

RG-BT1800-04 超远距离蓝牙模块

一、描述

超 Class 1 功率等级的 RG-BT1800-04 型超远距离蓝牙模块，采用了世界上领先的蓝牙芯片供应商 CSR（Cambridge Silicon Radio）公司的 BlueCore4-External 蓝牙芯片，完全遵循 Bluetooth V2.0 + EDR 蓝牙规范。具有全速 USB 和 UART 主设备接口,音频接口支持 I2S、PCM 及 SPDIF 协议。

RG-BT1800-04 型超远距离蓝牙模块是深圳市红果电子有限公司专业打造的高于 Class I 功率等级的蓝牙精品，充分展示了公司在高频 PCB 板设计、防 EMI 电磁辐射、射频微带天线阻抗控制及射频功放领域的技术成果。RG-BT1800-04 型超远距离蓝牙模块灵敏度高、低功耗、体积轻巧。在空旷、无遮挡的环境下，配适当增益的 2.4G 射频天线，同功率等级的模块点对点传输距离可达 1800 多米。IPEX-SMD 微型天线接口可直接外挂 2.4G 射频天线。



二、特征

- A single chip radio and baseband IC for Bluetooth 2.4GHz
- Fully Qualified Bluetooth v2.0+EDR, Enhanced Data Rate (EDR) compliant with v2.0.E.2 of specification for both 2Mbps and 3Mbps modulation modes.
- Integrated 15-bit Linear 8KHz Sample Frequency Audio CODEC in one chip
- Full Speed Bluetooth Operation with Full Piconet
- Standard HCI(UART or USB)
- Multi-configurable I2S, PCM or SPDIF Interface
- Support for 802.11 Co-Existence
- UART interface with programmable baud rate, Maximum baud rate: 3686400bps
- Scatternet Support
- RoHS Compliant

- 工业级设计
- 安全认证、数据加密
- 支持 DFU 软件升级
- 支持连接 7 个从设备
- 支持 USB 和 UART 接口
- 支持 SPI 编程接口
- 支持 PCM 音频输入、输出接口
- 低电压电源，2.7V to 3.6V
- 内置 Flash 存储容量：8Mbit
- 同功率等级点对点传输距离可达 1800 多米
- 内置 IPEX-SMD 微型天线接口可直接外挂 2.4G 射频天线

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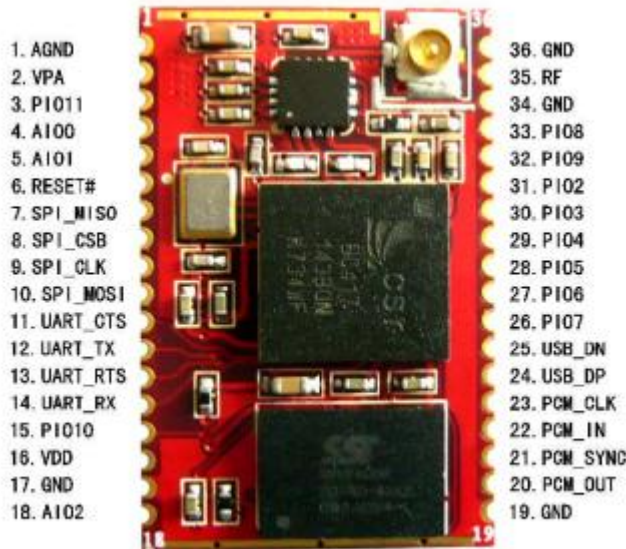
QQ：827212011；1529670393

- 支持低功耗模式: Park, Sniff, Hold 和 Deep Sleep
- 支持 A2DP、AVRCP、PBAP、DUN、FTP、HF1.5、HID、OPP、PAN、SPP 等多种蓝牙应用规范。

三、应用范围

- 医疗设备数据采集与传输
- 蓝牙投影设备
- 蓝牙 GPS 导航
- 蓝牙远距离遥控
- 蓝牙远距离工业控制与数据传输
- 蓝牙 RS232/485 转接
- 嵌入式远距离蓝牙串口通讯
- 嵌入式远距离蓝牙 USB 通讯
- 车载蓝牙 GPS 导航
- 传真、打印机适配器
- 局域网接入与拨号网络
- 蓝牙话筒、蓝牙音响、蓝牙音频发送与接收
- 电脑部件 (CF 卡、USB 适配器、RS232 适配器、PCMCIA,等)
- ○○○○

