

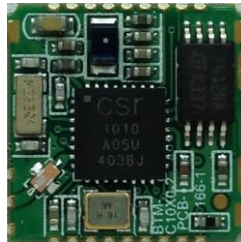
BTM-C1010-2

Datasheet

Issued date: August 18, 2015

EnzyTek Bluetooth® Low Energy Module

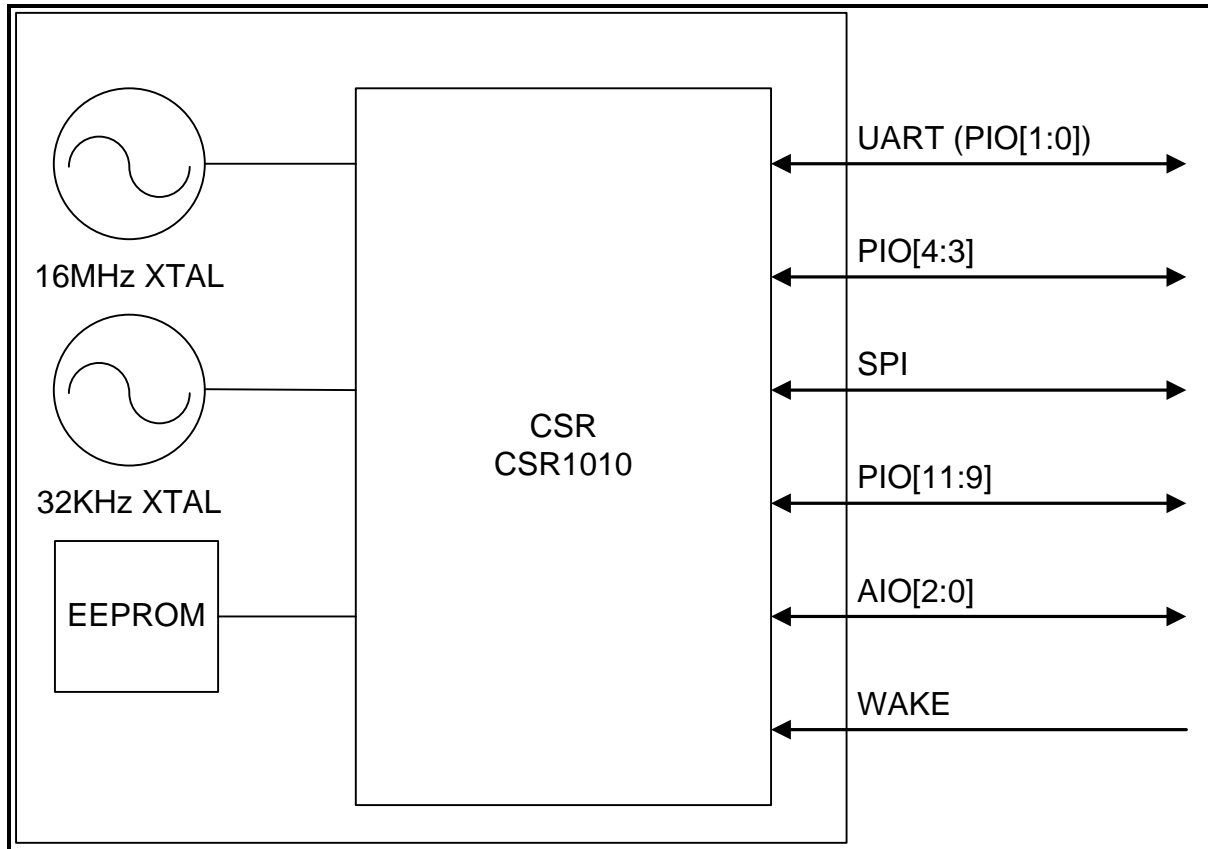
BTM-C1010-2



OVERVIEW

- ▶ Highly integration BT 4.1 Low Energy module, CSR CSR1010 + Memory + Filter + X'Tal.
 - ▶ Wireless communications module conforming to Bluetooth Version 4.1.
 - ▶ UART, SPI interfaces available to various applications.
 - ▶ 5 GPIO ports available for user's application.
 - ▶ 3 Analog IO ports available for user's application.
-
- | | |
|-----------------------|--|
| ▶ BT Chipset | : CSR CSR1010 |
| ▶ Standards | : Bluetooth 4.1 Low Energy |
| ▶ Frequency | : 2402 ~ 2480 MHz |
| ▶ TX Output Power | : 4 +/- 1 dBm (max) |
| ▶ RX Sensitivity | : -85 dBm (min) |
| ▶ Range | : > 10 m (line-of-sight at open space) |
| ▶ Memory | : EEPROM (512K Bits) |
| ▶ Operation Voltage | : 1.8V ~ 3.6V |
| ▶ Dimension | : 13 x 13 x 2.2 _(max) mm ³ (L×W×H) |
| ▶ Environmental Range | : Operation Temperature : 0~+85°C, Relative humidity : 0~95% |

