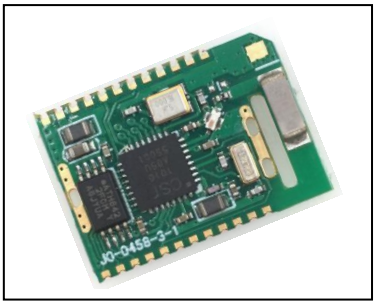
JS&T 金瓯科技



Customize service and solution for wireless transportation products

Bluetooth Module Hardware Datasheet

BLE1010C2P

Chongqing JINOU Science and Technology Development Co., Ltd.

2015-09-01

Contents

1.Features

128KB memory: 64KB RAM and 64KB ROM

Bluetooth® v4.1 specification

- 7.5dBm Bluetooth low energy maximum transmit output power
- -92.5dBm Bluetooth low energy receive sensitivity

Support for Bluetooth v4.1 specification host stack including ATT, GATT, SMP, L2CAP, GAP

RSSI monitoring for proximity applications

<900nA current consumption in dormant mode

Programmable general purpose PIO controller

10-bit ADC

12 digital PIOs

3 analogue AIOs

UART

I Ȼ / SPI for EEPROM / flash memory ICs and peripherals

Debug SPI

4 PWM modules

Wake-up interrupt and watchdog timer

Wide Supply-Voltage Range (2 V–3.6 V)

Nominal Supply Voltage at 3.3±0.1V

Surface-mount, Size:24.13×14.5 （unit：mm error = ±0.2mm）

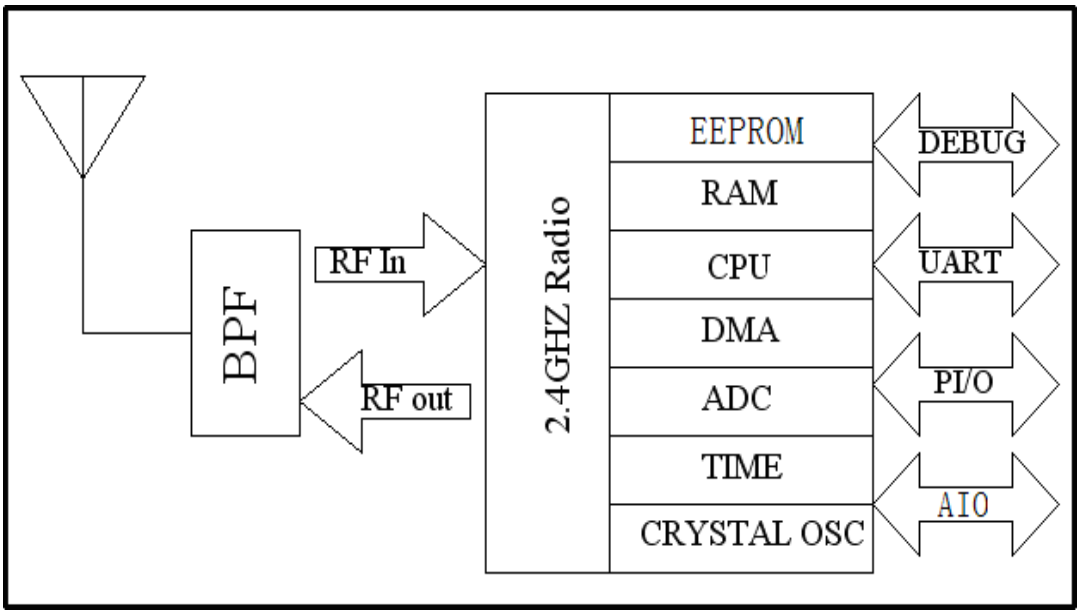
2.Product Description

The CSR1010 Module is a CSR μEnergy platform device. CSR μEnergy are CSR's single-mode Bluetooth low energy products for the Bluetooth Smart market. CSR1010 Module increases application code and data space for greater application development flexibility. CSR μEnergy enables ultra low-power connectivity and basic data transfer for applications previously limited by the power consumption,sizeconstraints and complexity of other wireless standards. CSR1010 Module provides everything required to create a Bluetooth low energy product with RF, baseband, MCU, qualified Bluetooth v4.1 specification stack and customer application running on a single IC.

