Technical Description

Product Function:

1. 2 x 15Watt RMS output power
2. Bluetooth V2.1 + EDR included profiles: A2DP, AVRCP
3. Advanced Audio Distribution Profile (A2DP) for wireless music streaming
4. Connects wirelessly to mobile phone, tablet or other Bluetooth Device
5. 3.5mm Aux input for non-Bluetooth device music playback
6. Docking for iPod/iPhone music playback and charging
7. 18V 1.5A AC/DC adaptor ; Input 100-240VAC 50/60Hz 800mA

Operational Description:

The Equipment Under Test (EUT) is driven by external AC/DC adaptor which provide DC18V 1.5A to the main unit. When the unit is turn ON by pressing the Power Key, the Bluetooth Module would wake up and start the operation.

If there is no iPhone/iPod is inserted on the docking and this is the first time the unit ON, Blue-tooth module would go to Pairing mode to search if any blue-tooth device like mobile is available for connect, when it is connected with a device, the EUT would go to connection mode, it can then playback the device music wirelessly though A2DP profile. The key pad signal Play/Pause can control the music playback of the device though Bluetooth AVRCP profile. When the unit is turn OFF, the module would remember the device. If the unit is turn ON from standby again, it would auto connected with the latest paired device.

When an iPod/iPhone is docked on the EUT, the unit would go to iPhone mode. The EUT would go though a authorization process for the iPod/iPhone first, which is under Apple protocol. After the process success, the unit can playback iPod/iPhone music, user can also use remote control to access the menu of the iPod. Besides, the unit also provide 5V charging though the dock to iPod/iPhone.

Under unit On, if Aux in jack is inserted, and the power/input key is pressed shortly, the unit would switch to Aux in mode and the signal go to the Class D Amplifier directly.

Bluetooth Module
Modulation Type: GFSK
Antenna Type: Integral, Internal (PCB Trace)
Frequency Range: 2402MHz - 2480MHz, 1MHz channel spacing, 79 channels
Antenna Gain: 0dBi
Nominal rated field strength: 104.0 dBμV/m at 3m
Maximum allowed field strength error: +/- 3dB

The functions of main components are mentioned below.

1. Power supply:
1) ZD1, Q1, Q2, Q3 act as 9V regulator. ZD3, Q8 act as 3.3V DC regulator.
2) Q9, Q10, Q11 acts as 3.3V DC supply for Bluetooth module.
3) U1 (FP6101) acts as 2A buck regulator providing 5V DC for iPod ducking.
4) U8 (AX1110-3.3V) acts as LED display power supply.

2. MCU:
1) U9 (SC51C1316) acts as system MCU.
2) X1 (16.384MHz) acts as system clock for MCU (U9).
3) U3 (CP chip 2.0C) is co-processor of iPod/iPhone Authentication.
4) U7 is Bluetooth module (see related Bluetooth module description below).

3. BlueTooth module (U7):
1) U1 (BC57F687A05) acts as the 2.4GHz radio core of Bluetooth module
2) L1, L2, C1, F1 (DBF81F104) act as antenna matching network.
3) U3 provides system clock (oscillation frequency 26MHz).
4) U2 (M24C32) is 4Kbyte serial EEPROM for the Bluetooth module.

4. Audio signal processing:
1) U4 (SC7313) acts as analog audio signal input selector and volume control.
2) U5 (DRV602) acts as difference opamp for audio signal from BT/iPod ducking.
3) U6 (TDA7492P) acts as 15W X 2 class D power amplifier.
4) L16, L19, L20, L23, C30, C46 act as output filters of class D amplifier (U6)

