Bluetooth Low Energy Module (BT5.0)

Key Features

- Bluetooth 4 and 5 low energy
- Powerful ARM Cortex-M4F processor
  - Clock speed: up to 48MHz
  - 352KB of In-System programmable flash with 8KB cache
  - 80KB SRAM
  - 8KB of cache SRAM
  - 2-Pin cJTAG and JTAG debugging
  - Support Over-the-Air upgrade (OTA)
  - Ultra-Low power sensor controller with 4KB of SRAM
  - 31 GPIOs
  - 4 x 32-Bit or 8 x 16-Bit general purpose timer
  - 12-Bit ADC, 200 kSamples/s, 8 channels
  - 2 x comparator with internal reference DAC
  - Programmable current source
  - 2 x UART
  - 2 x SSI (SPI, MICROWIRE, TI)
  - IIC, IIS
  - Real-Time-Clock (RTC)
  - AES 128- and 256-bit crypto accelerator
  - ECC and RSA public key hardware accelerator
  - SHA2 accelerator (Full suite up to SHA-512)
  - True Random Number Generator (TRNG)
  - Capacitive sensing, up to 8 channels
  - Integrated temperature and battery monitor
  - On-Chip buck DC/DC converter
- RF performance
  - TX power: -21dBm to 5dBm
  - RX sensitivity: up to -105dBm (LE coded PHY)
- Communication range: about 250 meters (LOS) – Long Range Mode
- Antenna: PCB antenna, 1.17 dBi gain
- Size: 22.95 mm x 15 mm x 2.1 mm (With Shielding)
- Ultra low power consumption:

- ➢ Shutdown: 120nA (Wake up on external events)
- ➢ Standby: 0.95uA (RTC running and RAM/CPU retention)
- ➢ RX current: 6.9mA
- ➢ TX current @ 0dBm: 7.4mA
- ➢ TX current @ 5dBm: 9.7mA
- ■ Industrial grade operating temperature range from -40°C to +105°C
- ■ Pin to pin compatible with BDE-BLEM205
- ■ BQB, FCC, CE, RoHS compliant

Descriptions

BDE-BLEM205-IN is a Bluetooth 4 and 5 single-mode compliant Bluetooth low energy module targeted at low power sensors and PC/Phone accessories.

BDE-BLEM205-IN 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.
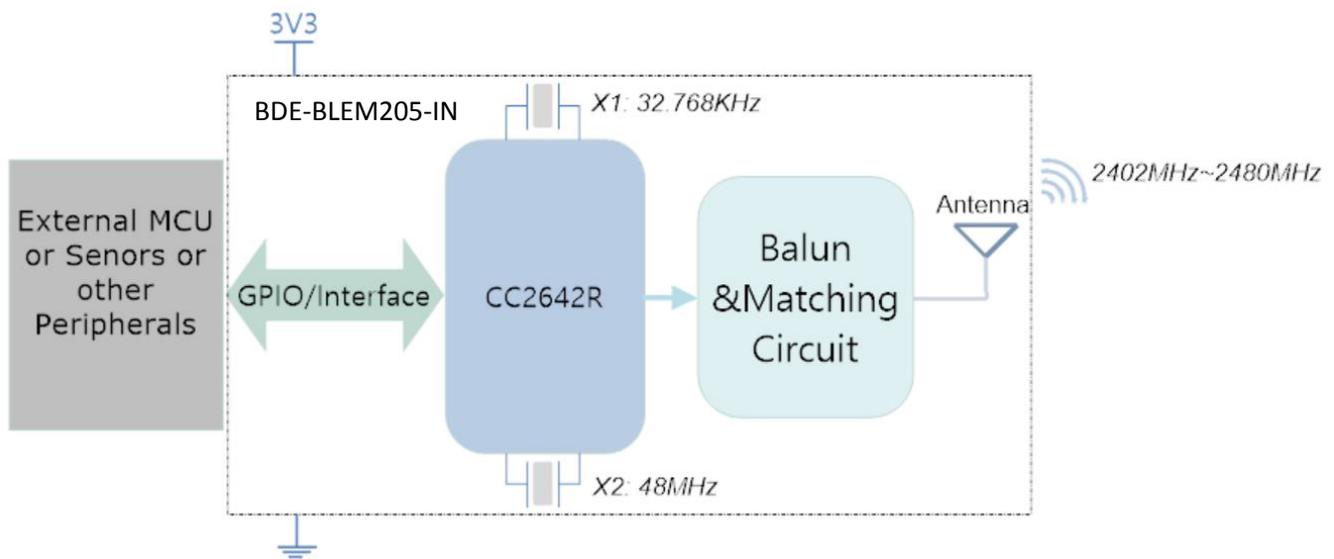
Block Diagram

