

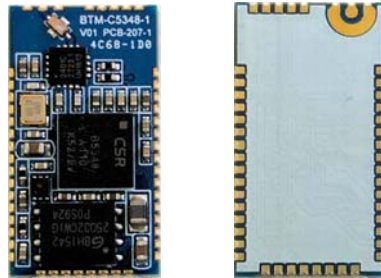
BTM-C5348-1_V01

(Version 01)

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EnzyTek Bluetooth® Class I Module - BTM-C5348-1_V01

(3V operation voltage with 32Mbit flash memory)



Product Description

BTM-C5348-1 is a highly integrated small form factor (12x22 mm²) Bluetooth class I module which adopts CSR CSR5348 as core chip for Bluetooth v4.1 dual mode operation. There are four physical interfaces supporting for various application - USB V2.0, UART and SPI. BTM-C5348-1 module offers 4 PWM LED, 10 bi-direction GPIO pins and 9 AIO pins (12 bits ADC) are available for customer used. Meanwhile, I²C interface on any PIOs as determined by the firmware.

FEATURES

- ▶ Highly integrated BT 4.1 module, CSR5348 (embedded Balun) + PA/LNA + Filter + X'Tal.
- ▶ Wireless communications module conforming to Bluetooth® Version 4.1, Class I.
- ▶ Internal switching mode regulator to optimize the power consumption.
- ▶ UART, USB, I2C interfaces available to various applications.
- ▶ 10 digital PIO ports available for user's application.
- ▶ 4 PWM LED drivers.
- ▶ 9 general purpose 12 bits ADC analog IO.
- ▶ Embedded battery charger, no external battery charging IC is needed..
- ▶ Kalimba DSP open platform co-processor.

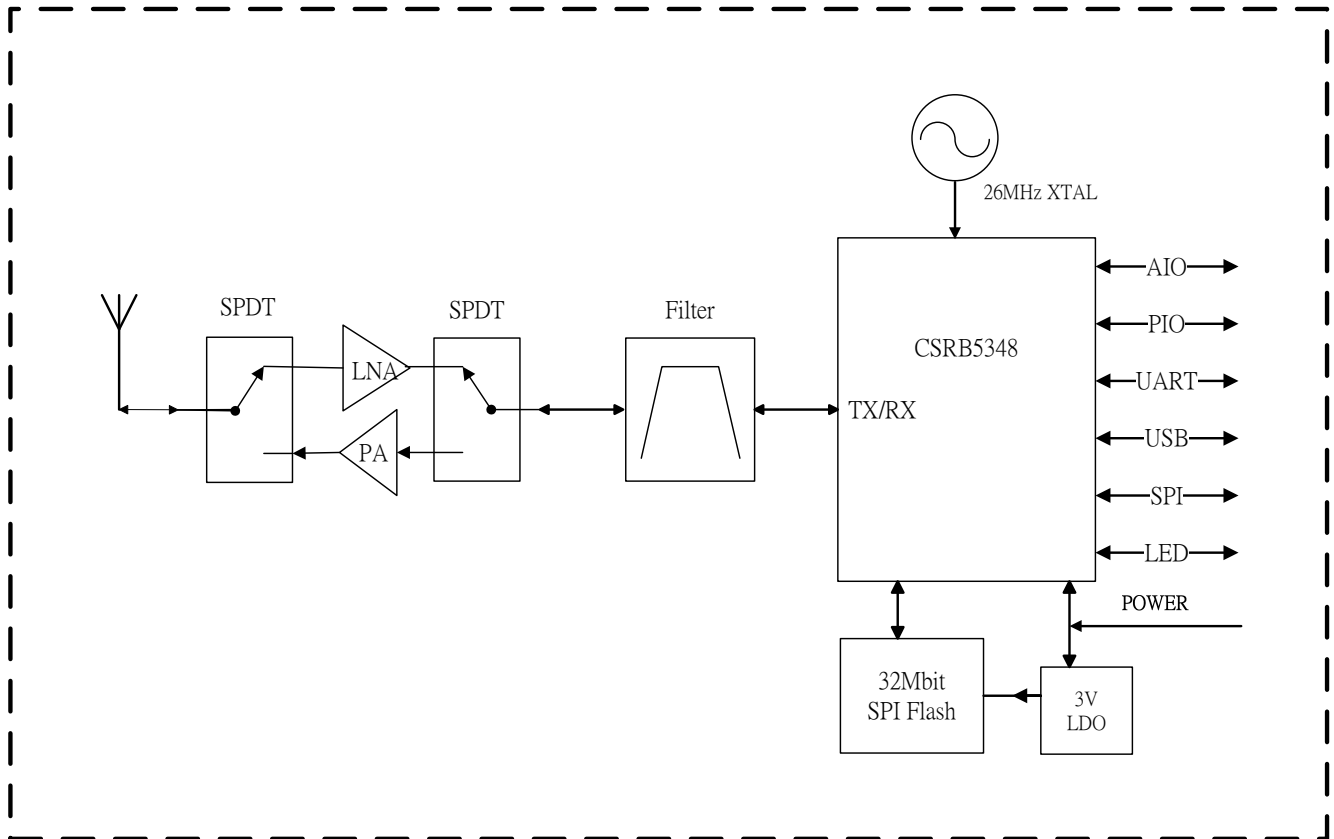
- ▶ Standard : Bluetooth 4.1, BR/EDR/LE Class I
- ▶ Bluetooth Transport : USB, UART.
- ▶ Bluetooth Profiles : Serial Port Profile (A/B), HID device
- ▶ Proprietary Profiles : BLE Serial Port Service (SPS)
- ▶ Default FW : SPP A/B, HID device, SPS Client/Server + AT command control interface
- ▶ Frequency : 2402 ~ 2480 GHz
- ▶ TX Output Power : 18 dBm/Max.
- ▶ RX Sensitivity : -90 dBm (typ)

