

# Bluetooth Low Energy Module (BT5.0)



## Key Features

- Bluetooth 5.0 single-mode compliant
- Support master and slave modes, 8 simultaneous connections in master mode
- Integrated Bluetooth Low Energy stack, no external MCU needed
- RF performance
  - TX power: -21dBm to 5dBm
  - RX sensitivity: up to -96dBm
- Communication range: 250 meters (LOS) – Long Range Mode
- Ultra low power ARM Cortex-M3 microcontroller core
- Antenna: PCB
- Size: 20.5 mm x 13 mm x 1.5mm (Without Shielding)  
20.5 mm x 13 mm x 2.1 mm (With Shielding)
- Ultra low power consumption:
  - Shutdown: 150nA (Wake up on external events)
  - Standby: 1.1uA (RTC running and RAM/CPU retention)
- BQB (QDID: 151462), FCC (FCC ID: 2ABRU-BLEM203D), CE, RoHS compliant

## Descriptions

BDE-BLEM203D is a Bluetooth 5.0 single-mode compliant Bluetooth low energy module targeted at low power sensors and PC/Phone accessories.

BDE-BLEM203D 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

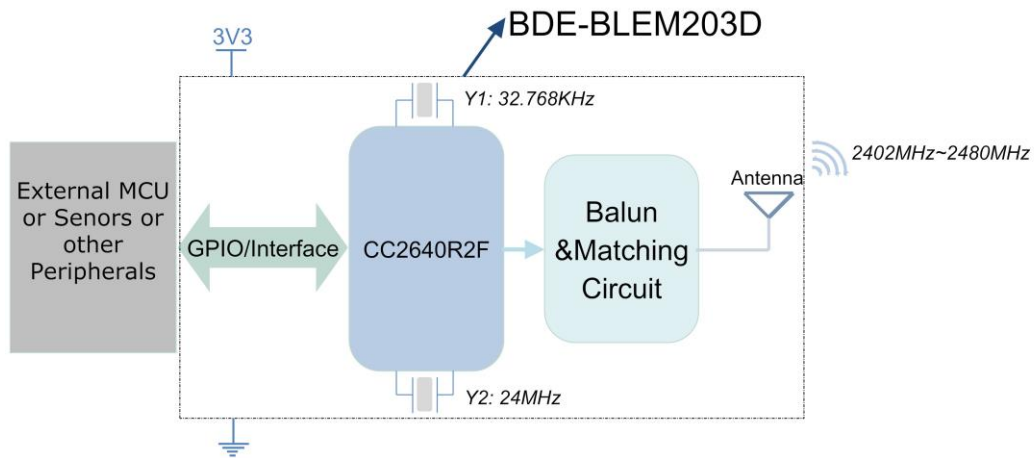


Fig. 1: The Block Diagram of BDE-BLEM203D

## Applications

- Medical devices
- Sports and fitness equipment
- Home electronics
- Mobile and PC accessories
- Industry automation

## Electrical Characteristics

### ■ Absolute maximum rating

Rating	Min	Typ	Max	Unit
Storage Temperature	-40	-	125	°C
VDDS	-0.3	-	4.1	V
Other Digital Terminals	-0.2	-	$V_{DDS}+0.3 \leq 4.1$	V

### ■ Recommended operating conditions

Rating	Min	Typ	Max	Unit
Operating Temperature	-40	-	85	°C
VDDS	1.8	3.3	3.8	V

## Overall Dimensions

Fig. 2 shows the overall dimensions of BDE-BLEM203D. The module measures 20.5mm long by 13mm wide by 1.5mm high without the shield.

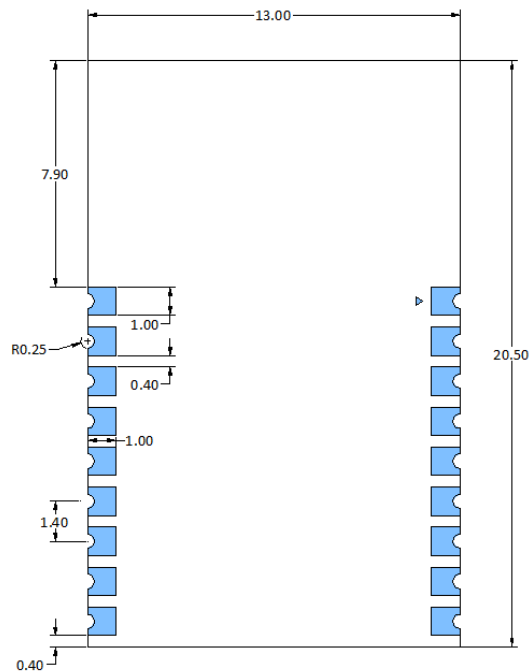


Fig. 2: Overall Dimensions of BDE-BLEM203D (BOTTOM VIEW)