Fig. 1: The Block Diagram of BDE-BLEM205-IN

BDE Technology Co., Ltd.

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	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	-	-	5	dBm	

- Recommended operating conditions

Rating	Min	Typ	Max	Unit
Operating Temperature	-40	-	105	℃
VDD	1.8	3.3	3.8	V

Pinout
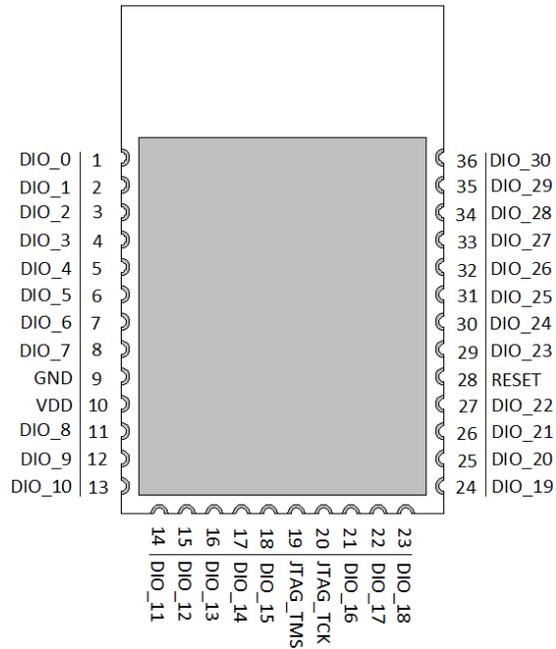

Fig. 2: The pinout of BDE-BLEM205-IN (TOP VIEW)

Table 1: Pin definitions of BDE-BLEM205-IN

Pin Number	Pin Name	Definitions
1	DIO_0	GPIO, Sensor Controller
2	DIO_1	GPIO, Sensor Controller
3	DIO_2	GPIO, Sensor Controller
4	DIO_3	GPIO, Sensor Controller
5	DIO_4	GPIO, Sensor Controller
6	DIO_5	GPIO, Sensor Controller, high-drive capability
7	DIO_6	GPIO, Sensor Controller, high-drive capability
8	DIO_7	GPIO, Sensor Controller, high-drive capability
9	GND	Power Ground
10	VDD	Power Supply
11	DIO_8	GPIO
12	DIO_9	GPIO
13	DIO_10	GPIO
14	DIO_11	GPIO
15	DIO_12	GPIO
16	DIO_13	GPIO
17	DIO_14	GPIO
18	DIO_15	GPIO
19	JTAG_TMS	JTAG TMSC, high-drive capability
20	JTAG_TCK	JTAG TCKC
21	DIO_16	GPIO, JTAG_TDO, high-drive capability

