proceedings.

In the normal course of business, we may be named as a party to various legal claims, actions and complaints. We cannot predict whether any resulting liability will have a material adverse effect on our financial position, results of operations, cash flows, market position or stock price.

Patent Litigation

On June 6, 2019, we filed a patent infringement lawsuit against a competitor, NXP, USA Inc., and on October 4, 2019, NXP USA, Inc. and its parent NXP Semiconductors N.V., filed a patent infringement lawsuit against us. Both we and NXP subsequently filed additional lawsuits against each other. The outcome of this patent litigation remains uncertain, and we may file additional lawsuits against NXP USA, Inc. and/or its parent or they may file additional lawsuits against us. For further information on these lawsuits, please refer to Note 6 of our condensed consolidated financial statements included elsewhere in this report.

Item 1A. Risk Factors.

You should carefully consider the following risk factors, in addition to the other information contained in this report, including the section of this report captioned "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and related notes. If any of the events described in the following risk factors and the risks described elsewhere in this report occur, then our business, operating results and financial condition could be materially impacted. This report also contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements due to factors that are described below and elsewhere in this report.

Risks Relating to Our Platform, Products and Technologies

We operate in a very competitive market.

Our principal current competitors are:

- in endpoint ICs, NXP, EM Microelectronic, Kiloway, Quanray, Fudan Microelectronics Group and Alien;
- in reader ICs, ST, Phychips, Iotelligent and MagicRF; and
- in readers and gateways, Zebra.

These competitors include companies that have much greater financial, operating, research and development, marketing and other resources than us. To gain market share, they could discount their products and accept lower margins, or they could maintain margins by achieving cost savings through better, more efficient designs or production methods. They could devote more resources than we can to product development, promotion, sale and support. They could also bundle other technologies, including those we do not have in our product portfolio, with their RAIN products.

Our partners, including our OEMs, ODMs, distributors, SIs, VARs and solution partners, may choose to compete with us rather than purchase our products, which would not only reduce our customer base but also increase competition in the market. Companies in adjacent markets or newly formed companies may decide to enter our market, particularly as RAIN adoption grows. Further, the Chinese government has made development of the Chinese semiconductor industry a priority, potentially increasing competition for us globally while possibly restricting our ability to participate in the Chinese market.

RAIN adoption is concentrated in key industries and the extent and pace of RAIN market adoption beyond those industries is uncertain.

Our financial performance depends on the pace of end-user RAIN adoption in key industries such as retail apparel, our largest market, retail general merchandise and SC&L. Although RAIN has been adopted to some degree by end users in those industries, those end users as well as the industries themselves are subject to business cycles and macroeconomic trends. Continued RAIN adoption by those end users and in those industries may be at risk if and when downcycles occur.

Outside those key industries, the RAIN market is still developing. RAIN adoption, as well as adoption of our platform and products, depend on many factors, including the extent to which end users understand and embrace the benefits that RAIN offers; whether the benefits of RAIN adoption outweigh the cost and time to replace or modify end users' existing systems and processes; and whether RAIN products and applications meet end users' current or anticipated needs.

We have, at times, anticipated and forecasted a pace of end-user adoption that exceeded the actual pace. We expect continued difficulty forecasting the pace of adoption. As a result, we may be unable to accurately forecast our future operating results including revenue, gross margins, cash flows and profitability, any or all of which could negatively impact our financial performance.

We are expected to introduce new products and product enhancements on a regular basis.

We introduce new products and services to advance our business, satisfy increasingly demanding end-user requirements and grow RAIN market adoption. We commit significant resources developing and introducing these new products and services. We also commit significant resources improving the performance and reliability of, and reducing the costs of, our existing products and services.

Whether our new products and services will succeed is uncertain. Our success in developing the technologies, processes or capabilities necessary or desired for new or enhanced products and services, or licensing or otherwise acquiring them from third parties, and our ability to introduce new products and services before our competition, depends on many factors, including:

- our ability to identify new product capabilities or services that will be widely adopted;
- our timely and efficient completion of the design process;
- our timely and efficient implementation of manufacturing, assembly and testing procedures;
- our attainment of appropriate product or service performance levels and product certification;
- partnering successfully with others to deliver complementary products or services;
- the quality, reliability and selling price of our product or service; and
- the effectiveness of our marketing, sales and service.

When we introduce new products, our success in ramping adoption depends, in part, on us making those products easy to deploy by our partners and their end users. For example, for our new M700-family endpoint ICs and E-family reader ICs, we continue supporting our partners to produce high-performing, high-quality products. Until our partners are able to deploy our products widely, adoption and our operating results could suffer.

Our abilities to deliver platform solutions at scale are nascent.

We believe we are still at a very early stage in our ability to deliver enterprise solutions. We are developing solutions for retail self-checkout and loss prevention and SC&L package routing that have been, or that we expect to be, deployed by the industry-leading enterprise end users for whom we are developing the solutions. However, to fully capitalize on our platform's potential, we must make our current offerings repeatable across multiple enterprises as well as deliver additional solutions to enterprise needs. If we do not succeed in identifying, developing and deploying enterprise solutions across a range of industries and customers, then our business prospects will suffer.

Delivering solutions that address enterprise needs requires a network of partner products and services that complement our own product offerings and that together address complex enterprise needs. Convincing enterprises to engage us to solve their business problems – including evaluation, design, deployment, operations and partner services, including leveraging RAIN data into the enterprise's information systems, requires tight coordination among our and our partners' sales, marketing, operations and engineering teams. Although we today have partners who successfully introduce our platform, or aspects of it, to their customers, their knowledge of our platform and RAIN in general is still nascent. If we do not build our network of solutions and partners to deliver those solutions and broaden our efforts to deliver solutions that leverage our platform in large, complex enterprise opportunities, then our business prospects will suffer.

We rely on endpoint IC sales to generate most of our revenue.

We derive, and expect to continue to derive, most of our product revenue from our endpoint ICs. If demand declines, or if we are unable to procure enough wafers to meet the demand we have, or if we are unable to raise prices to offset cost increases, then our business and operating results will suffer. In addition, the continued adoption of, and demand for, our existing endpoint ICs, as well as for our new endpoint ICs, derives in part from our ability to continually innovate and to demonstrate the benefits of using our endpoint ICs with our reader ICs, readers and gateways. If we fail to establish the benefits of using our endpoint ICs with our platform, then we may be unsuccessful in countering competitive pressures to lower prices for our endpoint ICs and our business and operating results could be adversely affected.

The selling prices of our products could fluctuate substantially.

The ASPs of our products has historically decreased with time, to meet end-user demands, to encourage adoption, to address macroeconomic conditions or to respond to market pressure from our competition. However, that trend is not constant and we have also increased prices from time to time. Although we expect further price decreases in the long term, we raised prices in 2021 and 2022 to accommodate higher product costs. We may be required to raise prices again if macroeconomic conditions, including inflation, create upward pressure on our product costs. If we are unable to offset ASP reductions with increased sales volumes or reduced product costs, or if we are unable to successfully increase ASPs to offset cost increases, then our revenue and gross margins will suffer.

When demand for older products declines, or during times of increased market inventory, ASPs may decline quickly. To sell our products profitably we must continually improve our technology and processes and reduce costs in line with the lower selling prices. If we and our product suppliers and manufacturers cannot create and implement processes or improve efficiencies sufficient to maintain our margins, then we may be unable to sell our products profitably.

Pricing commitments and other restrictive provisions in our customer agreements could adversely affect our operating results.

In the ordinary course of our business, we enter into agreements containing pricing terms that could, in some instances, adversely affect our operating results and gross margins. For example, some contracts specify future IC, reader or gateway pricing or contain most-favored-customer pricing for certain products. Other agreements contain exclusivity terms that prevent us from pursuing certain business with other customers during the exclusivity period. Reducing prices or offering favorable terms to one customer could adversely affect our ability to negotiate favorable terms with other customers.

Changes in our product mix could adversely affect our overall gross margin.

We generate most of our revenue from endpoint IC sales which have, for the most part, lower gross margins than our systems product sales. Our overall product gross margins are affected by product mix, which can fluctuate based on demand and supply, competitive pressures and end-user needs and demand. A shift in sales mix away from our higher margin products to lower margin products, either within our endpoint IC product portfolio or from our systems business to our endpoint ICs, could negatively affect our gross margins.

Poor product quality could result in significant costs to us and impair our ability to sell our products.

Our products must meet demanding specifications for quality, reliability and performance. Our products are both highly technical and deployed in large, complex systems in which errors, defects or incompatibilities can be problematic for our partners and end users.

If we are unable to correct errors, defects, incompatibilities or other problems in our products, we could experience:

- loss of customer orders or customers;
- lost or delayed market acceptance or sales;
- loss of market share;
- damage to our brand and reputation;
- impaired ability to attract new customers;
- diversion of development resources;
- increased service and warranty costs;
- replacement costs;
- legal actions by our partners or end users; and
- increased insurance costs.

Moreover, if we encounter product quality issues, then we may be required to incur significant time and costs to diagnose, test and fix the issues, and these efforts could further constrain our ability to supply our partners and end users with new products until we have resolved the issues.

End users and partners must design our products into their products and business processes.

Persuading end users or partners to design our products into their business processes or products requires educating them about RAIN’s and our products’ value. They may use other technologies or products and may not feel the need to learn about how RAIN or our products can improve their business processes or products. Even when convinced, they often undertake long pilot programs or qualification processes prior to placing orders. These pilot programs or qualification processes can be time consuming and expensive, and there is no assurance they will result in an order for our products. If we fail to develop new products that adequately or competitively address end users' or our partners' needs, then we may not receive product orders, which could adversely affect our business, prospects and operating results.

