INNOVATION IN SINGLE CRYSTAL BULK ACOUSTIC WAVE RESONATOR TECHNOLOGY

TECHNOLOGY THAT PROVIDES TRILLIONS OF CRYSTAL CLEAR MESSAGES.

AKOUSTIS

SMART SELECTIVITY SOLUTIONS

OCTOBER 2015 INVESTOR PRESENTATION
Forward-looking statements.

Statements in this presentation that are not descriptions of historical facts are forward-looking statements that are based on management’s current expectations and assumptions and are subject to risks and uncertainties. In some cases, you can identify forward-looking statements by terminology including “anticipates,” “believes,” “can,” “continue,” “could,” “estimates,” “expects,” “intends,” “may,” “plans,” “potential,” “predicts,” “should,” “will,” “would” or the negative of these terms or other comparable terminology. Factors that could cause actual results to differ materially from those currently anticipated include, without limitation,

- risks relating to the results of our research and development activities, including uncertainties relating to semiconductor process manufacturing;
- the early stage of our Bulk ONE™ technology presently under development;
- our need for substantial additional funds in order to continue our operations and the uncertainty of whether we will be able to obtain the funding we need;
- our ability to retain or hire key scientific, engineering or management personnel; our ability to protect our intellectual property rights that are valuable to our business, including patent and other intellectual property rights;
- our dependence on third-party manufacturers, suppliers, research organizations, testing laboratories and other potential collaborators;
- our ability to successfully market and sell our technologies;
- the size and growth of the potential markets for any of our technologies, and the rate and degree of market acceptance of any of our technologies;
- competition in our industry; and
- regulatory developments in the U.S. and foreign countries.

In light of these risks, uncertainties and assumptions, the forward-looking statements regarding future events and circumstances discussed in this report may not occur, and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements. You should not rely upon forward-looking statements as predictions of future events. The forward-looking statements included in this presentation speak only as of the date hereof, and, except as required by law, we undertake no obligation to update publicly or privately any forward-looking statements for any reason after the date of this presentation to conform these statements to actual results or to changes in our expectations.

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Demand on mobile devices is increasing.

1. Compounded by subscriber growth and data traffic, demand for radio frequency ("RF") bands is increasing exponentially.
   - 9.2B subscribers by 2020
   - 1.2 ExaBytes of data per month

2. Increased signal types and bands that devices must consistently acquire limit signal strength and drain energy from devices.

3. Radio frequency (RF) filters and resonators require new technologies to deliver increased band spectrum, more efficient signal identification and improved end-user experience.

(Source: Ericsson Mobility Report, June 2015)
RF filters and resonators enable communication.

RF filters allow transmission of selected frequency bands between the mobile antenna and the digital baseband system.

Resonators are the core building blocks of RF filters and serve as the gatekeepers that enable efficient passage of required spectrum.

Filters reject RF signals from other services, signals and from themselves as the number of bands packed inside each device increases.

Current RF filter devices are constructed using polycrystalline thin-film acoustic wave resonators that exhibit losses and generate heat. A smartphone supporting between 20-30 frequencies can require up to 150 resonators.

Current RF filters' limitations.

Signal stress on wireless devices results in increased power demand, signal loss ('lossy'), front end heat, battery depletion and poor performance.
RF Filters and resonators enable signal coexistence.

The RF front end (RFFE) is between the mobile antenna and the digital baseband system. Signals are powered through the RF filter then to the back end.

Filters' resonators enable the required frequencies to be passed through the circuit, while rejecting undesired frequencies.

Akoustis resonators more efficiently 'couple' signals between the antenna and the back end.
↑ Smartphones = ↑ Signals = ↑ Filters

**Mobile Handset Shipments**

- **LTE-FDD**
- **TD-LTE**
- **TD-SCDMA**
- **WCDMA/HSPA**
- **CDMA/EVDO only**
- **GSM/EDGE only**

**Increasing RF Complexity**

- **20x growth**
- **Filter requirements**

**Premium Filter Growth Drivers**

- **Shift from 2G/3G to 4G/LTE**
- **MIMO and Diversity**
- **Increased bands & carrier aggregation**
- **New spectrum, higher frequencies, 5G**

**Source:** Mobile Experts 2015

- ~28 B annual unit volume and $6.8 B market by 2016
What's the problem?

Legacy resonators, constructed from "lossy" polycrystalline (poly crystal) materials, exhibit excessive signal attenuation and causes increased power requirement and thermal load leading to dropped calls, battery drain, and phone heat.

Akoustis technology solves it.

RF filters, constructed using resonators containing single crystal piezoelectric material, more efficiently couple desired signals between a device's antenna to its digital back end.

Why Single Crystal Piezoelectric?