3. Applications

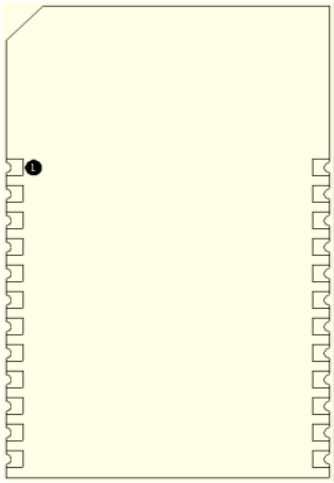
iPhone, iPad, iPod and Mac products and leading Android devices. Bluetooth low energy takes less time to make a connection than conventional Bluetooth wireless technology and can consume approximately 1/20th of the power of Bluetooth Basic Rate. CSR1010 QFN supports profiles for health and fitness sensors, watches, keyboards, mice and remote controls. Typical Bluetooth Smart applications:
HID: keyboards, mice, touchpads, remote controls
Sports and fitness sensors: heart rate, runner speed and cadence, cycle speed and cadence
Health sensors: blood pressure, thermometer and glucose meters
Mobile accessories: watches, proximity tags, alert tags and camera controls
Smart home: heating control and lighting control

4.Block Diagram



5. Pin Descriptions

5.1 Device Terminal

No.	Des		Des	No.
1	AIO2		AIO0	24
2	SPI-CLK/PIO5		AIO1	23
3	SPI-CSB/PIO6		RXD/PIO1	22
4	SPI-MOSI/PIO7		TXD/PIO0	21
5	SPI-MISO/PIO8		NC	20
6	SF-DIN/PIO3		NC	19
7	I2C-POWER/PIO2		SPI-EN	18
8	SF-CS/PIO4		WAKE	17
9	SF-DOUT/I2C-SDA		NC	16
10	SF-CLK/I2C-SCL		PIO11	15
11	VCC		PIO10	14
12	GND		PIO9	13

5.2 Device Terminal Functions

PIN	NAME	DESCRIPTION
1	AIO2	Analogue programmable I/O line.
2	SPI-CLK/PIO5	Programmable I/O line or debug SPI CLK selected by SPI-EN.
3	SPI-CSB/PIO6	Programmable I/O line or debug SPI (CSB) selected by SPI-EN.
4	SPI-MOSI/PIO7	Programmable I/O line or debug SPI MOSI selected by SPI-EN..
5	SPI-MISO/PIO8	Programmable I/O line or debug SPI MISO selected by SPI-EN.
6	SF-DIN/PIO3	Programmable I/O line or SPI serial flash data (SF_DIN) input
7	I2C-POWER/PIO2	Programmable I/O line or I₹C power.
8	SF-CS/PIO4	Programmable I/O line or SPI serial flash chip select (SF_CS#)
9	SF-DOUT/I2C-SDA	SPI serial flash data (SF_DOUT) output or I₹C data line
10	SF-CLK/I2C-SCL	SPI serial flash data (SF_CLK) clock or I₹C clock line
11	VCC	dc2-3.6V Power Supply
12	GND	Connect to GND
13	PIO9	Programmable I/O line
14	PIO10	Programmable I/O line
15	PIO11	Programmable I/O line
16	NC	Do Not Connect This Pin
17	WAKE	Input to wake module from hibernate or dormant
18	SPI-EN	Selectes SPI debug or PIO[8:5] ; active-low to PIO[8:5]
19	NC	Do Not Connect This Pin
20	NC	Do Not Connect This Pin
21	TXD/PIO0	Programmable I/O line or UART data output
22	RXD/PIO1	Programmable I/O line or UART data input
23	AIO1	Analogue programmable I/O line.
24	AIO0	Analogue programmable I/O line.

6. Electrical Specifications

6.1 ABSOLUTE MAXIMUM RATINGS (1)

rating	MIN	MAX	UNIT
Battery (VDD_BAT) operation	1.8	4.4	V
I/O supply voltage	–0.4	4.4	V
Storage temperature range	–40	85	℃
Other terminal voltages	Vss-0.4	Vdd+0.4	V

6.2 RECOMMENDED OPERATING CONDITIONS

	MIN	MAX	UNIT
Operating temperature range	–30	85	℃
Battery (VDD_BAT) operation	1..8	3.6	V
I/O supply voltage	1.2	3.6	V

)CSR1010 is reliable and qualifiable to 4.3V (idle, active and deep sleep modes) and 3.8V (all modes), but there are minor deviations in performance relative to published performance values for 1.8V to 3.6V. For layout guidelines for 4.3V operation, see CSR1000 Hardware Design Review Template.

(b) Safe to 4.3V if VDD_BAT = 4.3V.

