Resonant Inc
Form 10-K
March 25, 2016
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)
ý ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2015
OR
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to .
Commission file number 001-36467

RESONANT INC.
(Exact Name of Registrant as Specified in Its charter)

Delaware	45-4320930
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification No.)

110 Castilian Drive, Suite 100, Goleta, California 93117
(Address of Principal Executive Offices) (Zip Code)
(805) 308-9803
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Name of each exchange on which registered
Common Stock, $0.001 par value	The NASDAQ Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes o No ý
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes o No ý
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 ý No o
Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ý No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ý

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting

company" in Rule 12b-2 of the Exchange Act (Check one):

Large accelerated filer o	Accelerated filer o
Non-accelerated filer o (Do not check if smaller reporting company)	Smaller reporting company x

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

As of June 30, 2015, the aggregate market value of the voting and non-voting common equity held by non-affiliates was $21 million, based on the closing price on that date. As of March 22, 2016, the registrant had 7,389,506 shares of common stock issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for the registrant's 2016 Annual Meeting of Stockholders are incorporated by reference in Part III of this Annual Report on Form 10-K. Such Proxy Statement will be filed with the Securities and Exchange Commission within 120 days of December 31, 2015, the last day of the fiscal year covered by this Annual Report on Form 10-K.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains 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, or the Exchange Act. The words “believe,” “may,” “will,” “potentially,” “estimate,” “continue,” “anticipate,” “intend,” “could,” “wou “plan,” “expect” and similar expressions that convey uncertainty of future events or outcomes are intended to identify forward-looking statements. These forward-looking statements include, but are not limited to, statements concerning the following:

- the status of filter designs under development;
- the prospects for licensing filter designs upon completion of development;
- plans for other filter designs not currently in development;
- potential customers for our designs;
- the timing and amount of future royalty streams;
- our plans regarding the use of proceeds from our IPO and the expected duration of our capital resources;
- our plans regarding future financings;
- our hiring plans;
- the impact of our designs on the mobile device market;
- our business strategy;
- our intentions, expectations and beliefs regarding anticipated growth, market penetration and trends in our business;
- the timing and success of our plan of commercialization;
- our dependence on growth in our customers’ businesses;
- the effects of market conditions on our stock price and operating results;
- our ability to maintain our competitive technological advantages against competitors in our industry and the related costs associated with defending intellectual property infringement and other claims;
- our ability to timely and effectively adapt our existing technology and have our technology solutions gain market acceptance;
- our ability to introduce new offerings and bring them to market in a timely manner;
- our ability to maintain, protect and enhance our intellectual property;
- our expectations concerning our relationships with our customers and other third parties and our customers’ relationships with their manufacturers;
- the attraction and retention of qualified employees and key personnel;
- future acquisitions of or investments in complementary companies or technologies; and
- our ability to comply with evolving legal standards and regulations, particularly concerning requirements for being a public company and United States export regulations.

These forward-looking statements speak only as of the date of this Form 10-K and are subject to uncertainties, assumptions and business and economic risks. As such, our actual results could differ materially from those set forth in the forward-looking statements as a result of the factors set forth below in Part I, Item 1A, “Risk Factors,” and in our other reports filed with the Securities and Exchange Commission. Moreover, we operate in a very competitive and rapidly changing environment, and new risks emerge from time to time. It is not possible for us to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and

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assumptions, the forward-looking events and circumstances discussed in this Form 10-K may not occur, and actual results could differ materially and adversely from those anticipated or implied in our forward-looking statements. You should not rely upon forward-looking statements as predictions of future events. Although we believe that the expectations reflected in our forward-looking statements are reasonable, we cannot guarantee that the future results, levels of activity, performance or events and circumstances described in the forward-looking statements will be achieved or occur. Moreover, neither we nor any other person assumes responsibility for the accuracy and completeness of the forward-looking statements. We undertake no obligation to update publicly any forward-looking statements for any reason after the date of this Form 10-K to conform these statements to actual results or to changes in our expectations, except as required by law.

You should read this Annual Report on Form 10-K and the documents that we reference in this Annual Report on Form 10-K and have filed with the Securities and Exchange Commission as exhibits thereto with the understanding that our actual future results and circumstances may be materially different from what we expect.