5. Infra-red control:
1) U11 (HM338) acts as infra-red receiver module.

Channel Frequency Table of Bluetooth Module

CH.NO.	FRE.	Hex Value		CH.NO.	FRE.	Hex Value		CH.NO	FRE.	Hex Value		CH.NO	FRE.	Hex Value
CHO	2402MHz	0		CH26	2428MHz	!A		CH52	2454MHz	34		CH78	2480MHz	4E
CHl	2403MHz	1		CH27	2429MHz	IB		CH53	2455MHz	35				
CH2	2404MHz	2		CH28	2430MHz	IC		CH54	2456MHz	36				
CH3	2405MHz	3		CH29	2431MHz	ID		CH55	2457MHz	37				
CH4	2406MHz	4		CH30	2432MHz	IE		CH56	2458MHz	38				
CH5	2407MHz	5		CH31	2433MHz	IF		CH57	2459MHz	39				
CH6	2408MHz	6		CH32	2434MHz	20		CH58	2460MHz	3A				
CH7	2409MHz	7		CH33	2435MHz	21		CH59	2461MHz	3B				
CH8	2410MHz	8		CH34	2436MHz	22		CH60	2462MHz	3C				
CH9	2411MHz	9		CH35	2437MHz	23		CH61	2463MHz	3D				
CHlO	2412MHz	A		CH36	2438MHz	24		CH62	2464MHz	3E				
CHll	2413MHz	B		CH37	2439MHz	25		CH63	2465MHz	3F				
CH12	2414MHz	C		CH38	2440MHz	26		CH64	2466MHz	40				
CH13	2415MHz	D		CH39	2441MHz	27		CH65	2467MHz	41				
CH14	241GMH<::	E		CH40	2442MH<::	28		CHGG	24G8MH<::	42				
CH15	2417MHz	F		CH41	2443MHz	29		CH67	2469MHz	43				
CH16	2418MHz	10		CH42	2444MHz	2A		CH68	2470MHz	44				
CH17	2419MHz	11		CH43	2445MHz	2B		CH69	2471MHz	45				
CH18	2420MHz	12		CH44	2446MHz	2C		CH70	2472MHz	46				
CH19	2421MHz	13		CH45	2447MHz	2D		CH71	2473MHz	47				
CH20	2422MHz	14		CH46	2448MHz	2E		CH72	2474MHz	48				
CH21	2423MHz	15		CH47	2449MHz	2F		CH73	2475MHz	49				
CH22	2424MHz	16		CH48	2450MHz	30		CH74	2476MHz	4A				
CH23	2425MHz	17		CH49	2451MHz	31		CH75	2477MHz	4B				
CH24	2426MHz	18		CH50	2452MHz	32		CH76	2478MHz	4C				
CH25	2427MHz	19		CH51	2453MHz	33		CH77	2479MHz	4D				

Features

- Cost-effective single-chip solution for stereo headset and wireless speaker applications
- A2DP1.2 and AVRCP1.0 profiles enabled with SBC encoder for streaming audio over Bluetooth and for remote control functionality
- MP3 decoder for improved audio quality and reduced power consumption (MP3 decode functionality requires an appropriate licence from Thomson, see Section 17.1)
- Configurable A2DP 5-band EQ
- High-quality audio 95dB SNR on DAC playback
- 64MIPS Kalimba DSP coprocessor
- FastStream, CSR's low-latency codec for video and gaming applications
- HFP 1.5 (includes 3-way calling) and HSP 1.0 support
- cVc support for echo and noise reduction
- Low-power consumption: over 10 hours of audio playback from a 180mAh battery
- Fully qualified Bluetooth v2.1 + EDR specification system with support for secure simple pairing
- Best-in-class Bluetooth radio with 8dBm transmit power and -92dBm receive sensitivity
- 2 integrated linear regulators with 1.5V output from 1.7V to 1.95V input
- Integrated switch-mode regulator
- Integrated lithium battery charger
- 68-lead 8 x 8 x 0.9mm, 0.4mm pitch QFN package
- Green (RoHS compliant and no antimony or halogenated flame retardants)
- BlueTunes ROM stereo headset solution development kit available, includes example design. Order code BTN-003-1A

BlueTunes® ROM QFN

BlueTunes ROM Stereo Headset Solution

Single-chip Bluetooth® v2.1 + EDR System

Production Information

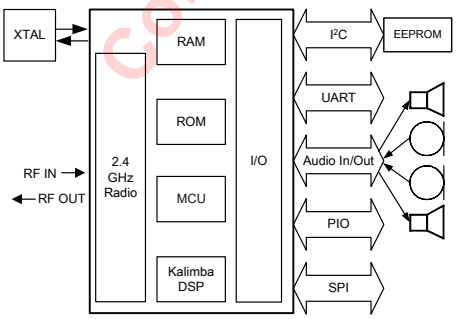
BC57F687A05

Issue 2

General Description

Based on **BlueCore®5-Multimedia ROM QFN**, the **BlueTunes ROM QFN** integrates a Bluetooth radio, baseband, DSP, high-quality audio codec, SMPS, LDO and a battery charger for minimal BOM, component count and PCB area.

