

## Features

- Bluetooth® v4.0 specification compliant
- 80MHz RISC MCU and 80MIPS Kalimba DSP
- Stereo codec with 1 microphone input
- Internal ROM, serial flash memory and EEPROM interfaces
- High-performance Stereo codec
- Radio includes integrated balun with RF performance of 8dBm transmit power and -89dBm receiver sensitivity
- AVRCP v1.4
- 5-band fully configurable EQ
- Wideband speech supported by HFP v1.6 and mSBC codec
- CSR's latest CVC technology for narrowband and wideband voice connections including wind noise reduction
- Multipoint support for A2DP connection to 2 A2DP sources for music playback
- Secure simple pairing, CSR's proximity pairing and CSR's proximity connections
- Stereo line-in
- Serial interfaces: USB 2.0, UART, I<sup>2</sup>C and SPI
- SBC, MP3 and AAC decoder support
- Wired audio support
- Integrated dual switch-mode regulators, linear regulators and battery charger
- External crystal load capacitors not required for typical crystals
- 3 LED outputs (RGB)
- 68-lead QFN 8 x 8 x 0.9mm 0.4mm pitch
- Green (RoHS compliant and no antimony or halogenated flame retardants)

## General Description

CSR's BlueCore® CSR8635 QFN is a single-chip Bluetooth ROM audio solution for rapid evaluation and development of Bluetooth ROM stereo applications.

BlueCore® CSR8635 QFN consumer audio platform for wired and wireless applications using the QFN package integrates an ultra-low power DSP and application processor with embedded flash memory, a high-performance stereo codec, a power management subsystem and LED drivers.

The CSR configuration tools and the development kit provide a flexible and powerful development platform to design advanced and high-quality Bluetooth stereo products using BlueCore® CSR8635 QFN single-chip Bluetooth audio solution.

## BlueCore® CSR8635 QFN

### CSR8635 Stereo ROM Solution

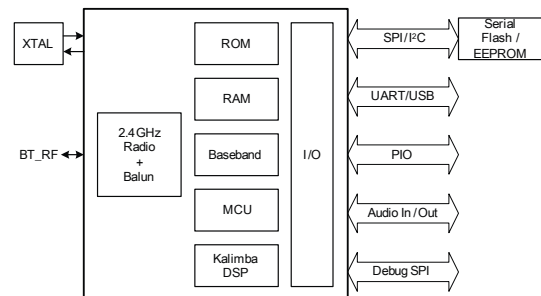
### 1-mic CVC Audio Enhancement

### Fully Qualified Single-chip Bluetooth® v4.0 System

#### Production Information

CSR8635A04

Issue 2



## Applications

- Stereo speakers
- Speakerphones
- 1-mic stereo headset or headphones
- Handsfree car kits

The enhanced Kalimba DSP coprocessor with 80MIPS supports enhanced audio and DSP applications.

The integrated audio codec supports stereo input and output, as well as a variety of audio standards.

See *CSR Glossary* at [www.csrsupport.com](http://www.csrsupport.com).

## Device Details

### Bluetooth low energy

- Dual-mode Bluetooth low energy radio
- Support for Bluetooth basic rate / EDR and low energy connections
- 3 Bluetooth low energy connections at the same time as basic rate A2DP

### Bluetooth Radio

- On-chip balun (50Ω impedance)
- No production trimming of external components
- Bluetooth v4.0 specification compliant

### Bluetooth Transmitter

- 8dBm (typ) RF transmit power with level control
- Class 1, Class 2 and Class 3 support, no external PA or TX/RX switch required

### Bluetooth Receiver

- -91dBm (typ)  $\pi/4$  DQPSK receiver sensitivity and -81dBm (typ) 8DPSK receiver sensitivity
- Integrated channel filters
- Digital demodulator for improved sensitivity and co-channel rejection
- Real-time digitised RSSI available to application
- Fast AGC for enhanced dynamic range
- Channel classification for AFH

### Bluetooth Synthesiser

- Fully integrated synthesiser requires no external VCO, varactor diode, resonator or loop filter
- Compatible with crystals 16MHz to 32MHz

### Kalimba DSP

- Enhanced Kalimba DSP coprocessor, 80MIPS, 24-bit fixed point core
- 2 single-cycle MACs; 24 x 24-bit multiply and 56-bit accumulator
- 32-bit instruction word, dual 24-bit data memory
- 6K x 32-bit program RAM including 1K instruction cache for executing out of internal ROM
- 16K x 24-bit + 16K x 24-bit 2-bank data RAM

### Audio Interfaces

- Stereo audio ADC with line input
- Stereo audio DAC
- Supported sample rates of 8, 11.025, 16, 22.05, 32, 44.1, 48 and 96kHz (DAC only)

### Auxiliary Features

- Crystal oscillator with built-in digital trimming

### Package Option

- 68-lead QFN 8 x 8 x 0.9mm 0.4mm pitch

### Physical Interfaces

- UART interface for debug
- USB 2.0 (full-speed) interface, including charger enumeration
- 1-bit SPI flash memory interface
- SPI interface for debug and programming
- I<sup>2</sup>C interface for EEPROM
- Up to 20 general purpose PIOs with 3 extra open-drain PIOs available when LED not used
- PCM and I<sup>2</sup>S (only in HCI mode) interfaces
- 3 LED drivers (includes RGB) with PWM flasher independent of MCU