Our visibility into the length of the sales and deployment cycles for our products is limited.

We have limited visibility into end user sales and deployment cycles, and these cycles are often longer than we anticipate. Many factors contribute to our limited visibility, including the time our partners and end users spend evaluating our products, the time educating them on RAIN's benefits and the time integrating our products with end users' systems. The length and uncertain timing of the sales and deployment cycles can lead to delayed product orders. In anticipation of those orders, we may incur substantial costs before the sales cycle is complete and before we receive any customer orders or payments, if we receive them at all.

An inability or limited ability of end user systems to exploit RAIN information may adversely affect the market for our products.

A successful end-user deployment requires not only tags and readers or gateways, but RAIN integration with information systems and applications that create business value from the RAIN data. Unless third parties continue developing and advancing business analytics tools, and end users enhance their information systems to use these tools, RAIN deployments could stall. Our efforts to foster third-party development and deployment of these tools could fail. In addition, our guidance to business-analytics providers for integrating our products with their tools could prove ineffective.

Solution providers and SIs are essential to the RAIN market. They provide deployment know-how to enable end users to successfully deploy RAIN solutions. Integrating our products with end-user information systems could prove more difficult or time consuming than we or they anticipate, which could delay deployments.

Alternative technologies may enable products and services that compete with ours.

Technology developments may affect our business negatively. Breakthroughs in legacy RFID technologies or markets, including those using low frequency or high frequency RFID technology, or in other radio technologies, could adversely affect RAIN market growth and demand for our products. Likewise, new technologies may enable lower-cost ICs than our products. If we are unable to innovate using new or enhanced technologies or are slow to react to changes in existing technologies or in the market, or if we have difficulty competing with advances in new or legacy technologies, then our development of new or enhanced products could be impacted and result in product obsolescence, decreased revenue and reduced market share.

Significant changes in RAIN standards bodies, standards or qualification processes could impede our ability to sell our products and services.

We participate in developing RAIN industry standards, including with GS1 and ISO, and have designed our products to comply with those standards. We have historically taken a leadership position in standards development. In the future, we could lose that leadership position or our influence in standards development, or we could choose not to participate in certain standards activities.

New or changed industry standards could cause us to incur substantial development costs to meet the new or changed standards. If industry standards diverge from our or the RAIN market's needs, then our products may fail to keep pace with the market or cause end users to delay their deployments. Moreover, the adoption or expected adoption of new or changed standards could slow sales of our existing products before we can introduce new products that meet the new or changed standards. New standards or changes to existing standards could also limit our ability to implement new features in our products. The lost opportunities as well as time and expense to develop new products or change our existing products to comply with new or changed standards could be substantial, and we may not ultimately succeed in developing products that comply with new or changed standards.

Certain organizations develop requirements for RAIN tags and test tags against those requirements. As one example, the ARC Program at Auburn University, or ARC, develops tag performance and quality requirements for end users that engage them. Some participants in the RAIN market are ARC sponsors, but we are not among them. Some other organizations perform this function as well. ARC or a similar organization could develop specifications that some or all of our endpoint ICs fail to meet.

Changes in government spectrum regulations or in their enforcement could adversely affect our ability to sell our products.

Government radio regulations require that our readers and gateways be certified for spectral compliance where they are sold or operated. Our readers and gateways are collectively certified for use in more than 40 countries worldwide, including the United States, Canada, Mexico, China, Japan, South Korea and every country in the EU. If one of our reader or gateway products is found to be noncompliant despite being certified, we could be required to modify field-deployed readers or gateways and could spend significant resources and miss sales opportunities in the process.

Government regulations may change, possibly without notice, requiring us to redesign our products to conform with the new regulations or constraining our ability to incorporate new features into our products. Such changes could cause us to incur significant costs, including costs associated with obsolete inventory. Regulatory changes may also cause us forego opportunities to improve our products, potentially delaying our time-to-market.

Sales of some of our products could cannibalize revenue from other products.

Some of our partners develop products using some of our products that compete with other of our products. For example, some of our OEM partners use our reader ICs to build and sell readers and gateways that compete with our readers and gateways. Similarly, some of our partners use our readers to build and sell gateways that compete with our gateways. If we fail to manage such conflicts successfully, then our business and operating results could be negatively affected.

Risks Relating to Our Personnel and Business Operations

We obtain the products we sell through a limited number of third parties with whom we do not have long-term supply contracts.

Our ability to secure cost-effective, quality products in a timely manner could be adversely affected by many factors, including:

- Third-party manufacturing capacity may not be available when we need it, particularly from our foundry partners from whom we procure silicon wafers.
- Efforts to diversify our supplier base may be unsuccessful or may not result in us obtaining the anticipated benefits of such diversification.
- Some products have long lead times, and we place orders for them many months before our anticipated delivery dates to our customers. If we inaccurately forecast customer demand, then we may be unable to meet our customers' delivery requirements or we may accumulate excess inventory, increasing our costs.
- Supply disruptions may affect our ability to meet partner or end user demand, whether in a cost-effective manner or at all, potentially causing those partners or end users to cancel orders, qualify alternative suppliers or purchase from our competitors. Supply disruptions can also distort demand, making it even harder to meet true demand with finished products.

If our suppliers fail to manufacture our products at reasonable prices or with satisfactory quality levels, then our ability to bring those products to market and our reputation could both suffer. If supplier capacity diminishes, whether from equipment failures, closures, bankruptcy, capacity allocation, in response to Covid-19, catastrophic loss of facilities or otherwise, then we could have difficulty fulfilling orders, our revenue could decline and our growth prospects could be impaired. Transitioning our product manufacturing to new providers would take many months and, in the case of ICs, could take years. Any transition would require a requalification by our customers or end users, which could also adversely affect our ability to sell our products as well as our operating results.

Shortages of silicon wafers and components used in our readers and gateways may adversely affect our ability to meet demand for our products and adversely affect our revenue and/or gross margins.

The semiconductor industry has experienced many periods of capacity shortfall and just experienced another due to increased post-Covid demand. In particular, in both 2021 and 2022 we experienced tight wafer availability, and although we believe wafer availability will improve in 2023, our foundry partner has also raised prices. The semiconductor industry may continue to experience significant supply/demand imbalances, resulting in continued constraints on wafer availability. We procure wafers on a purchase-order basis from our foundry partners; consequently, wafer supply is not contractually guaranteed and there can be no assurance that we will receive adequate wafer supply from our foundry partners in 2023 or in the future.

Wafer shortfalls limit sales and may cause market-share losses if we are unable to supply enough products or our customers purchase competing products or, alternatively, may artificially increase bookings as customers over-order our products, followed by sales declines in future periods as they consume their accumulated inventory. Additionally, if we are unable to raise our prices to cover our higher costs, our gross margins and other financial results could suffer.

As we recover from wafer shortages, we may invest in inventory to support anticipated business growth, like we did with endpoint IC inventory in 2017 and 2020. However, maintaining high inventory levels can increase expenses or increase reserves, and exposes us to a higher risk of product obsolescence as we introduce new products and technologies, all of which could negatively affect our business. We may not be able to adequately anticipate the scope or nature of business growth, which could potentially result excess or obsolescent inventory. For example, in 2022, we saw greater demand for our 300mm M700 wafers, but due to inventory and supply limitations, we were required to transition some potential customers back to our prior-generation 200mm Monza R6 product family, despite M700 being our primary market demand. If we are unable to sell the inventory we purchased, or if we must sell such inventory at lower process—whether as a result of excess, obsolescence, or other factors—then our business will be negatively impacted.

To convert the wafers we receive from our foundry partner into saleable products, we and several third parties perform additional procedures, such as testing, thinning, dicing and bumping the ICs. If we or our partners are unable to efficiently perform these post-processing procedures, or if we experience any capacity constraints with respect to these post-processing procedures, then we may be unable to keep up with demand for our products and our financial results will suffer.

We have also experienced shortages and price increases for components we use in our readers and gateways, as well as in packaging and test capacity for our reader ICs, and we may continue to experience such shortages and price increases in the future. Any such shortages or price increases will negatively impact our product availability and costs. If we are unable to procure sufficient components and to increase our prices to cover our increased costs, then our financial results will suffer.

We bear inventory risks due to our reliance on partners to sell and distribute our products.

We typically order products from our suppliers based on partner forecasts before we receive purchase orders. However, many of our partners have difficulty accurately forecasting their demand and the timing of that demand. They also sometimes cancel orders or reschedule product shipments, in some cases with little or no advance notice to us. We also sometimes receive soft commitments for large orders which do not materialize. In addition, when we introduce new products, we may initially carry higher inventory or have slower inventory turns depending on market acceptance. We have additional uncertainty arising from competition and from unanticipated external events, such as macroeconomic trends or events and changes in regulatory standards, all of which can adversely affect demand and consequently our inventory levels, sales and operating results.

Acquisitions could result in operating difficulties, dilution and other harmful consequences.

