

Data Sheet

BT03-1

Bluetooth 4.2 & 5 (LE) Module

Version 1.0

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Digimore Electronics Co., Ltd

10 Fl., No, 61, Yan-Ping South Road

Taipei 10045, Taiwan

TEL: +886 2 2311 3299

FAX: +886 2 2311 3375

www.digimore.com.tw

Revision History

Version	Date	Description
V 1.0	May 29 th 2017	Preliminary Version

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1. General Description

Bluetooth low energy (LE) Module BT03-1 is a Bluetooth module using TI Bluetooth low energy controller CC2640R2F. This module is ideal for low power wireless sensing device applications including mobile phone accessories, sports and leisure equipment, consumer electronics, HID, health care, etc.. The module is integrated with PCB antenna and crystal to reduce the external BOM cost. It has been designed to provide ultra-low power, low cost and robust communications and compliant with Bluetooth Version 4.2 & 5.0 low energy (BLE, Single Mode) solution.

2. Application

- 2.4 GHz Bluetooth Version 4.2 & 5 low energy system
- Mobile device accessories - Watches
- Sports and leisure equipment - Trackers / Heart Rate Monitors / Running and Biking Sensors / Gym Equipment Consumer electronics
- Consumer electronics
- HID devices - Voice remote controls / Gaming devices / Keyboards and Mice
- Health care and Medical - Thermometers / Weight Scales / Blood Glucose and Pressure Home and building automation
- Home and building automation – Lightings / Locks/ Gateways
- Industrial automation – Production / Manufacturing/ Logistics / HMI systems
- Retail – Beacons / ESL and Price tags

3. Features

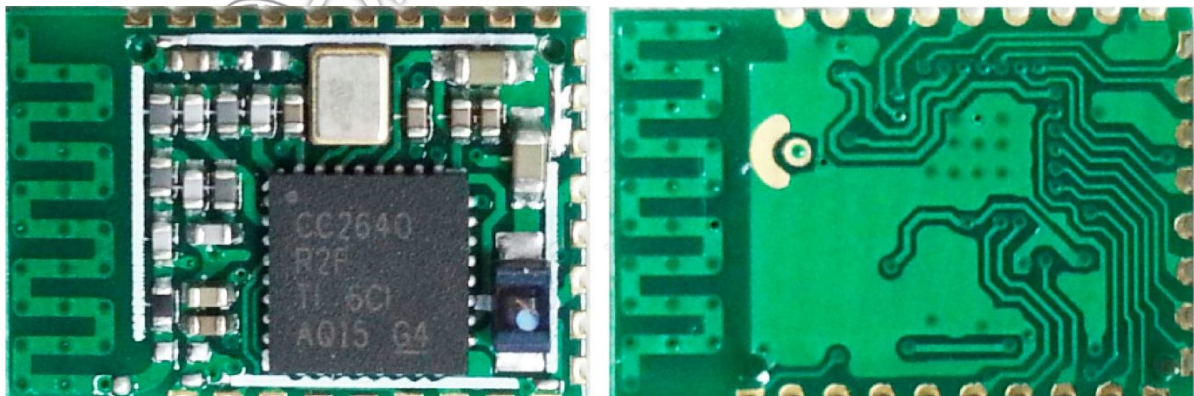
- Bluetooth Version 4.2 & 5.0 low energy (LE, Single Mode) compliant.
- Powerful ARM® Cortex®-M3 microcontroller and up to 48-MHz clock speed.
- 128KB In-System-Programmable Flash + Up to 28KB of System SRAM.

- Wide Supply Voltage Range (1.8 to 3.8V) and with Lowest Power.
- Powerful Peripherals
 - Up to 15 GPIOs (All Digital Peripheral Pins Can Be Routed to Any GPIO)
 - 4 General-Purpose Timer Modules
 - 12-Bit ADC, 200-ksamples/s, 8-Channel Analog MUX
 - Continuous Time / Ultra-Low-Power Analog Comparator
 - Programmable Current Source
 - UART / SSI / I2C / I2C / Integrated Temperature Sensor
 - Support for Capacitive-Sensing Buttons
 - Real-Time Clock (RTC)
 - AES-128 Security Module / True Random Number Generator (TRNG)
- Excellent Receiver Sensitivity.
- Programmable Output Power.
- On board PCB Antenna and Crystal.
- Dimension: 14.8mm x 10mm FR4 PCB.
- Module Thickness : 2.0mm.