BlueTunes ROM QFN uses advanced DSP features for the latest stereo enhancements and to improve audio quality, including SBC and MP3 decoder, support for FastStream (low-latency codec) and 5-band EQ.



Applications

- Stereo headset solution with support for echo and noise reduction
- Wireless stereo speakers

BlueTunes ROM QFN includes as standard cVc dual and single microphone algorithms for echo and noise suppression.

cVc dual-microphone algorithm can provide >30dB of noise suppression in both stationary and dynamic noise conditions such as; babble, road, music and competing voices. In addition an acoustic echo canceller is now integrated into the cVc dual-microphone solution, further enhancing the far-end user experience.

A cVc single-microphone provides full-duplex echo cancellation and a 10dB stationary noise suppressor.

BlueTunes ROM QFN includes secure simple pairing, which greatly simplifies the pairing process, making it even easier to use a Bluetooth headset.

BlueTunes ROM QFN Data Sheet

1 Device Details

Radio

- Common TX/RX terminal simplifies external matching; eliminates external antenna switch
- BIST minimises production test time
- Bluetooth v2.1 + EDR specification compliant

Transmitter

- 8dBm RF transmit power with level control from on-chip 6-bit DAC over a dynamic range >30dB
- Class 2 and Class 3 support without the need for an external power amplifier or TX/RX switch

Receiver

- Receiver sensitivity of -92dBm
- Integrated channel filters
- Digital demodulator for improved sensitivity and co-channel rejection
- Real-time digitised RSSI available on HCI interface
- Fast AGC for enhanced dynamic range

Synthesiser

- Fully integrated synthesiser requires no external VCO, varactor diode, resonator or loop filter
- Compatible with crystals 16MHz to 26MHz or an external clock 12MHz to 52MHz

Physical Interfaces

- Synchronous serial interface for system debugging
- I²C compatible interface to external EEPROM containing device configuration data (PS Key)
- UART interface
- 2 LED drivers with faders

Auxiliary Features

- Crystal oscillator with built-in digital trimming
- Power management includes digital shutdown and wake-up commands with an integrated low-power oscillator for ultra-low power Park/Sniff/Hold mode
- Clock request output to control external clock
- 2 integrated linear regulators: 1.5V output from 1.7V to 1.95V input
- Integrated high-efficiency switch-mode regulator: 1.8V output from 2.5V to 4.4V input
- Power-on-reset cell detects low-supply voltage
- 10-bit ADC available to applications
- Integrated charger for lithium ion/polymer batteries

Kalimba DSP

- Very low-power Kalimba DSP coprocessor, 64MIPS, 24-bit fixed point core
- Support for SBC and MP3 codec for improved audio quality (MP3 decode functionality requires an appropriate licence from Thomson, see Section 17.1)
- Single-cycle MAC; 24 x 24-bit multiply and 56-bit accumulator
- 32-bit instruction word, dual 24-bit data memory
- 6K x 32-bit program RAM, 8K x 24-bit + 8K x 24-bit data RAM
- 64 x 32-bit program memory cache when executing from ROM

Audio Codec

- 16-bit internal codec
- DAC for stereo audio
- ADC dual channel mono voice band audio
- Integrated amplifiers for driving 16Ω speakers; no need for external components
- Support for single-ended speaker termination and line output
- Integrated low-noise microphone bias

Baseband and Software

- Internal ROM
- 48KB of internal RAM, allows full-speed data transfer, mixed voice/data and full piconet support
- Logic for FEC, HEC, 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
- FastStream, CSR low latency codec significantly reduces the latency of the audio link, from source to sink, avoiding lip-sync issues when simultaneously listening to audio and watching video images
- Configurable stereo headset ROM software to set-up headset features and user interface
- HFP 1.5 (including 3-way calling) and HSP 1.0 support
- Bluetooth v2.1 + EDR specification Secure Simple Pairing support
- BlueTunes ROM QFN supports as standard a new high-performance DSP based dual-microphone noise reduction
- BlueTunes ROM QFN also supports a DSP based single-microphone cVc echo and noise reduction

Package Option

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