22	DIO_17	GPIO, JTAG_TDI, high-drive capability
23	DIO_18	GPIO
24	DIO_19	GPIO
25	DIO_20	GPIO
26	DIO_21	GPIO
27	DIO_22	GPIO
28	RESET	Reset, active-low
29	DIO_23	GPIO, Sensor Controller, Analog
30	DIO_24	GPIO, Sensor Controller, Analog
31	DIO_25	GPIO, Sensor Controller, Analog
32	DIO_26	GPIO, Sensor Controller, Analog
33	DIO_27	GPIO, Sensor Controller, Analog
34	DIO_28	GPIO, Sensor Controller, Analog
35	DIO_29	GPIO, Sensor Controller, Analog
36	DIO_30	GPIO, Sensor Controller, Analog

Overall Dimensions

Fig. 3 shows the overall dimensions of BDE-BLEM205-IN. The module measures 22.95mm long by 15mm wide by 2.1mm high with the shield.
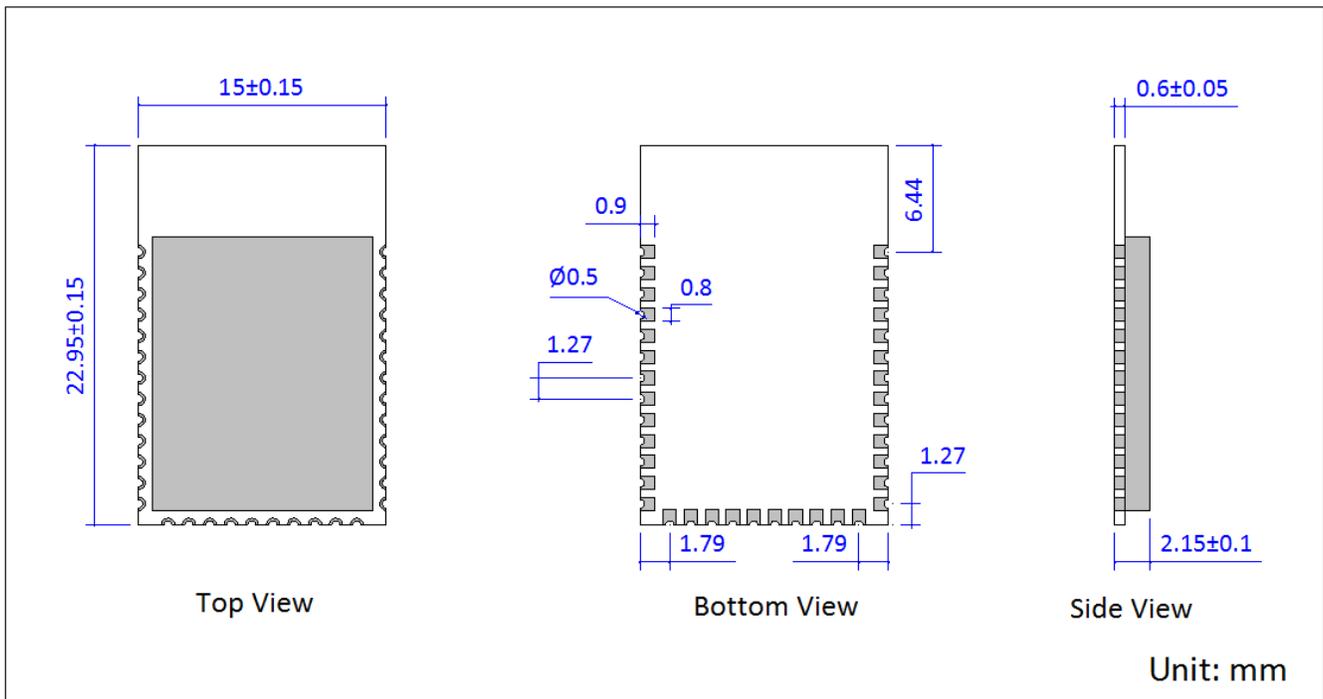

