Voice & Music
Business Update

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Megatrends

Major changes happening in audio

- Streaming: The way we listen to music has changed
- Increasing demand for high resolution audio
- Consumers are embracing wireless

- The emergence of smart assistants and speakers
- The removal of the headphone jack
- The evolution of hearables
5 new platforms

- Next generation Qualcomm® DDFA™ amplifier technology
- WHS94xx USB-C Audio SoCs
- CSRA68100: Highly flexible flash for premium Headsets and Speakers
- QC3xxx Entry level programmable flash for Headsets & Speakers
Bluetooth® Audio Platform Roadmap (subject to change)

CSR86xx, CSRA63xxx and CSRA64xxx are products of Qualcomm Technologies International, Ltd.
CSRA68100

Next Generation Flash

CSRA68100 for premium wireless speakers and headphones:

- New generation highly flexible Bluetooth® audio flash programmable
- Drives innovation and feature differentiation at premium end
- 4 times more processing power than CSR8675
- Advanced features on single chip platform:
  - Superior audio quality
  - Voice control
  - Far-field echo cancellation
  - Sensor Processing
  - Audio Post Processing

Initial Target Segments:
High-end Speakers, High-end Headphones

CSRA68100 and CSR8675 are products of Qualcomm Technologies International, Ltd.
New Bluetooth® wireless audio SoCs
Building on leading Bluetooth audio platforms

QCC3xxx family entry-level for mid to low-cost Bluetooth headsets and speakers:

- Supports increased customization
- Designed to deliver rich set of audio features not typically associated with lower tier
- Advanced developer tools
- Flexible environment for developing quality Bluetooth products, even at lower price points
USB-C Audio SoC

WHS9420 and WHS9410

- USB-C connection becoming more common on mobiles
- USB-C headphones and speakers offer high quality wired audio option
- New platforms combine our expertise from mobile and wireless audio
- **WHS9420**: integrated ANC supports very high quality audio over the USB connection with up to 192kHz/24-bit audio support and very high quality DAC output
- **WHS9410**: entry level solution designed to bring quality audio performance to lower tier products
Smart Audio Platform

- Unique combination of processing power, connectivity options, voice UI and premium audio technologies
- Flexible platform based on APQ8009 or APQ8017 hardware
- Range of software configurations available to support range of use cases and tiers
- Developer platform and modules available
Qualcomm® DDFA™ Digital Amplifier Technology

Next generation, high performance

• Direct Digital Feedback Amplifier

• Removes the problems of open-loop digital amplifier caused by imperfect switching waveforms and power supply variation

• True Digital Class D architecture with closed loop-operation maintains excellent audio performance

• All the advantages of Class D amps combined with the performance of linear

• Result of more than ten years research and development

• Enables DDFA on a much broader range of devices

<table>
<thead>
<tr>
<th>KPI</th>
<th>Performance</th>
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<tbody>
<tr>
<td>SNR</td>
<td>113dB (A-wt, 20Hz to 20KHz)</td>
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<tr>
<td>Dynamic Range</td>
<td>113dB (A-wt, 20Hz to 20KHz)</td>
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<tr>
<td>THD+N</td>
<td>&lt;0.002% (20Hz to 20KHz)</td>
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<tr>
<td>Noise floor modulation</td>
<td>&lt;2dB (-60dBFS to 0dBFS)</td>
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<tr>
<td>Residual noise</td>
<td>35μVrms @ 1Khz</td>
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<tr>
<td>Stereo Crosstalk</td>
<td>-103dB @ 1Khz</td>
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<tr>
<td>PSRR</td>
<td>69dB @ 1Khz</td>
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Audio Platforms

Uniquely positioned to address new market demands

World leading audio heritage and expertise

Flexibility of platforms - customize and innovate

World class development tools and support

Unparalleled breadth of portfolio

Connectivity options - Bluetooth®, Wi-Fi, USB-C