We regularly evaluate potential strategic transactions, and we may pursue one or more transactions if complementary to our business. For example, in April 2023, we completed our acquisition of Voyantic Oy, a global provider of RFID (primarily RAIN and NFC) inlay and label design, manufacturing and test systems. These transactions could be material to our financial condition and operating results. We have limited experience executing acquisitions. Integrating an acquired company, business or technology may create unforeseen operating difficulties and expenditures. Acquisition-related risks include:

- difficulties integrating acquired products or lines of business into our strategy and product plans;
- customers switching from us to new suppliers because of the acquisition;
- inability to retain employees from the business we acquire;
- challenges associated with integrating employees from the acquired company into our organization;
- difficulties integrating accounting, management information, human resource, legal and other administrative systems to permit effective management of the business we acquire;
- potential requirements for remediating controls, procedures and policies appropriate for a public company in the acquired business that prior to the acquisition lacked these controls, procedures and policies;
- potential liability for past or present environmental, hazardous substance, or contamination concerns associated with the acquired business or its predecessors;
- possible write-offs or impairment charges resulting from the acquisition; and
- unanticipated or unknown liabilities relating to the acquired business.

Foreign acquisitions involve additional risks beyond those above, including related to integrating operations across different cultures and languages, currency risks and the economic, political and regulatory risks associated with other countries. Also, the anticipated benefit of any acquisition, domestic or foreign, may not materialize. Future acquisitions or dispositions could result in potentially dilutive issuances of our equity securities, debt incurrence, contingent liabilities or amortization expenses or goodwill write-offs, any of which could harm our financial condition. Future acquisitions may require us to obtain additional equity or debt financing, which may not be available on favorable terms or at all.

Covid-19 has adversely affected our business, and the magnitude and duration of future Covid-19 effects on our business are uncertain.

Since 2020, Covid-19 has created significant worldwide economic volatility, uncertainty and disruption, and, while improving, those effects may persist. Our significant continuing Covid-19 risks include:

- uncertain product demand globally;
- product availability delays and shortages;

- challenges in effectively managing our inventory due to uncertain supply or demand;
- partner-requested preordering or rescheduling as a result of supply concerns, possibly distorting channel inventory, either positively or negatively;
- increased operating and product costs;
- delays in research and development efforts, which, in turn, could delay new product introductions or product enhancements; and
- maintaining employee engagement and productivity in a remote or hybrid work environment.

The extent to which Covid-19 will continue impacting market demand is still unclear. In 2020 through 2022, Covid-19 adversely affected retail, including retail apparel, where RAIN is widely adopted. It also affected other markets that use our products including aviation, sporting events such as footraces, and others.

Our international supply chains remain vulnerable to Covid-19 related disruptions because most our products are manufactured and processed in Asia, which until fairly recently still experienced negative impacts related to Covid-19. Accordingly, risks associated with Covid-19 on our future product supply remain.

Changes in global trade policies could have a material adverse effect on us.

Changes in U.S. and foreign laws and policies governing foreign trade, manufacturing, development and investment in the jurisdictions where we currently develop and sell products, and any negative consequences resulting from such changes, could materially affect our business.

The U.S. government has imposed significant tariffs on a variety of items imported from other countries, particularly China. China responded by imposing significant tariffs on a variety of items imported from the United States. These tariffs could materially and adversely affect our ability to compete internationally. Although the United States and China signed a preliminary trade agreement in early 2020, the tariffs remain in place as negotiations between the countries continue. The future of these tariffs, as well as the possibility for new tariffs, remains uncertain. Changes in U.S. and Chinese industrial policy also contribute to uncertainty regarding the global trade environment.

Other causes of uncertainty include the effects of sanctions and other actions taken against Russia because Russia invaded Ukraine. While we do not today have business with Russian partners or end users, the effect of these sanctions on global trade and macroeconomic conditions generally—such as increases in the cost of energy and inflation—could nevertheless negatively affect our business.

We are subject to risks inherent in operating abroad and may not be able to successfully maintain or expand our international operations.

In 2022, we derived 83% of our total revenue from sales outside the United States. We anticipate growing our business, in part, by growing our international operations, which presents a variety of risks, including:

- changes, some unexpected or unanticipated, in regulatory requirements, taxes, trade laws, tariffs, export quotas, custom duties or other trade restrictions;
- lack of established, clear, or fairly implemented standards or regulations with which our products must comply;
- greater difficulty in enforcing contracts, judgments and arbitration awards in international courts, and in collecting accounts receivable as well as longer payment and collection periods;
- limited or unfavorable intellectual property protection;
- misappropriation of our intellectual property;
- inflation and fluctuations in foreign currency exchange rates and interest rates;
- restrictions, or changes thereof, on foreign trade or investment, including currency-exchange controls, including as a result of sanctions against Russia as a result of Russia invading Ukraine;
- changes in a country's or region's political, regulatory, legal or economic conditions, including, for example, global and regional economic disruptions caused by Covid-19;
- political, social and economic instability abroad; wars and other armed conflicts; and terrorist attacks and security concerns in general, including Russia invading Ukraine and China threatening Taiwan;
- differing regulations with regard to maintaining operations, products and public information;

- inequities or difficulties obtaining or maintaining export and import licenses;
- differing labor regulations, including where labor laws may be more advantageous to employees than in the United States;
- restrictions on earnings repatriation;
- corrupt or unethical practices in foreign jurisdictions that may subject us to exposure under applicable anti-corruption and anti-bribery laws such as the U.S. Foreign Corrupt Practices Act of 1977, as amended, or FCPA, and the United Kingdom Bribery Act of 2010, or U.K. Bribery Act; and
- regulations, and changes thereof, relating to data privacy, cybersecurity and the unauthorized use of, or access to, commercial and personal information, particularly in Europe.

We are subject to governmental export and import controls that could subject us to liability or impair our ability to compete in international markets.

We must export and import our products in compliance with U.S. export controls, including the Commerce Department's Export Administration Regulations and economic and trade sanctions established by the Treasury Department's Office of Foreign Assets Controls, as well as similar controls established in the countries in which we do business. For example, the U.S. Commerce Department recently issued rules regarding semiconductor- and supercomputer-related products and restrictions against sending certain chips and chip-related technology and software to China without an export license. In addition, after Russia invaded Ukraine, the United States and other countries imposed economic sanctions and export control restrictions against Russia and Belarus, as well as against certain Russian nationals and entities. We must undertake additional diligence efforts to comply with these rules, which may be time-consuming and result in delayed or lost opportunities. We may not always be successful in obtaining necessary export or import licenses, and our failure to obtain required export or import approval for our products or limitations on our ability to export or sell our products may harm our domestic and international sales and negatively affect our revenue.

The U.S. government has imposed tariffs on a variety of items imported from China. China has responded by imposing tariffs on a variety of items imported from the United States. Such tariffs could have a material impact on our product costs and decrease our ability to sell our products to existing or potential customers as well as harm our ability to compete internationally. Any changes in our product or in export or import regulations or legislation; shift or change in enforcement; or change in the countries, persons or technologies targeted by these regulations could delay us introducing new products in international markets, decrease use of our products by, or decrease our ability to export or sell our products to, existing or potential customers with international operations, adversely affecting our business and results of operations.

Instability or deterioration in the political, social, business or economic conditions in key jurisdictions could harm our supply or deployment of products.

Deterioration in the political, social, business or economic conditions in any jurisdictions in which we have significant suppliers, distributors or end users—including as a result of natural disasters, labor strikes, public health crises, geopolitical events or other developments—could slow or halt product shipments or disrupt our ability to manufacture, test or post-process our products, as well as our ability to effectively and timely execute on end user deployments. We outsource our manufacturing and production to suppliers in a small number of Asian jurisdictions including Thailand, Malaysia, Taiwan and China. Some of these jurisdictions have experienced, and may yet experience, restrictions related to Covid-19. These jurisdictions have also experienced significant changes in political, social, business or economic conditions in the past and may experience them in the future.

We could be forced to transfer our manufacturing, testing and post-processing activities to more stable, and potentially more costly, regions or find alternative suppliers.

We source a significant portion of our wafers from suppliers in Taiwan, and our supply of wafers and other critical components may be materially and adversely affected by diplomatic, geopolitical and other developments between China and Taiwan. Notably, China has refused to renounce the use of military force against Taiwan, and there can be no assurance that relations between China and Taiwan will not deteriorate further, particularly in light of ongoing tensions between the United States and China. Any such developments could materially and adversely affect our business, financial condition and results of operations.

Our business operations could be disrupted by natural disasters.

In addition to the pandemic risk discussed earlier under "—Covid-19 has adversely affected our business, and the magnitude and duration of future Covid-19 effects on our business are uncertain," other disasters, whether natural or manmade, could decrease demand for our products, disable our facilities, disrupt operations or cause catastrophic losses. We have facilities in areas with known seismic activity, such as our headquarters in Seattle, Washington. We have facilities in areas with known flooding, such as our office in Shanghai, China. We have a wafer testing and dicing subcontractor in Thailand, a region with a known, and recent, history of flooding. A loss at any of these or other of our or our suppliers' facilities could disrupt operations, delay production and shipments, reduce revenue and engender potentially large expenses to repair or replace the facility. We do not carry insurance covering potential losses caused by pandemics, earthquakes, floods or other disasters.

Risks Relating to Our Relationships with Partners and End Users

We rely on a small number of customers for a large share of our revenue.

We sell our endpoint ICs directly to inlay and tag OEMs and ODMs. We sell our reader ICs to OEMs and ODMs, and our readers and gateways to solution providers, VARs and SIs, all primarily through distribution. If we fail to retain our endpoint IC, reader IC, reader or gateway partners or distributors or fail to establish relationships with new partners, then our business, financial condition or operating results could be harmed.