四、管脚分布



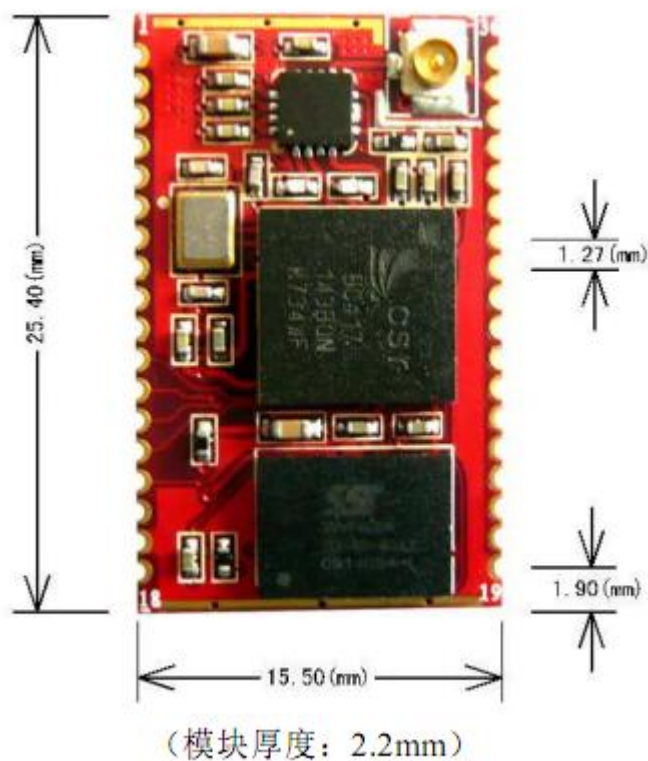
五、管脚描述

管脚序号	名称	类型	描述
1	AGND	VSS	Analog Ground
2	VPA	Power Supply	3.3V (+) supply Power for External RF Amplifier

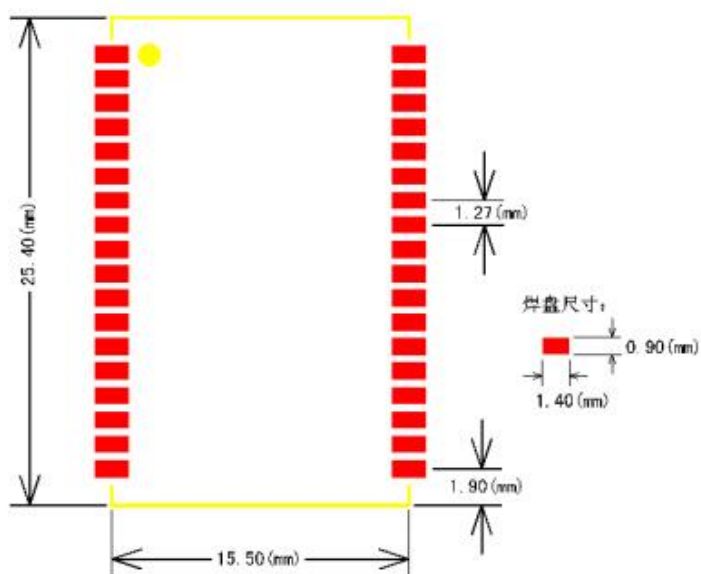
3	PI011	Bi-directional strength internal with programmable pull-up/down	Programmable Input/Output Line
4	AI00	Bi-directional	Analogue / programmable input/output line
5	AI01	Bi-directional	Analogue / programmable input/output line
6	RESET	CMOS input with weak internal pull-up	internal pull-up Reset if low. Input debounced so must be low for >5ms to cause a reset
7	SPI_MISO	CMOS output, tri-state, with weak internal pull-down	SPI data output Chip select for SPI, active low
8	SPI_CSB	CMOS input with weak internal pull-up	Chip select for SPI, active low
9	SPI_CLK	CMOS input with weak internal pull-down	SPI Clock
10	SPI_MOSI	CMOS input with weak internal pull-up	SPI Data Input
11	UART_CTS	CMOS input with weak internal pull-down	UART clear to send
12	UART_TX	CMOS output, tri-state, with weak internal pull-down	UART data input
13	UART_RTS	CMOS output, tri-state, with weak internal pull-down	UART ready to send
14	UART_RX	CMOS input with weak internal pull-down	UART data output
15	PI010	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
16	VDD	Power Supply	3.3V (+) supply with On-chip Input within 3.0~3.3V
17	GND	VSS	Ground
18	AI02	Bi-directional	Analogue /Programmable/Input/Output Line
19	GND	VSS	Ground
20	PCM_OUT	CMOS output, tri-state, with weak internal pull-down	PCM Data Output