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PART I

ITEM 1. BUSINESS

Overview

Resonant is a late-stage development company creating innovative filter designs for radio frequency, or RF, front-ends for the mobile device industry. The RF front-end is the circuitry in a mobile device responsible for analog signal processing and is located between the device's antenna and its digital baseband. We use a fundamentally new technology called Infinite Synthesized Networks®, or ISN®, to configure and connect resonators, the building blocks of RF filters. Filters are a critical component of the RF front-end used to select desired radio frequency signals and reject unwanted signals. We are using ISN to develop new classes of filter designs.

We plan to commercialize our technology by creating filter designs that address the problems created by the growing number of frequency bands in the RF front-end of mobile devices. We are developing a series of single-band surface acoustic wave, or SAW, filter designs for frequency bands presently dominated by larger and more expensive bulk acoustic wave, or BAW, filters. In addition, we are generating designs for bands that are now done with temperature-compensated SAWs, as well as some simpler SAW products. We are also developing multiplexer filter designs for 2 or more bands to address the carrier aggregation, or CA, requirements of our customers. Finally, we are developing reconfigurable filter designs to replace multiple filters for multiple bands. In order to succeed, we must convince RF front-end suppliers that our filter designs can significantly reduce the size and cost of their products.

We continued to make progress during 2015 in the development of our technology in all areas of RF filter design. We have completed the development of a single-band filter design (a duplexer) that currently is being manufactured by a third-party fab, and we have several other single-band filter designs in various stages of development and commercialization. In the fourth quarter of 2015, we began to investigate the feasibility of using our technology to design multiplexers to address the complexities of carrier aggregation, and we have commenced the initial design parameters for a couple of potential multiplexers. During 2015, we produced initial parts for a reconfigurable filter that reconfigures between two bands, which parts are currently being optimized, and continued development of a filter reconfigurable between three bands.

We believe licensing our designs is the most direct and effective means of delivering our solutions to the market. Our target customers make part or all of the RF front-end. We intend to retain ownership of our designs, and we expect to be compensated through license fees and royalties based on sales of RF front-end filters that incorporate our designs. We currently do not intend to manufacture or sell any physical products or operate as a contract design company developing designs for a fee.

Our History

Our technology was originally pioneered by Superconductor Technologies Inc., or STI. STI commercialized discoveries in high temperature superconductors by developing unique RF filter technology and creating high performance RF filters for cellular towers. STI had a program from 2007 to 2010 to develop electronically reconfigurable RF filters for mobile devices using surface acoustic wave, or SAW, filter technology. Dr. Robert Hammond was STI's Chief Technology Officer during this time. When STI halted work on the RF filter program in 2010 in order to devote its resources to the development of high temperature superconducting wire, Dr. Hammond, along with Terry Lingren, then serving as Vice President of Engineering at Kyocera Communications, Inc., and Neal Fenzi, who was then serving as Chief Engineer at STI, co-founded Resonant.

We were incorporated in Delaware in January 2012 as a wholly owned subsidiary of STI but had not conducted any operations through June 16, 2013. Resonant LLC was formed in California in May 2012. We commenced business on July 6, 2012 with initial contributions from our founders and STI. We changed our form of ownership from a limited liability company to a corporation in an exchange transaction in June 2013. We are the successor of Resonant LLC, a limited liability company formed on May 29, 2012 (our inception date). We commenced business on July 6, 2012 and completed our initial public offering, or IPO, on May 29, 2014, or IPO Date.

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Industry Background

Glossary

The following is a glossary of useful terms:

- Band, channel or frequency band—a designated range of radio wave frequencies used to communicate with a mobile device.
- Bulk acoustic wave (BAW)—an acoustic wave traveling through a material exhibiting elasticity.
- Duplexer—a bi-directional device that connects the antenna to the transmitter and receiver of a wireless device and simultaneously filters both the transmit signal and receive signal.
- Carrier Aggregation (CA)—the aggregation, or adding together, of multiple 20MHz carriers to meet the LTE-Advanced specification requirements, allowing for increased transmission bandwidth delivery of higher data rates, improved capacity and more efficient use of a carriers fragmented spectrum.
- Filter—a series of interconnected resonators designed to pass (or select) a desired radio frequency signal and block unwanted signals.
- Reconfigurable filter (previously referred to as Tunable)—a single filter that is capable of being tuned or reconfigured between two or more predetermined bands.
- Resonator—a device that naturally oscillates (or resonates) at specific frequencies. The oscillations in a resonator can be either electromagnetic or mechanical (including acoustic). Resonators are the building blocks for filters.
- RF front-end—the circuitry in a mobile device responsible for the analog signal processing which is located between the antenna and the digital baseband.
- Surface acoustic wave (SAW)—an acoustic wave traveling along the surface of a material exhibiting elasticity, with an amplitude that typically decays exponentially with depth into the substrate.
- Temperature-Compensated SAW (TC-SAW)—a SAW device which has additional material changes to reduce its variation with changes in temperature.

