

# 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 demand for robust, high quality, wireless listening in speakers, headsets and earbuds. The lower power and small size particularly enable smaller devices with longer audio playback between charges.

QCC5100 is designed for the future of wireless audio with support for Snapdragon Sound™ Technology Suite (our optimized chain of super audio connectivity and mobile innovations). Qualcomm® QCC517x and Qualcomm® QCC518x are also designed to support Bluetooth® LE Audio use cases including Auracast™.

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 and QCC518x are designed for concurrent support of complex features, for conversation, hands free calling, audio curation and music enjoyment.

Tight integration on a single SoC further enhanced with AI, brings added potential to reduce BOM, while delivering great levels of performance.

Designed to deliver enhanced comfort in headset and earbud form factors, the QCC5100 series SoCs feature integrated ultra-low power Qualcomm® Adaptive Active Noise Cancellation (ANC). QCC517x and QCC518x feature our Third-Gen ANC including adaptive transparency.

Our Qualcomm TrueWireless™ Mirroring is engineered to deliver a sophisticated user experience, offering dynamic bud-to-bud role-swapping, single bud use when desired, and balancing out power distribution between earbuds.

The QCC517x and QCC518x bring support for LE Audio use cases alongside traditional Bluetooth technology for superior listening experiences in a wide range of environments.

<sup>1</sup> Example use case stereo headset decoding A2DP stream, SBC at 350kbps/48 kHz, audio processing in by-pass

<sup>2</sup> QCC5171, QCC5181 only.

## Highlights

### Ultra-low power

The QCC5100 series is designed for unprecedented efficiency in power consumption and supports the development of very small form factor, richly-featured earbuds that can be used for up to 16 hours with a 65mAh battery<sup>1</sup>. QCC517x and QCC518x 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.



### Bluetooth® LE Audio

QCC517x and QCC518x are designed to support a range of LE Audio-enabled use cases for earbuds, including audio sharing, broadcast, low latency gaming, and stereo recording and Auracast. This dual-mode platform integrates the best of LE Audio and traditional Bluetooth technology to enable smooth feature adoption for new real-world listening scenarios.



### 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 end-to-end low latency audio. Designed to dynamically scale the Bluetooth connection to deliver audio up to lossless quality, the QCC517x and QCC518x feature 44.1kHz lossless audio with Snapdragon Sound technologies over Classic Bluetooth technology, whilst the QCC518x further leverages Snapdragon Sound to support lossless audio over LE Audio, increasing the resolution to 48kHz sample rate.



### Integrated noise cancellation

Qualcomm Adaptive ANC enables support for great noise management without compromising on battery life, even in ultra-small form factors. QCC517x and QCC518x are designed to support our Third-Gen Qualcomm Adaptive ANC, with full-band transparency mode for strong, effective noise cancellation and a natural-feeling spatial accurate awareness of the listener's surrounding environment, while adaptation algorithms respond quickly to window noise and mitigate for changes in fit.



### 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 activated<sup>2</sup> voice assistants.



# QCC5100 Target Applications

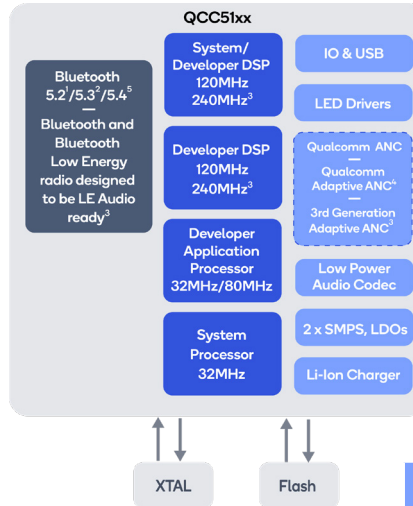
- Bluetooth Earbuds
- Bluetooth Headphones
- Bluetooth Headsets
- Bluetooth Hearables
- Bluetooth Portable Speakers



## Features

- Qualcomm® QCC514x is qualified to Bluetooth specification 5.2, and Qualcomm® QCC5151/QCC5171 are qualified to Bluetooth specification 5.3 and QCC5181 is qualified to Bluetooth specification 5.4
- In earbuds, QCC5171 and QCC5181 support LE Audio Gaming Mode, Unicast Voice, Unicast Music, Broadcast receive, and Auracast
- In stereo headset, QCC5171 supports LE Audio Gaming mode and QCC5181 supports Gaming Mode, Unicast Voice, Unicast Music, Broadcast receive and Auracast
- Designed to support Snapdragon Sound for optimised audio quality, robustness and latency
- 2Mbps Bluetooth Low Energy (LE) support
- From 4.2mm x 4.3mm 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
- High quality 2-ch Class D & Class AB analog output
- Up to 4-ch<sup>3</sup> high quality line inputs and 192kHz 24-bit I2S & SPDIF interfaces
- Fully programmable Qualcomm Adaptive ANC – no PCB size penalty and ultra low-power
- Natural sounding transparency mode with real time adaptation for fit variation and howling detection
- Designed to support pre-certified button press or wake word activated digital assistants
- Designed to help reduce eBoM through highly integrated SoC design
- Flexible software platform with new IDE support
- Designed to support aptX Adaptive up to 96KHz, backward compatible with aptX and aptX HD<sup>7</sup>
- Designed for lossless audio up to 44.1kHz and 48kHz<sup>5</sup> with Snapdragon Sound
- Designed to support Qualcomm TrueWireless Mirroring
- Designed to support Qualcomm® cVc™ Echo Cancellation (ECNS) and Noise Suppression