## Pin Definitions

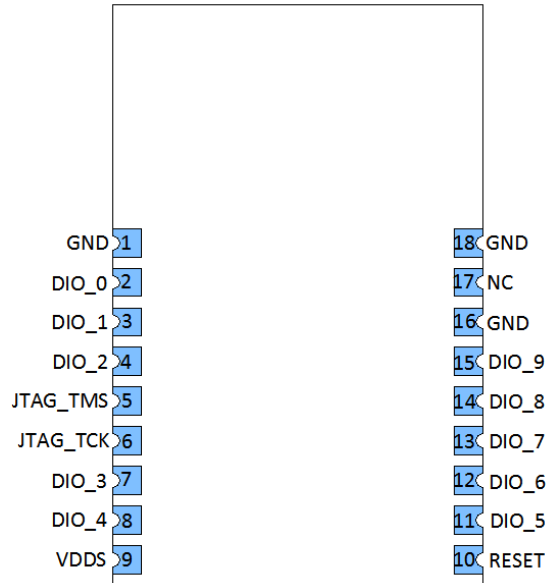


Fig. 3: The pinout of BDE-BLEM203D (TOP VIEW)

Table 1: Pin definitions of BDE-BLEM203D

Pin Number	Pin Name	Definitions
1	GND	Power Ground
2	DIO_0	GPIO, Sensor Controller, high-drive capability
3	DIO_1	GPIO, Sensor Controller, high-drive capability
4	DIO_2	GPIO, Sensor Controller, high-drive capability
5	JTAG_TMS	JTAG_TMS
6	JTAG_TCK	JTAG_TCK
7	DIO_3	GPIO, High-drive capability, JTAG_TDO
8	DIO_4	GPIO, High-drive capability, JTAG_TDI
9	VDDS	Power Supply
10	RESET	Reset, Active-low
11	DIO_5	GPIO, Sensor Controller, Analog
12	DIO_6	GPIO, Sensor Controller, Analog
13	DIO_7	GPIO, Sensor Controller, Analog
14	DIO_8	GPIO, Sensor Controller, Analog
15	DIO_9	GPIO, Sensor Controller, Analog
16	GND	Power Ground
17	NC	NC
18	GND	Power Ground

## Module Location

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.