The Mobile Internet

The need for duplexers and other filters in the RF front-ends of mobile devices is growing rapidly due to rising consumer demand for always-on wireless broadband. Mobile devices such as smartphones and tablets are quickly becoming the primary means of accessing the internet. According to Cisco, worldwide mobile data traffic grew at 74% in 2015 and will grow at a compounded annual growth rate of 57% from 2014 to 2019. Cisco also reported that data traffic from wireless devices exceeded traffic from wired devices in 2014.

The exponential growth in mobile data traffic is testing the limits of existing wireless bandwidth. Carriers and regulators have responded by opening new RF spectrum, driving up the number of frequency bands in mobile devices. As a prime example, the AWS-3 spectrum auction conducted by the FCC, which closed on January 29, 2015, raised a record $44.9 billion for an additional 65MHz of spectrum in the United States. Similar auctions are occurring worldwide.

According to Navian, the market for RF front-end filters in mobile devices was 20.4 billion filters in 2014 and will grow to an estimated 37.5 billion filters by 2017 which is a compounded growth of approximately 21%.

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Figure 1—Projected growth of the market for RF front-end filters including duplexers in mobile devices from 2014 through 2017 (in billions of filters). Source: Navian.

In addition to RF front-end filter unit growth, filter sales growth is expected to follow and is estimated to be $3.2 billion in 2014 and is forecasted to reach $5.2 billion by 2017, according to Navian. This represents a compound annual growth rate of approximately 17.5%.

Figure 2—Projected growth of the market for RF front-end filters, including duplexers, in mobile devices from 2014 through 2017 (in billions of dollars). Source: Navian.

Adding RF spectrum is not a complete solution. The added spectrum does not come in large contiguous blocks, but rather in small channels or bands of varying size and frequency. Thus, more data means more bands, and the result is a rapid and substantial increase in the number of bands in mobile devices.

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Challenges Faced by the Mobile Device Industry

The world is progressing toward ubiquitous RF coverage in which almost all devices will be connected, most wirelessly. Technology experts predict that by 2020 there will be over 20 billion connected devices operating worldwide and we will be measuring mobile usage in Exabytes. This overwhelming demand for wireless data has driven the carriers and regulators to open new spectrum bands.

This substantial and rapid increase in bands has created several significant problems including a corresponding increase in the number of filters and duplexers in mobile devices. This is because traditional RF front-end solutions typically require one duplexer for each frequency band. For example, over the past two years the duplexer count in a leading smartphone increased from nine to 23 duplexers and corresponding large increase in the number of individual filters. This is dramatically driving up the cost of RF front-ends. We believe that filters and duplexers will comprise almost half of the cost to the RF front-end market by 2017.

The growing number of duplexers is also increasing the total size of the RF front-end. In some cases, size constraints require the mobile device manufacturer to fragment its product offering into multiple versions, each with a limited set of duplexers customized for a particular geographic region and in some cases focused on just one carrier network. Multiple versions of a mobile product increases manufacturing, inventory and distribution costs. In addition, consumers can find it difficult to roam between carriers and/or countries due to this splintering of bands and phone models. Mobile device manufacturers would prefer to make one version of a product containing a full set of duplexers that can be electronically selected as required for a particular carrier network.

In addition, the new, higher frequency bands tend to use a relatively expensive BAW technology. Mobile device manufacturers would prefer to use SAW technology because of its lower cost and smaller size. However, conventional filter designs using SAW technology do not perform adequately in high frequency bands or in bands with closely spaced receive and transmit channels, typical of many new bands.

