Bluetooth 5.0 Low Energy Module

Key Features

- Bluetooth 5.0 Single-Mode Compliant
- Powerful ARM Cortex-M3
  - Up to 48-MHz Clock Speed
  - 275KB of Nonvolatile Memory including 128KB of In-System Programmable Flash
  - Up to 28KB of System SRAM, of Which 20KB is Ultra-Low Leakage SRAM
  - 8KB of SRAM for Cache or System RAM use
  - 2-Pin cJTAG and JTAG Debugging
  - Supports Over-The-Air Upgrade (OTA)
  - Ultra-Low Power Sensor Controller
  - 10 GPIOs
  - All Digital Peripheral Pins Can Be Routed to Any GPIO
  - Four General-Purpose Timer Modules (Eight 16-Bit or Four 32-Bit Timers, PWM Each)
  - 12-Bit ADC, 200-ksamples/s, 8-Channel Analog MUX
  - Continuous Time Comparator
  - Ultra-Low-Power Analog Comparator
  - Programmable Current Source
  - UART
  - 2× SSI (SPI, MICROWIRE, TI)
  - I2C
  - I2S
  - Real-Time Clock (RTC)
  - AES-128 Security Module
  - True Random Number Generator (TRNG)
  - Support for Eight Capacitive-Sensing Buttons
  - Integrated Temperature Sensor
- RF Performance
  - TX Power: up to 2dBm
  - RX Sensitivity: up to -96dBm

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- Communication Range: 60 meters (LOS)
- Antenna: Integrated PCB antenna
- Size: 16.55mm x 10.8mm x 1.5mm (Without Shielding)
       16.55mm x 10.88 mm x 2.3mm (With Shielding)
- Ultra Low Power Consumption:
  - Shutdown: 100nA (Wake up on External Events)
  - Standby: 1.1uA (RTC Running and RAM/CPU Retention)
  - RX Current: 5.9mA
  - TX Current @ 0dBm: 6.1mA
- BQB, FCC, CE, RoHS compliant

Descriptions

BDE-BLEM203P is a Bluetooth 5.0 single-mode compliant Bluetooth low energy module targeted at low power sensors and PC/Phone accessories. It supports BLE 5.0 futures, including 2Mbits and PHY coded.

BDE-BLEM203P highly integrates Bluetooth Low Energy radio, stack, profile and applications in a SoC, without the need of using an external MCU. The module also offers flexible hardware interfaces for the sensor application.

It enables ultra-low power connectivity and data transfer for the applications that are sensitive to power consumption, size and cost.
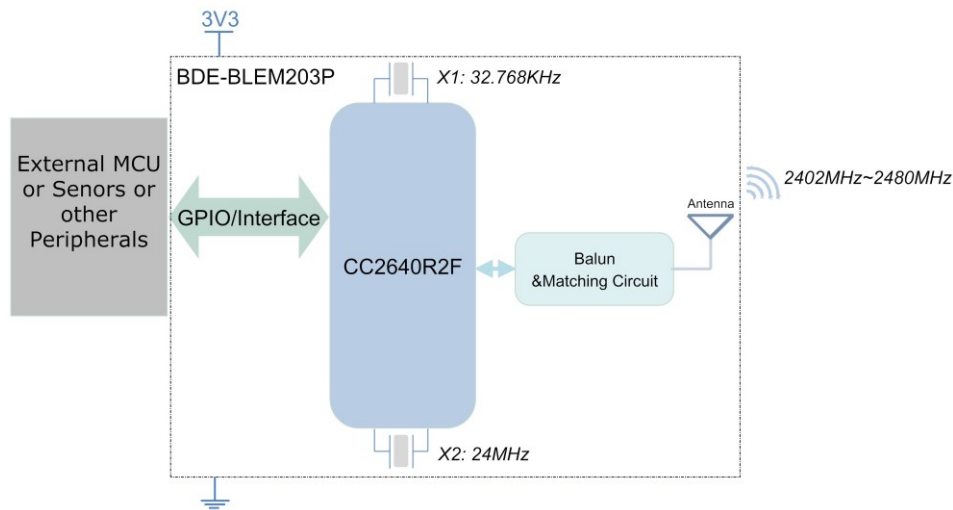
Block Diagram