Fig. 3: Overall Dimensions of BDE-BLEM205-IN

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.
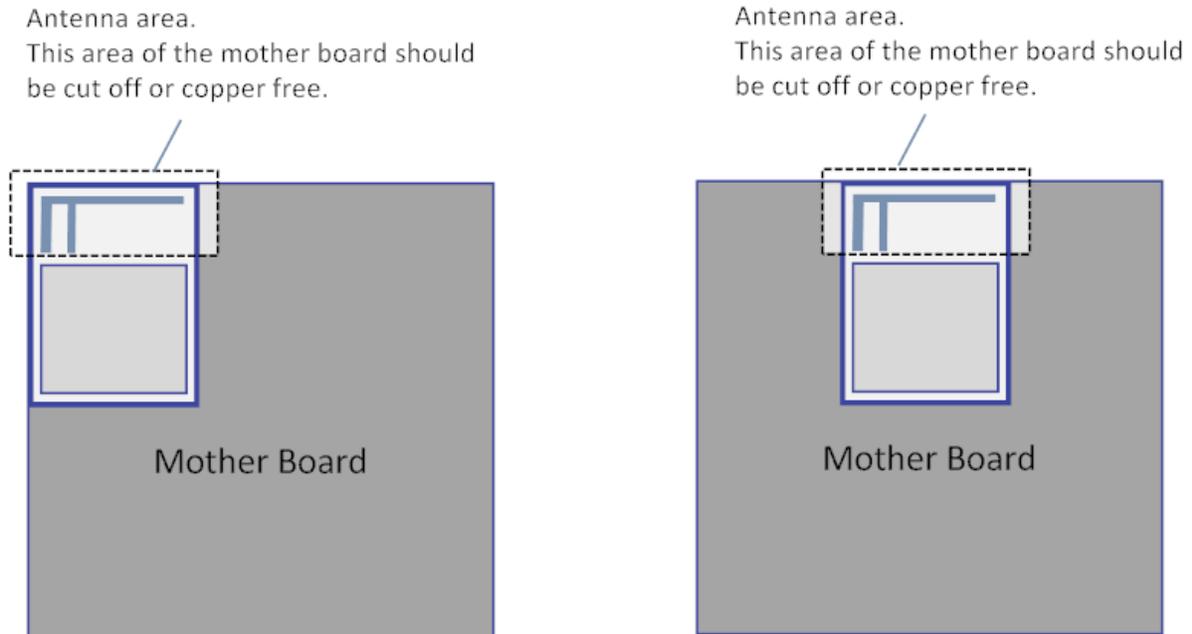
- Location in X-Y plane