High-purity, electronic-grade, Single Crystal material outperforms legacy poly crystal thin film materials. Single Crystal provides an aligned, uniform structure versus legacy, defective poly crystal material.

Understanding Poly vs. Single Crystal

Think raw diamond vs. a cut, polished and ordered finish diamond.

Defective, cloudy, grainy, poor electronic grade. Light reflected and scattered by defects.

Highly ordered, clear, cut, electronic-grade, polished. Light transmitted creating brilliance.
**Our history. Our mission. Our shares.**

**Our mission** is to revolutionize the RF filter for mobile wireless using single crystal piezoelectric materials in filter resonators.

**AKTS**

- Share Price (09/08/15): $4.84
- Market Cap (09/08/15): ~$62 M
- Fully Diluted Shares Outstanding: 12.1 M
- Insider Ownership: 34%
- Year End: Mar 31
- Legal Counsel: CKR Law, Mark Crone
- Auditor: Marcum, LLP

**OTCQB**

**May 2014**
- Company founded

**July 2014**
- Patenting process begins for Bulk One®

**December 2014 – April 2015**
- Grants awarded by SBIR, N.C. DoC, and N.C. Board of Science, Technology and Information

**May 2015**
- OTC
- Company completes merger and raises $5.3 million

**July 2015**
- NSF
- Awarded $30,000 in grant extension from NSF

**June 2015**
- Overallotment exercised for $0.4 million

**July – September 2015**
- Active engagement with design clients

**June 2014**
- Self financed IP and R&D with founders and angel capital. Applied for grants with SBIR and NSF

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- NSF R&D Grant #2

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- Overallotment exercised for $0.4 million

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**10+ Phase One Design Clients**

**Nasdaq**

**SMART SELECTIVITY**

**December 2015**
- Uplisting target date with intent on

**~$6.5 M**

- of investment and grant capital in use.

- June 2014: $530,000
  - J. Shealy ($175,000) + Angel Investors

- December 2014: $150,000
  - NSF R&D Grant #1

- April 2015: $50,000
  - N.C. BST&I Grant

- June 2015: $5,700,000
  - J. Shealy ($200,000) + Angel + accredited investors

- June 2015: $30,000
  - NSF R&D Grant #2
Mobile wireless filter overview and landscape.

**TREND**
The high frequency filter market is rapidly growing, driven by 4G/LTE deployment, expanding Wi-Fi and LTE-Unlicensed (LTE-U) deployment by major carriers. **Acoustic wave filters are considered the market standard for performance.** Acoustic wave filters are either Surface Acoustic Wave (SAW) or Bulk Acoustic Wave (BAW).

**Surface Acoustic Wave (SAW)**
SAW is a mature technology widely used in 2G and 3G receiver front ends, duplexers and filters. SAW filters are well suited for frequencies up to about 1.9 GHz, including several standard GSM, CDMA and 3G bands. **SAW filters are built directly on a chip’s surface and mechanical signals propagate horizontal to the surface.**

**Bulk Acoustic Wave (BAW)**
BAW filters offer superior performance (higher Q) with lower insertion loss. BAW technology allows narrowband filters with exceptionally steep filter skirts and excellent rejection. This makes BAW the technology of choice for many challenging interference problems. **BAW filters are constructed in a vertical stack and mechanical waves propagate perpendicular to the surface.** This construction produces lower signal attenuation allowing operation at a higher frequency band.
Piezoelectric materials in the family of filters.

Filter manufacturing options are **piezoelectric**, ceramic, IPD or cavity.

Piezoelectric materials are powerful and dynamic can be formed into BAW or SAW filters. BAW filters are recognized to provide superior band efficiency.

Piezoelectric BAW filters can be film (‘FBAR’), solid-mounted (‘SMR’) or single crystal. Single crystal piezoelectric materials offer superior resonator FOM (Figure of Merit).
Akoustis' market niche.

- Akoustis will focus on High Band solutions where it can differentiate on performance.
- BAW filters will cannibalize SAW filters as licensed spectrum moves above 2GHz.
- 4G/LTE, Wi-Fi and future evolutions will drive additional demand for filters and resonators.
Akoustis' **Bulk ONE®** advantages.

**Small form factor** → increased integration in high density RF Front End
**Wide bandwidth** → multiple bands with single die, reduce inventory
**Increase power handling** → improve survivability, linearity and propagation
**Lower insertion loss** → reduce PA size/cost, improve thermal, increase battery life

Disruptive single crystal piezoelectric materials
Large scale silicon wafers
Compact, integrated wafer level packaging (WLP)
Wide bandwidth, low loss filter solutions for mobile devices
Improved thermal performance, longer battery life

Lower-loss RF acoustic wave filters reduce heat and enable longer battery life in 4G/LTE mobile devices
# Legacy v. single crystal comparison.