### ■ Location in X-Y plane

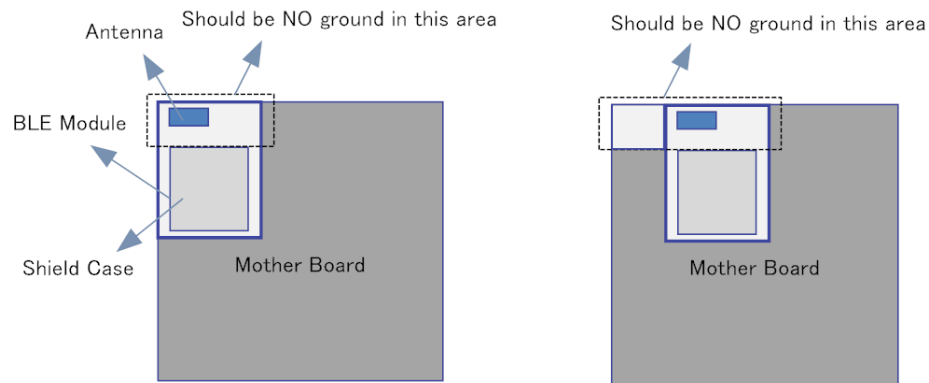


Fig. 4: Recommended location in X-Y plane

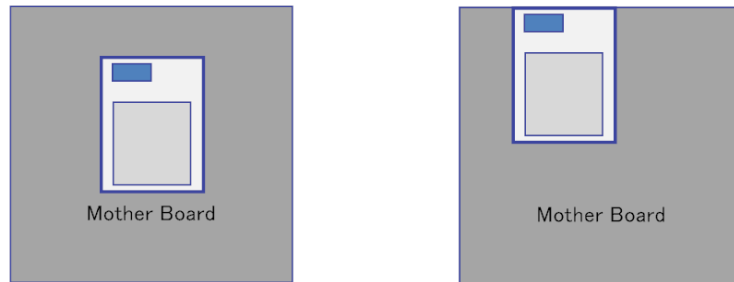


Fig. 5: Not recommended location in X-Y plane

■ Location in Z plane

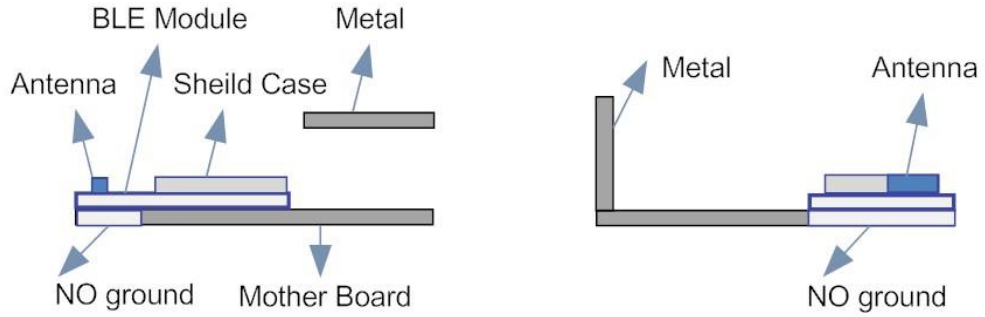


Fig. 6: Recommended location in Z plane

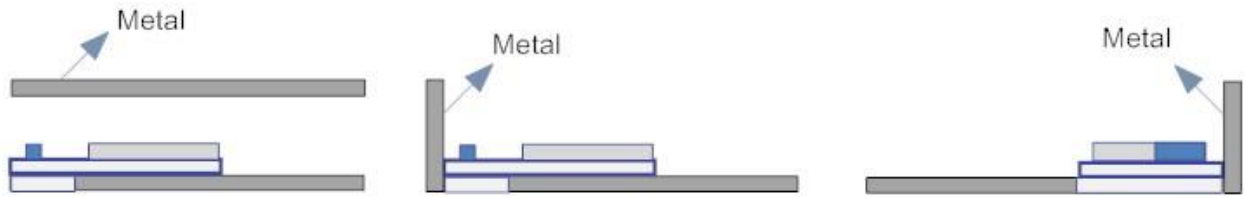


Fig. 7: Not recommended location in Z plane

## Typical Solder Reflow Profile

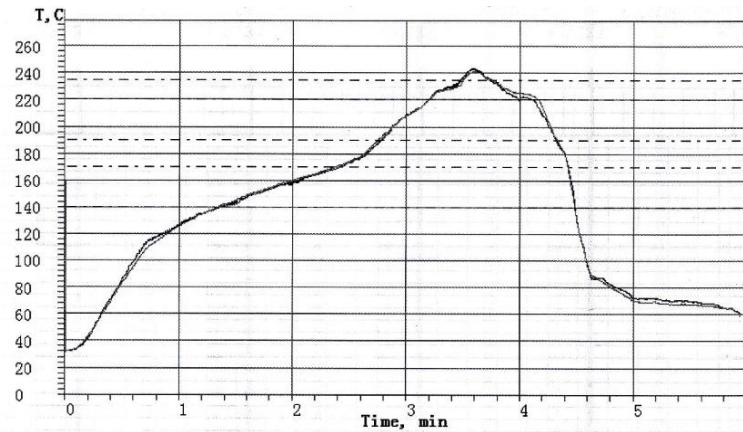


Fig. 7: Typical Solder Reflow Profile

## Package Information



Fig. 8: Package information

## Integration Instructions

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

### 2.2 List of applicable FCC rules

FCC Part 15.247

### 2.3 Specific operational use conditions

This transmitter/module and its antenna must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

### 2.4 Limited module procedures

Not applicable.

### 2.5 Trace antenna designs

Not applicable.

### 2.6 RF exposure considerations

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This compliance to FCC radiation exposure limits for an uncontrolled environment, and minimum of 5mm separation between antenna and body.

The host product manufacturer would provide the above information to end users in their end-product manuals.

### 2.7 Antennas

Integral Antenna: 1.15 dBi, 2.4 GHz~2.5 GHz

### 2.8 Label and compliance information

The end product must carry a physical label or shall use e-labelling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2ABRU-BLEM203D".

### 2.9 Information on test modes and additional testing requirements

For more information on testing, please contact the manufacturer.

### 2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.



## FCC Statement

Integrator is reminded to assure that these installation instructions will not be made available to the end user of the final host device.

The final host device, into which this RF Module is integrated has to be labelled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2ABRU-BLEM203D".

"This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) This device must accept any interference received, including interference that may cause undesired operation."

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.107) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

## Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- (1) The radio elements have the radio frequency circuitry shielded.
- (2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- (3) The module contains power supply regulation on the module.
- (4) The module contains a permanently attached antenna.
- (5) The module demonstrates compliance in a stand-alone configuration.
- (6) The module is labeled with its permanently affixed FCC ID label.
- (7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- (8) The module complies with RF exposure requirements.

This transmitter/module must not be collocated or operating in conjunction with any other antenna or transmitter.

## Contacts

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