6.3 Input/Output Terminal Characteristics

Digital Terminals

Output voltage level	MIN	TYP	MAX	UNIT
VIL input logic level low	-0.4		0.3xVDD_PADS	V
VIH input logic level high	0.7 x VDD_PADS		VDD- PADS+0.4	V
Tr/Tf			25	ms
VOL output logic level low, lOL = 4.0mA			0.4	V
VOH output logic level high, lOH = -4.0mA	0.75xVDD_PADS			V
Tr/Tf			5	ms

Input and tristate currents	MIN	TYP	MAX	UNIT
With strong pull-up	-150	-40	-10	uA
I℃ with strong pull-up	-250			uA
With strong pull-down	10	40	150	uA
With weak pull-up	-5	-1	-0.33	uA
With weak pull-down	0.33	1	5	uA
CI input capacitance	1		5	pF

AIO

Input /Output voltage level	MIN	TYP	MAX	UNIT
Input voltage	0		VDD-AUX	V
Output voltage	0		VDD-AUX	V

6.4 ESD Protection

Apply ESD static handling precautions during manufacturing. Table shows the ESD handling maximum ratings.

condition	class	Max rating
Human Body Model Contact Discharge per JEDEC EIA/JESD22-A114	2	2000V (all pins)
Charged Device Model Contact Discharge per JEDEC EIA/JESD22-C101	III	500V (all pins)

7. Circuit Description

System RAM

64KB of integrated RAM supports the RISC MCU and is shared between the ring buffers used to hold data for each active connection, general-purpose memory required by the Bluetooth stack and the user application.

Internal ROM

CSR1010 QFN has 64KB of internal ROM. This memory is provided for system firmware implementation. If the internal ROM holds valid program code, on boot-up, this is copied into the program RAM.

Microcontroller

The MCU, interrupt controller and event timer run the Bluetooth software stack and control the Bluetooth radio and external interfaces. A 16-bit RISC microcontroller is used for low power consumption and efficient use of memory.

Programmable I/O Ports, PIO and AIO

12 lines of programmable bidirectional I/O are provided. They are all powered from VDD_PADS. PIO lines are software-configurable as weak pull-up, weak pull-down, strong pull-up or strong pull-down. Note:

At reset all PIO lines are inputs with weak pull-downs. Any of the PIO lines can be configured as interrupt request lines or to wake the IC from deep sleep mode.

Programming and Debug Interface

Important Note:

The CSR1010 module debug SPI interface is available in SPI slave mode to enable an external MCU to program and control the CSR1010 QFN, generally via libraries or tools supplied by CSR. The protocol of this interface is proprietary. The 4 SPI debug lines directly support this function.

The SPI programs, configures and debugs the CSR1010 QFN. It is required in production.

Ensure the 4 SPI signals are brought out to either test points or a header.

Take SPI_PIO#_SEL high to enable the SPI debug feature on PIO[8:5].

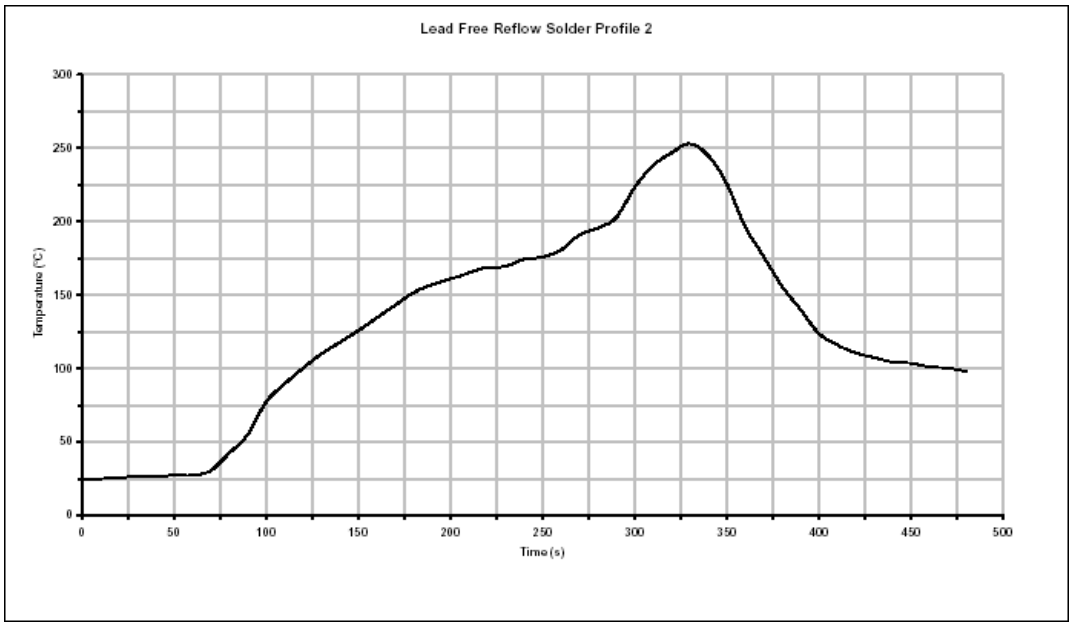
Reset

CSR1010 QFN is reset by:

Power-on reset
Software-configured watchdog timer

8. Solder Profiles

Composition of the solder ball: Sn 95.5%, Ag 4.0%, Cu 0.5%



Typical Lead-Free Re-flow Solder Profile

Key features of the profile:

- Initial Ramp = 1-2.5 ℃/sec to 175 ℃±25 ℃ equilibrium
- Equilibrium time = 60 to 180 seconds
- Ramp to Maximum temperature (250 ℃) = 3 ℃/sec max.
- Time above liquidus temperature (217 ℃): 45 -90 seconds
- Device absolute maximum reflow temperature: 260 ℃

Devices will withstand the specified profile. Lead-free devices will withstand up to three reflows to a maximum temperature of 260 ℃.