Fig. 1: The Block Diagram of BDE-BLEM203P

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Applications

- Home and Building Automation
- Industrial
- Retail
- Health and Medical
- Sports and Fitness
- HID

Electrical Characteristics

- Absolute maximum rating

Rating	Min	Typ	Max	Unit	Notes
Storage Temperature	-40	-	125	℃	
VDD	-0.3	-	4.1	V	
Other Digital Terminals	-0.3	-	VDDS+0.3≤4.1	V	
Voltage on ADC input	-0.3	-	VDDS	V	Voltage scaling enabled
	-0.3	-	1.49	V	Voltage scaling disabled, internal reference
	-0.3	-	VDDS/2.9	V	Voltage scaling disabled, VDDS as reference
RF pin	-	-	2	dBm	

- Recommended operating conditions

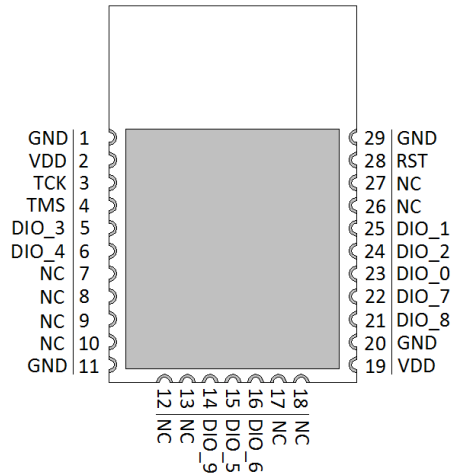| Rating	Min	Typ	Max	Unit
Operating Temperature	-40	-	85	℃
VDDS	1.8	3.3	3.8	V

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Pin Out

Fig. 2: The pinout of BDE-BLEM203P (TOP VIEW)

Table 1: Pin definitions of BDE- BLEM203P

Pin Number	Pin Name	Definitions
1	GND	Power Ground
2	VDD	Power Supply
3	TCK	JTAG_TCK
4	TMS	JTAG_TMS
5	DIO_3	GPIO, High-drive capability, JTAG_TDO
6	DIO_4	GPIO, High-drive capability, JTAG_TDI
7	NC	NC
8	NC	NC
9	NC	NC
10	NC	NC
11	GND	Power Ground
12	NC	NC
13	NC	NC
14	DIO_9	GPIO, Sensor Controller, Analog
15	DIO_5	GPIO, Sensor Controller, Analog
16	DIO_6	GPIO, Sensor Controller, Analog
17	NC	NC
18	NC	NC
19	VDD	Power Supply
20	GND	Power Ground
21	DIO_8	GPIO, Sensor Controller, Analog
22	DIO_7	GPIO, Sensor Controller, Analog
23	DIO_0	GPIO, Sensor Controller, high-drive capability

24	DIO_2	GPIO, Sensor Controller, high-drive capability
25	DIO_1	GPIO, Sensor Controller, high-drive capability
26	NC	NC
27	NC	NC
28	RST	
29	GND	Power Ground