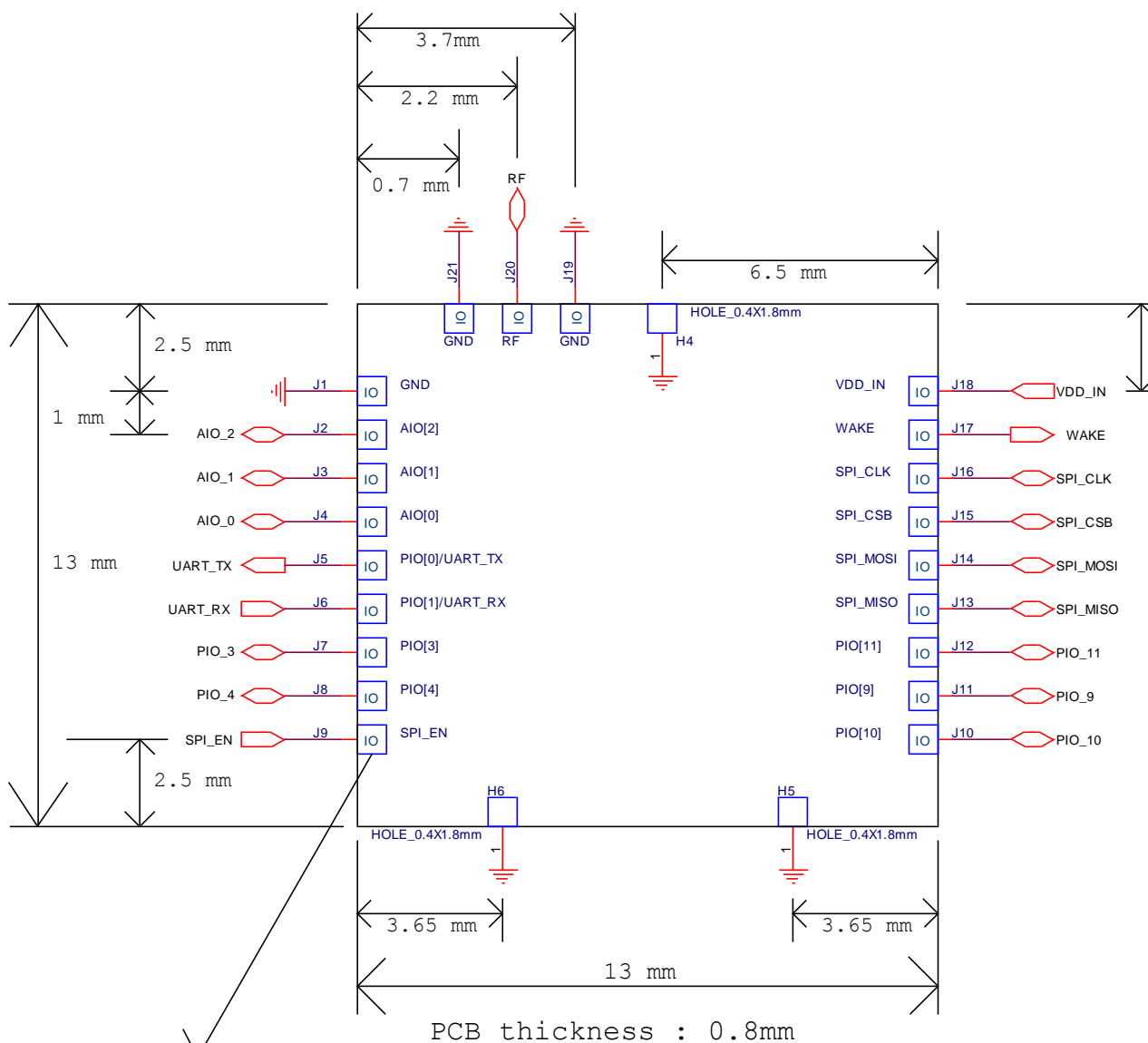
System Block Diagram



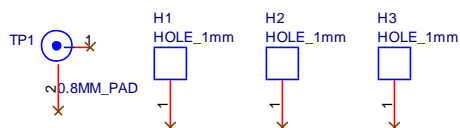
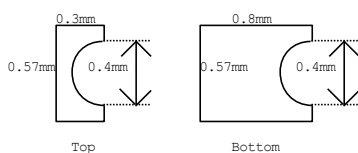
Pinout Diagram / Dimension

Unit : mm

Note: Please contact EnzyTek to get the detail footprint of the module to do the PCB design.