In 2022, sales to tag OEMs Avery Dennison and Arizon accounted for 28% and 10% of our total revenue, respectively. Sales concentration to a small number of OEMs decreases our bargaining power and increases the risk that our pricing or sales could decline based on actions taken by our competitors or our own failure to compete effectively.

Our competitors' relationships with, or acquisitions of, these partners or distributors could interfere with our relationships with them. Any such interference could impair or delay our product sales or increase our cost of sales.

We engage directly with end users to adopt our products in large projects. These projects, often involving large purchases of our readers and gateways, are often discrete deployments that can result in significant sales for periods of time. They also increase the volatility of our revenue and operating results. If we are unable to replace project-based revenue with new revenue streams, or if end users with large projects change or delay them without giving us with adequate notice, then our sales could decline from period to period and harm our stock price.

Our ability to affect or determine end-user demand is limited in part because we sell and fulfill primarily through partners and rarely directly to end users.

End users drive demand for our products but because we sell our products primarily through partners, we are one step removed from those end users and often unable to directly assess and affect their demand. Our partners may choose to prioritize selling our competitors' products over ours, or they may offer products that compete with our products or limit sales of our products. If our partners do not sell enough of our products or if they choose to decrease their inventories of our products, then our sales to those partners and our revenue will decline.

Our partners may not properly forecast end users' demand for our products.

Our partners may purchase more of our products than they need to satisfy end-user demand, increasing their inventory and reducing our future sales to them. Distributors may, subject to time and quality limitations, return products in exchange for other products. Our reserves estimates for products stocked by our distributors are based primarily on reports provided to us by those distributors, typically monthly. If the inventory and resale information our partners and distributors provide is inaccurate, or if we do not receive it in a timely manner, then we may not have a reliable view of products being sold to end users which could negatively impact our operating results.

Our growth strategy depends in part on the success of strategic relationships with third parties and their continued performance and alignment.

We invest in relationships with solution providers, SIs, VARs and software providers whose product and/or solution offerings complement ours and through which we often fulfill our product sales. Our business will be harmed if we fail to develop and grow these partner relationships. For example, our operating results may suffer if our efforts developing partner relationships increase our costs but do not increase revenue. Partner relationships may also include exclusivity provisions, multiple levels of distribution, discounted pricing or investments in other companies. The cost of developing and maintaining these partner relationships may go unrecovered and our efforts may not generate a corresponding revenue increase.

If we fail to maintain or enhance our brand recognition or reputation on which our business depends, then our business could be harmed.

We believe that building our brand and reputation is key to our relationships with partners and end users and our ability to attract new partners and end users. We also believe that our brand and reputation will be increasingly important as market competition increases. Our success depends on a range of factors, including:

- continuing to deliver high-quality, innovative and defect-free products;
- maintaining high partner and end user satisfaction;
- successfully differentiating our products from those of our competitors; and
- appropriately managing both positive and negative publicity.

Product supply shortages have challenged our ability to meet market needs and we have recently increased prices in response to our suppliers increasing their prices to us. Our inability to supply partners and end users with products they need, and/or our need to increase our prices could result in long-lasting, negative consequences to our relationships with those partners and end users, to RAIN adoption and to our business overall.

Increasing attention to environmental, social and governance matters may cause us to incur additional costs or expose us to additional risks.

Investors, governmental and nongovernmental organizations, partners and end users are increasingly focusing on environmental, social and governance, or ESG, practices. Our ESG practices may not meet their standards, and they as well as advocacy groups may campaign for us to change our business or practices to address their ESG-related concerns. A failure, or perceived failure, of us to respond to any such campaigns could harm our business and reputation and negatively impact the market price of our securities. Moreover, with the continued evolution of ESG practices and reporting and disclosure requirements, our costs related to those ESG practices and reporting and disclosure requirements could increase, which could negatively affect our operating results.

Risks Relating to Our Intellectual Property

If we are unable to protect our intellectual property, then our business could be adversely affected.

Our success depends in part upon our ability to obtain, maintain and enforce our patents, copyrights, trade secrets, trademarks and other intellectual property rights and prevent third parties from infringing, misappropriating or circumventing those rights. We have historically focused on filing U.S. patent applications, for many reasons, including the fact that most RAIN products are used in or imported into the United States. We have only a small number of foreign patent applications or foreign patents. We also only have registered trademarks and domain names in select countries where we believe filing for such protection is appropriate. By focusing our intellectual property protection on the United States and a small number of foreign countries, we have limited ability to assert that intellectual property outside the United States, including in some significant foreign markets such as China.

We cannot guarantee that:

- any of the patents, trademarks, copyrights, trade secrets or other intellectual property rights we presently employ in our business will not lapse or be invalidated, circumvented, challenged or abandoned;
- our intellectual property rights will provide competitive advantages to us;
- our ability to assert our intellectual property rights against potential competitors or to settle current or future disputes will not be limited by our agreements with third parties;
- any of our pending or future patent applications will be issued or have the coverage we originally sought;
- our intellectual property rights can or will be enforced, particularly in jurisdictions where competition may be intense or where legal protections may be weak;
- we will not lose the ability to assert our intellectual property rights against, or to license our technology to, others and collect royalties or other payments; or
- we will retain the right to ask for a royalty-bearing license to an industry standard if we fail to file an intellectual property declaration pursuant to the standards process.

Monitoring and addressing unauthorized use of our intellectual property is difficult and costly, and litigation to enforce our intellectual property rights is time consuming, distracting, expensive and uncertain. Our failure to identify unauthorized use of, or otherwise adequately protect our intellectual property could adversely affect our business.

We may become party to intellectual property disputes which could be time consuming, costly to prosecute, defend or settle, result in the loss of significant rights, and adversely affect RAIN adoption or adoption of our products or platform.

We are engaged in several patent infringement lawsuits against NXP USA, Inc., a Delaware corporation, and certain of its affiliates. For further information regarding this litigation, please refer to Note 6 of our consolidated financial statements included elsewhere in this report. Our litigation with NXP, including any appeals, has contributed, and may continue to contribute, to increased legal expenses and demands on our management team's time, and could negatively impact our relationships with partners or end users. While we have obtained favorable jury verdicts in prosecuting our patent infringement claim against NXP in California and in defending against NXP's patent infringement claim against us in Washington, these results remain subject to appeal. Moreover, these jury verdicts can provide no assurance regarding the results of our other ongoing litigation involving NXP. If we are unsuccessful in prosecuting our patent-infringement claims against NXP or in defending ourselves against NXP's counterclaims, or to the extent we cannot maintain the validity and enforceability of our patents, then we could see a material adverse effect on our business, results of operations or financial condition.

Patent litigation is inherently complex and uncertain. We may or may not prevail in patent-related proceedings and our intellectual property could be weakened. If any pending or future proceedings result in an adverse outcome, then we could be required to:

- cease manufacturing, using or selling the infringing products, processes or technology;
- pay substantial damages for infringement;
- expend significant resources to develop non-infringing products, processes or technology;
- license technology from the party claiming infringement, which license may not be available on commercially reasonable terms, or at all;
- cross-license our technology to a competitor to resolve an infringement claim, which could weaken our ability to compete with that competitor; or
- pay substantial damages to our partners or end users for them to discontinue using, or replace, infringing products with non-infringing products.

Even if we do prevail in patent-related proceedings, verdicts and and judgments can be modified or even reversed by trial or appellate courts.

Many companies in our industry, as well as nonpracticing entities, hold patents and other intellectual property rights and may pursue, protect and enforce those intellectual property rights. We receive invitations to license patent and other intellectual property rights to technologies that could be important to our business. We also receive assertions against us, our partners and end users claiming we or they infringe patent or other intellectual property rights. If we decline to accept an invitation to license or to refute an asserted claim, then the offering or claiming party may pursue litigation against us.

Intellectual property disputes have adversely affected RAIN adoption in the past. As one example, in 2011 Round Rock Research filed lawsuits against 11 end users, including Walmart and Macy's, for RAIN-related patent infringement. Despite the subsequent availability of an industry-wide license, we believe those lawsuits adversely affected demand for our products from 2011 to 2019. The licensed Round Rock patents expired in 2019. However, we, our partners, suppliers or end users could be involved in similar disputes in the future which could adversely affect our operating results and growth prospects.

Many of our agreements require us to indemnify and defend partners and end users from third-party infringement claims and pay damages in the case of adverse rulings. These damages could be sizable and disproportionate to the business we derive from those partners or end users. Moreover, we may not know whether we are infringing a third party's rights due to the large number of RAIN-related patents or to other systemic factors. For example, patent applications in the United States are maintained in confidence for up to 18 months after filing or, in some instances, for the entire time prior to patent issuance. Consequently, we may not be able to account for such rights until after a patent issues.

Intellectual property policies of industry standards organizations in whose working groups we participate could require us to provide royalty-free licenses of some of our intellectual property.

When participating in GS1, ISO, RAIN and other industry-standards organizations, it is a general policy that those who participate in developing a protocol or standard must license, either royalty-free or under reasonable and nondiscriminatory, or RAND, terms, intellectual property that is necessary to implement all or part of the protocol or standard. The standards body may require that the license be granted to members, as in the case of GS1, or to all parties, as in the case of ISO, that implement the protocol or standard.

As a participant in developing GS1 EPCglobal UHF Gen2, UHF Gen2 V2, tag data standards, low-level reader protocol and other GS1 EPCglobal protocols, we agreed to license to other GS1 EPCglobal members, on a royalty-free basis, those of our patents necessary to practice those protocols, subject to us receiving reciprocal royalty-free rights from the other GS1 EPCglobal member practicing the protocol. As a participant in developing ISO standards, we agreed to license on a RAND basis those of our patents necessary to practice those standards, subject to us receiving a reciprocal RAND license from the other entity practicing the standard.

