

Operation description

Bluetooth Headset

1. **Purpose:** The purpose of this document is to describe key component operations on Bluetooth headset.
2. **Key components:** CSR BlueCore2- Audio(BC213159A) Bluetooth Single Chip, ATTEL AT24C16A EEPROM, TI TPS62202DBV High-efficiency DC-DC Converter, TI BQ2057CDGK Advanced Linear Charge Management IC.
3. **Operation Principle:** CSR BlueCore-2 Audio (BC213159A) is a single chip radio and baseband IC for Bluetooth 2.4GHz systems. It is implemented in 0.18μm CMOS technology. When used with the CSR Bluetooth software stack, it provides a fully compliant Bluetooth system for data and voice communications.
Operation at 1.7 ~ 3.6V supply.
Operation clock is provided by 16MHz oscillator.

Key Features

Radio

- Operation with common TX/RX terminals simplifies external matching circuitry and eliminates external antenna switch
- Extensive built-in self-test minimizes production test time
- No external trimming is required in production
- Full RF reference designs are available

Transmitter

- Up to +6dBm RF transmit power with level control from the on-chip 6-bit DAC over a dynamic range greater than 30dB
- Supports Class 2 and Class 3 radios without the need for an external power amplifier or TX/RX switch
- Support Class 1 radio with an external power amplifier, provided by a power control terminal controlled by an internal 8-bit voltage DAC and an external RF TX/RX switch

Receiver

- Integrated channel filters
- Digital demodulator for improved sensitivity and co-channel rejection
- Digitized RSSI available in real time over the HCI interface
- Fast AGC for enhanced dynamic range

Synthesizer

- Fully integrated synthesizer, no external VCO varactor diode, resonator or loop filter
- Compatible with crystals between 8 and 32MHz (in multiples of 250KHz) or an external clock
- Accepts 15.36, 16.2, 19.2, 19.44, 19.68, 19.8 and 38.4MHz TCXO frequencies for GSM and CDMA devices with either sinusoidal or logic level signals

Auxiliary Features

- Crystal oscillator with built-in digital trimming
- Power management includes digital shut down and wake up commands and an integrated low power oscillator for ultra-low Park/Sniff/Hold mode power consumption
- Devices can be used with an external master oscillator and provides a 'clock request signal' to control external clock source.
- On-chip linear regulator, producing 1.80V output from 2.2-3.6V input
- Power-on-reset cell detects low supply voltage
- Arbitrary sequencing of power supplies is permitted
- Uncommitted 8-bit ADC and 8-bit DAC are available to application programs

Baseband and software

- Internal programmed 4Mbit ROM for complete system solution
- 32Kbyte on-chip RAM allows full speed Bluetooth data transfer, mixed voice and data, plus full 7 slaves piconet operation
- Dedicated logic for forward error correction, header error control, access code correlation, demodulation, cyclic redundancy check, encryption bit-stream generation, whitening and transmit pulse shaping
- Transponders for A-law, μ -law and linear voice from host and A-law, μ -law and CVSD voice over air

Physical Interfaces

- Synchronous serial interface up to 4Mbaud for system debugging
- UART interface with programmable Baud rate up to 1.5Mbaud with an optional

bypass mode

- Full speed USB interface supports OHCI and UHCI host interfaces. Compliant with USB v2.0
- Synchronous bi-directional serial programmable audio interface
- Operational I²CTM Compatible interface

Bluetooth Stack Running on an Internal Microcontroller

CSR's Bluetooth Protocol Stack runs on-chip in a variety of configurations:

- Standard HCI (UART or USB)
- Fully embedded to RFCOMM
- Customer specific builds with embedded application code

ATMEL AT24C16A EEPROM

The AT24C16A provides 16384 bits of serial electrically erasable and programmable read only memory (EEROM) organized as 2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low power and low voltage operation are essential.

