

BT-57F蓝牙模块

规格书

本模块特点:

- 1) 自带天线, 接收发射距离远, 抗干扰能力强
- 2) 本模块可以与本公司下列型号模块直接互换

BT-57H(BC57H6587C蓝牙芯片)

BT-57G (BC57G687C蓝牙芯片)

BT-6145(BC6145蓝牙芯片)

BT-6130(BC6130蓝牙芯片)

BT-57K(bc57k6587)

BT-3860(OV)

BT-57F687CA04(BC57F687CA04)

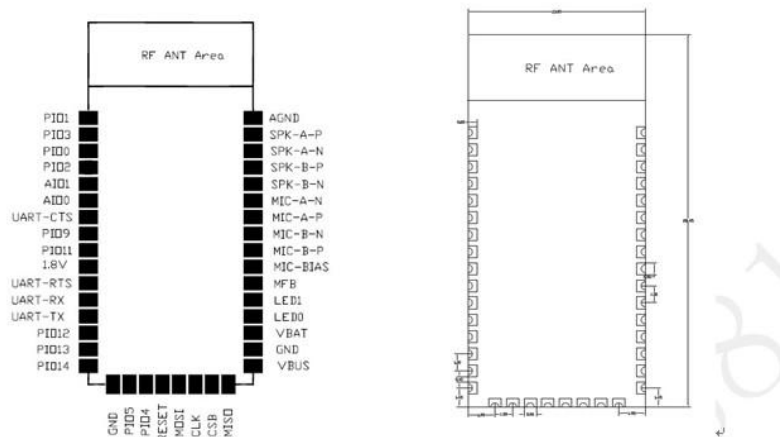
具体选型请参考附表模块选型指南

- 3) 专为高品质音频产品设计, 音频走线合理, 抗RF干扰
- 4) 提供免费设计布板技术支持服务
- 5) 提供插卡音箱+蓝牙方案设计服务

凡是采用本模块的设计, 任何工程问题都可以联系我们帮你协调解决

BLUETOOTH BT-57F Specification List

Title	Specification
chipset	BC57F687A05/BC57F687A04
Frequency range	2.402GHZ—2.480GHZ
Bluetooth spec	V2.1+EDR
Receive sensitivity	-90dbm
TX Power	+8dBm
Input Power	1.8 V
Output Class	CLASS2
Operating Channels	79channels of 1Mhz BW
Host interface(USB)	RS232
Rang	>10M
Operating temperature	-20—75
Storage Temperature	-40---80
Operating Humidity	10%-90%
Bluetooth date rates	5Mbps
Frequency hoop	AHF(QOS Flow control)
Application	HS/HF/SPP/A2DP/AVRCP
Profile	UP



蓝牙五按键（PIO5可以控制功放打开，关闭，以便进入节电模式）

接口定义1(功能区分)	说明
MFB(pin 30)	开/关机/配对，接听/挂断，播放/暂停
PIO1(pin 1)	选曲：上一曲
PIO3(pin 2)	音量加
PIO5(pin 18)	音频通道打开控制（输出）（可不要）
PIO0(pin 3)	音量减
PIO2(pin 4)	下一曲

蓝牙三按键（PIO5可以控制功放打开，关闭，以便进入节电模式）

接口定义2(功能区分)	说明
MFB(PIN30)	开/关机/配对，接听/挂断，播放/暂停
PIO3(PIN 2)	音量加(长按) 下一曲（短按）
PIO5(PIN18)	音频通道打开控制（输出）
PIO0(PIN3)	音量减（长按） 上一曲（短按）
LED0(PIN 28)	红色指示灯（电源，充电，配对）
LED1(PIN29)	蓝色指示灯（配对，工作）

采用此控制方式，可以兼容BT-6145模块

布线说明：

- 1) MICGND地，请直接连到MicGND，
- 2) 模块天线下请不要铺地，MIC，SPK，电源线一定不要走模块下面过
- 3) 不用的PIN脚，可以直接封掉
- 4) 建议用户采用BT-57F双MIC原理图布板，可以兼容BT-6145
- 5) 充电采用的是4054。可以不用，直接用模块充电，模块充电电流比较小
- 6) 如果电池200MAH以上的话，还是请使用4054，充电电流大，效率高
- 7) 使用4054充电，请单独加一个充电指示灯，尽量不用三极管切换
- 8) 元件封装及其参考电路见附件

Status Information

The status of this Data Sheet is Production Information.
CSR Product Data Sheets progress according to the following format:

Advance Information

Information for designers concerning CSR product in development. All values specified are the target values of the design. Minimum and maximum values specified are only given as guidance to the final specification limits and must not be considered as the final values.

