Qualcomm

Qualcomm® QCC5100 Series Bluetooth Audio SoCs

Extremely low power, premium-tier SoCs designed for compact, feature-rich wireless earbuds, headsets and speakers.

QCC5100 is a family of breakthrough Bluetooth® audio System-on-Chips (SoCs) based on a low power architecture. This series is designed to meet consumer demand for robust, high quality, wireless listening experiences in smaller devices with low power consumption for longer audio playback.

QCC5100 series architecture is engineered for low power performance. Power consumption can be reduced by up to 65 percent compared to our previous generation technology, for both voice calls and music streaming and devices are optimized to support longer audio playback in virtually all operating modes.

The flexibility provided by the programmable applications processor and audio DSPs, helps manufacturers to differentiate their products with new features. The SoCs are designed to support cloud-based voice assistants through the voice assistant's respective cloud services.

The QCC5100 series features digital active noise cancelling (ANC) technology integrated in the SoC, designed to eliminate the need for an external ANC solution. This feature can help reduce the complexity, cost and PCB space needed for adding ANC to earbuds, hearables, and other portable audio devices.

With Qualcomm TrueWireless™ Stereo technology, the QCC5100 family is engineered to deliver improved robustness and more evenly balanced power distribution between both earbuds, supporting longer playback time.

Highlights

Quad-core processing

Quad-core processing[1] architecture provides two application processors and two DSP units, designed to allow for an extensive degree of parallel processing, supporting the delivery of user experiences not possible using previous generation devices.

Ultra-low power

The QCC5100 series is designed for unprecedented efficiency in power consumption compared to our previous technology. These SoCs support the development of very small form factor, richly-featured earbuds that can be used all day, with up to 10 hours of use from a 65mHA battery.[2]

High quality wireless audio

Qualcomm® aptX™ Audio, aptX HD and aptX Adaptive audio technologies are designed to deliver consistent, high quality audio streaming over Bluetooth. The internal 24-bit end-to-end audio pipeline and high-performance DACs are designed to deliver high resolution audio through the audio processing chain.

Customizable platform that supports innovation

The QCC5100 audio platform includes a comprehensive and customizable Audio Development Kit (ADK) and several example designs that help to address the key challenges faced when developing products.

[1] Quad-core processing is available on Qualcomm® QCC5121, Qualcomm® QCC5126 and Qualcomm® QCC5127 variants
[2] Example use case stereo headset decoding A2DP stream, SBC at 350kbps/48 kHz. audio processing in by-pass.

Qualcomm® aptX™ Adaptive

QCC5100 Target Applications

- Bluetooth Earbuds
- Bluetooth Headphones
- Bluetooth Headsets
- Bluetooth Hearables
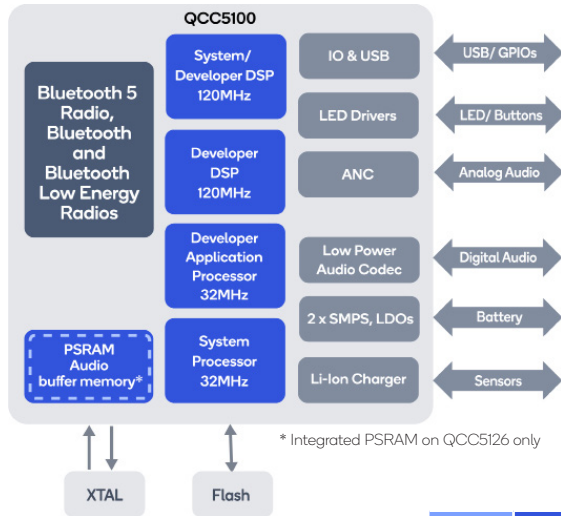- Bluetooth Portable Speakers

Bluetooth®

Features

- Extremely low power design
- Bluetooth 5 radio
- 2Mbps Bluetooth low energy (LE) support
- Ultra-small form factor
- Powerful quad-core processor[1] architecture
- Dual core 32-bit processor application subsystem
- Dual core Qualcomm® Kalimba™ DSP Audio subsystem
- Embedded ROM + RAM and external Q-SPI Flash
- Integrated PSRAM for audio buffering[2]
- High performance low power audio
- 2-ch 98dBA headset class D
- 2-ch 99dBA line inputs (single-ended)
- 192kHz 24-bit I2S & SPDIF interfaces
- Fully programmable digital ANC
- Designed to support digital assistants, Push to Talk/Voice Activated
- Flexible software platform with powerful new IDE support
- Designed to support aptX, aptX HD and aptX Adaptive
- Designed to support Qualcomm TrueWireless Stereo and Qualcomm TrueWireless Stereo Plus
- Integrated battery charger supporting internal mode (up to 200 mA) and external mode (up to 1.8 A)
- Designed for reduced eBoM through highly integrated SoC design

[1] Quad-core processing is available on QCC5121, QCC5126 and QCC5127 variants
[2] Integrated PSRAM on QCC5126 only; QCC5127 supports external PSRAM

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QCC5100 Block Diagram

* Integrated PSRAM on QCC5126 only

	QCC5121	QCC5124	QCC5125	QCC5126	QCC5127
Support for Digital Assistant - Push to Talk	✓	✓	✓	✓	✓
Support for Digital Assistant - Voice Activated	✗	✗	✗	✓	✓[3]
Number of Application Processors	2	2	2	2	2
Number of DSPs	2	2	1	2	2
Digital ANC - FeedForward/Feedback/Hybrid	✓	✓	✓	✓	✓
aptX Adaptive	✓	✓	✓	✓	✓
Power Consumption (A2DP streaming)	~6ma	~6ma	~10ma	~6ma	~6ma

[3] Requires external PSRAM

QCC5100 Specifications

Bluetooth	Bluetooth 5 including 2 Mbps Bluetooth LE Single ended antenna connection with on-chip balun and Tx/Rx switch
Audio DSP	Dual 120MHz Kalimba audio DSP cores Flexible clock speed from 2MHz up to 120MHz
Application Subsystem	32-bit firmware processor 32-bit 32/80MHz developer processor
Memory	80KB program RAM 256KB data RAM, 5Mb ROM
Interfaces	UART, 2x Bit Serializers (I2C/SPI), USB 2.0, SDIO, QSPI, NOR flash, up to 55x PIO
Power Management	Integrated power management unit (PMU) Dual switch-mode power supply (SMPS)
Battery Support	Integrated battery charger supporting internal mode (up to 200 mA) & external mode (up to 1.8 A)
Packaging	124-ball 6.5 x 6.5 x 1.0mm VFBGA, 0.5mm pitch