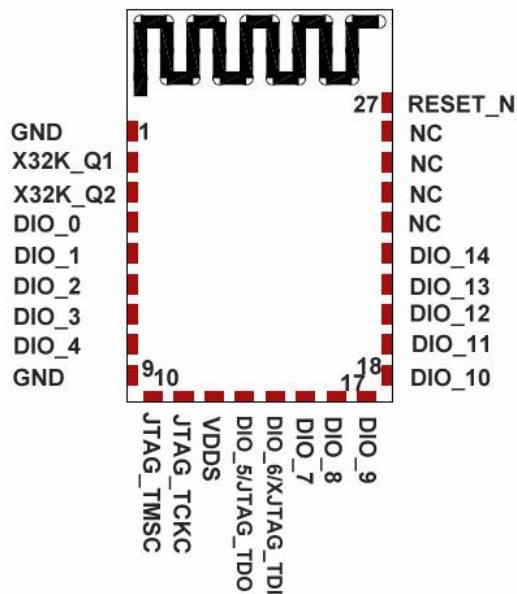
4. Mechanical Characteristics

Items	Description	Unit
Module Weight (PCBa)	TBD	g

4. 1 Module Picture



6. Pin Assignment and Descriptions



6.1 Pin Descriptions

PIN	Symbol	Pin Type	Description
1	GND	Power	System GND
2	X32K_Q1	Analog I/O	32 kHz crystal oscillator pin 1
3	X32K_Q2	Analog I/O	32 kHz crystal oscillator pin 2
4	DIO_0	Digital I/O	GPIO, Sensor Controller
5	DIO_1	Digital I/O	GPIO, Sensor Controller
6	DIO_2	Digital I/O	GPIO, Sensor Controller, High-drive capability
7	DIO_3	Digital I/O	GPIO, Sensor Controller, High-drive capability
8	DIO_4	Digital I/O	GPIO, Sensor Controller, High-drive capability
9	GND	Power	System GND
10	JTAG_TMSC	Digital I/O	JTAG TMS, High-drive capability
11	JTAG_TCKC	Digital I/O	JTAG TCK
12	VDD5	Power	System Power-Input, 1.8V–3.8V digital power-supply connection
13	DIO_5/JTAG_TDI	Digital I/O	GPIO, High drive capability, JTAG_TDO
14	DIO_6/JTAG_TDI	Digital I/O	GPIO, High drive capability, JTAG_TDI

PIN	Symbol	Pin Type	Description
15	DIO_7	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
16	DIO_8	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
17	DIO_9	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
18	DIO_10	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
19	DIO_11	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
20	DIO_12	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
21	DIO_13	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
22	DIO_14	Digital/ Analog I/O	GPIO, Sensor Controller, Analog
23	NC	-	Not Connected
24	NC	-	Not Connected
25	NC	-	Not Connected
26	NC	-	Not Connected
27	RESET_N	Digital input	Reset, active-low

7. Electrical Characteristics

7.1 Absolute Maximum Ratings

Description	Condition	Min	Typ	Max	Unit
Supply Voltage (VDDS)		- 0.3		3.9	V
Voltage on any digital/ analog IO		- 0.3		VDDS+0.3, Max 4.1	V
Voltage on X32K_Q1, X32K_Q2		- 0.3		2.25	V
Input RF level		-		5	dBm
Storage temperature range		-40		125	°C

Note:

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

7.2 Recommended Operating Conditions

	Min	Typ	Max	Unit
Operating supply voltage (VDD5)	1.8	-	3.8	V
Operating ambient temperature range, TA	- 25	25	75	°C

7.3 DC Characteristics

TA = 25°C, VDD5 = 3V

Description	Condition	Min	Typ	Max	Unit
VIH	Lowest GPIO input voltage reliably interpreted as a <High>	-	-	0.8	V
VIL	Highest GPIO input voltage reliably interpreted as a <Low>	0.2	-	-	V
GPIO VOH at 8 mA load	IOCURRE = 2 High-drive GPIOs only	-	2.68	-	V
GPIO VOL at 8 mA load	IOCURRE = 2 High-drive GPIOs only	-	0.33	-	V
GPIO VOH at 4 mA load	IOCURRE = 1	-	2.72	-	V
GPIO VOL at 4 mA load	IOCURRE = 1	-	0.28	-	V

7.4 32.768-kHz Crystal Oscillator (XOSC_LF)

TA = 25°C, VDD5 = 3V

Parameter	Condition	Min	Typ	Max	Unit
Crystal frequency			32.768		kHz
Crystal frequency tolerance		-500		500	Ppm
ESR Equivalent series resistance			30	100	KΩ
CL Crystal load capacitance		6		12	pF

7.5 Typical Current Consumption

TA=25°C, VCC = 3V

Description	Condition	Min	Typ	Max	Unit
Core Current Consumption	RX mode, standard mode, no peripherals active, low MCU activity	-	6.1	-	mA
	TX mode, 0 dBm output power, no peripherals active, low MCU activity	-	6.1	-	mA
	TX mode, 5 dBm output power, no peripherals active, low MCU activity	-	9.1	-	mA

	Active, Core running CoreMark	-	1.45 mA + 32μA/Mhz	-	-
	Idle, Supply Systems and RAM powered	-	550	-	μA
	Standby, with Cache, RTC, CPU, RAM and (partial) register retention, XOSC_LF	-	3	-	μA
	Standby, with RTC, CPU, RAM and (partial) register retention, XOSC_LF	-	1.3	-	μA
	Standby, with RTC, CPU, RAM and (partial) register retention, RCOSC_LF		1.1		μA

Note:

The current consumption depends on applications.

7.6 RF Section

1-Mbps GFSK (Bluetooth low energy)

TA = 25°C, VDDSD = 3V

Description	Condition	Min	Typ	Max	Unit
Frequency Range		2402	-	2480	MHz
Channel Spacing		-	2	-	MHz
Output Power		-23	-	5	dBm
Receiver Sensitivity		-	-97	-	dBm
Receiver Saturation		-	4	-	dBm
Frequency Error Tolerance		-350		350	kHz

Bluetooth 5

TA = 25 °C, VDDSD = 3V

Description	Condition	Min	Typ	Max	Unit
TBD					

APPENDIX A

A-1 Application Circuit

TBD

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