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, designed to meet consumer demand for robust, high quality, wireless listening in smaller devices with longer audio playback. Qualcomm® QCC515x and Qualcomm® QCC517x are designed for the future of wireless audio with support for Snapdragon Sound™ technology (our optimized chain of super audio connectivity and mobile innovations). Furthermore the QCC517x is designed to support LE Audio use cases.

The flexibility provided by the QCC5100 series’ programmable applications processor and audio DSPs helps manufacturers to differentiate and deliver on their unique product vision. QCC517x SoCs are designed for concurrent support for our superior audio features and are further enhanced with AI, bringing added potential to reduce BOM, while delivering equal or better levels of performance.

All QCC5100 series SoCs feature integrated ultra-low power Qualcomm® Active Noise Cancellation (ANC), reducing PCB area and supporting ANC in small form factors. Additionally, Qualcomm® QCC514x, QCC515x and QCC517x include Qualcomm® Adaptive Active Noise Cancellation (ANC), designed to deliver enhanced ear comfort and performance, while compensating for variations in earbud fit.

Our Qualcomm TrueWireless™ Mirroring is engineered to deliver a sophisticated user experience, offering dynamic bud-to-bud role-swapping and evening out power distribution between both earbuds. The QCC517x brings support for LE Audio use cases alongside traditional Bluetooth tech, for superior listening experiences in a wide range of environments.

1 Example use case stereo headset decoding A2DP stream, SBC at 350kbps/48 kHz, audio processing in by-pass
2 QCC514x, QCC515x and QCC517x only.

Highlights

Ultra-low power

The QCC5100 series is designed for unprecedented efficiency in power consumption and support the development of very small form factor, richly-featured earbuds that can be used for up to 16 hours with a 65mAh battery¹. QCC517x SoCs are optimized for AI and deliver double the compute power compared to the previous generation devices, at no compromise to our industry leading ultra-low power performance.

LE Audio

QCC517x is designed to support a range of LE Audio enabled use cases for earbuds, including audio sharing, broadcast, low latency gaming, and stereo recording. This dual-mode platform integrates the best of LE Audio and traditional Bluetooth to enable smooth feature adoption for real-world listening scenarios.

CD Lossless and high resolution audio

With Qualcomm® aptX™ Adaptive Audio and high-performance DACs these platforms are designed to deliver high resolution (24-bit 96kHz) and low latency audio through the Bluetooth audio processing chain. The QCC517x features CD-Lossless audio with Snapdragon Sound, designed to dynamically scale the Bluetooth connection to deliver 16-bit 44.1kHz lossless audio.

Integrated noise cancellation

Our range of integrated digitally-programmable ANC solutions support great noise cancellation without compromising on battery life, even in ultra-small form factors. QCC517x is designed to support our third-generation Qualcomm Adaptive ANC, with full-band ambient mode for strong, effective noise cancellation and a natural feeling spatial awareness of the listener’s surrounding environment.

Innovative, customizable platform

The QCC5100 series is designed specifically to help our customers to innovate with two comprehensively programmable DSPs, and with our Audio Development Kit (ADK), developers can create unique and differentiated products. The QCC5100 series is designed to support both button-press and wake word activated² voice assistants.

This material is subject to change without notice. 87-CF482-1 Rev. I

Qualcomm, Qualcomm QCC5100, Qualcomm QCC515x, Qualcomm QCC517x, Qualcomm QCC514x, Qualcomm ANC, Qualcomm Adaptive ANC, Qualcomm TrueWireless Mirroring, Snapdragon Sound and Qualcomm aptX are products of Qualcomm Technologies, Inc. and/or its subsidiaries.
QCC5100 Target Applications

- Bluetooth Earbuds
- Bluetooth Headphones
- Bluetooth Headsets

- Bluetooth Hearables
- Bluetooth Portable Speakers

Features

- Qualcomm® QCC512x qualified to Bluetooth 5.1;
  QCC514x qualified to Bluetooth 5.2, and QCC515x and QCC517x qualified to Bluetooth 5.3
- QCC517x is designed to support the LE Audio standard
- 2Mbps Bluetooth Low Energy (LE) support
- From 4mm x 4mm ultra-small form factor enabling highly miniaturized earbuds
- Dual-core 32-bit processor application subsystem
- Dual-core Qualcomm® Kalimba™ DSP Audio subsystem (Total quad-core processor architecture, supporting complex use cases)
- Embedded ROM + RAM and external Q-SPI Flash
- Integrated PSRAM for audio buffering
- High performance, low-power audio codec suited to high resolution audio use cases
- High quality 2-ch Class D analog output
- High quality 2-ch Class AB analog output
- Up to 4-ch¹ high quality line inputs
- 192kHz 24-bit I²S & SPDIF interfaces
- Fully programmable Qualcomm Adaptive ANC – no PCB size penalty and ultra-low-power⁴
- Designed to support button press or wake word activated⁵ digital assistants with minimal integration effort
- Designed to help reduce eBoM through highly integrated SoC design
- Flexible software platform with new IDE support
- Designed to support aptX® Adaptive up to 96kHz⁶, backward compatible with aptX and aptX HD
- Designed for CD Lossless audio with Snapdragon Sound²
- Designed to support Qualcomm TrueWireless Stereo and Qualcomm TrueWireless Mirroring³⁶
- Designed to support Qualcomm® cVc™ Echo Cancellation (ECNS) and Noise Suppression technologies

Ordering Information

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QCC51xx Specifications

Bluetooth

- Bluetooth 5.1/5.2/5.3 including 2 Mbps Bluetooth LE
- Single ended antenna connection with on-chip balun and Tx/Rx switch

Audio DSP

- Dual 120MHz (2x120MHz) Kalimba audio DSP cores
- Flexible clock speed from 2MHz up to 120MHz (2x60MHz²)

Application Subsystem

- 32-bit firmware processor
- 32-bit 32/60MHz developer processor

Memory

- 80KB program RAM, 256KB data RAM (QCC512x)
- 112KB program RAM, 448KB data RAM (QCC514x/QCC515x)
- 384KB program RAM, 1408KB data RAM (QCC517x)

Interfaces

- UART, USB 2.0, SDIO, QSPI, 2x bit serializers (QCC512x - QCC515x), 3x bit serializers (QCC517x) (I²C/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)

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