BDE-BLEM401P Bluetooth Low Energy Module User Manual

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BDE-BLEM401P

Bluetooth Low Energy Module (BT4.2)

BDE-BLEM401P

BDE-BLEM401P-U

Key Features

- Bluetooth Dual Mode 4.2 compliant
- Low-power 2.4GHz Transceiver
- ARM968E Core Microprocessor integrated
- 160 KB programmable Flash for Program and 20 KB RAM for Data
- Program code read protection
- Operation voltage from 0.9 V to 3.6 V
- Clock
  - 16 MHz crystal reference clock

- 64 MHz digital PLL clock
- 32 kHz ring oscillator
- External 32 kHz crystal oscillator
- MCU can run with any clock source with internal frequency divider

- Interface and peripheral units
  - JTAG, SPI interface
  - UART
  - Multi-channels PWM output
  - On-chip 10 bit general ADC
  - 13 GPIO with multiplexed interface functions
  - True random number generator
- RF Performance
  - TX Power: up to 4dBm
  - RX Sensitivity: up to -96dBm
- Communication Range: 30 meters (LOS)
- Antenna:
  - Integrated PCB antenna - 401P
  - IPEX/U.FL connector for external antenna - 401P-U
- Size: 16.55mm x 10.8mm x 1.5mm (Without Shielding)
  16.55mm x 10.88 mm x 2.3mm (With Shielding)
- Power Consumption:
  - Shutdown: 1uA (Wake up on External Events)
  - Standby: 8.5uA (RTC Running and RAM/CPU Retention)
  - RX Current: 5.1mA
  - TX Current @ -1dBm: 4.8mA
- BQB (DID: D049515), FCC ID: 2ABRUBDLEM401P, CE, RoHS compliant

Descriptions

BDE-BLEM401P is a Bluetooth 4.2 dual mode compliant module targeted at low power sensors and PC/Phone accessories.

BDE-BLEM401P highly integrates a high-performance RF transceiver, baseband, ARM9E core, programmable protocol and profile to support BLE application. 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