All detailed specifications including pin-outs and electrical specifications may be changed by CSR without notice.

Pre-Production Information

Pin-out and mechanical dimension specifications final. All values specified are the target values of the design. Minimum and maximum values specified are only given as guidance to the final specification limits and must not be considered as the final values.

All electrical specifications may be changed by CSR without notice.

Production Information

Final Data Sheet including the guaranteed minimum and maximum limits for the electrical specifications.

Production Data Sheets supersede all previous document versions.

RoHS Compliance

BT-57F687 External devices meet the requirements of Directive 2002/95/EC of the European Parliament and of the Council on the Restriction of Hazardous Substance (RoHS).

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Device Features

- Fully Qualified Bluetooth system
- Bluetooth v2.1+EDR Specification Compliant
- Kalimba DSP Open Platform Co-Processor
- Full Speed Bluetooth Operation with Full Piconet Support
- Scatternet Support
- Low Power 1.8V Operation
- 8x 8mm 68-ball QFN Package
- Minimum External Components
- Integrated 1.8V regulator
- Dual UART Ports
- 16-bit Stereo Audio CODEC
- RoHS Compliant

General Description

BlueCore5-Multimedia External is a single chip radio and baseband IC for Bluetooth 2.4GHz systems.

BC57F687 interfaces to 8Mbit of external Flash memory. When used with the CSR Bluetooth software stack, it provides a fully compliant Bluetooth system to v2.1 and EDR of the specification for data and voice communications.

Applications

- Stereo Headphones
- Automotive Hands-Free Kits
- Echo Cancellation
- High Performance Telephony Headsets
- Enhanced Audio Applications
- A/V Profile Support

BlueCore5-Multimedia External contains the Kalimba DSP, an open platform digital signal processor (DSP) coprocessor supporting enhanced audio applications.

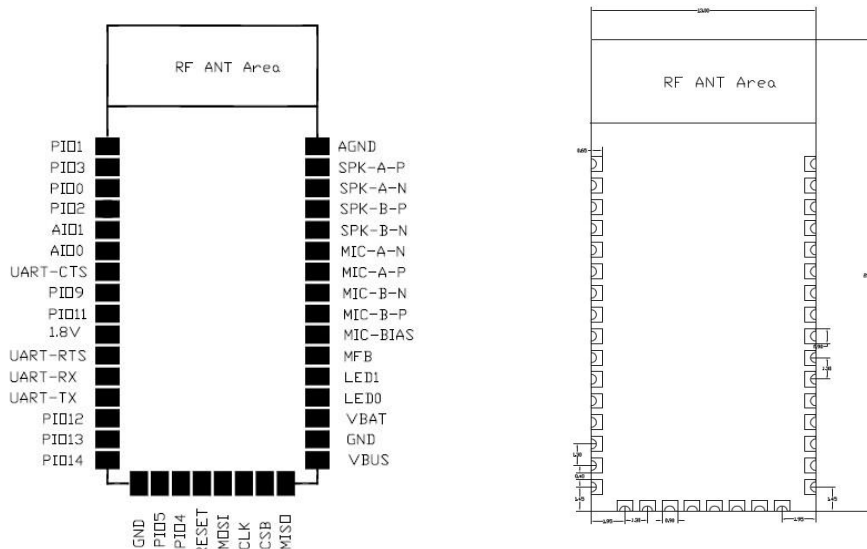
BlueCore5-Multimedia External has been designed to reduce the number of external components required, ensuring that production costs are minim.

The device incorporates auto-calibration and built-in self-test (BIST) routines to simplify development, type approval and production test. All hardware and device firmware is fully compliant with the Bluetooth v2.1+EDR Specification.

Specification

General

Data Transmission Rate	723 kbps (asynchronous)
Supply Voltage	DC +3.3V
Power Consumption	13mA max. About 3mA max. Standby; Active power-saving mode
Link Distance	Better than 10 meters(33 feet) in free space
Certifications	FCC Part 15,UL 1950,ETSI 300 826, EN 60950 (Europe),Radio/Baseband Bluetooth BQB
Operating Temperature	-20°C to +80°C
Radio	
Modulation	Frequency Hopping Spread Spectrum (FHSS) with Gaussian Frequency Shift Keying (GFSK)
Frequency Range	2.40GHz-2,4832GHz(ISM Band)
RF Channels	79 channels for USA ,Japan, and Europe (except France)
RF Output Power	+8 dBm max, Class 2(upgradeable to 20dBm)
Sensitivity	Better than -80dBm@0.1% BER
Max. Input Level	-24dBm
Antenna interface	50 ohm input and output impedance
Baseband	
Link Mode	ACL&SCO link supported
Network Capabilities	Piconet: point-to-piont & point-to-multipoint and Scatter net supported
Security	Initialization:4-digit PIN code Authentication: Security Mode 2 support Encryption: 128- bit Data Encryption support
Data Packets	DM1/DH1,DM3/DH3,DM5/DH5



