

BTM-C1011-2

Datasheet

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EnzyTek Bluetooth® Low Energy Module

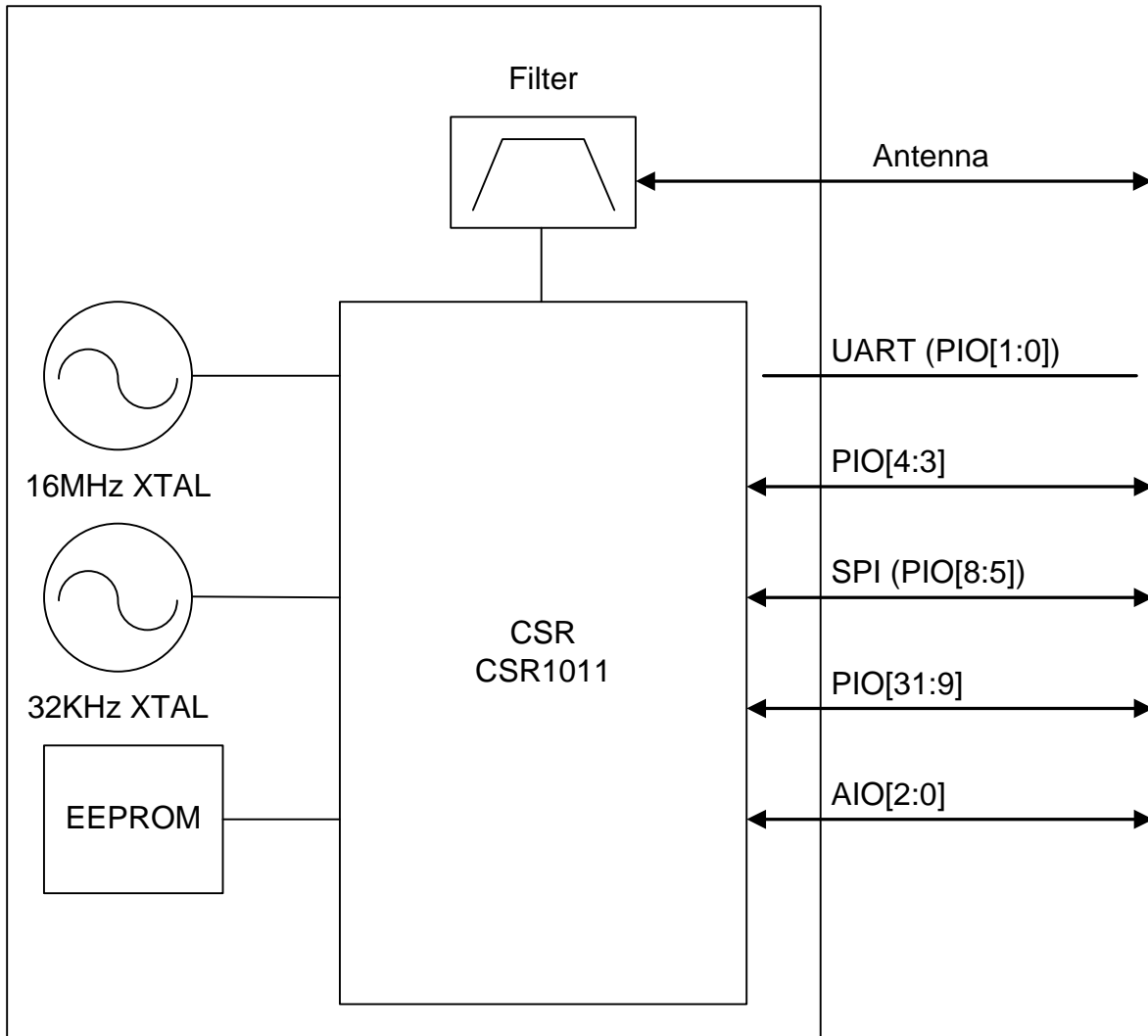
BTM-C1011-2



OVERVIEW

- ▶ Highly integration BT 4.0 Low Energy module, CSR CSR1011 + Memory + Filter + X'Tal.
 - ▶ Wireless communications module conforming to Bluetooth Version 4.0.
 - ▶ UART, SPI interfaces available to various applications.
 - ▶ 24 GPIO ports available for user's application.
 - ▶ 3 Analog IO ports available for user's application.
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- | | |
|-----------------------|--|
| ▶ BT Chipset | : CSR CSR1011 |
| ▶ Standards | : Bluetooth 4.0 Low Energy |
| ▶ Frequency | : 2402 ~ 2480 MHz |
| ▶ TX Output Power | : 4.5 +/- 1 dBm (max) |
| ▶ RX Sensitivity | : -88 dBm (min) |
| ▶ Range | : > 10 m (line-of-sight at open space) |
| ▶ Memory | : EEPROM (512K Bits) |
| ▶ Operation Voltage | : 3.3V |
| ▶ Dimension | : 19.05 x 13.46 x 2.2 _(max) mm ³ (L×W×H) |
| ▶ Environmental Range | : Operation Temperature : 0~+85°C, Relative humidity : 0~95% |