## QCC51xx Block Diagram



- 1 QCC514x only
- 2 QCC5151 and QCC5171
- 3 QCC5171 and QCC5181
- 4 QCC514x and QCC5151
- 5 QCC5181 only
- 6 For True Wireless earbuds only
- 7 For stereo headsets only
- 8 3rd generation

Support for Snapdragon Sound (Classic Bluetooth)

Support for Digital Assistant - Push to Talk

Support for Digital Asst.- Wake Word Activated

Support for Qualcomm TrueWireless Mirroring

Bluetooth 5.2/5.3/5.4 qualified

LE Audio use cases including Auracast

Qualcomm ANC

Qualcomm Adaptive ANC

aptX Adaptive

aptX Voice

Lossless audio with Snapdragon Sound (Classic Bluetooth)

Lossless audio with Snapdragon Sound (LE Audio)

Power Consumption (A2DP streaming)

	QCC5141	QCC5144	QCC5151	QCC5171	QCC5181
Support for Snapdragon Sound (Classic Bluetooth)	✓	✓	✓ <sup>6</sup>	✓	✓
Support for Digital Assistant - Push to Talk	✓	✓	✓ <sup>6</sup>	✓	✓
Support for Digital Asst.- Wake Word Activated	✓	✓	✓ <sup>6</sup>	✓	✓
Support for Qualcomm TrueWireless Mirroring	✓	✓	✓	✓	✓
Bluetooth 5.2/5.3/5.4 qualified	5.2	5.2	5.3	5.3	5.4
LE Audio use cases including Auracast	✗	✗	✗	✓ <sup>6</sup>	✓
Qualcomm ANC	✓	✓	✓	✓ <sup>8</sup>	✓ <sup>8</sup>
Qualcomm Adaptive ANC	✓ <sup>6</sup>	✓ <sup>6</sup>	✓ <sup>6</sup>	✓ <sup>6,8</sup>	✓ <sup>6,8</sup>
aptX Adaptive	✓	✓	✓	✓	✓
aptX Voice	✓	✓	✓	✓	✓
Lossless audio with Snapdragon Sound (Classic Bluetooth)	✗	✗	✗	44.1k <sup>6</sup>	44.1k
Lossless audio with Snapdragon Sound (LE Audio)	✗	✗	✗	✗	48k
Power Consumption (A2DP streaming)	-5ma	-5ma	-5ma	-4ma	-4ma

## QCC51xx Specifications

<b>Bluetooth</b>	Bluetooth 5.2 <sup>1</sup> /5.3 <sup>2</sup> /5.4 <sup>5</sup> including 2 Mbps Bluetooth LE Single ended antenna connection with on-chip balun and Tx/Rx switch
<b>Audio DSP</b>	Dual 120MHz (240MHz <sup>3</sup> ) Kalimba audio DSP cores Flexible clock speed from 2MHz up to 120MHz (240MHz <sup>3</sup> )
<b>Application Subsystem</b>	32-bit firmware processor 32-bit 32/80MHz developer processor
<b>Memory</b>	112KB program RAM, 448KB data RAM (QCC514x/QCC5151) 384KB program RAM, 1408KB data RAM (QCC517x/QCC518x)
<b>Interfaces</b>	UART, USB 2.0, SDIO, QSPI, 2x bit serializers (QCC515x), 3x bit serializers (QCC517x) (I2C/SPI), NOR flash, up to 55x PIO
<b>Power Management</b>	Integrated power management unit (PMU) Dual switch-mode power supply (SMPS)
<b>Battery Support</b>	Integrated battery charger supporting internal mode (up to 200 mA) & external mode (up to 1.8 A)

Qualcomm Kalimba, Qualcomm cVc, Qualcomm QCC514x, Qualcomm QCC5141, Qualcomm QCC5144, Qualcomm QCC5151, Qualcomm QCC5171 and Qualcomm QCC5181 are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

©2023 Qualcomm Technologies, Inc. and/or its affiliated companies. All Rights Reserved. Qualcomm, Snapdragon, Snapdragon Sound and Qualcomm TrueWireless are trademarks or registered trademarks of Qualcomm Incorporated. aptX, cVc and Kalimba are trademarks or registered trademarks of Qualcomm Technologies International, Ltd. Other products and brand names may be trademarks or registered trademarks of their respective owners. 0223B

## Ordering Information

Product	Part Number
QCC5141	QCC-5141-0-WLNSP94B
QCC5144	QCC-5144-0-CSP90B4
QCC5151	QCC-5151-0-WLNSP94B
QCC5171	QCC-5171-0-WLNSP99
QCC5181	QCC-5181-0-WLNSP99