PAD Size



I/O PIN LISTING

| Pin No. | Pin Name | Type | Description |
|---------|-----------------|---|---|
| J1 | GND | Power | Ground |
| J2 | AIO_2 | Analog bi-directional | Programmable input/output line |
| J3 | AIO_1 | Analog bi-directional | Programmable input/output line |
| J4 | AIO_0 | Analog bi-directional | Programmable input/output line |
| J5 | UART_TX (PIO_0) | CMOS output, tri-state, with weak internal pull-up | UART data output t, optional PIO0 which is defined by FW. |
| J6 | UART_RX (PIO_1) | CMOS input with weak internal pull-down | UART data input, optional PIO1 which is defined by FW. |
| J7 | PIO_3 | Bi-directional with programmable strength internal pull-up/down | Programmable input/output line |
| J8 | PIO_4 | Bi-directional with programmable strength internal pull-up/down | Programmable input/output line |
| J9 | SPI_EN | Input with internal pull-down | Enable SPI interface for debugging, NC. |
| J10 | PIO_10 | Bi-directional with programmable strength internal pull-up/down | Programmable input/output line |
| J11 | PIO_9 | Bi-directional with programmable strength internal pull-up/down | Programmable input/output line |
| J12 | PIO_11 | Bi-directional with programmable strength internal pull-up/down | Programmable input/output line |
| J13 | SPI_MISO | CMOS output, tri-state, with weak internal pull-down | Serial Peripheral Interface data output |
| J14 | SPI_MOSI | CMOS input with weak internal pull-down | Serial Peripheral Interface data input |
| J15 | SPI_CSB | CMOS input with weak internal pull-up | Chip select for Synchronous Serial Interface active low |
| J16 | SPI_CLK | CMOS input with weak internal pull-down | Serial Peripheral Interface clock |
| J17 | WAKE | Input has no internal pull-up or pull-down, use external pull-down. | Input to wake the module from hibernate or dormant. |
| J18 | VDD_IN | Power | 3.3V input |
| J19 | GND | Power | Ground |
| J20 | RF | Antenna | 50 Ohm impedance |
| J21 | GND | Power | Ground |

Electrical Characteristics

Absolute Maximum Ratings :

| | Min. | Typ. | Max. | Unit |
|---------------------|------|------|------|------|
| Supply Voltage | - | - | 3.6 | V |
| Storage Temperature | -40 | - | 85 | °C |

Recommend Operation Conditions :

| | Min. | Typ. | Max. | Unit |
|-----------------------|------|------|------|------|
| Supply Voltage | 1.8 | - | 3.6 | V |
| Operating Temperature | 0 | - | 85 | °C |

Input/Output Terminal Characteristics :

| | Min. | Typ. | Max. | Unit |
|---|----------|------|---------|------|
| Digital (UART, PIO) | | | | |
| V _{IL} Input Voltage Low | -0.4 | - | +0.4 | V |
| V _{IH} Input Voltage High | 0.7xVDD | - | VDD+0.4 | V |
| V _{OL} Output Voltage Low, (I _O is 4mA) | - | - | 0.4 | V |
| V _{OH} Output Voltage High, (I _O is -4mA) | 0.75xVDD | - | - | V |

