

# BTM840B datasheet

## Document History

Revision	Date	Change Reason
Rev00	2014-09-24	Draft release
Rev01	2014-10-31	Add Product Picture
Rev02	2014-11-24	Change BT4.0 to BT4.1
Rev03	2014-11-25	Change BTM840 to BTM840B, modify Application circuit
Rev04	2015-01-12	modify <b>Storage /Operating Temperature range</b>

# Rayson Bluetooth® Module

## Low Energy Smart Module

**BTM-840B**

### Features

- Bluetooth standard V4.1 conformity.
- CSR1010 chip
- Programmable general purpose PIO controller :
- Wide supply voltage range 1.8 to 3.6V.
- I2C for EEPROM and ICs peripherals.
- -90dBm Bluetooth low energy RX sensitivity.
- 12 digital PIOs
- 3 analogue AIOs
- 4 PWM modules
- Wake-up interrupt and Watchdog timer
- RoHS Compliant
- Small outline. 11 x 11x2.0mm

### Applications

- Sports and fitness
- Healthcare
- Automotive
- Home entertainment
- Office and mobile accessories

### Outline



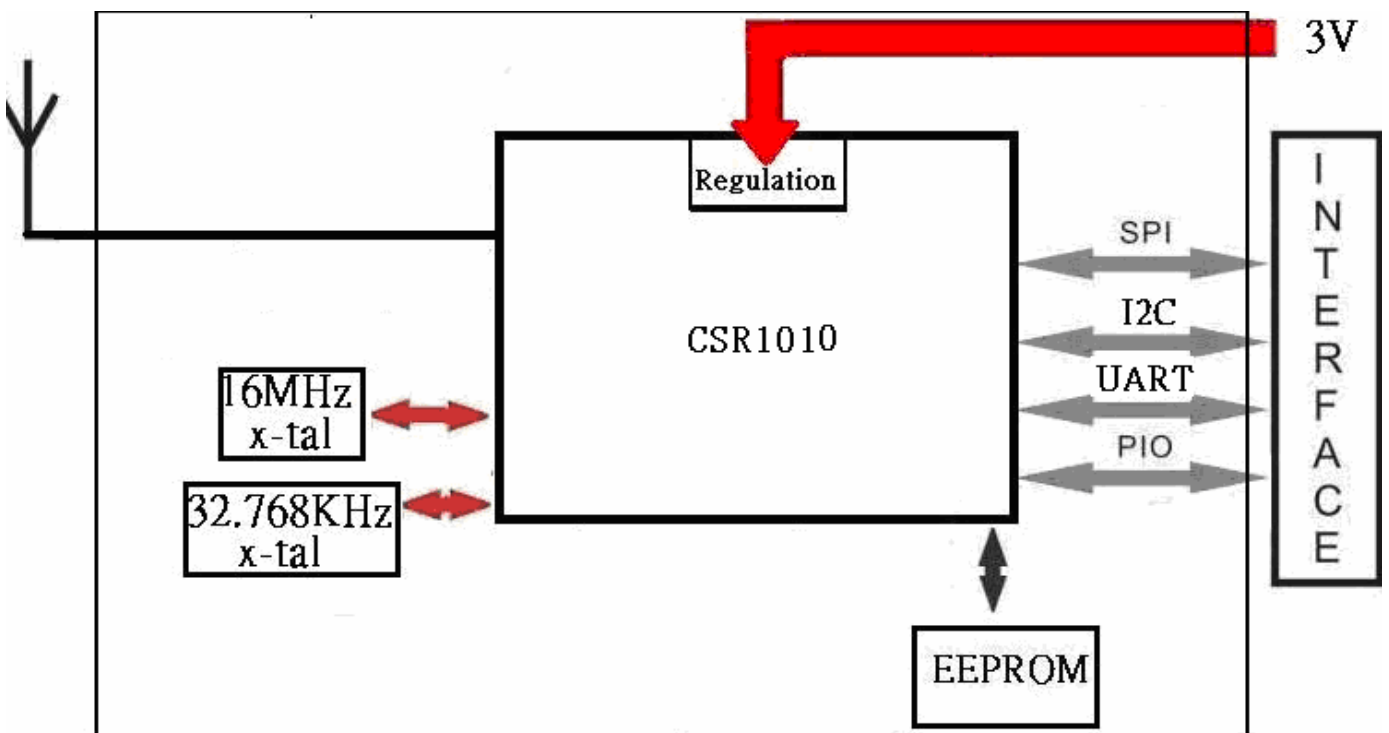
## Electrical Characteristics

Absolute Maximum Ratings		
Ratings	Min.	Max.
Storage Temperature	-30 °C	+85°C
Supply Voltage : 3V	1.8V	3.6 V
Recommended Operating Condition		
Operating Condition	Min.	Max.
Operating Temperature range	-20 °C	+75°C
Supply voltage: 3V	1.8V	3.6V