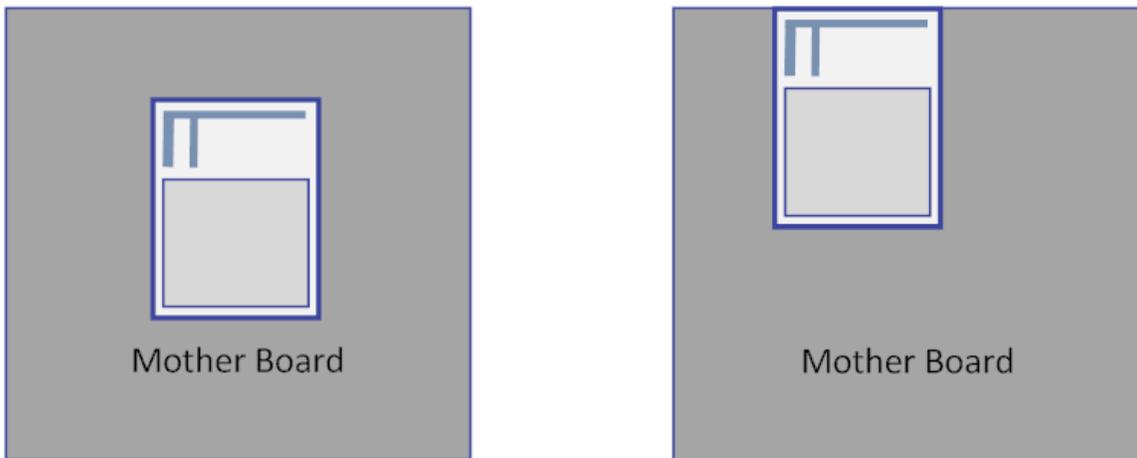Fig. 4: Recommended location in X-Y plane
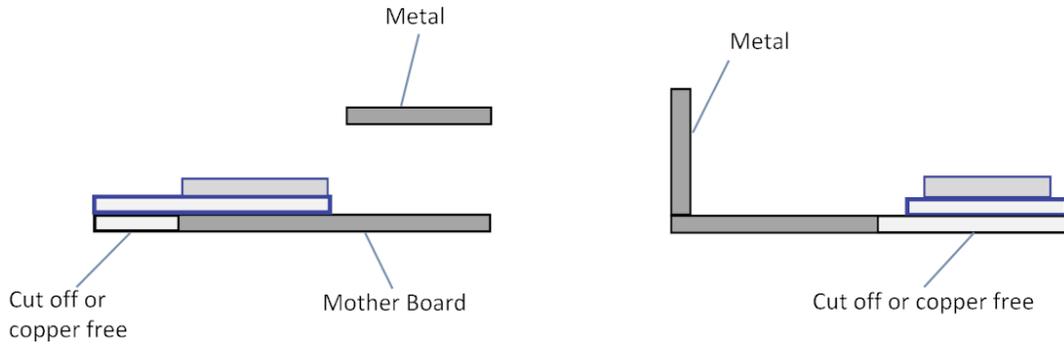

Fig. 5: Not recommended location in X-Y plane

BDE Technology Co., Ltd.

■ Location in Z plane

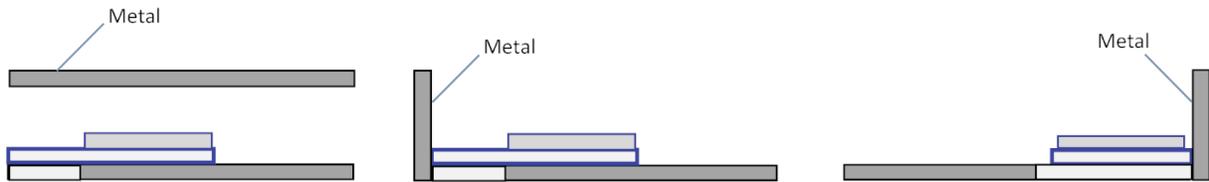Fig. 6: Recommended location in Z plane

Fig. 7: Not recommended location in Z plane
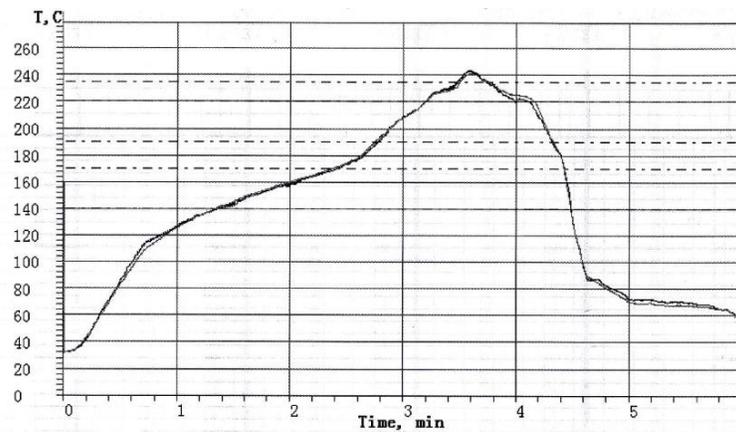
Typical Solder Reflow Profile

Fig. 8: Typical Solder Reflow Profile

Package Information

Fig. 9: Package

Contacts

BDE Technology Co. Ltd

Address: Innovation Building C1-1105, 182 Science Ave, Science City, 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 Co., Ltd.