Overall Dimensions

Fig. 1 shows the overall dimensions of BDE-BLEM203P. The module measures 16.55mm long by 10.88mm wide by 2.3mm high with the shield.
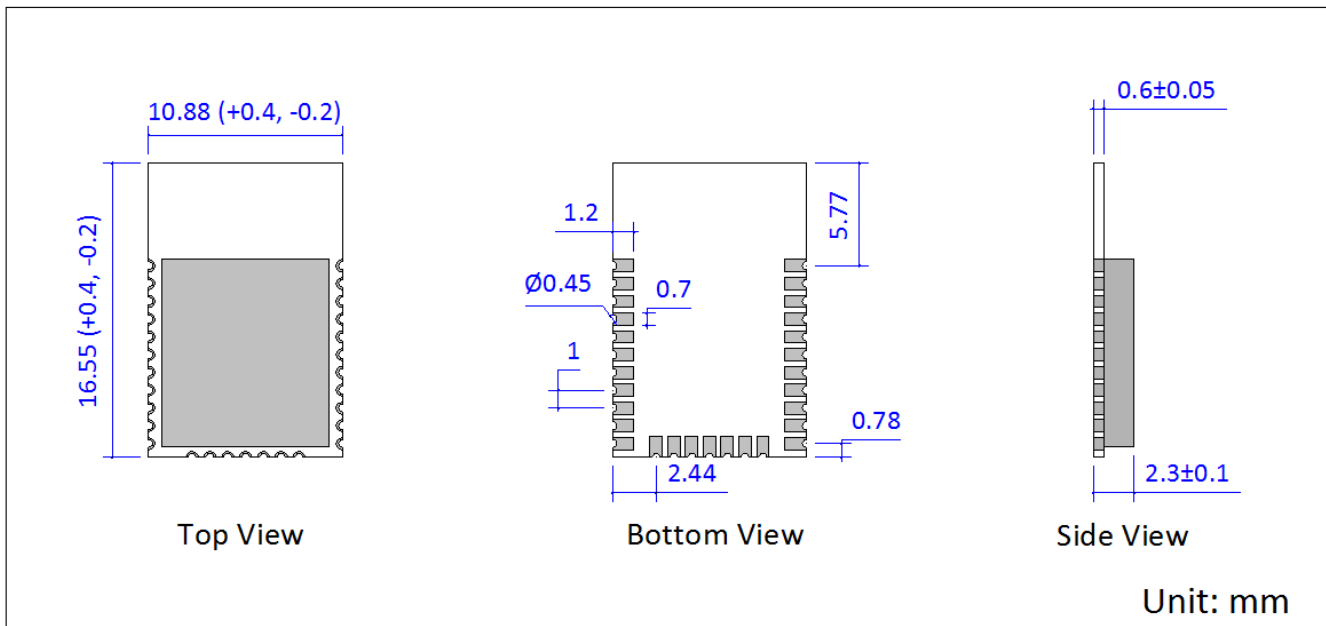

Fig. 3: Overall Dimensions of BDE-BLEM203P

Module Location for Reference

In order to get a fine performance when integrate the module to your product, it is advised to use the recommended module location to the respective PCB.

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■ Location in X-Y plane

Antenna area.
This area of the mother board should
be cut off or copper free.

Mother Board

Antenna area.
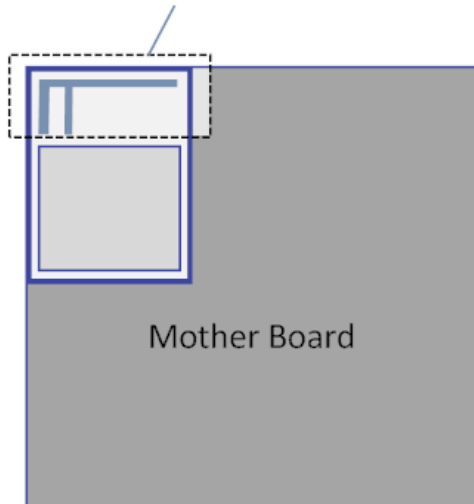This area of the mother board should
be cut off or copper free.

Mother Board

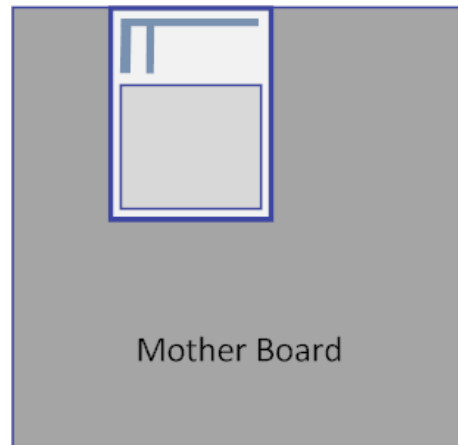Fig. 4: Recommended location in X-Y plane

Mother Board

Mother Board
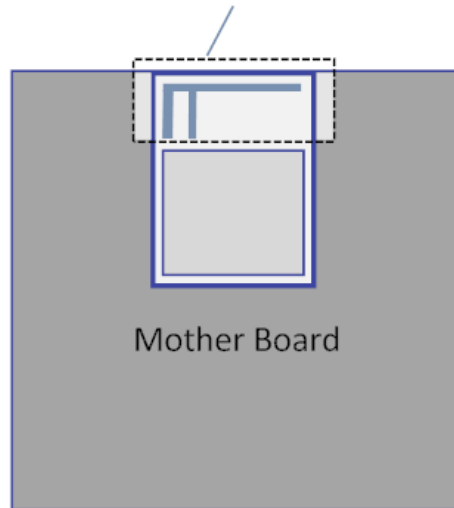
Fig. 5: Not recommended location in X-Y plane

