Features

- 80MHz RISC MCU and 80MIPS Kalimba DSP
- Internal ROM, serial flash memory and EEPROM interfaces
- Mono DAC with 2 microphone inputs
- Radio includes integrated balun
- CSR's latest CVC technology for narrowband and wideband voice connections including wind noise reduction
- Wideband speech supported by HFP v1.6 profile and mSBC codec
- Voice recognition support for answering a call, enables true hands-free use
- Multipoint HFP connection to 2 phones for voice
- Multipoint A2DP connection enables a headset (A2DP) connection to 2 A2DP source devices for music playback
- Secure simple pairing, CSR's proximity pairing and CSR's proximity connection
- Audio interfaces: I²S and PCM
- Serial interfaces: UART, USB v2.0 (full-speed), I²C and SPI
- Integrated dual switch-mode regulators, linear regulators and battery charger
- External crystal load capacitors not required for typical crystals
- 3 LED outputs
- 68-ball VFBGA 5.5 x 5.5 x 1mm 0.5mm pitch
- Green (RoHS compliant and no antimony or halogenated flame retardants)

BlueCore® CSR8620™ BGA

2-mic Mono Headset Solution

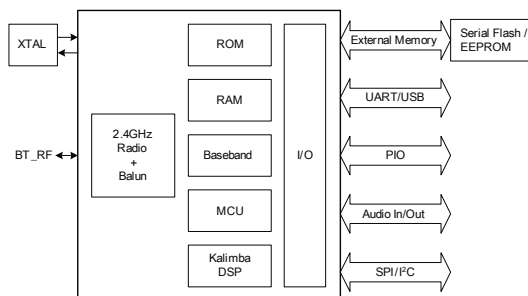## 2-mic CVC Audio Enhancement

Fully Qualified Single-chip Bluetooth® v4.0 System

Pre-production Information

CSR8620A03

Issue 4

General Description

BlueCore® CSR8620™ BGA is a product from CSR's Connectivity Centre. It is a single-chip radio and baseband IC for Bluetooth 2.4GHz systems.

The integrated peripherals reduce the number of external components required, including no requirement for external codec, battery charger, SMPS, LDOs, balun or external program memory, ensuring minimum production costs.

The battery charger architecture enables the CSR8620 BGA to independently operate from the charger supply, ensuring dependable operation for all battery conditions.

Applications

- 2-mic mono headset
- Support for smartphone/tablet applications

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

The integrated audio codec supports 2 microphone inputs and mono output, as well as a variety of audio standards.

See *CSR Glossary* at www.csrsupport.com.

Device Details

Bluetooth Radio

- On-chip balun (50Ω impedance in TX and RX modes)
- No trimming of external components is required in production
- Bluetooth v4.0 specification compliant

Bluetooth Transmitter

- 9dBm RF transmit power with level control from on-chip 6-bit DAC
- Class 1, Class 2 and Class 3 support without the need for an external power amplifier or TX/RX switch

Bluetooth Receiver

- Receiver sensitivity of -90dBm
- 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

- Mono audio DAC
- Microphone bias generator and up to 2 analogue microphone inputs
- digital microphone inputs
- Enhanced side-tone gain control
- 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-ball VFBGA 5.5 x 5.5 x 1mm 0.5mm pitch

Physical Interfaces

- UART interface for debug
- USB 2.0 (full-speed) interface for audio and charger enumeration
- 2-bit/4-bit SPI flash memory interface
- SPI interface for debug and programming
- I²C interface for EEPROM
- Up to 22 general purpose PIOs with 3 extra open-drain PIOs available when LED not used
- PCM and I²S 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.
- 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, mixed voice/data 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
- Transcoders for A-law, µ-law and linear voice from host and A-law, µ-law and CVSD voice over air

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CSR8620 2-mic Mono Headset Details

Bluetooth Profiles

- Bluetooth v4.0 specification support
- HFP v1.6
- HSP v1.2
- A2DP v1.2

Improved Audio Quality

- mSBC codec support for wideband speech

CSR's latest 2-mic CVC audio enhancements for narrowband and wideband connections including:

- 2-mic far-end audio enhancements
- Near-end audio enhancements (noise suppression and AEQ)
- Wind noise reduction
- Packet loss concealment
- Bit error concealment
- Automatic gain control and automatic volume control
- Frequency expansion for improved speech intelligibility

Additional Functionality

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

Headset Configurator Tool

Configures the CSR8620 2-mic mono headset ROM 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. headset connected, and events, e.g. power on
- Indication tones for events and ringtones
- HFP v1.6 supported features
- Battery divider ratios and thresholds, e.g. thresholds for battery low indication, full battery etc.
- Advanced Multipoint settings

CSR8620 2-mic Mono Headset Development Kit

- CSR8620 2-mic mono headset demonstrator board
- Interface adapters and cables are available
- Works in conjunction with the CSR8620 2-mic mono headset Configurator tool and other supporting utilities
- For order code details contact CSR

1 Ordering Information

Device	Package			Order Number
	Type	Size	Shipment Method	
CSR8620 2-mic Mono Headset	VFBGA 68-ball (Pb free)	5.5 x 5.5 x 1mm 0.5mm pitch	Tape and reel	CSR8620A03-IBBC-R

Note:

Until CSR8620A03 reaches **Production** status, engineering samples order number applies. This is ES-CSR8620A03-IBBC, with no minimum order quantity.

CSR8620 BGA is a ROM-based device where the product code has the form CSR8620Axx. Axx is the specific ROM-variant, A03 is the ROM-variant for CSR8620 2-mic Mono Headset.

At **Production** status minimum order quantity is 2kpcs taped and reeled.

Your attention is drawn to Cambridge Silicon Radio Limited's ("Seller"'s) standard terms of supply which govern the supply of **Prototype Products** or **Engineering Samples** and which state in clause 5:

5.1 "Prototype Products" or "Engineering Samples" means any products that have not passed all the stages of full production acceptance as determined solely by the Seller. The Seller will usually identify which of the Goods ordered are considered Prototype Products designating them "ES" on the Quotation and any Order for Prototype Products shall be subject to the special terms contained in this clause 5.

5.2 The Seller has used reasonable efforts to design and build the Prototype Products in accordance with the relevant specification, but because the testing carried out by the Seller in respect of the Prototype Products is incomplete, the Seller does not give or enter into any warranties, conditions or other terms in relation to quality or fitness for purpose of the Prototype Products and/or that the Prototype Products are free from bugs, errors or omissions.

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

To contact a CSR representative, email sales@csr.com or go to www.csr.com/contacts.

1.1 Contacts

General information	www.csr.com
Information on this product	Sales@csr.com
Customer support for this product	www.csrsupport.com
Details of compliance and standards	Product.compliance@csr.com
Help with this document	Comments@csr.com

1.2 CSR8620 2-mic Mono Headset Development Kit Ordering Information

Description	Order Number
CSR8620 2-mic Mono Headset Audio Development Kit	DK-8620-NNNNN-1A

Document History

Revision	Date	Change Reason
1	07 DEC 10	Original publication of this document.
2	13 DEC 10	Update to microphone support description.
3	14 DEC 11	Updated functionality. Minor editorial updates.
4	16 DEC 11	Bluetooth v4.0 specification and Pre-production Information added. If you have any comments about this document, email comments@csr.com giving number, title and section with your feedback.

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