1	PIO (1)	21	MOSI
2	PIO (3)	22	CLK
3	PIO (0)	23	CSB
4	PIO (2)	24	MISO
5	AIO (1)	25	VBUS
6	AI0(0)	26	GND
7	UART-CTS	27	VBAT
8	PIO(9)	28	LED(0)
9	PIO(11)	29	LED(1)
10	1.8V	30	MFB
11	UART-RTS	31	MIC-BIAS
12	UART-RX	32	MIC-B-P
13	UART-TX	33	MIC-B-N
14	PIO(12)	34	MIC-A-P
15	PIO(13)	35	MIC-A-N
16	PIO(14)	36	SPK-B-N
17	GND	37	SPK-B-P
18	PIO(5)	38	SPK-A-N
19	PIO(4)	39	SPK-A-P
20	RESET	40	Audio ground

Detailed Pin Description

1. UART/RS232 Interface

The UART/RS232 interface of BT-57F is a 4-pin interface: UART-TX, UART- RX, UART- CTS, and UART-RTS. It is a high performance UART/RS232 interface and its baud rate is programmable up to 1,382.400 Kbps.

Baud Rate	Persistent Store Value		Error
	Hex	Dec	
1200	0x0005	5	1.73%
2400	0x000a	10	1.73%
4800	0x0014	20	1.73%
9600	0x0027	39	-0.82%
19200	0x004f	79	0.45%
38400	0x009d	157	-0.18%
57600	0x00ec	236	0.03%
76800	0x013b	315	0.14%
115200	0x01d8	472	0.03%
230400	0x03b0	944	0.03%
460800	0x075f	1887	-0.02%
921600	0x0ebf	3775	0.00%
1382400	0x161e	5662	-0.01%
1843200	0x1d7e	7550	0.00%
2764800	0x2c3d	11325	0.00%

2. RF Interface

The RF interface of BT-57F is used to connect to external antenna, it contains RF and RF GND. The connection from BT-57F module to antenna should be kept as short as possible to prevent any RF transmission power loss. If the connection used is a PCB trace, then impedance control as 50-ohm is required.

3. Serial Peripheral Interface

BT-57F uses 16-bit data and 16-bit address serial peripheral interface, where transactions may occur when the internal processor is running or is stopped. This section details the considerations required when interfacing to BT-57F via the four dedicated serial peripheral interface terminals. Data may be written or read one word

at a time or the auto increment feature may be used to access blocks.

4. Stereo Audio Interface

The main features of the interface are:

1. Stereo and mono analogue input for voice band and audio band
2. Stereo and mono analogue output for voice band and audio band

The stereo audio CODEC uses a fully differential architecture in the analogue signal path, which results in low noise sensitivity and good power supply rejection while effectively doubling the signal amplitude. It operates from a single power-supply of 1.8V and uses a minimum of external components.

5. Power and Ground

The BT-57F has power regulator built-in and only needs to supply 3.7V to VB pin to operate. From the external 3.7V power source, the BT-57F will generate the required 1.8V power supply for the RF circuits. The 3.3V power supply is used for USB speed sense pull-up resistor, and module's reset circuit.

7. Shield Ground

The shield ground pad of BT-57F module should be connected to the chassis ground of the system.

8. RESET

The RESET pin is an active high reset and is internally filtered using the internal low frequency clock oscillator. A reset will be performed between 1.5 and 4.0ms following RESET being active. It is recommended that RESET be applied for a period greater than 5ms.

The power on reset occurs when the VCC falls below typically 1.5V and is released when VCC rises above typically 1.6V.

At reset the digital I/O pins are set to inputs for bi-directional pins and outputs are tristated. The PIOs have weak pull-downs.