## Current Consumption (CSR1010 QFN total typical current consumption measured at the battery)

MODE	Description	Total Typical Current at 3V
Dormant	functions are shutdown. To wake up toggle the WAKE pin	<900nA
Deep sleep	VDD_PADS = ON, REFCLK = OFF, SLEEPCLK = ON, VDD_BAT = ON, RAM = ON, digital circuits = ON, SMPS = ON (low-power mode), 1ms wake-up time	<5μA
Idle	VDD_PADS = ON, REFCLK = ON, SLEEPCLK = ON, VDD_BAT = ON, RAM = ON, digital circuits = ON, MCU = IDLE, <1μs wake-up time	~1mA
RX / TX active	-	~16mA @ 3V peak current

## Block Diagram



# UART Interface

The BTM840B UART interface provides a simple mechanism for communicating with other serial devices using the RS232 protocol.

2 signals implement the UART function, UART\_TX and UART\_RX. When BTM840B is connected to another digital device, UART\_RX and UART\_TX transfer data between the 2 devices.

UART configuration parameters, e.g. baud rate and data format, are set using BTM840B firmware.

When selected in firmware PIO[0] is assigned to a UART\_TX output and PIO[1] is assigned to a UART\_RX input.

Note:

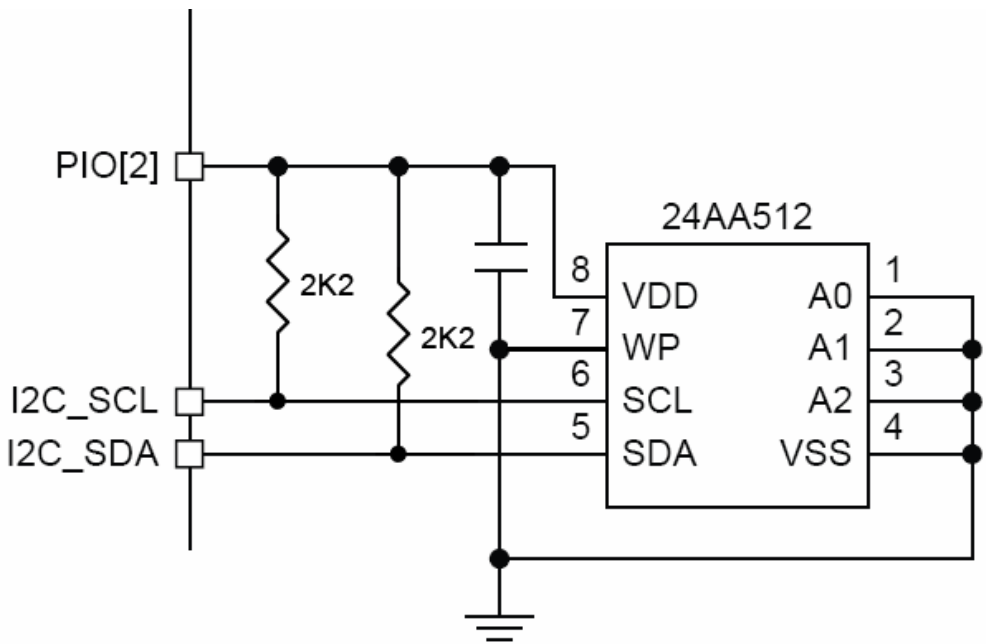
To communicate with the UART at its maximum data rate using a standard PC, the PC requires an accelerated serial port adapter card.

shows the possible UART settings for the BTM840 as below:

Parameter		Possible Values
Baud rate	Minimum	1200 baud ( $\leq 2\%$ Error)
		9600 baud ( $\leq 1\%$ Error)
	Maximum	2Mbaud ( $\leq 1\%$ Error)
Parity		None, Odd or Even
Number of stop bits		1 or 2

The maximum baud rate is 2400 baud during deep sleep.

# Master I<sup>2</sup>C Interface



Example of an I<sup>2</sup>C Interface EEPROM Connection

## SPI Master Interface

The SPI master memory interface in the BTM840B is overlaid on the I<sup>2</sup>C interface and uses a further 3 PIOs for the extra pins :

SPI master Interface	Pin
Flash_VDD	PIO[2]
SF_DIN	PIO[3]
SF_CS#	PIO[4]
SF_CLK	I2C_SCL
SF_DOUT	I2C_SDA

Note:

If an application using BTM840B is designed to boot from SPI serial flash, it is possible for the firmware to map the I<sup>2</sup>C interface to alternative PIOs.