■ Location in Z plane

Metal

Cut off or
copper free

Mother Board
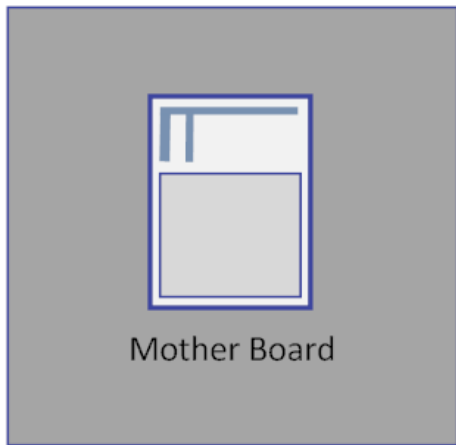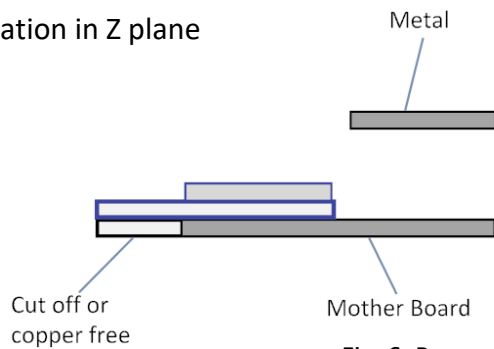
Metal

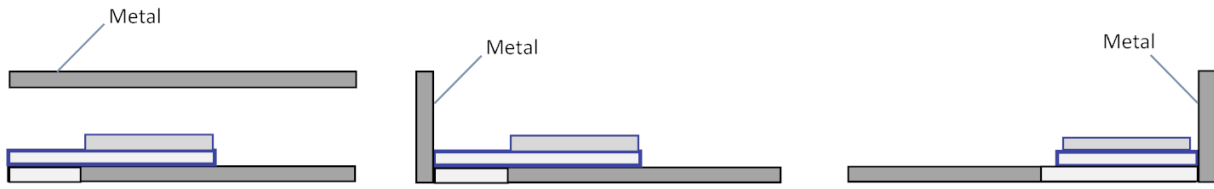Cut off or copper free
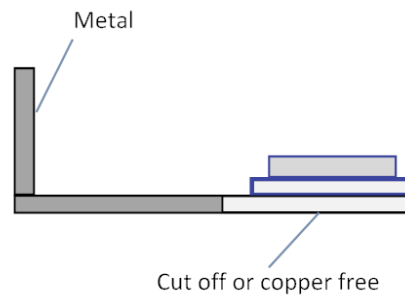
Fig. 6: Recommended location in Z plane

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Fig. 7: Not recommended location in Z plane

Typical Solder Reflow Profile
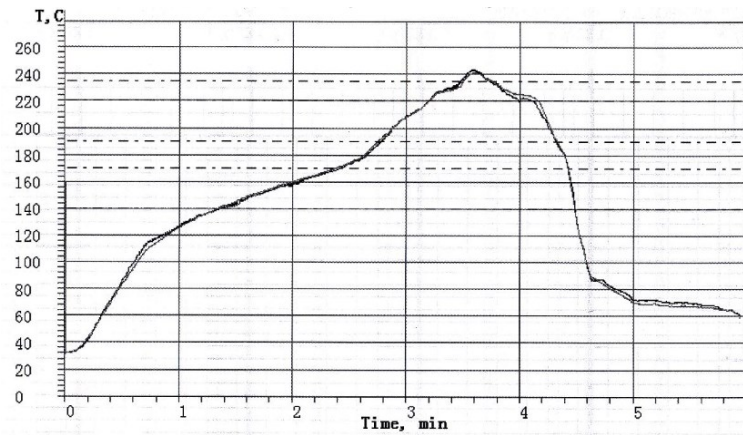
Fig. 8: Typical Solder Reflow Profile

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Package Information

Fig. 9: Package

Contacts

BDE Technology Inc.

Address: Originality Building B2-403, 162 Science Ave, Huangpu District, Guangzhou, 510663, China
494 E Thornhill Ln, Palatine, IL 60074, USA
Tel: +86-020-28065335   Fax: +86-020-28065338

Website: www.bdecomm.com   Email: info@bdecomm.com

BDE Technology Inc.