- ▶ Operation Voltage : 3.3V

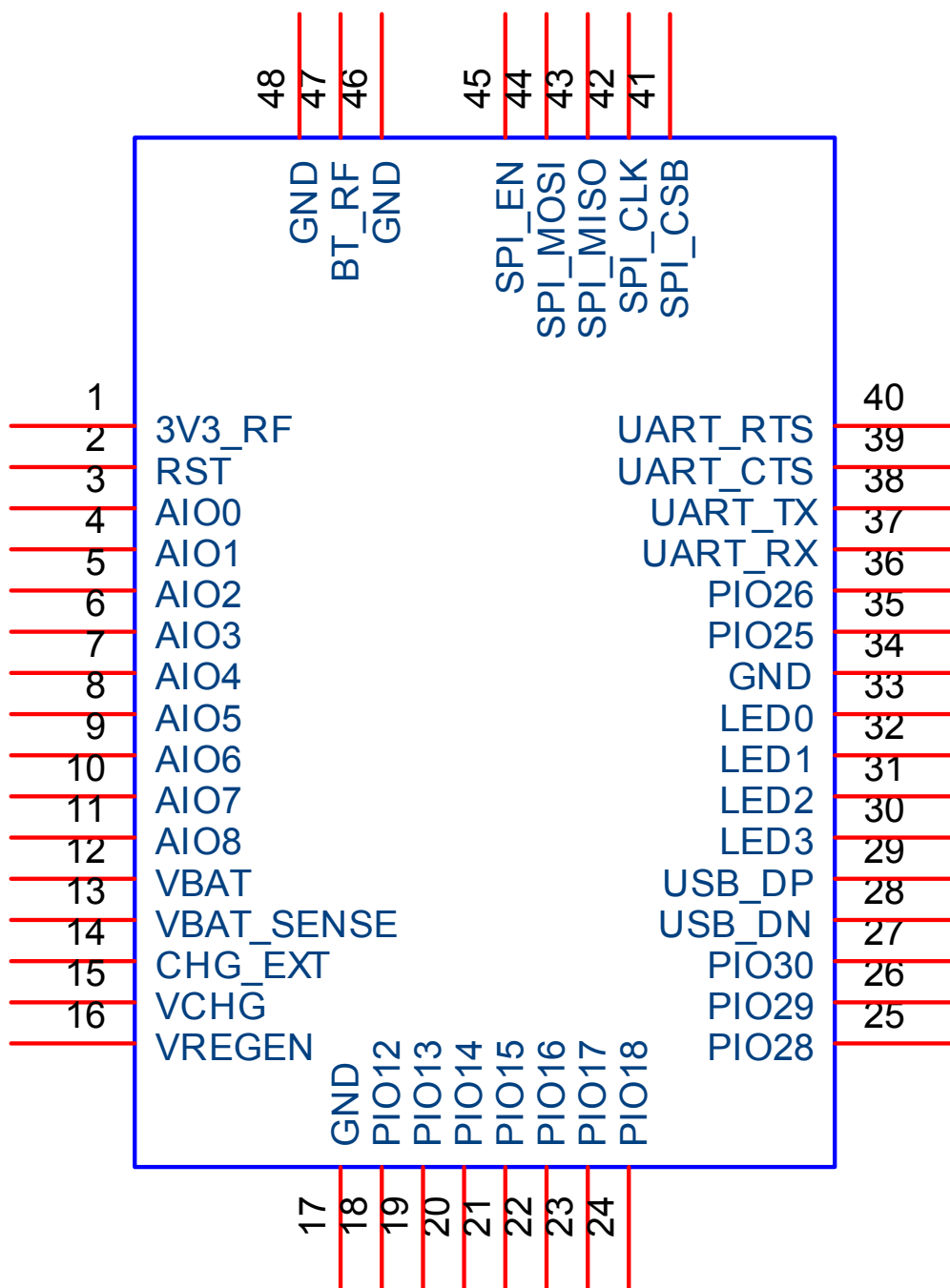
- ▶ Flash Memory Size : 32Mb external serial flash
8Mb internal ROM,
- ▶ Programmable DSP : 4K x 32bit Program RAM, 12K x 24bit data RAM.