Although the policies themselves seek to advance protocol or standards development, disputes can arise because it may not be clear whether certain intellectual property is necessary to practice a protocol or standard. Such uncertainty could complicate us asserting our not-necessary patents against others, or to use those patents in our own defense, thereby devaluing our intellectual property. Further, some GS1 EPCglobal members declined to license their intellectual property on royalty-free terms, instead retaining the right to license their technology on RAND terms. These members may choose to assert their intellectual property, in which case we will need to defend ourselves within the confines of the GS1 and ISO intellectual property policies.

We rely on third-party license agreements which, if impaired or terminated, could cause production or shipment delays that could harm our business.

We have license agreements with third parties for patents, software and technology we use in our operations and in our products. For example, we license tools from design-automation software vendors to design our silicon ICs. Third-party licenses for patents, software and other technology important to our business may not continue to be available on commercially reasonable terms or may not be available at all. Loss of any such licenses could cause manufacturing interruptions or delays or reductions in product shipments until we can develop, license, integrate and deploy alternative technologies, if even possible, which could harm our business and operating results.

Our use of open-source software may expose us to additional risks and weaken our intellectual property rights.

Our products, processes and technology sometimes use or incorporate software that is subject to an open-source license. Certain open-source licenses require a user who intends to distribute the open-source software as a component of the user's software to disclose publicly part or all of the user's source code. In addition, certain open-source software licenses require the user of such software to make derivative works of the open-source software available to others at low or no cost. Open-source licensors generally do not provide warranties or other contractual protections regarding infringement claims or the quality of their code, opening us to business risks that could materially harm our operating results.

We cannot guarantee that we have incorporated open-source software in a manner that is consistent with our policies and procedures relative to such open-source software, or in a manner that will not subject us to liability.

Risks Relating to Privacy and Cybersecurity

Privacy and security concerns relating to RAIN could damage our reputation and deter current or potential customers from using our products.

Privacy advocates and others have raised and may continue raising concerns about RAIN compromising consumer privacy or facilitating theft. These concerns include unauthorized parties potentially collecting personal information or personal data, tracking consumers, stealing identities or causing other issues relating to privacy or data protection. Any such incident could cause our or our partners' or end users' operations to be disrupted and subject us or them to regulatory investigations or proceedings and claims, demands or litigation; consequently, we could face potential liability and significant costs and expenses to remediate or otherwise respond to the incident. Any failure or perceived failure to comply with any privacy- or security-related laws, regulations or contractual or other obligations to which we are or may be subject may result in regulatory actions, claims or litigation; legal and other costs; substantial time and resources; and fines, penalties or other liabilities. Any actions or concerns about security and privacy may be expensive to defend, cause us to expend substantial time and resources and damage our reputation and operating results or could negatively impact overall RAIN industry development, even if unfounded.

We cannot be sure that any limitation-of-liability provisions in our customer and user agreements, contracts with third-party vendors and service providers or other contracts are enforceable or adequate or would protect us from any liabilities or damages against claims relating to a security breach or other privacy- or security-related issue.

Government regulations and guidelines and other standards relating to consumer privacy may adversely impact adoption of our products, require us to make design changes or constrain our ability to implement new and desired product features, and actual or alleged violations of laws relating to privacy or information security may result in claims, proceedings and liability.

Our partners and end users are subject to laws and regulations related to collecting, storing, transmitting and using personal information and personal data, as well as to additional laws and regulations that address privacy and security related to RFID in general. Because RAIN is a type of RFID, we believe these laws and regulations apply to RAIN.

The European Commission, or the EC, has issued guidance to address privacy concerns about RFID. In May, 2009 the EC issued a recommendation that retailers in the EU inform their customers when RFID tags are either on or embedded within products. In April 2011 the EC signed a voluntary agreement with private and public entities to develop privacy guidelines for companies using RFID in the EU. Whereas compliance is voluntary, our partners and end users that do business in the EU prefer products that comply with the guidelines. If our products do not comply or enable compliance with the guidelines, then our business may suffer.

More generally, the data security and privacy legislative and regulatory landscape in the United States, EU and other jurisdictions continues evolving. Aspects of key privacy laws and regulations—including the California Consumer Privacy Act of 2018, the California Privacy Rights Act, other similar state privacy laws enacted in numerous states, and the General Data Protection Regulation—remain unclear as of the date of this report and continue evolving, potentially with far-reaching implications. Laws and regulations relating to privacy, data protection and security; related industry standards and guidelines; and continued evolution of these laws, regulations, standards, guidelines and other actual and asserted obligations, as well as their interpretation and enforcement, may require us to modify our products, practices and policies, which we may not be able to do on commercially reasonable terms or at all, and otherwise could cause us to incur substantial costs and expenses. Any failure or perceived failure by us or any third parties with which we do business to comply with these laws and regulations or other actual or asserted obligations may result in claims or litigation; actions against us by governmental entities; legal and other costs; substantial time and resources and fines, penalties or other liabilities. Any such actions may be expensive to defend, may incur substantial legal and other costs and substantial time and resources and likely would damage our reputation and adversely affect our business, financial condition and results of operations.

Additionally, if we fail to develop products that meet end-user privacy requirements, then end users may choose not to use our products.

Although the Gen2 V2 protocol includes features for addressing consumer privacy and authenticating a tag, and although we have incorporated custom features in our products to further protect consumer privacy, a third party may still breach these features, including as implemented in our products, in which case our reputation could be damaged and our business and prospects could suffer.

A breach of security or other security incident impacting our systems or others used in our business could have an adverse effect on our business.

We face risks of security breaches and incidents from a variety of sources including viruses, ransomware, hacking, malicious code, supply-chain attacks as well as social engineering or other employee or contractor negligence, malfeasance or unintentional acts. Accidental or willful security breaches or incidents, or unauthorized access to our facilities or information systems, or to others used in our business, could compromise the security of those facilities or information systems and the confidentiality, integrity and availability of confidential, personal or proprietary information. These risks may be heightened in connection with Russia's invasion of Ukraine.

The consequences of loss, misuse, corruption or other unauthorized processing of confidential, personal or proprietary information could include, among other things, unfavorable publicity, reputational damage, difficulty marketing or selling our products, customer allegations of breach of contract, loss or theft of intellectual property, claims and litigation, governmental and regulatory investigations and other proceedings and fines, penalties and other damages and liabilities. Any of these consequences could have a material adverse effect on our business, financial condition, reputation and business relationships.

We rely on third-party services to store and process data on our behalf, and on third-party security systems in a variety of applications. Our platform operates in conjunction with, and depends on, third-party products, services and components for security. The cybersecurity threat environment continues to evolve considering the increase in remote work and heightened activity by state-sponsored actors. If we, our platform, or any of the third parties on which we rely suffers a security breach or incident, vulnerability, error, ransomware or malicious event, then we could face increased costs, claims, liability, reduced revenue and harm to our reputation.

We incur significant costs to detect and prevent security breaches and other security-related incidents. In the event of an actual or perceived security breach or incident we may need to expend significant resources to mitigate, notify third parties of, and otherwise address the breach or incident, its root cause and take steps to prevent further breaches or incidents. Our insurance may not adequately cover claims relating to an actual or perceived security breach or incident and any breach or incident may increase our insurance costs as well as reduce or eliminate the future availability of such insurance, harming our business and reputation.

Risks Relating to Our Financial Position and Capital Needs

We have a history of losses and have only achieved profitability intermittently. We cannot be certain that we will attain or sustain profitability in the future.

We have incurred losses since our inception in 2000. Whereas we were profitable between 2013 and 2015, we had a net loss of $24.3 million for the year ended December 31, 2022, and an accumulated deficit of $386.8 million as of December 31, 2022. Our ability to attain or sustain profitability depends on numerous factors, many of which are out of our control, including continued RAIN industry adoption and us maintaining or growing our market share. Our costs to support operations, product development and business and personnel expansion in sales, engineering and marketing are significant and are likely to increase as we invest to grow the market and our share of it, reduce our costs and improve our operations. If we fail to increase our revenue or manage our expenses, or if our investments in growing the market or our share of it fail, then we may not attain or sustain profitability.

We have a history of significant fluctuations in our quarterly and annual operating results.

Our history shows significant sales volatility and a limited ability to forecast sales. We anticipate that, for the foreseeable future, our visibility to future sales, including volumes and prices, will continue to be limited. That limited visibility may cause fluctuations in our operating results and differences between actual and expected quarterly or annual operating results.