Adding to the complexity of the industry, mobile devices must now be capable of receiving from two to as many as five downlink bands simultaneously, known as downlink carrier aggregation, or CA. This carrier aggregation requirement creates the need for complex multiplexing filter modules, or multiplexers, which are significantly more complex than duplexers and effectively require two duplexers for each CA combination. There will be an estimated 140 worldwide combinations of CA cases, creating increased complexity and cost to RF front ends by 2017. In the case of a quadplexer, with four different frequency bands, within each band the signal loss must be minimized, while rejecting three bands often in close proximity. Duplexers must only reject a single band. Mobile Experts predicts that 26.4 billion RF paths in mobile phones will be shipped supporting CA in 2020. This rising complexity in the industry is also exacerbating the constraints on design capacity and resources.

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Figure 3-Projected growth of the market for mobile devices enabled for CA from 2015 through 2020 (in millions of units). Source: Mobile Experts.

Our Technology

RF front-end module companies currently produce filters internally or purchase filters from third-party manufacturers, such as Taiyo-Yuden, TDK-EPCOS, WISOL and Avago/Broadcom. These module companies and filter manufacturers design filters using their own internal resources, which are proving insufficient to meet the explosive growth in both total global filter demand and unique filter designs, as well as the increasingly complex filter requirements necessitated in part by crowded spectrum and carrier aggregation. We believe that our patented ISN technology will enable us to design complex filter products at approximately half the unit cost and in approximately half the time of traditional approaches. ISN can be summarized as a three-step process:

We synthesize RF acoustic devices. We have developed a large suite of proprietary mathematical methods and software tools that allow us to find better solutions because we can explore a much bigger set of possible solutions. Our ISN tools and methods draw upon a century of network synthesis techniques. In other words, rather than rely on a single design solution (the acoustic wave ladder that is used almost solely in this industry to date), we generate, or synthesize, large numbers of unique solutions specifically for each set of requirements. This allows us to create filters using existing manufacturing methods, such as SAW manufacturing methods, that perform as well as those using higher cost methods of BAWs. These synthesized solutions provide a framework for generating circuit models for optimization.

We use circuit models to optimize initial designs. Most of this industry models acoustic wave filters using a coupling-of-modes, or COM, model. In contrast, we use circuit models derived from the actual physics of acoustic wave filters. Circuit models are computationally much faster, which allows for very quick optimization of the many possible solutions that result from the synthesis process. We can quickly compare large numbers of different, optimized solutions before commencing the third step lengthy but highly accurate simulations based on fundamental methods.

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We use fundamental models to simulate final designs. Our highly accurate models are based entirely on fundamental material properties and dimensions, again unlike common practice in this industry today. This allows for far fewer turns through the fab to reach the desired product performance. Because our models are fundamental, integration with our foundry and fab customers is eased due to the understanding of the fabs basic material properties and dimensions.

Our Plan of Commercialization

We plan to pursue filter design projects with potential customers and other strategic partners and we believe licensing our designs is the most direct and effective means of delivering our solutions to the market. These types of arrangements may subsidize filter design costs, as well as offer complementary technology and market intelligence. However, we intend to retain ownership of our technology, designs and related improvements and charge royalties based on sales of filters that incorporate our designs. We generally do not intend to manufacture or sell any physical products or operate as a contract design company developing designs for a fee. Our strategy is to establish and leverage alliances with new customers, who will help grow the market for our designs by integrating them with their own proprietary technology and products, thus combining their own particular strengths with ours to provide an extensive array of solutions and to develop and license filter designs that offer improvements in cost, size and performance of RF front-ends. The goal of our designs is to improve profit margins and increase market share for our customers.

Our customers are filter and module manufacturers. In the case of filter manufacturers' customers, our designs are produced using the manufacturer's own fabrication facilities and internal processes. For module company customers, we partner with a foundry to produce filters with our design. We will license specific, custom designs to these customers. Our plan is to charge royalties at a fixed amount per filter or as a percentage of sales price. We expect to generate substantially all of our revenues with these types of licensing arrangements. Each filter design and related royalty stream is expected to have a finite commercial life as mobile devices continue to evolve. Our plan is to offer our customers replacement designs as existing designs become obsolete.

We anticipate a significant delay between the start of a design and the start of royalty payments under a particular license. In some cases, we may grant the customer a limited period of exclusivity on a specific design or frequency band to enable the customer to be the first to market with the design. We do not expect any of these exclusivity provisions to have any long-term duration nor prevent us from concurrently working on filter designs in other bands for other customers.