### Integrated Power Control and Regulation

- Automatic power switching to charger when present
- 2 high-efficiency switch-mode regulators with 1.8V and 1.35V outputs direct from battery supply
- 3.3V linear regulator for USB supply
- Low-voltage linear regulator for internal digital circuits
- Low-voltage linear regulator for internal analogue circuits
- Power-on-reset detects low supply voltage
- Power management includes digital shutdown and wake-up commands for ultra-low power modes

### Battery Charger

- Lithium ion / Lithium polymer battery charger
- Instant-on function automatically selects the power supply between battery and USB, which enables operation even if the battery is fully discharged
- Fast charging support up to 200mA with no external components. Higher charge currents using external pass device.
- Supports USB charger detection
- Support for thermistor protection of battery pack
- Support to enable end product design to PSE law:
  - Design to JIS-C 8712/8714 (batteries)
  - Testing based on IEEE 1725

### Baseband and Software

- Internal ROM
- Memory protection unit supporting accelerated VM
- 56KB internal RAM, enables full-speed data transfer, and full piconet support
- Logic for forward error correction, header error control, access code correlation, CRC, demodulation, encryption bit stream generation, whitening and transmit pulse shaping

## CSR8635 Stereo ROM Solution Details

### Bluetooth Profiles

- Bluetooth v4.0 specification support
- A2DP v1.2
- AVRCP v1.4
- HFP v1.6
- HSP v1.2
- DI v1.3

### Music Enhancements

- Configurable 5-band EQ for music playback (rock, pop, classical, jazz, dance etc)
- SBC, MP3, AAC and Faststream decoder
- Volume Boost
- Stereo Widening (S3D)

### Additional Functionality

- Support for multi-language programmable audio prompts
- CSR's proximity pairing and CSR's proximity connection
- Multipoint support for A2DP connection to 2 A2DP sources for music playback
- Talk-time extension

### CSR8600 ROM Series Configuration Tool

Configures the CSR8635 stereo ROM solution software features:

- Bluetooth v4.0 specification features
- Reconnection policies, e.g. reconnect on power-on
- Audio features, including default volumes
- Button events: configuring button presses and durations for certain events, e.g. double press on PIO for last number redial
- LED indications for states, e.g. device connected, and events, e.g. power on
- Indication tones for events and ringtones
- Battery divider ratios and thresholds, e.g. thresholds for battery low indication, full battery etc.
- Advanced Multipoint settings

### CSR8635 Stereo ROM Solution Development Kit

- Example CSR8635 QFN module design
- Carrier board
- Output stage: headphone amplifier
- Interface adapters and cables
- Works in conjunction with the CSR8600 ROM Series Configuration Tool and other supporting utilities

## 1 Ordering Information

Device	Package			Order Number
	Type	Size	Shipment Method	
CSR8635 Stereo ROM Solution	QFN-68-lead (Pb free)	8 x 8 x 0.9mm 0.4mm pitch	Tape and reel	CSR8635A04-IQQF-R

**Note:**

CSR8635 QFN is a ROM-based device where the product code has the form CSR8635Axx. Axx is the specific ROM-variant, A04 is the ROM-variant for CSR8635 Stereo ROM Solution.

Minimum order quantity is 2kpcs taped and reeled.

**Supply chain:** CSR's manufacturing policy is to multisource volume products. For further details, contact your local sales account manager or representative.

### 1.1 Contacts

General information	<a href="http://www.csr.com">www.csr.com</a>
Information on this product	<a href="mailto:sales@csr.com">sales@csr.com</a>
Customer support for this product	<a href="http://www.csrsupport.com">www.csrsupport.com</a>
Details of compliance and standards	<a href="mailto:product.compliance@csr.com">product.compliance@csr.com</a>
Help with this document	<a href="mailto:comments@csr.com">comments@csr.com</a>

### 1.2 CSR8635 Stereo ROM Solution Development Kit Ordering Information

Description	Order Number
CSR8635 Stereo ROM Solution Audio Development Kit	DK-8635-10163-1A

## Document History

Revision	Date	Change Reason
1	22 JUL 13	Original publication of this document.
2	08 OCT 13	Production Information added and number of GPIOs updated.

## Trademarks, Patents and Licences

Unless otherwise stated, words and logos marked with <sup>™</sup> or <sup>®</sup> are trademarks registered or owned by CSR plc or its affiliates. Bluetooth <sup>®</sup> and the Bluetooth <sup>®</sup> logos are trademarks owned by Bluetooth <sup>®</sup> SIG, Inc. and licensed to CSR. Other products, services and names used in this document may have been trademarked by their respective owners.

The publication of this information does not imply that any license is granted under any patent or other rights owned by CSR plc and/or its affiliates.

CSR reserves the right to make technical changes to its products as part of its development programme.

While every care has been taken to ensure the accuracy of the contents of this document, CSR cannot accept responsibility for any errors.

Refer to [www.csrsupport.com](http://www.csrsupport.com) for compliance and conformance to standards information.

The status of this document is **Production Information**:

- This includes guaranteed minimum and maximum limits for the electrical specifications.
- Production Information supersedes all previous document versions.