## Radio Characteristics

Note: (a) Up to five exceptions are allowed in the Bluetooth V4.0+EDR specification on receiver part..

(b) Measured at  $F_0 = 2441\text{MHz}$ .

(c) Measured at  $f_1-f_2=5\text{MHz}$ . Measurement is performed in accordance with Bluetooth RF test RCV/CV/05..., i.e., wanted signal at -64dBm

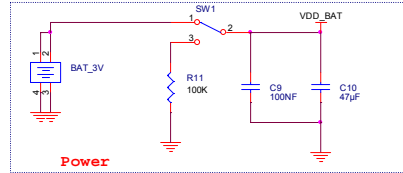
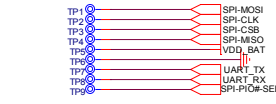
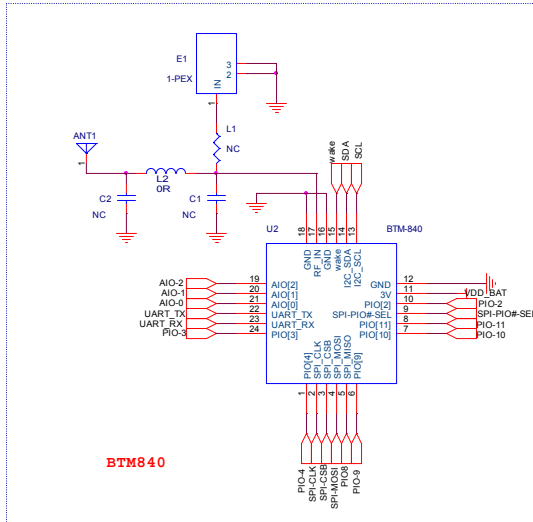
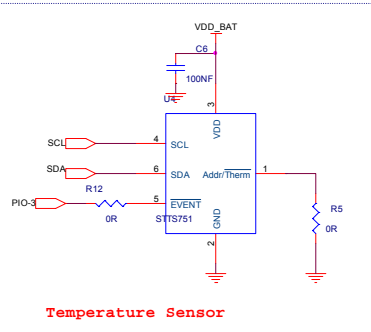
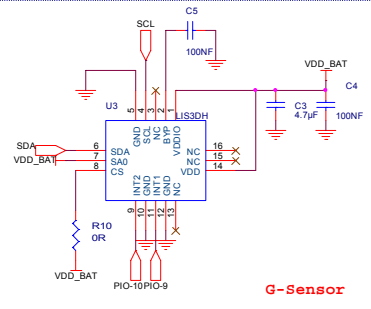
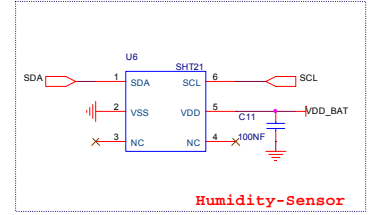
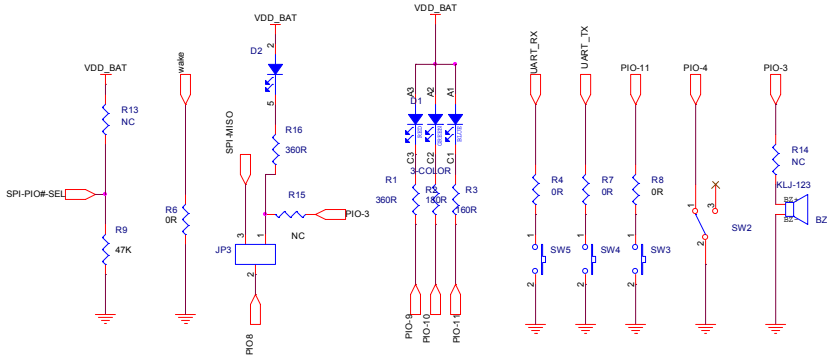
(d) Measured at unbalanced port of balun. Integrated in 100KHz bandwidth and normalised to 1Hz. actual figure is typically below -130dBm/Hz except for peaks -80dBm at 1600MHz, -80dBm in band at 2.4GHz and -80dBm at 3.2GHz

Note: (1) Measurements methods are in accordance with the Bluetooth V4.0+EDR specification.