Our products will be designed for manufacture with existing high-volume fabrication processes allowing rapid time to market, but we do not plan to manufacture or sell any physical components. Unlike a traditional manufacturing company, we intend to create designs for manufacturers eliminating for us the costs and problems associated with manufacturing and inventory. This allows us to concentrate on our unique expertise, leaving the hardware manufacturers to drive their own economies of scale.

Single Band Designs

We continue to develop a series of SAW filter designs for RF frequency bands presently dominated by the larger and more expensive BAW filters. We completed our first single-band filter design (a duplexer) during the first quarter of 2015 with our first fab. We continue to develop other SAW filter designs for customers. Some of these filter designs are for duplexers that have historically been TC-SAWs or BAWs while others or for discrete SAW filters that may need improvements in performance, size or cost. We believe that, using our ISN technology combined with our experience and know-how, we can design innovative SAW filters that meet the performance requirements for many of these bands but at significantly less cost than that of BAW filters or even TC-SAW filters they would replace. We also believe that these single band filter designs, whether discrete existing SAWs or TC-SAW and BAWs designed as SAWs, are the earliest opportunity to revenues for us.

Multiplexer Designs

Wireless carriers worldwide are experiencing increasing demand for higher data speeds. CA allows multiple data streams from different frequencies to be added together to provide increased data rate for the mobile users. However, CA further complicates the required filter characteristics. During the fourth quarter of 2015, based upon requests from potential customers, we performed some initial investigations on the feasibility of designing multiplexers that would

allow four RF paths (two transmit and two receive) to operate simultaneously, allowing CA for both receive and transmit paths. Quadplexers, (4-RF path multiplexer) as described above, enable CA on both receive and transmit paths and reduce the RF front-end complexity by removing the switches, but complexity of the filters themselves increase dramatically. We believe that our ISN technology is ideally suited to this difficult filter design problem that covers a wide frequency range with much more demanding performance requirements.

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Although some band combinations for aggregation will not require multiplexers, we believe that multiplexers are the best solution for bands in close frequency proximity. We plan to develop a family of high performance multiplexers to address this growing market. Our initial designs will build on our experience from SAW single band designs.

Tunable or Reconfigurable Designs

We believe that our ISN technology will also enable us to produce tunable, or reconfigurable, filters. These reconfigurable filters are electronically programmed in real time for different RF frequency bands so that one filter can do the work of many and therefore replace multiple filters and significantly lower the cost and size of RF front-ends. We began work on a reconfigurable filter that reconfigures between two bands. Our initial designs use SAW filters and build on our expertise in SAW filter technology. We have advanced the design to initial parts which are currently being optimized. We are concurrently designing a filter reconfigurable between three bands. Several prospective customers have expressed interest in a prototype reconfigurable filter and our goal is to have demonstration parts that meet each of the individual band specifications and performance requirements. We plan to make these parts available for assessment by these prospective customers with the goal of securing a lead customer thereafter. The design of a reconfigurable filter has not ever been commercialized for use in the RF front end and there can be no assurance that we can ever design a reconfigurable filter that meets the necessary specifications and performance criteria to become a commercial filter design nor that any prospective customer will be interested in advancing the design.

Our immediate focus is to address the problems in the RF front-end with innovative single-band, multiplex and reconfigurable designs made possible with our ISN technology. These designs present the greatest near-term potential for commercialization of our ISN technology. We expect the trend towards spectrum proliferation, in addition to carrier aggregation, will require complex filter multiplexing. We believe our ISN technology will enable cost effective designs for these applications.

Intellectual Property

We have an active program protecting our proprietary technology through the filing of patents. Our patent portfolio reflects both the initial technology contribution of STI, as well as our own patent filings since our founding. We have plans to file additional patents this year.

Our patent portfolio comprises more than 75 issued and pending patents. This patent portfolio relates primarily to the following subject matter:

•filter circuit structures and topologies;
•filter synthesis and design methods; and
•resonator structures.

We also have an active and ongoing program to identify, protect and commercialize our intellectual property. This program includes the development of a comprehensive patent strategy. We routinely use specialized outside firms to assist in these endeavors. These firms assist with invention identification, intellectual property strategy and competitive landscape analysis.

Our research has not identified any public information, such as patents or published articles, relating to our technology that would affect our freedom to operate. However, there can be no assurance that our pending patent applications or any future patent applications will be approved or will not be challenged successfully by third parties, that any issued patents will protect our technology or will not be challenged by third parties, or that the patents of others will not have an adverse effect on our ability to do business. Furthermore, there can be no assurance that others will not independently develop similar or competing technology or design around any patents that have been or may be issued to us.