21	PCM_SYN C	Bi-directional with weak internal pull-down	PCM Data Strobe
22	PCM_IN	CMOS input, with weak internal pull-down	PCM Data Input
23	PCM_CLK	Bi-directional with weak internal pull-down	PCM Data Clock
24	USB_DP	Bi-directional	USB Data+ with selectable internal 1.5k pull-up resistor
25	USB_DN	Bi-directional	USB Data-
26	PI07	Bi-directional with programmable strength internal pull-up/down	Programmable Input/output line
27	PI06	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
28	PI05	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
29	PI04	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
30	PI03	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
31	PI02	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
32	PI09	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
33	PI08	Bi-directional with programmable strength internal pull-up/down	Programmable Input/Output Line
34	GND	VSS	Analog Ground
35	RF	Analogue	Transmitter out and receiver input
36	GND	VSS	Analog Ground

六、外型尺寸



七、PCB 封装



警示: 蓝牙模组粘贴区域PCB顶层尽量不要走线或铺铜(建议加铺丝印油); 模组底部射频测试点区域PCB顶层严禁走线或铺铜;

八、电气特性

1、最大绝对额定值:

参数	最小	正常	最大	单位
Operating temperature rang	-40 (0)	-	+150	℃
Peak current of power supply	0	-	90	mA
VDD	+3.0	-	+3.7	V
VPA	+3.0	-	+6.0	V
AIO0、AIO1、AIO2	0	-	+1.8	V
Other terminal voltages	VSS - 0.4	-	VDD + 0.4	V

2、推荐工作条件:

参数	最小	正常	最大	单位
Operating temperature rang	-40 (0)	-	+80	℃
VDD	+3.0	+3.3	+3.6	V
VPA	+3.0	+3.3	+5.0	V
AIO0、AIO1、AIO2	0	-	+1.8	V

3、输入/输出端口特性 (数字)

数字端口	最小	典型	最大	单位
Input Voltage Levels				
V _{IL} input logic level low	-0.4	-	+0.8	V
V _{IH} input logic level high	0.7VDD	-	VDD+0.4	V
Output Voltage Levels				
V _{OL} output logic level low, (I _O = 4.0mA)	-	-	0.2	V
V _{OH} output logic level high, (I _O = -4.0mA)	VDD-0.2	-	-	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
C _I Input Capacitance	1.0	-	5.0	pF

4、输入/输出端口特性 (USB)

USB端口	最小	典型	最大	单位
VDD_USB for correct USB operation (VDD_USB equal to VDD)	3.1		3.6	V
Input Threshold				
V _{IL} input logic level low	-	-	0.3VDD_USB	V
V _{IH} input logic level high	0.7VDD_USB	-	-	V
Input Leakage Current				
VSS_PADS < VIN < VDD_USB(a) (VSS_PADS equal to VDD)	-1	1	5	μA
C _I Input capacitance	2.5	-	10.0	pF
Output Voltage Levels to Correctly Terminated USB Cable				
V _{OL} output logic level low	0.0	-	0.2	V
V _{OH} output logic level high	2.8	-	VDD_USB	V

(a) Internal USB pull-up disabled

5、输入/输出端口特性 (Auxilliary ADC)

Auxiliary ADC	最小	典型	最大	单位
Resolution(a)	-	-	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	-	s
Sample rate(b)	-	-	700	Samples/s

(a) VDD_ANA = +1.8V (Internal voltage regulation)

(b) ADC is accessed through the VM function. The sample rate given is achieved as part of this function

6、功耗

操作模式	连接类型	串口波特率 (kbps)	平均	单位
Page scan	-	115.2	0.42	mA
Inquiry and page scan	-	115.2	0.76	mA
ACL No traffic	Master	115.2	4.60	mA
ACL With file transfer	Master	115.2	10.3	mA
ACL No traffic	Slave	115.2	17.0	mA
ACL With file transfer	Slave	115.2	24.7	mA
ACL 40ms sniff	Master	38.4	2.40	mA
ACL 1.28s sniff	Master	38.4	0.37	mA
SCO HV1	Master	38.4	39.2	mA
SCO HV3	Master	38.4	20.3	mA
SCO HV3 30ms sniff	Master	38.4	19.8	mA
ACL 40ms sniff	Slave	38.4	2.11	mA
ACL 1.28s sniff	Slave	38.4	0.42	mA
Parked 1.28s beacon	Slave	38.4	0.20	mA
SCO HV1	Slave	38.4	39.1	mA
SCO HV3	Slave	38.4	24.8	mA
SCO HV3 30ms sniff	Slave	38.4	19.0	mA
Standby Host connection ^(a)	-	38.4	40	μA
Reset (RESETB low) ^(a)	-	-	34	μA
PA ^(b) Quiescent Current			20	mA
PA ^(b) Max Current (Pout=20dBm)			50	mA

(a) Low power mode on the linear regulator is entered and exited automatically when the chip enters/leaves Deep Sleep mode.