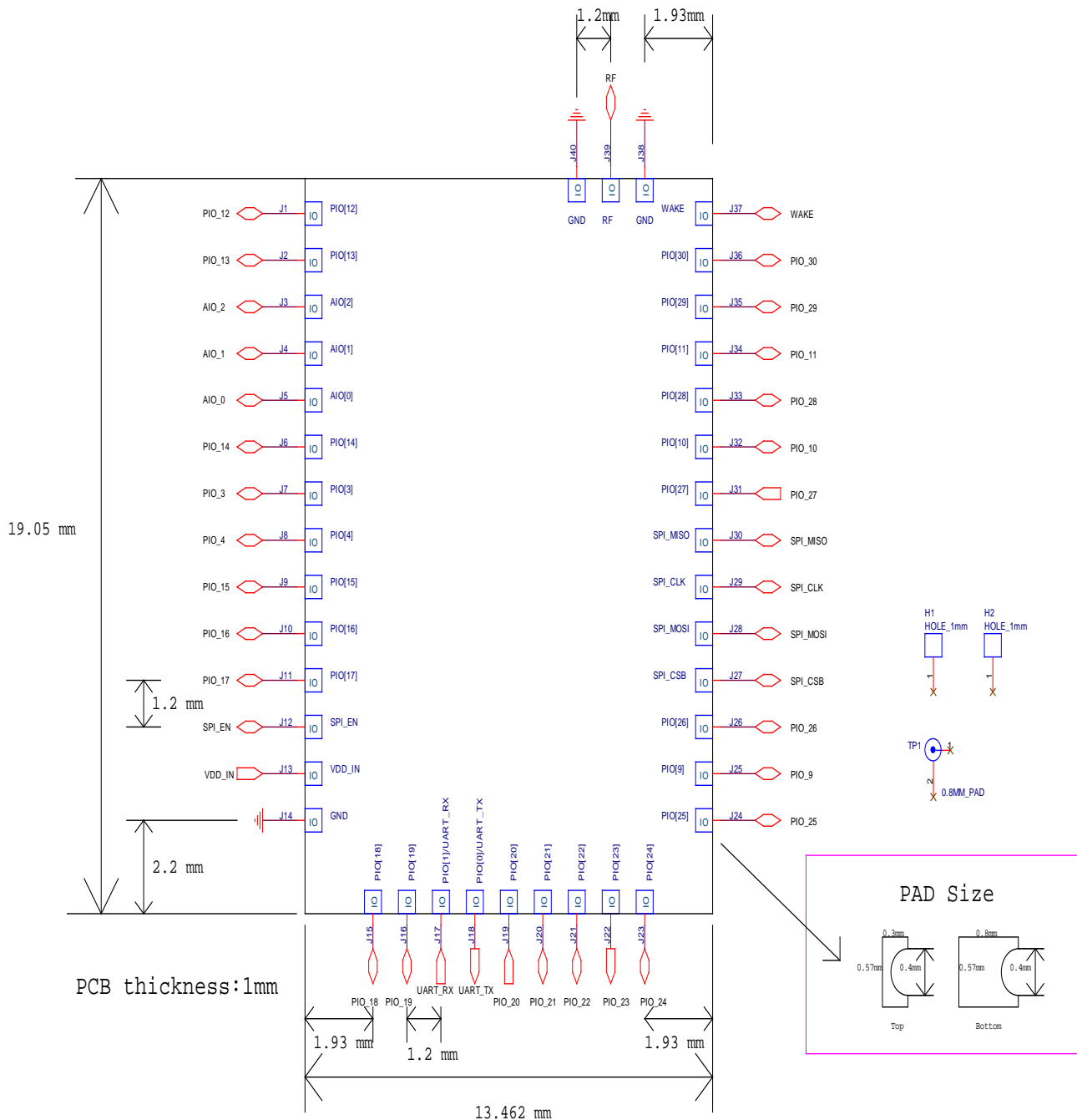
System Block Diagram



Pinout Diagram / Dimension

Unit : mm

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



I/O PIN LISTING

Pin No.	Pin Name	Type	Description
J1	PIO_12	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J2	PIO_13	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J3	AIO_2	Analog bi-directional	Programmable input/output line
J4	AIO_1	Analog bi-directional	Programmable input/output line
J5	AIO_0	Analog bi-directional	Programmable input/output line
J6	PIO_14	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
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	PIO_15	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J10	PIO_16	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J11	PIO_17	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J12	SPI_EN	Input with internal pull-down	Enable SPI interface for debugging, NC.
J13	VDD_IN	Power	3.3V input (BTM-BC4E03-2H)
J14	GND	Power	Ground
J15	PIO_18	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J16	PIO_19	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J17	UART_RX (PIO_1)	CMOS input with weak internal pull-down	UART data input, optional PIO1 which is defined by FW.
J18	UART_TX (PIO_2)	CMOS output, tri-state, with weak internal pull-up	UART data output t, optional PIO1 which is defined by FW.
J19	PIO_20	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line

J20	PIO_21	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J21	PIO_22	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J22	PIO_23	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J23	PIO_24	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J24	PIO_25	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J25	PIO_9	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J26	PIO_26	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J27	SPI_CSB	CMOS input with weak internal pull-up	Chip select for Synchronous Serial Interface active low
J28	SPI_MOSI	CMOS input with weak internal pull-down	Serial Peripheral Interface data input
J29	SPI_CLK	CMOS input with weak internal pull-down	Serial Peripheral Interface clock
J30	SPI_MISO	CMOS output, tri-state, with weak internal pull-down	Serial Peripheral Interface data output
J31	PIO_27	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J32	PIO_10	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J33	PIO_28	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J34	PIO_11	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J35	PIO_29	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J36	PIO_30	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
J37	WAKE	Input has no internal pull-up or pull-down, use external pull-down	Input to wake module from hibernate or dormant.
J38	GND	Power	Ground
J39	RF	Antenna	50 Ohm impedance

EnzyTek

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J40	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