- ▶ Dimension : 22mm x 12 mm x 1.8 mm (L x W x H)

Block Diagram



Pinout Diagram



I/O PIN LISTING

Pin No.	Pin Name	Type	Description
1	3V3_RF	Power	DC_3.3V power input
2	RST	Input with strong pull-up	Reset if low. Input debounced so must be low for >5ms to cause a reset.
3	AIO0	Bi-directional Analog IO	Analogue programmable input / output line
4	AIO1	Bi-directional Analog IO	Analogue programmable input / output line
5	AIO2	Bi-directional Analog IO	Analogue programmable input / output line
6	AIO3	Bi-directional Analog IO	Analogue programmable input / output line
7	AIO4	Bi-directional Analog IO	Analogue programmable input / output line
8	AIO5	Bi-directional Analog IO	Analogue programmable input / output line
9	AIO6	Bi-directional Analog IO	Analogue programmable input / output line
10	AIO7	Bi-directional Analog IO	Analogue programmable input / output line
11	AIO8	Bi-directional Analog IO	Analogue programmable input / output line
12	VBAT	Battery terminal +ve or 3.3V input	Lithium ion/polymer battery positive terminal. Battery charger output and input to switch-mode regulator or 3.3V power input
13	VBAT_SENSE	Battery charger sense input	Battery charger detect
14	CHG_EXT	Charger input	External battery charger control
15	VCHG	Charger input	External battery charger input
16	VREGEN	Regulator enable input	Power On/Off, "Answer" button for Stereo Headset application
17	GND	Power	Ground
18	NC		
19	NC		
20	PIO14	Bidirectional with weak pull-down	Programmable input / output line
21	PIO15	Bidirectional with weak pull-down	Programmable input / output line
22	PIO16	Bidirectional with weak pull-down	Programmable input / output line
23	PIO17	Bidirectional with weak pull-down	Programmable input / output line
24	PIO18	Bidirectional with weak pull-down	Programmable input / output line
25	PIO28	Bidirectional with weak pull-down	Programmable input / output line
26	PIO29	Bidirectional with weak pull-down	Programmable input / output line
27	PIO30	Bidirectional with weak pull-down	Programmable input / output line
28	USB_DN	Bi-directional	USB data minus
29	USB_DP	Bi-directional	USB data plus with selectable internal 1.5kΩ pull-up resistor
30	LED3	Open drain output	LED driver