We also rely on trademark, copyright and trade secret laws to protect our intellectual property. We have registered U.S. trademarks for ‘‘Resonant,’’ ‘‘ISN” and “Integrated Synthesized Networks.’’ We protect our trade secrets and other proprietary information by requiring confidentiality agreements from all our employees, consultants and third parties having access to such information. Despite these efforts, there can be no assurance that others will not gain access to our trade secrets, or that we can meaningfully protect our technology. In addition, effective trademark, copyright and trade secret protection may be unavailable or limited in certain foreign countries. Although we intend to protect our rights vigorously, there can be no assurance that such measures will be successful.

Competition

We differentiate ourselves from traditional filter designers and manufacturers in two primary ways. First, to our knowledge we are the only company with a stated business model and technical team, exclusively focused on RF front end

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filters. Second, we have spent many years developing ISN®, our own patented suite of design tools specifically for this purpose. In this respect, we believe we offer our customers a novel solution to the need for increasingly complex filter designs developed by an independent, stand-alone company that is not presently offered by any of our competitors.

We have advantages that we believe present significant barriers to entry for potential competitors that desire to replicate our business model:

•a large and growing portfolio of patents;
•a suite of proprietary software design tools;
•a highly experienced design team; and
•a multi-year technology lead.

We do compete with the existing filter designs and design capabilities of some of our target customers and their filter manufacturers. These companies include, among others, RF module companies like Skyworks Solutions Inc., Qorvo, Inc., Avago Technologies Limited, and Murata Manufacturing Co., Ltd. and filter designers and manufacturers such as TDK Epcos, Taiyo Yuden, and WISOL as well as other RF front-end component manufacturers. We must demonstrate to our target customers and their filter manufacturers that switching to our designs will give them a competitive advantage by providing market entry or sufficiently improving the cost, size, and performance of their current products to justify our royalty rates.

The use of our patented ISN tools, not only enables our lower cost and smaller size SAW solutions for single band and multiplexer designs but also enables our current development of reconfigurable filters that, if successful will offer a new, highly competitive solutions to many of the challenges facing the manufacturers of RF front end modules. While previous attempts by others to develop reconfigurable, or tunable, filters have proven unsuccessful in meeting the performance requirements of the RF front-end market, we believe our ISN technology has the potential to enable the development of a commercially viable reconfigurable filter that will provide us with an additional competitive advantage.

Employees

We have twenty-seven employees. Our three founders divide their time between filter designs and administrative matters. We have eighteen other employees on our technical staff and nine other employees devoted to finance, marketing and administrative matters. We also use several outside consultants.

Our principal executive offices are located at 110 Castilian Drive, Suite 100, Goleta, California 93117, and our telephone number is 805-308-9803. Our website address is www.resonant.com. The information contained on, or that can be accessed through, our website is not a part of this report.

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ITEM 1A. RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below, together with all of the other information in this Form 10-K, including our consolidated financial statements and related notes, before investing in our common stock. If any of the following risks materialize, our business, financial condition, results of operations and prospects could be materially and adversely affected. In that event, the price of our common stock could decline, and you could lose part or all of your investment.

Risks Related to Our Business and Our Industry

We will require additional capital to continue operations beyond the second quarter of 2016, which capital may not be available on terms acceptable to us, if at all.

Our principal sources of liquidity as of December 31, 2015 consist of existing cash balances and investments of $5.5 million. Currently, we are using approximately $2.3 million in cash per quarter in operating activities excluding fixed asset purchases and investments in patents. Due to these conditions, substantial doubt exists as to our ability to continue as a going concern. We believe our current resources will provide sufficient funding for planned operations through the second quarter of 2016. We have determined that additional capital from the sale of equity securities or the incurrence of indebtedness will be required for us to continue operations beyond the second quarter of 2016. We are in discussions with potential investors to provide us with equity funding. We also continue to have discussions with potential lenders, potential customers and/or strategic corporate partners that may provide funding to us through debt instruments or the licensing of future filter designs or development projects. There can be no assurance that additional financing will be available to us on acceptable terms, or at all. Additionally, if we issue additional equity securities to raise funds, whether to potential customers or other investors, the ownership percentage of our existing stockholders would be reduced. New investors may demand rights, preferences or privileges senior to those of existing holders of common stock. Additionally, we may be limited as to the amount of funds we can raise pursuant to the continued listing requirements of NASDAQ. If we cannot raise needed funds, we might be forced to make substantial reductions in our operating expenses, which could adversely affect our ability to implement our business plan and ultimately our viability as a company.