Notes：They need to be baked prior to mounting。

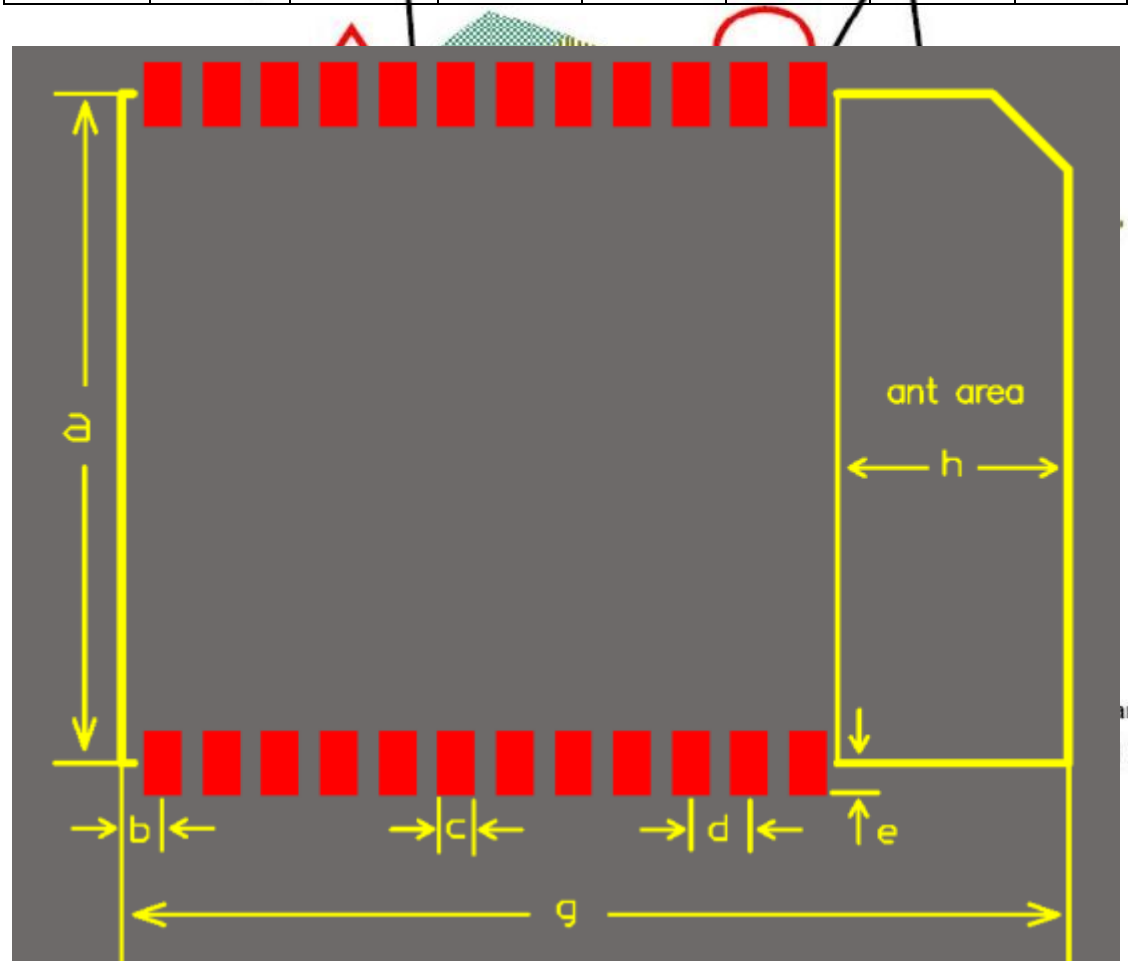
9. Physical Dimensions

Recommend PCB Layout

If there is PCB or other material under the antenna area, antenna will be de-tuned from its resonant frequency. Impedance re-matching is needed.

When mounting on a PCB, locate it at (or near) the edge of the PCB

a	b	c	d	e	g	h	Unit
570	34.9	32	50	27	807.1	196.8	mil
14.5	0.886	0.813	1.27	0.7	20.5	5	mm



Chongqing Jinou Science & Technology Development Co., Ltd.
Add: Add: No. 71 Kecheng Road, Jiulongpo District, Chongqing, 400041, China
Tel: 86-23-68903066
E-mail: ivy@oemblue.conm info@oemblue.com
Web: www.jinoux.com www.oemblue.com