31	LED2	Open drain output	LED driver
32	LED1	Open drain output	LED driver
33	LED0	Open drain output	LED driver
34	GND	Power	Ground
35	PIO25	Bidirectional with weak pull-down	Programmable input / output line
36	PIO26	Bidirectional with weak pull-down	Programmable input / output line
37	UART_RX	Bidirectional with strong pull-up	UART data input
38	UART_TX	Bidirectional with weak pull-up	UART data output
39	UART_CTS	Bidirectional with weak pull-down	UART clear to send, active low.
40	UART_RTS	Bidirectional with weak pull-up	UART request to send, active low. Alternative function PIO[16].
41	SPI_CSB	Input with strong pull-up	Chip select for SPI, active low
42	SPI_CLK	Input with weak pulldown	SPI clock
43	SPI_MISO	Output with weak pull-down	SPI data output
44	SPI_MOSI	Input with weak pull-down	SPI data input
45	SPI_EN	Input with weak pull-down	SPI Select
46	GND	Power	Ground
47	BT_RF	Antenna	50 Ohm impedance
48	GND	Power	Ground

P.S. : The PIO definition can be customize for the application, please contact with EnzyTek for detail FW specification.

Radio Characteristics

VCC = 3.3V and test under Non-EDR environment

		Min	Typ	Max	Bluetooth Spec.	Unit
Maximum RF transmit power		17	18	19	0 ~ +20	dBm
Sensitivity, 0.1% BER	2.402 GHz			-90	≤ -70	dBm
	2.440 GHz			-90		dBm
	2.480 GHz			-90		dBm
RF Power control range			18		≥ 16	dB
RF Power control resolution		3.5		5.5	2dB \leq step \leq 8dB	dBm
20dB bandwidth for modulated carrier			910		≤ 1000	kHz
Δf_{1avg} Max. modulation		155	165	170	140 < f_{1avg} < 175	kHz
Δf_{2max} Min.. modulation		135		185	≥ 115	kHz
$\Delta f_{1avg} / \Delta f_{2avg}$		0.9	1.15	1.25	≥ 0.80	
Initial Center Frequency		-15		+15	$\leq \pm 75$	kHz
Frequency Drift Rate		-340		340	$\leq \pm 400$	kHz/us
Frequency Drift (single slot packet)		-20	-10	20	$\leq \pm 25$	kHz
Frequency Drift (five slot packet)		-20	-12	20	$\leq \pm 40$	kHz
Current Consumption @ 2.5dBm	CW mode		TBD			mA
	PRBS9 data (DH1)		TBD			mA

Input/Output Terminal Characteristics :

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

Classical BT Power Consumption

SPP_A

Current (10 minutes)	Average (mA)	Minimum (mA)	Maximum (mA)
Disconnected	1.891	1.871	2.126
Connected, without data transfer	3.662	3.049	9.825
Connected, with data transfer (Send following test pattern 33 bytes every sec, 1\$0a\$0d22\$0a\$0d333\$0a\$0d4444\$0a\$0d5555\$0a\$0d666666\$0a\$0d)	3.915	3.046	12.1
Bidirectional TX/RX data as above	4.151	3	11.404

SPP_B

Current (10 minutes)	Average (mA)	Minimum (mA)	Maximum (mA)
Disconnected, Discoverable	2.2	1.867	10.209
Connected, without data transfer	5.658	5.117	9.524
Connected, with data transfer (Receive following test pattern 33 bytes every sec, 1\$0a\$0d22\$0a\$0d333\$0a\$0d4444\$0a\$0d5555\$0a\$0d666666\$0a\$0d)	5.807	5.12	10.379
Bidirectional TX/RX data as above	5.896	5.126	10.244