Radio Characteristics

VCC = 3.3V

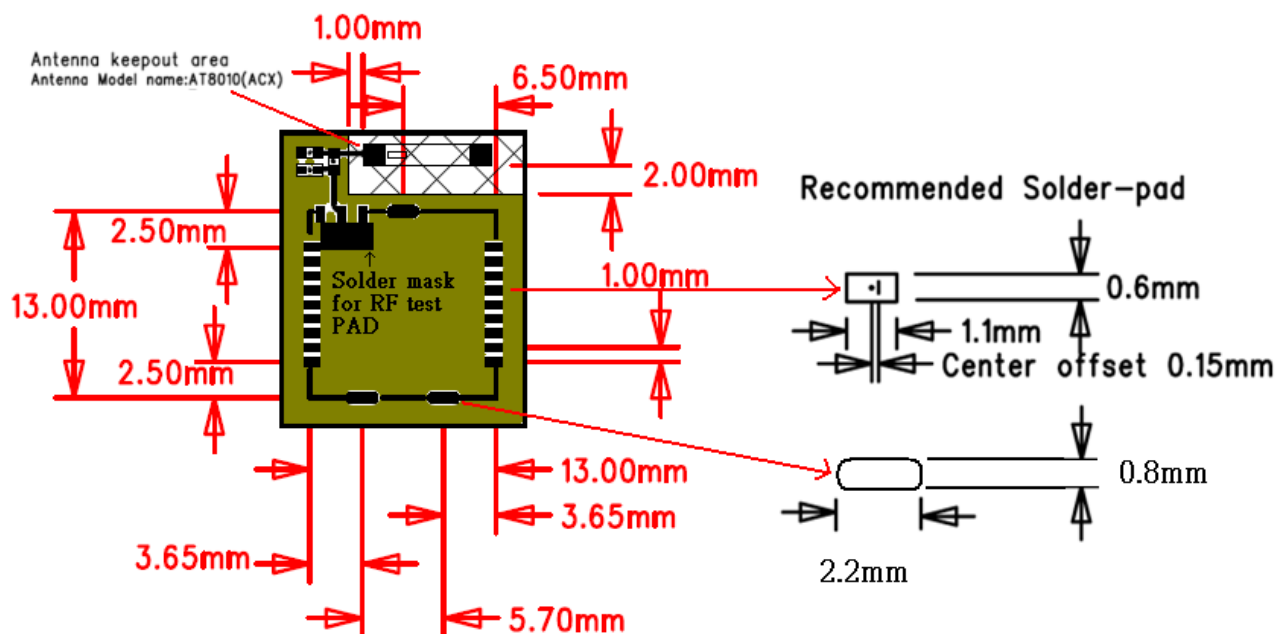
| | Min | Typ | Max | Limits(BLE SPEC) | Unit |
|---------------------------|------|-----|------|------------------|----------|
| Output Power | | | | | |
| Max Power | 4 | | | <10 | dBm |
| Min Power | -20 | | | >-20 | dBm |
| Peak to Average | | 0 | | <3 | dBm |
| Carrier drift | | | | | |
| Fn | -150 | | 150 | <=150 | kHz |
| Drift rate | -20 | | 20 | <20 | kHz/50us |
| Max Power | -50 | | 50 | <50 | kHz |
| Modulation Characteristic | | | | | |
| F1avg,'F1max' | 225 | | 275 | 225<= <=275 | kHz |
| F2avg,'F2max' | 185 | | | >=185 | kHz |
| F1/F2 Ratio | | 0.8 | | >=0.8 | |
| Sensitivity (-88dBm) | | | | | |
| Frame Error Rate | 0 | | 30.8 | <=30.8(-70dBm) | % |
| PER Integrity | | | | | |
| Frame Error Rate | 50 | | 65.4 | 50<= <=65.4 | % |
| Max Input Power | | | | | |
| Frame Error Rate | | 0 | | <=30.8(-40dBm) | % |

Current Consumption

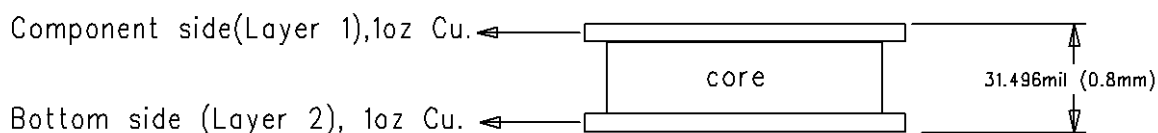
| | | |
|-------------------------|--------------------|--------------------------|
| HW | BTM-C1010-2 | |
| FW version | F-Serial_Port-v003 | |
| FW configuration | Role | Gatt Server, device side |
| | Service | SPS Service |
| | Baud Rate | 2400 |
| | Default Power | Scale 0 |
| BT BLE Host | iPhone 4S (ios5) | |
| Current Meter | Fluke 189 | |

| | Min. | Avg. | Max. |
|--|-------------|-------------|-------------|
| Power On No connection | 5.93 uA | 6.79 uA | 39.90uA |
| Power On advertising | 202 uA | 365 uA | 567 uA |
| Connected No Data Transfer | 15 uA | 69 uA | 143 uA |
| Connected TX Data/sec (from module to host) | 17 uA | 184 uA | 1210 uA |
| Connected TX Data/500ms (from module to host) | 17 uA | 275 uA | 1213 uA |
| | | | |

PCB Layout Guide



The 2-Layer Stackup



Material : FR4

DR=4.2+/-10%@1GHz and,DF=0.014+/-10%@1GHz

50-ohm Transmission Line, Width = 24 mil, Gap = 6mil

Application Schematic