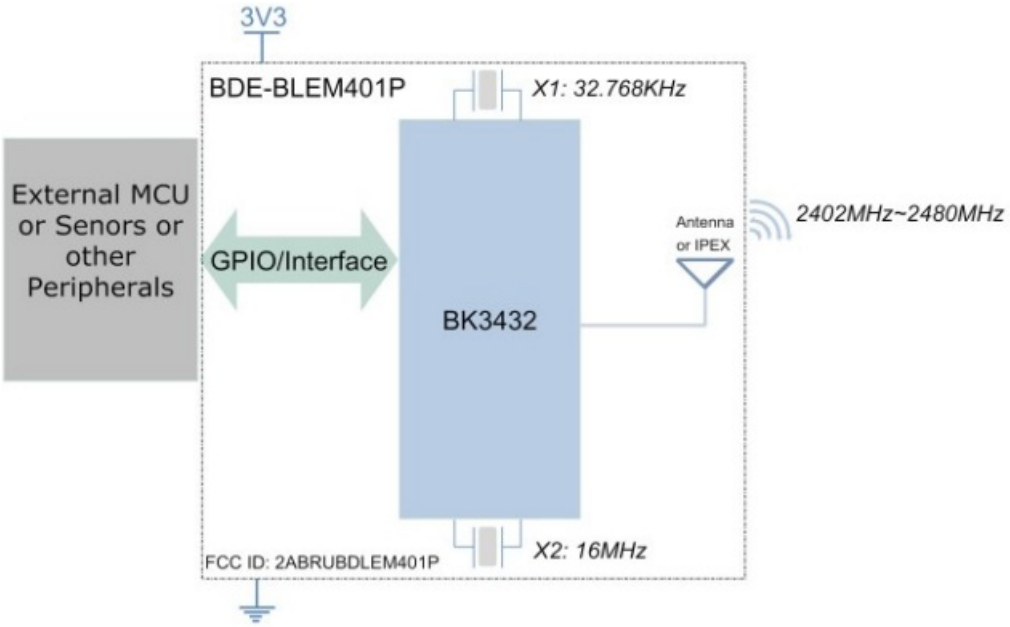

Fig. 1: The Block Diagram of BDE-BLEM401P

Applications

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

Electrical Characteristics

- Recommended operating conditions

Rating	Min	Typ	Max	Unit
Operating Temperature	-40	–	85	℃
VDDS	1.6	3.3	3.6	V

Pin Out

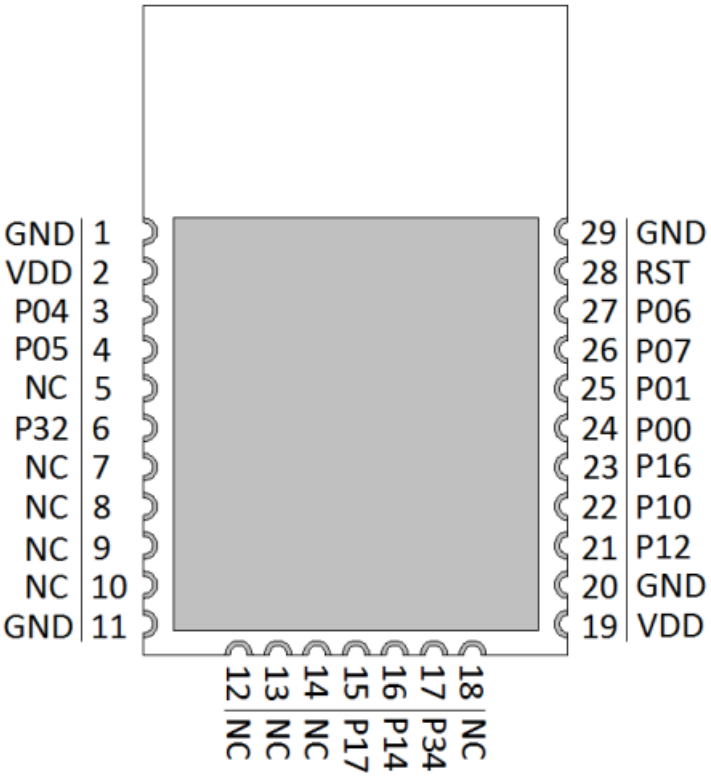

Fig. 2: The pinout of BDE-BLEM401P (TOP VIEW)

Table 1: Pin definitions of BDE- BLEM203P

Pin Number	Pin Name	Definitions
1	GND	Power Ground
2	VDD	Power Supply
3	P04	GPIO, SPI_SCK, SPI_MOSI (Program mode), JTAG_TDI (JTAG mode)
4	P05	GPIO, SPI_MOSI, SPI_MISO (Program mode), JTAG_TDO (JTAG mode)
5	NC	NC
6	P32	GPIO, ADC CH2
7	NC	NC
8	NC	NC
9	NC	NC
10	NC	NC
11	GND	Power Ground
12	NC	NC
13	NC	NC
14	NC	NC
15	P17	GPIO, UART2_RX
16	P14	GPIO, PWM
17	P34	GPIO, ADC CH4
18	NC	NC
19	VDD	Power Supply
20	GND	Power Ground
21	P12	GPIO, PWM
22	P10	GPIO, PWM (20mA)
23	P16	GPIO, UART2_TX
24	P00	GPIO, UART_TX
25	P01	GPIO, UART_RX
26	P07	GPIO, SPI_NSS, SPI_CS (Program mode), JTAG_TMS (JTAG mode)
27	P06	GPIO, SPI_MISO, SPI_SCK (Program mode), JTAG_TCK (JTAG mode)
28	RST	Reset, active low
29	GND	Power Ground

Overall Dimensions

Fig. 1 shows the overall dimensions of BDE-BLEM401P. The module measures 16.55mm long by 10.88mm wide by 2.3mm high with the shield.