Electrical Characteristics

Important Notes:

1. Absolute Maximum Ratings

Absolute Maximum Ratings		
Rating	Minimum	Maximum
Storage Temperature	-40°C	+150°C
Supply Voltage: +3.3V	-0.4V	3.7V
Supply Voltage: VB	-0.4V	5.6V
Other Terminal Voltages	VSS-0.4V	VDD+0.4V

2. Recommended Operating Conditions

Recommended Operating Conditions		
Operating Condition	Minimum	Maximum
Operating Temperature Range	-40°C	+105°C
Guaranteed RF performance range (1)	-25°C	+85°C
Supply Voltage: +3.3V	1.7V	3.6V
Supply Voltage: VB	2.2V	4.2V

3. Linear Regulator

Linear Regulator	Minimum	Typical	Maximum	Unit
Normal Operation				
Output Voltage (Iload = 70 mA)	1.70	1.78	1.85	V
Temperature Coefficient	-250	-	+250	ppm/°C
Output Noise(1)(2)	-	-	1	mV rms
Load Regulation (Iload < 100 mA)	-	-	50	mV/A
Settling Time(1)(3)	-	-	50	μs
Maximum Output Current	140	-	-	mA
Minimum Load Current	5	-	-	μA
Input Voltage	-	-	4.2	V
Dropout Voltage (Iload = 70 mA)	-	-	350	mV
Quiescent Current (excluding load, Iload < 1mA)	25	35	50	μA
Low Power Mode(4)				
Quiescent Current (excluding load, Iload < 100μA)	4	7	10	μA
Disabled Mode(5)				
Quiescent Current	1.5	2.5	3.5	μA

4. Digital Terminals

Digital Terminals	Minimum	Typical	Maximum	Unit	
Input Voltage Levels					
VIL input logic level low	$2.7V \leq VDD \leq 3.0V$	-0.4	-	+0.8	V
	$1.7V \leq VDD \leq 1.9V$	-0.4	-	+0.4	V
VIH input logic level high	0.7VDD	-	VDD+0.4	V	
Output Voltage Levels					
VOL output logic level low, ($I_o = 4.0mA$), $2.7V \leq VDD \leq 3$	-	-	0.2	V	
VOL output logic level low, ($I_o = 4.0mA$), $1.7V \leq VDD \leq 1.9V$	-	-	0.4	V	
VOH output logic level high, ($I_o = -4.0mA$), $2.7V \leq VDD \leq 3.0V$	VDD-0.2	-	-	V	
VOH output logic level high, ($I_o = -4.0mA$), $1.7V \leq VDD \leq 1.9V$	VDD-0.4	-	-	V	
Input and Tri-state Current with:					
Strong pull-up	-100	-40	-10	μA	
Strong pull-down	+10	+40	+100	μA	
Weak pull-up	-5.0	-1.0	-0.2	μA	
Weak pull-down	+0.2	+1.0	+5.0	μA	
I/O pad leakage current	-1	0	+1	μA	
CI Input Capacitance	1.0	-	5.0	pF	

5. Power-on Reset

Power-on reset	Minimum	Typical	Maximum	Unit
VDD_CORE falling threshold	1.40	1.50	1.60	V
VDD_CORE rising threshold	1.50	1.60	1.70	V
Hysteresis	0.05	0.10	0.15	V

6. Clocks

Crystal Oscillator	Minimum	Typical	Maximum	Unit
Crystal frequency(1)	8.0	-	32.0	MHz
Digital trim range(2)	5.0	6.2	8.0	pF
Trim step size(2)	-	0.1	-	pF
Transconductance	2.0	-	-	mS
Negative resistance(3)	870	1500	2400	Ω
External Clock				
Input frequency(4)	7.5	-	40.0	MHz
Clock input level(5)	0.2	-	VDD_ANA	V pk-pk

Allowable jitter	-	-	15	ps rms
XTAL_IN input impedance	-	-	-	kΩ
XTAL_IN input capacitance	-	7	-	pF

7. Auxiliary ADC

Auxiliary ADC	Minimum	Typical	Maximum	Unit
Resolution	-	-	8	Bits
Input voltage range (LSB size = VDD_ANA/255)	0	-	VDD_ANA	V
Accuracy(Guaranteed monotonic)	INL	-1	1	LSB
	DNL	0	1	LSB
Offset	-1	-	1	LSB
Gain Error	-0.8	-	0.8	%
Input Bandwidth	-	100	-	kHz
Conversion time	-	2.5	-	μs
Sample rate(1)	-	-	700	Samples/s

8. Auxiliary DAC

Auxiliary DAC	Minimum	Typical	Maximum	Unit
Resolution	-	-	8	Bits
Average output step size(1)	12.5	14.5	17.0	mV
Output Voltage		monotonic(1)		
Voltage range (IO=0mA)	VSS_PADS	-	VDD_PIO	V
Current range	-10.0	-	+0.1	mA
Minimum output voltage (IO=100mA)	0.0	-	0.2	V
Maximum output voltage (IO=10mA)	VDD_PIO-0.3	-	VDD_PIO	V
High Impedance leakage current	-1	-	+1	μA
Offset	-220	-	+120	mV
Integral non-linearity(1)	-2	-	+2	LSB
Settling time (50pF load)	-	-	10	μs