(b) PA —— 射频功放

7、典型峰值电流（不含PA功放电流）

Typical Peak Current Temperature = +20°C	
Device Activity/State	Current (m A)
Peak current during cold boot	57.9
Peak TX current Master	51.5
Peak RX current Master	39.0
Peak TX current Slave	52.0
Peak RX current Slave	45.5

九、射频特性

1、Transmitter - Basic Data Rate

Radio Characteristics VDD=3.15V Temperature=+20°C					
	Min	Typ	Max	Bluetooth Specification	Unit
Maximum RF transmit power ⁽¹⁾⁽²⁾	-	14 ⁽³⁾	-	0 to +20 ⁽⁴⁾	dBm
Variation in RF power over temperature range with compensation disabled (\pm) ⁽⁵⁾	-	2.0	-	-	dB
Variation in RF power over temperature range with compensation enabled (\pm) ⁽⁵⁾	-	1.0	-	-	dB
RF power control range	-	>20	-	≥ 16	dB
RF power range control resolution ⁽⁶⁾	-	0.5	-	-	dB

Notes:

- (1) BlueCore4-External firmware maintains the transmit power to be within the Bluetooth specification v2.0+ EDR limits.
- (2) Measurement made using a PSKEY_LC_MAX_TX_POWER setting corresponds to a PSKEY_LC_POWER_TABLE power table entry of 55 Internal, 170 External.
- (3) The design is capable of producing 18dBm at 20°C. However, in order to meet both the FCC Part 15.205a and 15.209a radiated spurious requirement of -41dBm/MHz (500microvolts/metre at a distance of 3 metres) and the Bluetooth requirement for ACP, it is necessary to limit the maximum output power to +14dBm at 20°C. The corresponding recommended POWER_TABLE entry is internal gain 55, external gain 170.
- (4) Class 1 RF transmit power range, Bluetooth specification v2.0 + EDR.
- (5) To some extent these parameters are dependent on the matching circuit used and its behaviour over temperature. Therefore, these parameters may be beyond CSR's direct control.
- (6) Resolution guaranteed over the range -5dB to -25dB relative to maximum power for Tx Level >20.

2、Transmitter - Enhanced Data Rate

Radio Characteristics VDD = 3.15V Temperature = +20°C					
	Min	Typ	Max	Bluetooth Specification	Unit
Maximum RF transmit power ⁽¹⁾⁽²⁾	-	18 ⁽²⁾	-	0 to +20 ⁽³⁾	dBm
Relative transmit power ⁽⁴⁾	-	-2	-	-4 to +1	dB
EDR Differential Phase Encoding	-	No Errors	-	≥ 99	%

Notes:

- (1) BlueCore4-External firmware maintains the transmit power to be within the Bluetooth v2.0 + EDR specification limits.
- (2) Although the design is capable of generating in excess of +18dBm, regulatory compliance over the full temperature range of -20°C to +65°C will not be satisfied if the transmit power approaches this value. Actual output power with TX_PRE 71, INT PA 63, EXT PA 255 corresponds to +8dBm at 20°C.
- (3) Class 1 RF transmit power range, Bluetooth v2.0 + EDR specification.
- (4) Measurements methods are in accordance with the EDR RF Test Specification v2.0.E.2.

3、Receiver – Basic Data Rate

Radio Characteristics VDD = 3.15V Temperature = +20°C						
	Frequency (GHz)	Min	Typ	Max	Bluetooth Specification	Unit
Sensitivity at 0.1% BER for all packet types	2.402	-	-86.5	-	≤-70	dBm
	2.441	-	-86.5	-		
	2.480	-	-87.0	-		
Maximum received signal at 0.1% BER		-	>-20	-	≥-20	dBm

4、Receiver –Enhanced Data Rate

Radio Characteristics VDD = 3.15V Temperature = +20°C						
	Modulation	Min	Typ	Max	Bluetooth Specification	Unit
Sensitivity at 0.01% BER ⁽¹⁾	π/4 DQPSK	-	-89	-	≤-70	dBm
	8DPSK	-	-82	-	≤-70	dBm
Maximum received signal at 0.1% BER ⁽¹⁾	π/4 DQPSK	-	>0	-	≥-20	dBm
	8DPSK	-	-10	-	≥-20	dBm

(1) Measurements methods are in accordance with the EDR RF Test Specification v2.0.E.2