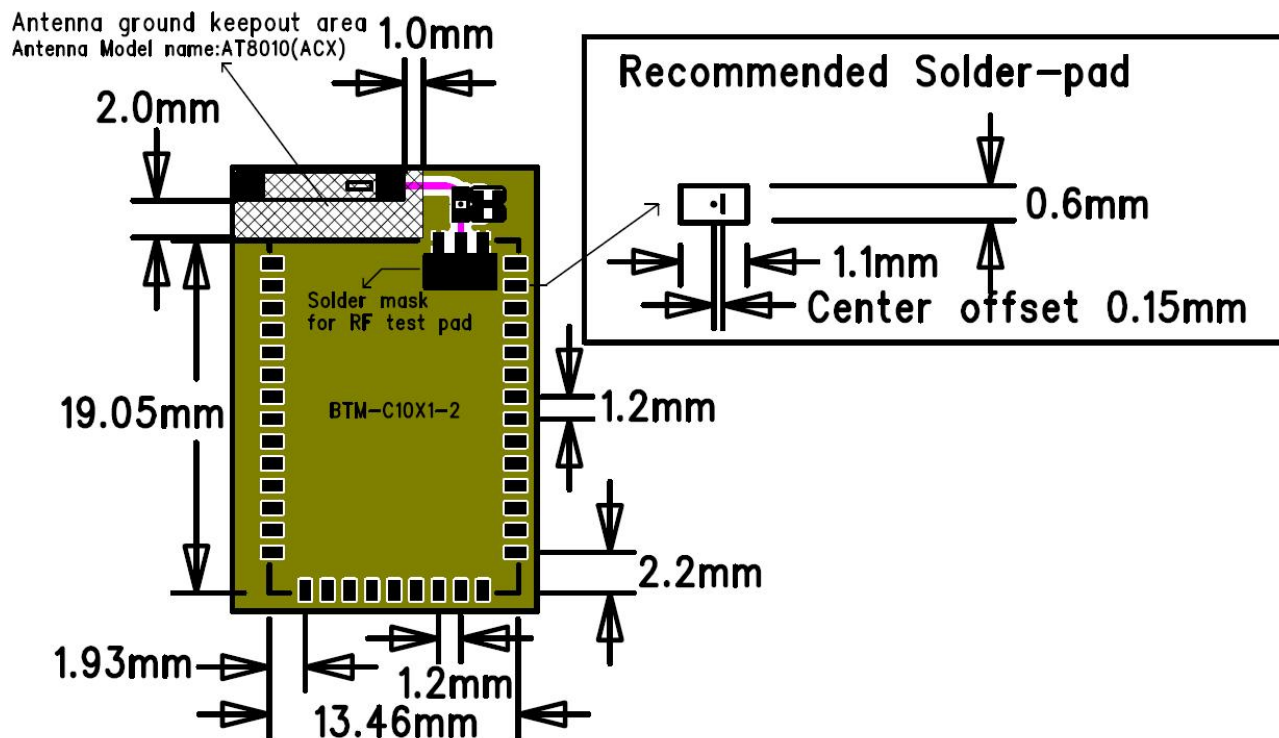
	Min	Typ	Max	Limits(BLE SPEC)	Unit
Output Power					
Max Power	4			<10	dBm
Min Power	-20			>-20	dBm
Peak to Average		0		<3	dBm
Carrier drift					
Fn	-150		150	<=150	kHz
Drift rate	-20		20	<20	kHz/50us
Max Power	-50		50	<50	kHz
Modulation Characteristic					
F1avg,'F1max'	225		275	225<= <=275	kHz
F2avg,'F2max'	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-C1011-2	
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 Temperture/sec (from module to host)	17 uA	184 uA	1210 uA
Connected TX Temperture/500ms (from module to host)	17 uA	275 uA	1213 uA

PCB Layout Guide



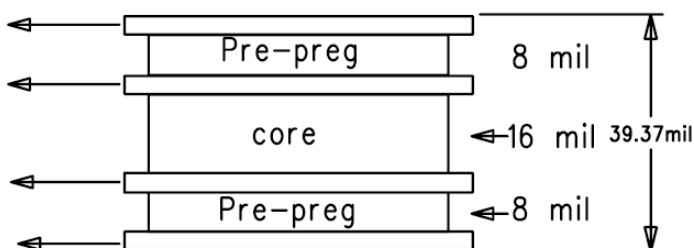
The 4-Layer Stackup

Component side(Layer 1), 1oz Cu.

GND side(Layer 2), 1oz Cu.

VCC side(Layer 3), 1oz Cu.

BOTTOM side (Layer 4), 1oz Cu.



Material : FR4

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

T/R : W=12.5 mil , Gap=15 mil

Application Schematic