We have a history of operating losses and we may never achieve or maintain profitability or positive cash flows.

We have a limited operating history and only a preliminary business plan upon which investors may evaluate our prospects. We have never generated revenues and we have a history of losses from operations with an accumulated deficit as of December 31, 2015 of $30.9 million. Our operations have been funded with initial capital contributions, proceeds from the sale of equity securities and debt. We intend to continue to make investments to support our business growth and will require additional funds to respond to business challenges, including the need to develop new technology, improve our operating infrastructure or acquire complementary businesses and technologies. Our ability to generate revenues and achieve profitability and, ultimately, positive cash flows, may depend on whether we can obtain additional capital when we need it and will depend on whether we complete the development of our technology and find customers who will license our designs. There can be no assurance that we will ever generate adequate revenues to achieve profitability and positive cash flows.

Our business model is based on licensing filter designs, which is unproven. Historically, our target customers have relied on their own filter designs or purchased finished filters from a manufacturer, and have not licensed third-party designs. Consequently, we may not succeed in our licensing strategy, which would require us to adopt a new business model and would have a material adverse effect on our potential for generating revenues and potentially threaten our viability.

Our business model is based on licensing our proprietary filter designs. We do not intend to manufacture or sell any physical products or operate as a contract design company developing designs for a fee. We believe licensing our designs is the most direct and effective means of delivering our solutions to the market. We intend to retain ownership of our designs and charge royalties based on sales of RF front-end modules that incorporate our designs.

Our target customers either make part or all of the RF front-end. These customers have historically used their own filter designs or purchased finished filters from a manufacturer. Our business model is new to the filter industry, and

we may encounter resistance to our licensing strategy. The failure of our business model would have a material adverse effect on our potential for generating revenues and potentially threaten our viability.

We may not be able to complete a design that meets our customers' specifications. Even if we succeed in developing a design that meets all of a customers' specifications, the customers could decline to use our designs in their products. Further, our customers' product could fail in the marketplace. Any of these events would have a material adverse effect on our business and potentially threaten our viability.

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We are currently working on filter designs for several customers that have given us stringent performance specifications. If successfully developed, our designs will compete against other technologies for inclusion in our customers' products. Our customers' final products will then compete against other products and technologies for inclusion in mobile devices in the marketplace. There can be no assurance that we can complete our designs or that our final designs will have acceptable performance and meet our customers' specifications. Even if our filter designs have acceptable performance, there are a number of other considerations influencing the customer's decision whether to use our design, such as packaging type and manufacturing cost, many of which are beyond our control. The decision to use our designs is solely within our customers' discretion. For example, we completed our first duplexer design for Band 3 in July 2015 that we believe delivers competitive performance relative to other comparable Band 3 products, nonetheless our first customer declined to license the design. While we continue to provide this Band 3 filter design to customers for evaluation, there is no assurance that our design will ever be licensed. Further, if our filter design is selected by a customer for inclusion in its design or product, there is no guarantee that the customer's design or product will be selected for inclusion in mobile devices. The failure to be selected at the design stage or the device stage would have a material adverse effect on our business and potentially threaten our viability.

We are not a filter manufacturer thus we are required to fabricate our duplexer designs by filter fabricators or manufacturers. For some of our customers that will not manufacture our design themselves, we may be required to have our customer approve the filter manufacturer, and the customer will not license our design unless the manufacturer can demonstrate the ability to economically produce the duplexer design in large volumes.

We believe our designs can be manufactured using existing technology, but we will be dependent on the manufacturer's filter fabrication processes and capabilities for our filter designs. Even if we successfully design a fully compliant duplexer, the customer will not license our design unless the manufacturer can demonstrate the ability to economically produce the design in large volumes. We do not have any control over the manufacturer. We cannot assure you that the manufacturer will have the necessary technology, skills and resources to successfully manufacture of our design in commercial quantities.

Our SAW-based circuit designs will be complex and may prove difficult to manufacture in commercial quantities. We will be relying on our customers and filter fabricators or manufacturers to build our designs. Our business could fail if they encounter difficulties manufact