BLE Power Consumption

SPS_Client

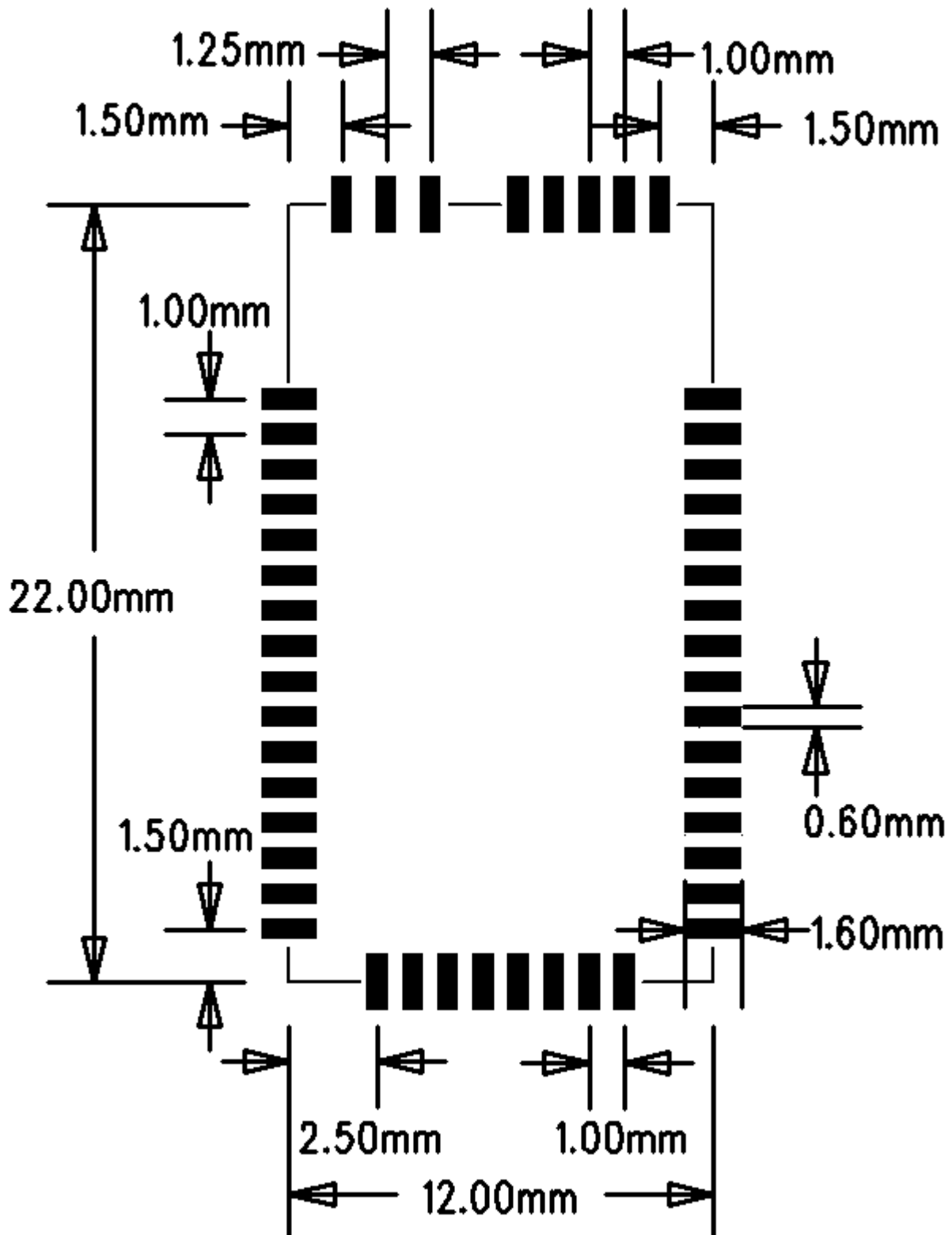
Current (10 minutes)	Average (mA)	Minimum (mA)	Maximum (mA)
Disconnected	1.888	1.869	1.93
Connected, without data transfer	3.4	2.981	6.937
Connected, with data transfer (Send following test pattern 33 bytes every sec, 1\$0a\$0d22\$0a\$0d333\$0a\$0d4444\$0a\$0d5555\$0a\$0d666666\$0a\$0d)	3.586	2.934	10.926
Bidirectional TX/RX data as above	3.602	2.939	8.869

SPS_Server

Current(10 minutes)	Average (mA)	Minimum (mA)	Maximum (mA)
Disconnected (ADV)	2.03	1.866	6.799
Connected, without data transfer	1.955	1.867	4.917
Connected, with data transfer (Receive following test pattern 33 bytes every sec, 1\$0a\$0d22\$0a\$0d333\$0a\$0d4444\$0a\$0d5555\$0a\$0d666666\$0a\$0d)	2.055	1.869	7.215
Bidirectional TX/RX data as above	2.211	1.865	8.219

PCB Footprint Dimensions

Unit : mm



Application Circuit