Many factors, some outside our control, may cause or contribute to fluctuations in our quarterly and annual operating results. These fluctuations make financial planning and forecasting difficult. These fluctuations may also cause unanticipated decreases in our available cash, which could negatively affect our business and prospects. Material factors that contribute to fluctuations in our operating results include:

- macroeconomic conditions, including inflation, recession or economic slowdown, and their impact on our business and that of our suppliers, partners and end users;
- fluctuations or delays in RAIN adoption and deployment by end users;
- changes in the pace or direction of major deployments, whether due to macroeconomic conditions or enterprise-specific events or circumstances;
- fluctuations in demand for our products or platform, including by tag OEMs and other significant partners and end users on whom we rely for a substantial portion of our revenue;
- fluctuations in the pricing and availability or supply of our products or key elements or components of those products, especially semiconductor wafers;
- degradations in product quality, whether due to us or our suppliers, including quality claims or product returns;
- delays in new-product introductions and in the maturity of our new-product technologies;
- decreases in selling prices for our products;
- delays in our product-shipment timing, customer or end-user sales or deployment cycles, or work performed under development contracts;
- intellectual property disputes involving us, our partners, end users or other participants in our industry;
- adverse outcomes of litigation or governmental proceedings;
- timing variability in product introductions, enhancements, services and technologies by us and our competitors as well as market acceptance of new or enhanced products, services and technologies;
- unanticipated excess or obsolete inventory as a result of significant demand fluctuations, supply-chain mismanagement, new-product introduction, quality issues or otherwise;
- changes in the amount and timing of our operating costs, including those related to expanding our business, operations and infrastructure;
- changes in business cycles or seasonal fluctuations that affect the markets in which we sell;
- changes in industry standards or specifications, or changes in government regulations, relating to our products or our platform;
- late, delayed or cancelled payments from our partners or end users; and
- unanticipated impairment of long-lived assets and goodwill.

A substantial portion of our operating expenses are fixed in the short term, and as a result, fluctuations in revenue or unanticipated expenses can have a material and immediate impact on our profitability and negatively affect our operating results, which could cause the price of our common stock to decline.

We may need to raise additional capital which may not be available on favorable terms or at all.

In the future we may raise capital, including pursuant to a shelf registration statement filed with the SEC, potentially diluting our stockholders, restricting our operations or otherwise adversely affecting our business.

Debt financing, if available, may include covenants limiting or restricting our ability to take specific actions such as incurring additional debt, expending capital or declaring dividends, or may impose financial covenants that limit our ability to achieve our business objectives.

Our management has broad discretion in how to invest and spend our cash and cash equivalents and the proceeds from financings, including on capital expenditures, product development, working capital and other general corporate purposes. We may spend our cash and cash equivalents in ways that our stockholders may not agree with or that do not yield favorable returns.

If we need additional capital but cannot raise it on acceptable terms, if at all, then we may not be able to meet our business objectives, financial obligations or both. If we raise additional capital but do not deploy it effectively then our business, financial condition, results of operations and prospects could be harmed and the market price of our common stock could suffer.

Risks Relating to U.S. Federal Income Tax

Our ability to use net operating losses to offset future taxable income may be limited.

As of December 31, 2022, we had federal net operating loss carryforwards, or NOLs, of $249.3 million and federal research and development credit carryforwards of $22.3 million, which we may use to reduce future taxable income or offset income taxes. We have established a valuation allowance against the carrying value of these deferred tax assets. The NOL and federal research and development credit carryforwards began expiring in 2020.

Under Sections 382 and 383 of the U.S. Internal Revenue Code, or the Code, a corporation that experiences a more-than 50% ownership change by one or more stockholders or groups of stockholders who own at least 5% of a company's stock over a three-year testing period is limited in its ability to use its pre-change NOLs and other tax assets to offset future taxable income or income taxes. If we undergo a future ownership change then our ability to use our NOLs and credit carryforwards could be limited by Sections 382 and 383 of the Code. Our NOLs may also be limited under state law. As a result of these limitations, we may not be able to utilize a material portion of, or possibly any of, the NOLs and credit carryforwards to offset future taxable income or income taxes.

We could be subject to additional income tax liabilities.

We are subject to income taxes in the United States and certain foreign jurisdictions. During the ordinary course of business, we use significant judgment in evaluating our worldwide income-tax obligations and we conduct many transactions for which the ultimate tax determination is uncertain. Although we believe our tax determinations are proper, the final determination of any tax audits and any possible litigation could be materially different from our historical income-tax provisions and accruals. The results of an audit or litigation could have a material effect on our operating results or cash flows in the period or periods for which that determination is made.

Changes in tax laws could have a material adverse effect on our business, cash flow, results of operations or financial conditions.

We are subject to tax laws, regulations and policies of several taxing jurisdictions. Changes in tax laws, as well as other factors, could cause us to experience fluctuations in our tax obligations and effective tax rates and otherwise adversely affect our tax positions and/or our tax liabilities. For example, in August 2022 the United States enacted a 1% excise tax on stock buybacks and a 15% alternative minimum tax on adjusted financial statement income as part of the Inflation Reduction Act of 2022.

The U.S. CHIPS and Science Act, enacted August 9, 2022, provides tax credits for semiconductor manufacturing activities within the United States, but because we outsource our semiconductor manufacturing we do not expect to be entitled to these tax credits.

Many countries, as well as organizations such as the Organization for Economic Cooperation and Development, have proposed changes to existing tax laws, including a proposed 15% global minimum tax. Any of these developments or changes in federal, state or international tax laws or tax rulings could adversely affect our effective tax rate and our operating results. There can be no assurance that our effective tax rates, tax payments or tax credits and incentives will not be adversely affected by these or other developments or changes in law.

Taxing authorities may successfully assert that we should have collected or in the future should collect sales and use, value-added or similar taxes.

We do not collect sales and use, value-added or similar taxes in all jurisdictions in which we have sales, based on our belief that such taxes are either not applicable or an exemption from such taxes applies. Certain jurisdictions may assert that such taxes are applicable, which could result in tax assessments, penalties and interest, and we may be required to collect such taxes in the future, including as a result of a change in law. Such tax assessments, penalties and interest or future requirements may negatively affect our operating results.

Risks Relating to Our Financial Reporting and Disclosure

Any failure to maintain an effective system of disclosure and internal controls over financial reporting, or our ability to produce timely and accurate financial statements, could adversely affect investor confidence in us.

As a public company, we must maintain effective disclosure controls and procedures and internal control over financial reporting. Effective internal controls are necessary for us to provide reliable financial reports and prevent fraud.

Any failure to implement and maintain effective disclosure controls and procedures and internal control over financial reporting, including identifying material weaknesses, could cause investors to lose confidence in the accuracy and completeness of our financial statements and reports, which could adversely affect the market price of our common stock. We could also be subject to sanctions or investigations by The Nasdaq Stock Market, the SEC and other regulatory authorities.

We have incurred, and in the future will incur, high costs associated with being a public company.

We have incurred significant legal, accounting and other costs associated with public-company reporting requirements. We ceased to be an "emerging growth company" on December 31, 2021, and are no longer eligible for the reduced disclosure requirements and exemptions applicable to "emerging growth companies." Our loss of this status has required additional management attention and increased our costs, including legal, accounting and investor-relations-related costs. We cannot predict or accurately estimate the additional costs we are likely to incur from being a public company or the timing of these costs.

We have and will continue to incur costs associated with accepted corporate governance requirements, including those of the SEC and The Nasdaq Global Select Market. We expect those governance requirements to lead to ongoing legal and financial costs and make some activities more time consuming and costly. They may also increase the difficulty and expense for us to obtain director and officer liability insurance. Although we monitor developments with respect to those requirements, we cannot predict or accurately estimate the additional costs we are likely to incur or the timing of these costs.

Risks Relating to Owning or Trading Our Securities

The market price of our common stock has been and will likely continue to be volatile, and the value of your investment could decline significantly.

The trading price of our common stock has fluctuated and is likely to continue to fluctuate substantially. The following factors, in addition to general risks and other risks described in this report, may have a material effect on the trading price of our common stock:

- price and volume fluctuations in the overall stock market;
- changes in operating performance, stock market valuations and volatility in the market prices of other technology companies generally, and of those in our industry in particular;
- actual or anticipated quarterly variations in our results of operations or those of our competitors;
- actual or anticipated changes in our growth rate relative to our competitors;
- delays in end-user deployments of RAIN solutions;
- announcements by us or our competitors of acquisitions, new products, significant contracts, commercial relationships or capital commitments;
- supply interruptions, including semiconductor wafer or other product or component shortfalls;
- developments relating to intellectual property rights or in disputes relating to those rights;
- our ability to develop and market new and enhanced products on a timely basis;
- commencement of, or our involvement in, litigation;
- changes in our board of directors or management;
- changes in governmental regulations or in the status of our regulatory approvals;
- unstable political and economic conditions, including instability resulting from wars and other armed conflicts, such as Russia invading Ukraine;
- the trading volume of our stock;
- actual or perceived security breaches or incidents;

- limited public float;
- any future sales of our common stock or other securities;
- financial analysts dropping or reducing their coverage of us; changes in financial estimates by analysts who do cover us; or our failure to meet analyst estimates or investor expectations;
- fluctuations in the values of companies that investors perceive to be comparable to us;
- the financial projections we may provide to the public, as well as any changes in those projections or our failure to meet those projections; and
- general economic conditions and slow or negative growth in the markets in which we operate.

Technology stocks like ours have experienced extreme price and volume fluctuations, often unrelated or disproportionate to the company's underlying operating performance. Stock price volatility can cause stockholders to institute securities class-action litigation or stockholder derivative litigation, as occurred to us between 2018 and 2020. If any of our stockholders were to bring a lawsuit against us, the defense and disposition of the lawsuit could be costly and divert the time and attention of our management, harm our operating results and negatively impact the trading price of our common stock.

Transactions relating to the 2021 Notes may affect our stock's value.

If the 2021 Notes are converted by holders, then we are entitled to deliver cash, stock or any combination of cash or stock, at our election. If we elect to deliver stock, the ownership interests of our existing stockholders will be diluted, and public market sales of stock issued upon a conversion could decrease our stock price. Anticipated future conversions of the 2021 Notes into stock could also decrease our stock price, as could short selling by holders of the 2021 Notes to hedge their positions.