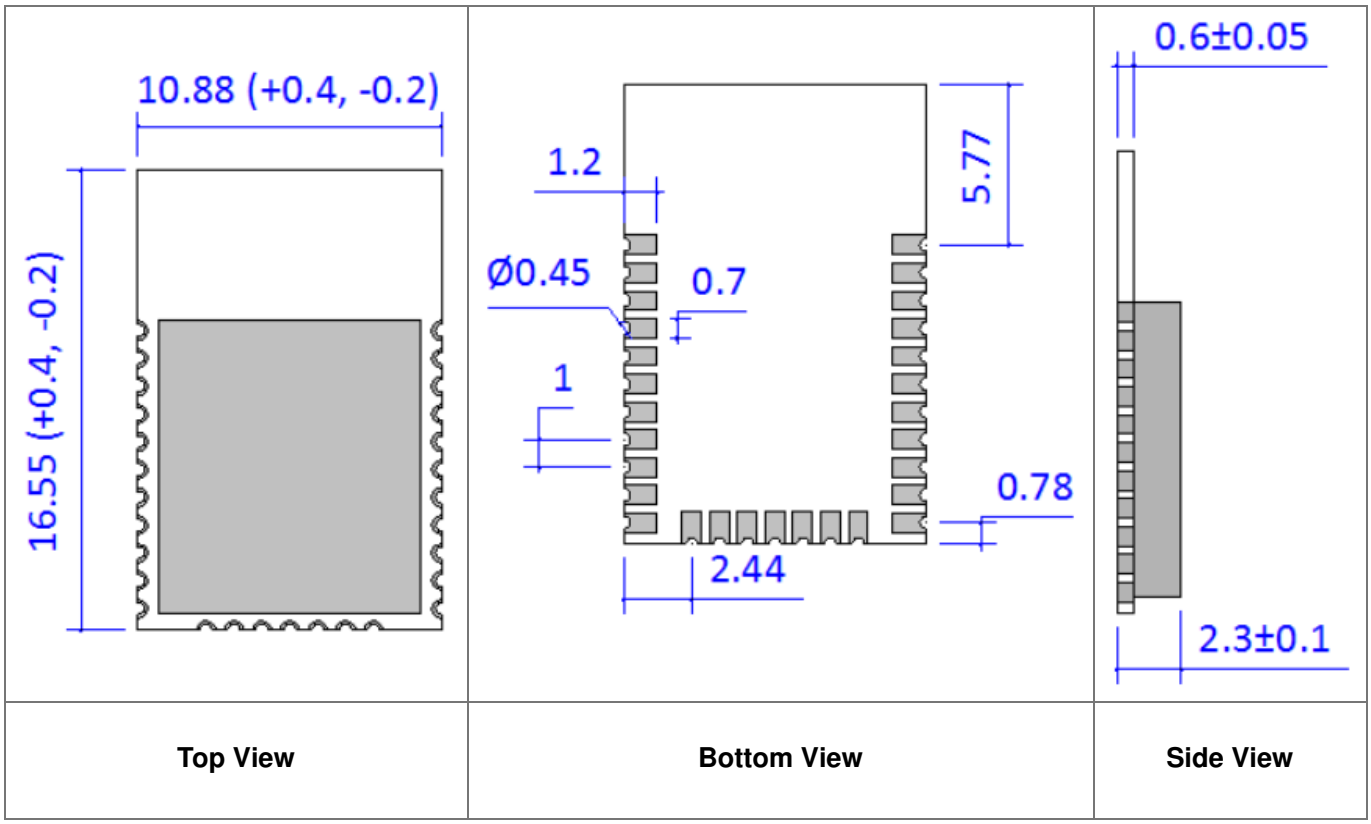

Fig. 3: Overall Dimensions of BDE-BLEM401P

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.