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<tr>
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<th>Incumbent (Legacy)</th>
<th>AKOUYSTIS</th>
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<tbody>
<tr>
<td><strong>FILTER TYPE</strong></td>
<td>FBAR/BAW</td>
<td>Bulk ONE®</td>
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<tr>
<td><strong>FILTER PIEZOELECTRIC MATERIAL</strong></td>
<td>AIN</td>
<td>Group III element nitride</td>
</tr>
<tr>
<td><strong>SUBSTRATE</strong></td>
<td>Silicon</td>
<td>Silicon</td>
</tr>
<tr>
<td><strong>TECHNIQUE</strong></td>
<td>PVD</td>
<td>CVD</td>
</tr>
<tr>
<td><strong>CRYSTAL QUALITY</strong></td>
<td>Poly Crystal (defective, grain boundaries)</td>
<td>Single Crystal (highly ordered)</td>
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| **BAW Acoustic Coupling** $(k_{eff}^2)$ | 6.5% | Spec: 8%  
Extends Filter Bandwidth |
|----------------------------------------|------|----------------------|
| **Resonator Acoustic Velocity** $(V_{AC})$ | 5,400 m/sec (*) | Spec: 7,500 m/sec  
High Band Capable |
| **Maximum Filter Insertion Loss** (dB) | -3dB  
50% power loss | Spec: < -1dB  
Less than 10% power loss |
| **Smartphone Transmitter Impact**      | +/- 50% TX power lost | up to 40% TX power savings (16% battery life) |
| **Smartphone Receiver Impact**         | Degraded Signal Quality | Improved Signal Quality |

(*) Best from teardown of two BAW competitors

**Acoustic Coupling** describes the conversion of electrical signals to mechanical vibrations in a resonator. Our 8% goal equates to extended bandwidth.

**Resonator Acoustic Velocity** describes the high frequency capability of a resonator and is a measure of the piezo Crystal Quality.

**Maximum Filter Insertion Loss** is a measure of how much power is wasted in the RF Front End due to the RF filter. Our -1dB goal provides 40% power savings in the RFFE.
IP barriers to entry
7 US patents plus 3 international PCT's filed

Akoustis' filed Patents with 250+ claims:

- “MOBILE COMMUNICATION DEVICE CONFIGURED WITH A SINGLE CRYSTAL PIEZO RESONATOR STRUCTURE”
- “SINGLE CRYSTAL ACOUSTIC RESONATOR AND BULK ACOUSTIC WAVE FILTER”
- “WAFER SCALE PACKAGING”
- “INTEGRATED CIRCUIT CONFIGURED WITH TWO OR MORE SINGLE CRYSTAL ACOUSTIC RESONATOR DEVICES”
  “METHOD OF MANUFACTURE FOR SINGLE CRYSTAL CAPACITOR DIELECTRIC FOR A RESONANCE CIRCUIT”
- “RESONANCE CIRCUIT WITH A SINGLE CRYSTAL CAPACITOR DIELECTRIC MATERIAL”
- “MEMBRANE SUBSTRATE STRUCTURE FOR SINGLE CRYSTAL ACOUSTIC RESONATOR DEVICE”

System End user
High Selectivity Filters
Package Technology
Acoustic Devices & Manufacturing
Piezo Materials
Platform Substrates
Joint development and wafer supply agreements signed with strategic foundry partner, Global Communication Semiconductor (GCS) in Torrance, CA.

Production facility supports 6” Bulk ONE® wafer manufacturing.

Support client/customers quick-turn product cycles using rapid new product introduction (NPI) line.
Pathway to commercialization.

DECEMBER 2015
Milestone #1: Deliver Technology Demonstrators to design client

Deliverables:
1. Resonator Data
2. Non-band specific resonator samples on evaluation board
3. Resonator model

SEPTEMBER 2016
Milestone #3: Deliver band specific filter to design client

Deliverables:
1. Filter Data
2. Band 40* (2.3-2.4GHz) filter samples on evaluation board
3. Resonator & filter model
   *Current recommendation subject to change based on market feedback

MARCH 2017
Milestone #5: Production release Bulk ONE® discrete High Band filter (first commercial revenue)

APRIL 2016
Milestone #2: Deliverable filter demonstrator to design client

Deliverables:
1. Filter Data
2. Non-band specific filter (~2GHz) samples on evaluation board & loose
3. Filter model

FEBRUARY 2017
Milestone #4: Deliver design clients catalog filter product prototypes

Deliverables:
1. Process released
2. Pre-production 4G discrete filters die (bands of interest 40, 41, 22, 25, 3, 2, 7, etc)
3. Resonator & filter model
 AKOUSTIS Target Customers Include:

RF Front End module and Transceiver/RFFE manufacturers, who require access to BAW filters to compete in 4G/LTE RFFE modules and/or for reference designs.