(2) Up to five exceptions are allowed in the Bluetooth V4.0+EDR specification on receiver part.

(3) Measured at  $F_0 = 2405\text{MHz}, 2441\text{MHz}, 2477\text{MHz}$ .

# Application circuit



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Date:	Thursday, November 27, 2014	Sheet	1 of 1

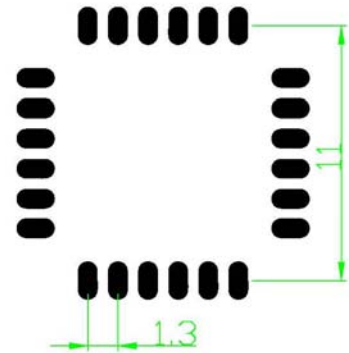
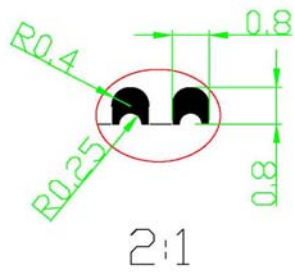
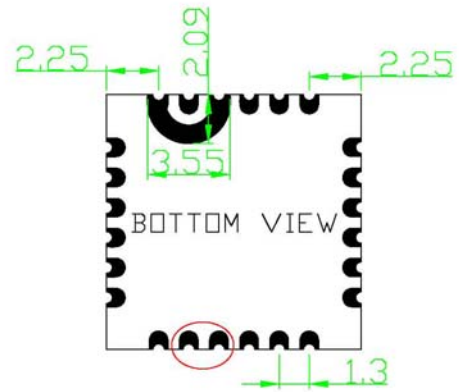
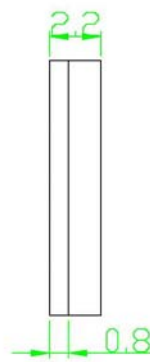
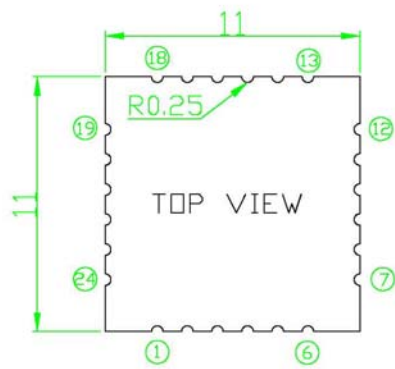
## BTM-840B Pins Function

No.	Pin Name	Pin Type	Pin description
1	PIO[4]	Bi-directional	Programmable input/output
2	SPI_CLK( PIO5)	Bi-directional	Programmable input/output or debug SPI_CLK selected
3	SPI_CSB( PIO6)	Bi-directional	Programmable input/output or debug SPI chip selected
4	SPI_MOSI( PIO7)	Bi-directional	Programmable input/output or debug SPI_MOSI selected
5	SPI_MISO(PIO8)	Bi-directional	Programmable input/output or debug SPI_MISO selected
6	PIO[9]	Bi-directional	Programmable input/output line
7	PIO[10]	Bi-directional	Programmable input/output line
8	PIO[11]	Bi-directional	Programmable input/output line or button input
9	SPI_PIO#_SEL	Bi-directional	Programmable input/output or SPI/PIO selected, set HI for SPI
10	PIO2	Bi-directional	Provide I2C or SPI Power , pls leave it NC if don't use it.
11	3V	Power input	Connect to external 3V ( battery ) ,we advise to connect a decoupling capacitor to this pin and it should be more than 47uF.

12	GND	GND output	Common ground
13	I2C-SCL	Bi-directiona	I2C clock or SPI serial flash clock output(SF_CLK)
14	I2C-SDA	Bi-directiona	I2C data input/output or SPI serial flash data output(SF_DOUT)
15	WAKE	Bi-directional	Input to wake module from dormant/hibernate mode. if no use, pls pull down.
16	GND	GND	Common ground
17	RF_IN	Analogue	Antenna interface Request, pls leave it NC if don't use it.
18	GND	GND	Common ground
19	AIO(2)	Bi- Analogue	Analogue Programmable input/output line
20	AIO(1)	Bi- Analogue	Analogue Programmable input/output line
21	AIO(0)	Bi- Analogue	Analogue Programmable input/output line
22	UART TX	Bi-directiona	Programmable input/output or UART TX
23	UART RX	Bi-directional	Programmable input/output or UART RX
24	PIO[3]	Bi-directional	Programmable input/output line or PWN signal output

# Dimension:

Unit: mm



PCB LAYOUT (TOP VIEW)