In December 2019, we issued the 2019 Notes. When we did so we entered into privately negotiated capped-call transactions with financial counterparties to mitigate the dilutive impact on the Company above a given stock price. We left those capped-call transactions intact after we acquired the remainder of the outstanding 2019 Notes in June 2022. From time to time, the financial counterparties to the capped calls may modify their hedge positions by entering into or unwinding various derivative transactions involving our stock or by purchasing or selling our stock or other securities of ours in secondary market transactions prior to the maturity of the capped calls. This activity could cause a decrease in our stock price.

For more information on the 2019 Notes, the 2021 Notes and the capped-call transactions, see Note 7 of our consolidated financial statements included elsewhere in this report.

Our principal stockholders and management own a significant percentage of our stock and are able to exercise significant influence over matters subject to stockholder approval.

As of June 30, 2023, our executive officers, directors and principal stockholders, together with their respective affiliates, beneficially owned approximately 51.1% of our stock. As a result, our executive officers, directors and principal stockholders may be able to significantly influence, in their capacity as stockholders, matters requiring approval by our stockholders, including electing directors and approving mergers, acquisitions or other transactions. They may have interests that differ from yours and may vote in a way with which you disagree and which may be adverse to your interests. This ownership concentration could have the effect of delaying or preventing a change in our control or otherwise discouraging a potential acquirer from attempting to obtain control of us, which in turn could have a material adverse effect on our stock price. This ownership concentration could also prevent attempts by our stockholders to replace or remove our board of directors or management.

We may not have sufficient cash flow or access to cash necessary to satisfy our obligations under the 2021 Notes, and our current and future indebtedness may restrict our business.

Our ability to make scheduled payments of the principal of, to pay interest on or to refinance any current or future indebtedness, including the 2021 Notes, or to make cash payments in connection with any conversion of the 2021 Notes or upon any fundamental change if holders require us to repurchase their 2021 Notes for cash, depends on our future performance, which is subject to economic, financial, competitive and other factors beyond our control. Our business may not generate sufficient future cash from operations to service our indebtedness and make necessary capital expenditures. If we are unable to generate sufficient cash flow, then we may be required to pursue other alternatives, such as selling assets, restructuring indebtedness or obtaining additional equity capital on terms that may be onerous or highly dilutive. Our ability to refinance any of our indebtedness, including the 2021 Notes, will depend on the capital markets and our financial condition at that time. We may not be able to pursue these alternatives on favorable terms or at all, which could result in us defaulting on our debt obligations.

Our existing and future indebtedness could have important consequences to our stockholders and significant effects on our business. For example, it could:

- make it more difficult for us to satisfy our debt obligations, including the 2021 Notes;
- increase our vulnerability to general adverse economic and industry conditions;
- require us to dedicate a substantial portion of our cash flow from operations to payments on our indebtedness, thereby reducing the cash available to run our business;
- limit our flexibility in planning for, or reacting to, changes in our business or in our industry;
- restrict us from exploiting business opportunities;
- place us at a competitive disadvantage compared to our competitors that have less indebtedness; and
- limit our ability to borrow additional funds for working capital, capital expenditures, acquisitions, debt service requirements, executing our business strategy or for other purposes.

Anti-takeover provisions in our charter documents and under Delaware or Washington law could prevent, delay or impede an acquisition of us and constrain our stock price.

Provisions of our certificate of incorporation and our bylaws may delay or discourage transactions involving an actual or potential change in our control or change in our management, including transactions in which stockholders might otherwise receive a premium for their shares, or transactions that our stockholders might otherwise deem to be in their best interests. These provisions could therefore adversely affect our stock price. Among other things, our certificate of incorporation and bylaws:

- permit our board of directors to issue up to 5,000,000 shares of preferred stock, with any rights, preferences and privileges as they may designate;
- provide that the authorized number of directors may be changed only by resolution of the board of directors;
- provide that all vacancies, including newly created directorships, may, except as otherwise required by law, be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum;
- divide our board of directors into three classes, each of which stands for election once every three years (subject to gradual declassification beginning at the 2021 annual meeting of stockholders, such that our board of directors will be fully declassified beginning at the 2023 annual meeting of stockholders);
- restrict the forum for certain litigation against us to Delaware;
- require that any action taken by our stockholders be effected at a duly called annual or special meeting of stockholders and not by written consent;
- provide that stockholders seeking to present proposals before a meeting of stockholders or to nominate candidates for election as directors at a meeting of stockholders must provide notice in writing in a timely manner, and also specify requirements as to the form and content of a stockholder’s notice;
- do not provide for cumulative voting rights (therefore allowing the holders of a majority of the shares of common stock entitled to vote in any uncontested election of directors to elect all of the directors standing for election, if they should so choose); and
- provide that special meetings of our stockholders may be called only by the chair of the board, our chief executive officer or the board of directors.

In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with any “interested” stockholder for a period of three years following the date on which the stockholder became an “interested” stockholder. Likewise, because our principal executive offices are located in Washington, the anti-takeover provisions of the Washington Business Corporation Act may apply to us under certain circumstances now or in the future. These provisions prohibit a “target corporation” from engaging in any of a broad range of business combinations with any stockholder constituting an “acquiring person” for a period of five years following the date on which the stockholder became an “acquiring person.”

Our bylaws include provisions that could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our bylaws provide that, unless we otherwise consent in writing, the Court of Chancery of the State of Delaware is the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our certificate of incorporation or our bylaws; or any action asserting a claim against us that is governed by the internal affairs doctrine. The choice of forum provision may limit stockholders' ability to bring a claim in a judicial forum favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. Alternatively, if a court were to find the choice of forum provision contained in our bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business and financial condition.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

None.

Item 3. Defaults Upon Senior Securities

None.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

Securities Trading Plans of Directors and Executive Officers

During our last fiscal quarter, no director or officer, as defined in Rule 16a-1(f), adopted or terminated a "Rule 10b5-1 trading arrangement" or a "non-Rule 10b5-1 trading arrangement," each as defined in Item 408 of Regulation S-K.

Ratification of Certain Matters

On June 26, 2023, our board of directors adopted resolutions, or the Resolutions, pursuant to Section 204 of the Delaware General Corporation Law, or Section 204, approving the ratification of the issuance of options to purchase shares of Common Stock and an award of restricted stock units, which we refer to as the Ratification. A copy of the Resolutions adopted by our board of directors setting forth the information with respect to the Ratification required under Section 204 is attached hereto as Exhibit 99.1. Any claim that any defective corporate act or putative stock ratified pursuant to the Ratification is void or voidable due to the failures of authorization identified in the Resolutions, or that the Delaware Court of Chancery should declare in its discretion that such ratification done in accordance with Section 204 of the Delaware General Corporation Law not be effective or be effective only on certain conditions must be brought within the later of (i) 120 days from the validation effective time (which is June 26, 2023) and (ii) the giving of this notice (which is deemed to be the date that this Quarterly Report on Form 10-Q is filed with the Securities and Exchange Commission).

Item 6. Exhibits

Exhibit Number	Exhibit Description	Incorporation by Reference Form	Date	Number	Filed Herewith
3.1	Amended and Restated Certificate of Incorporation of Impinj, Inc., as filed with the Secretary of State of the State of Delaware on June 10, 2020	8-K	6/12/2020	3.1	
3.2	Amended and Restated Bylaws of Impinj, Inc. adopted as of February 23, 2023	8-K	2/23/2023	3.1	
31.1	Certification of Principal Executive Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended				X
31.2	Certification of Principal Financial Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended				X
32.1*	Certification of Principal Executive Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350				X
32.2*	Certification of Principal Financial Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350				X
99.1	Unanimous Written Consent of the Board of Directors of Impinj, Inc., effective June 26, 2023			99.1	X
101	Inline XBRL Document Set for the condensed consolidated financial statements and accompanying notes in Part I, Item 1, “Financial Statements” of this Quarterly Report on Form 10-Q.				X
104	Inline XBRL for the cover page of this Quarterly Report on Form 10-Q, included in the Exhibit 101 Inline XBRL Document Set.				X

* The certifications attached as Exhibits 32.1 and 32.2 that accompany this Quarterly Report on Form 10-Q are not deemed filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Impinj, Inc. 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 this Form 10-Q, irrespective of any general incorporation language contained 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.

Impinj, Inc.

Date: July 26, 2023

By: */s/ Cary Baker*
Cary Baker
Chief Financial Officer (principal financial officer and duly authorized signatory)

Exhibit 31.1

CERTIFICATIONS

I, Chris Diorio, Ph.D., certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Impinj, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 26,2023

/s/ Chris Diorio

Chris Diorio, Ph.D.
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Cary Baker, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Impinj, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 26,2023

/s/ Cary Baker
Cary Baker
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

IMPINJ, INC.
CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Impinj, Inc. (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, Chris Diorio, Ph.D., Chief Executive Officer *(Principal Executive Officer)* of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that 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.

/s/ Chris Diorio

Chris Diorio, Ph.D.
Chief Executive Officer
(Principal Executive Officer)

Date: July 26,2023

A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Report to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Impinj, Inc. 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.

Exhibit 32.2

IMPINJ, INC.
CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Impinj, Inc. (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, Cary Baker, Chief Financial Officer *(Principal Financial Officer)* of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that 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.

/s/ Cary Baker
Cary Baker
Chief Financial Officer
(Principal Financial Officer)

Date: July 26,2023

A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

This certification accompanies the Report to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Impinj, Inc. 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.