Smartphone OEMs, who require access to pure-play BAW filter and will benefit from improved filter and influence sourcing decisions.

Future customers first engage as a 'design-client'. Our **4-phase development cycle provides visibility** and reporting on our milestones.

**Phase 1: Design Client Engagement**
- First Lead
- Validate Fit
- NDA

**Phase 2: Technology Demonstrator**
- Tech Merit “Deep Dive”
- ID Platform Requirements

**Phase 3a: Filter Product Prototype**
- Akoustis Designed Filter
  - Client/Market Spec
  - Filter design
  - Fab/test/deliver filter

**Phase 3b: Filter Wafer Prototype**
- Client Designed Filter
  - Design kit access
  - Fab/test/deliver wafer
  - Client evaluation

**Phase 4: Filter Production**
- Design win confirmation
- Customer volume ramp
Management team.

Jeff Shealy – Chairman & CEO
- MBA (Wake Forest University), PhD ECE (UCSB)
- +20 Yrs. Exp. in RF/Wireless; RFMD Executive for 13 Yrs., Hughes
- 2 Prior High-tech ventures, RF Nitro (RFMD acq. for $30M, 2001), Avogy
- Expertise: Public company, P&L, GaN tech commercialization

Cindy Payne – CFO & Treasurer
- BSBA WCU, CPA
- +20 Yrs. Exp. Finance, CFO Amerock, Tolt Services
- High tech to hardware, scaled organizations from 10 to 2000
- Expertise: Financial management, Private equity structure

Mark Boomgarden – Vice President of Operations
- BSEE (UNC-Charlotte)
- +20 Yrs. Exp. Hi Tech Operations; Tessera SVP/GM
- Silicon start-up, Digital Optics
- Expertise: Silicon Foundry Ops, Packaging, Licensing

Dave Aichele – Vice President of Business Development
- BSEE (Ohio University), MBA (Leeds - University of Colorado)
- +20 Yrs. Exp. Hi Tech Biz Dev/Sales; T1V EVP, RFMD Director
- Fortune 500 to start-up, +10 yrs mobile wireless market experience
- Expertise: New tech business development, Contract Negotiations

Shawn Gibb – Chief Materials Scientist
- BS Chem (NYU), BE ChE / ME Materials (Stevens Inst. Of Technology)
- +18 Yrs. Exp. In RF/Wireless/Optoelectronics, Crystal IS VP Engineering
- 1 Prior High-tech venture, Crystal IS (Ashai Kasei Aquired $40M, 2012)
- Expertise: III-N material growth (bulk & thin film), Single crystal nitride technology
Board of directors.

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- 2 Prior High-tech ventures, RF Nitro (RFMD acq. for $30M, 2001), Avogy
- Expertise: Public company, P&L, GaN tech commercialization

Prof. Steve Denbaars – Director
- PhD (GaN Single Crystal MOCVD Materials)
- +30 Yrs. Experience, UCSB Professor
- 3 prior GaN ventures—Soraa, Nitres (CREE acq. for $200M, 2000), SLD
- Expertise: GaN, AIN materials

Jerry D. Neal – Independent Director
- Co-Founder of RF Micro Devices, Inc (RFMD, now Qorvo)
- +35 Yrs. Exp. RF and Wireless Industry
- Former EVP Strategic Development at RFMD, Previously at Analog Devices Inc.
- Expertise: key business relationships, business growth

Dr. Arthur Geiss – Independent Director
- PhD (Brown University)
- Former VP Wafer Fab Operations of RF Micro Devices, Inc (RFMD, now Qorvo)
- Previous management role at Alpha Industries (now Skyworks Solutions)
- Expertise: III-Nitride materials, manufacturing, operations, and process development

Jeffrey K. McMahon – Independent Director
- BSCE – NC State University
- 17 Year Experience, current Managing Director at The North Highland Co.
- Former Manager at Andersen Consulting/Accenture
- Expertise: Management consulting, revenue growth, risk management
Balance sheet.

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<tr>
<td>Cash* (6/30/15)</td>
<td>$4.3 M</td>
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<tr>
<td>Total Assets (6/30/15)</td>
<td>$4.5 M</td>
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Expecting additional $1.3M in follow-on (non-dilutive) R&D support from NSF beginning in 2016

*On June 10, 2015 Akoustis completed a private offering of its common stock to accredited investors, with the sale of 261,000 additional shares at a price of $1.50 per share, resulting in additional gross proceeds to Akoustis of $391,500. Akoustis had previously sold approximately 3.53 million shares of common stock in this private offering in May 2015, at the same purchase price per share, for aggregate gross proceeds of $5.3 million. The total gross amount raised by Akoustis in this offering was $5.7 million, before deducting commissions and expenses related to the offering.
Contact us.

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