Features:

- Write Protect Pin for Hardware Data Protection
- Low-voltage and Standard-voltage Operation
 - 2.7 (V_{CC} = 2.7V to 5.5V)
 - 1.8 (V_{CC} = 1.8V to 5.5V)
- 2-wire Serial Interface
- Schmitt Trigger, Filtered Inputs for Noise Suppression
- Bi-directional Data Transfer Protocol
- 100 kHz(1.8V) and 400 kHz(2.5V, 2.7V and 5V) Clock Rate
- 16-byte Page Write Modes
- Partial Page Writes are Allowed
- Self-timed Write Cycle (10 ms max)
- High Reliability
 - Endurance: One Million Write Cycles
 - Data Retention: 100 years
- Automotive Grade and Extended Temperature Devices Available
- 8-lead PDIP, 8-lead JEDEC SOIC, 8-lead MAP and 8-lead TSSOP Packages

TI TPS62202DBV High-efficiency DC-DC Converter

The TPS6220x devices are a family of high-efficiency synchronous step-down converters ideally suited for portable systems powered by 1-cell Li-Ion or 3-cell NiMH/NiCd batteries. The devices are also suitable to operate from a standard 3.3-V or 5-V voltage rail.

With an output voltage range of 6.0V down to 0.7V and up to 30 mA output current, the devices are ideal to power low voltage DSPs and processors used in PDAs, pocket PCs, and smart phones. Under nominal load current, the devices operate with a fixed switching frequency of typically 1 MHz. At light load currents, the part enters the power save mode operation; the switching frequency is reduced and quiescent current is typically only 15 uA; therefore it achieves the highest efficiency over the entire load current range.

Features:

- High Efficiency Synchronous Step-Down Converter With up to 95% Efficiency
- 2.5 V to 6.0 V Input Voltage Range
- Adjustable Output Voltage Range From .7 V to V_I
- Fixed Output Voltage Options Available
- Up to 300 mA Output Current
- 1 MHz Fixed Frequency PWM Operation
- Highest Efficiency Over Wide Load Current Range Due to Power Save Mode
- 15-uA Typical Quiescent Current
- Soft Start
- 100% Duty Cycle Low-Dropout Operation
- Dynamic Output Voltage Positioning
- Available in a Tiny 5-Pin SOT23 Package

TI BQ2057CDGK Advanced Linear Charge Management IC

The BENCHMARQ bq2057 series advanced Lithium-Ion (Li-Ion) and Lithium-Polymer (Li-Pol) linear charge-management ICs are designed for cost-sensitive and compact portable electronics. They combine high-accuracy current and voltage regulation, battery conditioning, temperature monitoring, charge termination, charge-status indication, and AutoComp charge-rate compensation in a single 8-pin IC. MSOP, TSSOP, and SOIC package options are offered to fit a wide range of end applications.

Features:

- Ideal for Single (4.1V or 4.2V) and Dual-Cell (8.2V or 8.4V) Li-Ion or Li-Pol Packs
- Requires Small Number of External Components
- 0.3 V Dropout Voltage for Minimizing Heat Dissipation
- Better Than $\pm 1\%$ Voltage Regulation Accuracy With Preset Voltages
- AutoComp™ Dynamic Compensation of Battery Pack's Internal Impedance to Reduce Charge Time
- Optional Cell-Temperature Monitoring Before and During Charge
- Integrated Voltage and Current Regulation With Programmable Charge-Current and High- or Low-Side Current Sensing
- Integrated Cell Conditioning for Reviving Deeply Discharge Cells and Minimizing Heat Dissipation During Initial Stage Of Charge
- Charge Status Output for Single or Dual Led or Host Processor Interface
- Automatic Battery-Recharge Feature
- Charge Termination by Minimum Current
- Automatic Low-Power Sleep Mode When V_{CC} Is Removed
- EVMs Available for Quick Evaluation
- Packaging: 8-Pin SOIC, 8-Pin TSSOP, 8-Pin MSOP