Exhibit 99.1

UNANIMOUS WRITTEN CONSENT
OF THE BOARD OF DIRECTORS
OF IMPINJ, INC.

Pursuant to Section 141(f) of the Delaware General Corporation Law (the "***DGCL***") and the bylaws of Impinj, Inc., a Delaware corporation (the "***Corporation***"), the undersigned, constituting all of the members of the board of directors of the Corporation (the "***Board***"), hereby adopt the following resolutions:

Ratification Resolutions

WHEREAS, the Board has been advised that there are certain corporate irregularities that create uncertainty with respect to the grant of certain options to acquire common stock of the Corporation, par value $0.001 per share (the "***Common Stock***"), and an award of restricted stock units ("***RSUs***"), in each case pursuant to the Company's 2016 Equity Incentive Plan (the "***Plan***").

WHEREAS, Section 204 of the DGCL ("***Section 204***") provides that no "***defective corporate act***" or "***putative stock***" shall be void or voidable solely as a result of a "***failure of authorization***" (as such terms are defined in subsection (h) of Section 204) if ratified as provided in Section 204.

WHEREAS, the Board has determined that it is advisable and in the best interests of the Corporation and its stockholders to adopt the following resolutions in order to ratify the defective corporate acts set forth below.

Ratification of Issuance of Stock Options

WHEREAS, the Corporation entered into a consulting agreement with a limited liability company owned by Cathal Phelan, a member of the Board, pursuant to which Mr. Phelan provided advisory and consulting services (the "***Phelan Consulting Agreement***").

WHEREAS, on September 18, 2020, the Compensation Committee of the Board (the "***Committee***") granted Mr. Phelan options to purchase 60,000 shares of Common Stock under the Plan in connection with the Phelan Consulting Agreement effective September 21, 2020 (the "***2020 Option Grant***").

WHEREAS, notwithstanding the fact that the 2020 Option Grant was awarded to Mr. Phelan in connection with his status as a consultant to the Corporation, and not in his capacity as a member of the Board, there is concern that the 2020 Option Grant may have caused Mr. Phelan to receive equity awards in excess of the limit on the value of equity awards that may be granted to Outside Directors (as defined in the Plan) and the Outside Director Compensation Policy (the "***Policy***").

RESOLVED, that:

(A) The potential defective corporate acts to be ratified are the 2020 Option Grant and the issuance of Common Stock pursuant thereto (the "***Option Shares***") in the amounts and on the dates (the "***Exercise Dates***") set forth on Exhibit A.

(B) The dates of the potential defective corporate acts identified in paragraph (A) of this resolution are September 21, 2020 and the Exercise Dates.

(C) The potential defective corporate acts identified in paragraph (A) of this resolution involved the 2020 Option Grant and the issuance of the Option Shares upon exercise of the 2020 Option Grant on the Exercise Dates as set forth on Exhibit A.

(D) The nature of the failures of authorization in respect of the potential defective corporate acts identified in paragraph (A) of this resolution is:

- The 2020 Option Grant may not have been authorized in accordance with Section 157 of the DGCL, the Plan, and the Policy, as applicable, including in circumstances in which the Committee approved the 2020 Option Grant pursuant to the Plan but the 2020 Option Grant may have exceeded, or resulted in the aggregate value of Awards (as defined in the Plan) granted to Mr. Phelan under the Plan and the Policy exceeding, the limit on Awards that may be granted to an Outside Director in a fiscal year under the Plan and the Policy.

- The Option Shares may not have been issued in accordance with Sections 151 and 152 of the DGCL, including in circumstances in which the Option Shares may have been issued pursuant to stock options that were not granted in accordance with the terms approved by the Board or the Committee.

(E) The Board hereby approves the ratification of the potential defective corporate acts identified in paragraph (A) of this resolution pursuant to Section 204 of the DGCL notwithstanding whether the 2020 Option Grant and issuance of the Option Shares may have exceeded the limitation on Awards that may be granted to an Outside Director in a fiscal year under the Plan and the Policy.

Ratification of Award of Restricted Stock Units

WHEREAS, in connection with an extension to the Phelan Consulting Agreement, the Corporation entered into an agreement with a limited liability company owned by Mr. Phelan pursuant to which Mr. Phelan agreed to continue providing consulting services to the Corporation (the "***Phelan Consulting Extension***").

WHEREAS, on July 25, 2022, the Committee granted Mr. Phelan an award of 8,000 RSUs under the Plan in connection with the Phelan Consulting Extension effective October 1, 2022 (the "***2022 RSU Award***").

WHEREAS, notwithstanding the fact that the 2022 RSU Award was awarded to Mr. Phelan in connection with his status as a consultant to the Corporation, and not as a member of the Board, the 2022 RSU Award may have resulted in Mr. Phelan receiving equity awards with a value in excess of the limit on the value of equity awards that may be granted to an Outside Director in a fiscal year under the Plan and the Policy.

RESOLVED, that:

(A) The potential defective corporate acts to be ratified are the 2022 RSU Award and the issuance of Common Stock upon the settlement thereof (the "***RSU Shares***") in the amounts and on the dates (the "***Settlement Dates***") set forth on Exhibit B.

(B) The dates of the potential defective corporate acts identified in paragraph (A) of this resolution are October 1, 2022 and the Settlement Dates.

(C) The potential defective corporate acts identified in paragraph (A) of this resolution involved the 2022 RSU Award and the issuance of the RSU Shares on the Settlement Dates as set forth on Exhibit B.

(D) The nature of the failures of authorization in respect of the potential defective corporate acts identified in paragraph (A) of this resolution is:

- The 2022 RSU Award may not have been authorized in accordance with Section 157 of the DGCL, the Plan, and the Policy, as applicable, including in circumstances in which the Committee approved the 2022 RSU Award pursuant to the Plan but the 2022 RSU Award may have exceeded, or resulted in the aggregate value of Awards granted to Mr. Phelan under the Plan exceeding, the limit on Awards that may be granted to an Outside Director in a fiscal year under the Plan and the Policy.

- The RSU Shares may not have been issued in accordance with Sections 151 and 152 of the DGCL, including in circumstances in which the RSU Shares may have been issued pursuant to the settlement of RSUs that were not granted in accordance with the terms approved by the Board or the Committee.

(E) The Board hereby approves the ratification of the potential defective corporate acts identified in paragraph (A) of this resolution pursuant to Section 204 of the DGCL notwithstanding the limitation on Awards that may be granted to an Outside Director in a fiscal year under the Plan.

Common Law Ratification

RESOLVED, that, in addition to the ratification permitted by Section 204, each of the foregoing potential defective corporate acts is hereby approved, adopted, confirmed, and ratified, for all purposes of, and to the fullest extent permitted by, the common law of Delaware and any other applicable law.

Notice to Stockholders

RESOLVED, that the officers of the Corporation be, and each of them hereby is, authorized and directed to provide, in the name and on behalf of the Corporation, notice of the adoption of these resolutions in accordance with subsection (g) of Section 204.

Omnibus Resolutions

RESOLVED, that the officers of the Corporation be, and each of them hereby is, authorized and empowered to take any and all such further action, to execute, deliver, and file any and all such further agreements, instruments, documents, certificates, and communications and to pay such expenses, in the name and on behalf of the Corporation, as such officer may deem necessary or advisable to effectuate the purposes and intent of the resolutions hereby adopted, the taking of such actions, the execution, delivery, and filing of such agreements, instruments, documents, certificates, or communications and the payment of such expenses by any such officer to be conclusive evidence of his or her authorization hereunder and the necessity, advisability, and approval thereof.

RESOLVED, that all actions heretofore taken by any director, officer, or agent of the Corporation, for and on behalf of the Corporation, with respect to any of the matters referenced in the foregoing resolutions are hereby ratified, approved, and confirmed in all respects.

RESOLVED, that this consent may be executed in any number of counterparts, each of which shall constitute an original and all of which together shall constitute one action, any copy, facsimile or other reliable reproduction of this consent may be substituted or used in lieu of the original writing for any and all purposes for which the original writing could be used, and this consent shall be filed with the minutes of the proceedings of the Board.

[*Signature page follows*]

This action by unanimous written consent shall be effective as of the date the Corporation receives the unanimous consent of the Corporation's directors. This action by unanimous written consent may be executed in any number of counterparts, each of which shall constitute an original and all of which together shall constitute one action. Any copy, facsimile, or other reliable reproduction of this action by written consent may be substituted or used in lieu of the original writing for any and all purposes for which the original writing could be used. This action by unanimous written consent shall be filed with the minutes of the proceedings of the Board.

/s/ Steve Sanghi Date: June 26, 2023
Steve Sanghi

/s/ Chris Diorio, Ph.D. Date: June 26, 2023
Chris Diorio, Ph.D.

/s/ Cathal Phelan Date: June 26, 2023
Cathal Phelan

/s/ Daniel Gibson Date: June 26, 2023
Daniel Gibson

/s/ Meera Rao Date: June 26, 2023
Meera Rao

/s/ Miron Washington Date: June 26, 2023
Miron Washington

/s/ Umesh Padval Date: June 26, 2023
Umesh Padval

EXHIBIT A

Exercise Date	Number of Option Shares Issued
February 11, 2022	20,000
July 29, 2022	20,000
October 28, 2022	10,000

EXHIBIT B

Settlement Date	Number of RSU Shares Issued
January 1, 2023	2,000
April 1, 2023	2,000