9. Stereo Audio CODEC Characteristics

Input Stage/Microphone Amplifier	Minimum	Typical	Maximum	Unit
Input full scale at maximum gain	-	4	-	mV rms
Input full scale at minimum gain	-	400	-	mV rms
Gain resolution	-	3	-	dB
Distortion at 1kHz	-		-74	dB
Input referenced RMS noise in 15kHz bandwidth	-	8	-	μV rms
3dB Bandwidth	-	17	-	kHz
Input impedance	-	20	-	kΩ

THD+N (microphone input) @ 30mV RMS input	-	-66	-	dB
Analogue to Digital Converter	Minimum	Typical	Maximum	Unit
Resolution	-	-	16	bits
Input sample rate	8	-	44.1	kHz
Signal to Noise Ratio+ Distortion(1), 0 - Fsample /2, with Full Scale 1kHz Tone				
Fsample = 8kHz	-	84	-	dB
Fsample = 11.025kHz	-	83	-	dB
Fsample = 16kHz	-	84	-	dB
Fsample = 22.050kHz	-	83	-	dB
Fsample = 32kHz	-	80	-	dB
Fsample = 44.1kHz	-	74	-	dB
Digital Gain	-24		21.5	dB
Digital to Analogue Converter	Minimum	Typical	Maximum	Unit
Resolution	-	-	16	bits
Output sample rate	8	-	48	kHz
Gain Resolution	-	3	-	dB
Signal to Noise Ratio + Distortion(1), 0-20 kHz, with Full Scale 1kHz Tone				
Fsample = 8kHz	-	79	-	dB
Fsample = 11.025kHz	-	78	-	dB
Fsample = 16kHz	-	79	-	dB
Fsample = 22.050kHz	-	88	-	dB
Fsample = 32kHz	-	90	-	dB
Fsample = 44.1kHz	-	90	-	dB
Fsample = 48kHz	-	89	-	dB
Digital Gain	-24	-	21.5	dB

10. Output Stage/Loudspeaker Driver

Output Stage/Loudspeaker Driver	Minimum	Typical	Maximum	Unit
Output power into 32Ω	-	30	-	mW pk
Output voltage full scale swing	-	2.0	-	V pk-pk
Output current drive (at full scale swing)(1)	10	20	40	mA
Output full scale current (at reduced swing)(1)	-	75	-	mA
Distortion and noise (relative to full scale), THD	-	-75	-	dBc
Allowed Load: resistive	16	-	O.C.	Ω
Allowed Load: capacitive	-	-	500	pF

11. Power Consumption

Typical Average Current Consumption		
VDD=1.8V Temperature = +20°C		Output Power = +4dBm
Mode	Average	Unit
SCO connection HV3 (30ms interval Sniff Mode) (Slave)	3	mA
SCO connection HV3 (No Sniff Mode) (Slave)	16	mA
SCO connection HV1 (Slave)	13	mA
ACL data transfer 115.2kbps UART no traffic (Master)	5	mA
ACL data transfer 115.2kbps UART no traffic (Slave)	22	mA
ACL data transfer 720kbps UART (Master or Slave)	45	mA
ACL data transfer 720kbps USB (Master or Slave)	45	mA
ACL connection, Sniff Mode 40ms interval, 38.4kbps UART	3.2	mA
ACL connection, Sniff Mode 1.28s interval, 38.4kbps UART	0.45	mA
Parked Slave, 1.28s beacon interval, 38.4kbps UART	0.55	mA
Standby Mode (Connected to host, no RF activity)	47.0	μ A
Reset (RESET high or RESETB low)	15.0	μ A
DSP		
DSP core (including PM memory access)		
Minimum (NOP)	0.25	mA/MIPS
Maximum (MAC)	0.65	mA/MIPS
DSP memory access (DM1 or DM2)	0.15	mA/MIPS
CODEC		
Microphone inputs and ADC / channel	0.85	mA
DAC and loudspeaker driver, no signal / channel(1)	1.4	mA
Digital audio processing subsystem	8	mA

本设备为通用模块, 客户可以按需定制软件, 提供免费软硬件设计服务!

注意: MIC地接到AGND, 可以有效降低噪声 (MIC地不要直接接入大地)

如有任何问题或索取资料及其参考电路, 请发邮件

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