- **Location in X-Y plane**

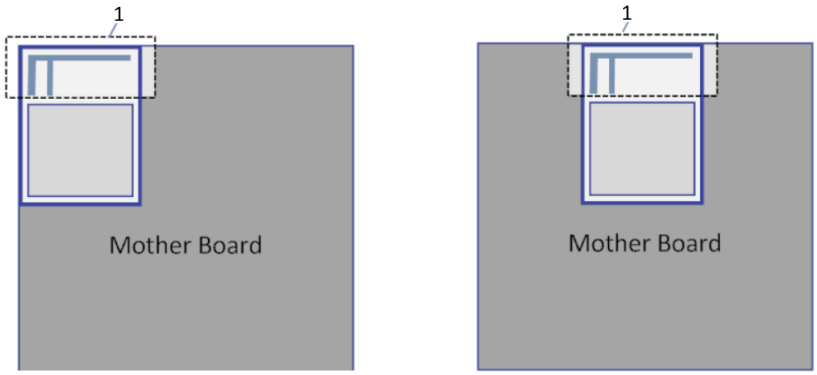

Fig. 4: Recommended location in X-Y plane

1. Antenna area.

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

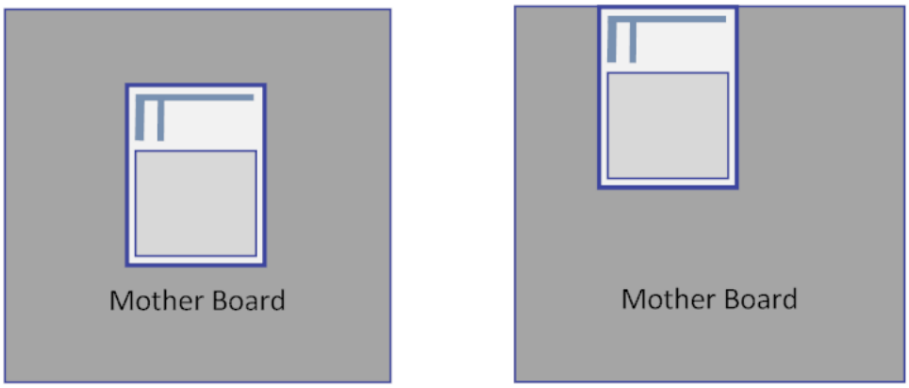

Fig. 5: Not recommended location in X-Y plane

- **Location in Z plane**

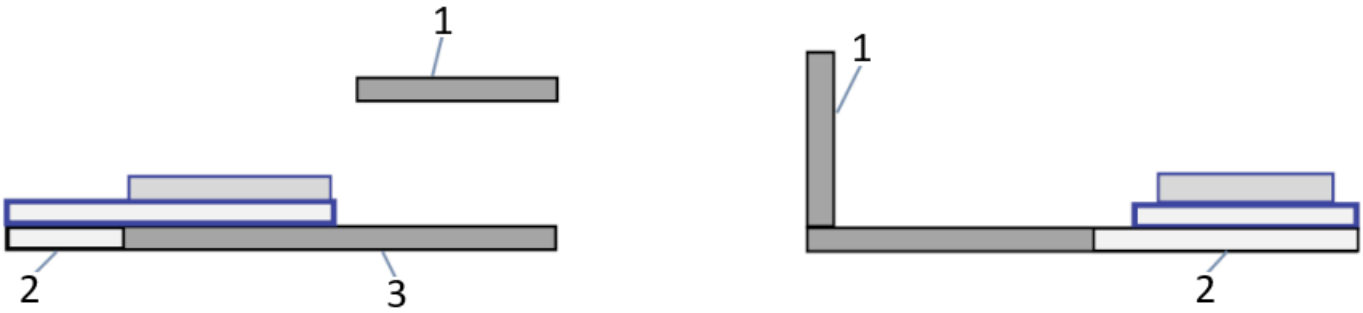

Fig. 6: Recommended location in Z plane

1. Metal
2. Cut off or copper free
3. Mother Board

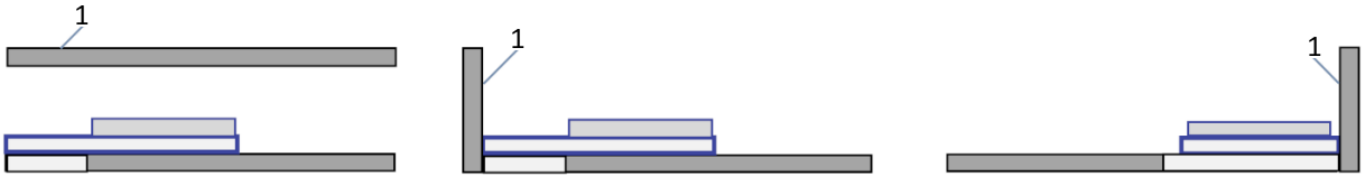

Fig. 7: Not recommended location in Z plane

1. Metal

Typical Solder Reflow Profile

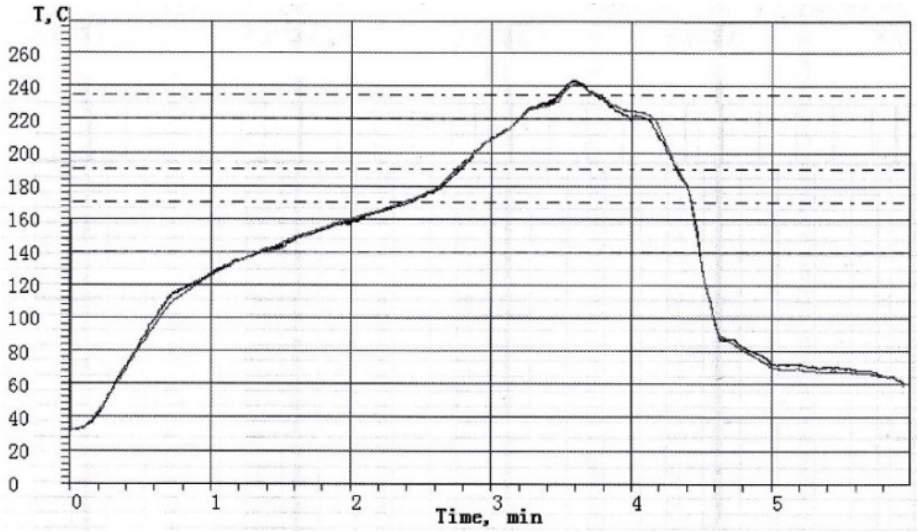

Fig. 8: Typical Solder Reflow Profile

Package Information


Fig. 9: Package

FCC statements

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: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

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.

The SAR limit of USA (FCC) is 1.6 W/kg averaged over one gram of tissue. Device types Panasonic ELUGA Ray 600 (FCC ID: 2APTIS60ER6) has also been tested against this SAR limit.The highest SAR value reported under this standard during product certification for use when properly worn on the body is 0.681 W/kg and for head is 0.898 W/kg. Simultaneous RF exposure is 1.233W/Kg. This device was tested for typical body-worn operations with the back of the handset kept 10mm from the body. To maintain compliance with FCC RF exposure requirements, use accessories that maintain a 10mm separation distance between the user's body and the back of the handset. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.

Contacts

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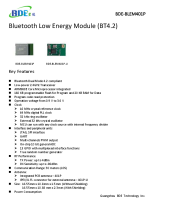
Guangzhou BDE Technology Inc.

Documents / Resources

	BDE BDE-BLEM401P Bluetooth Low Energy Module [pdf] User Manual BDE-BLEM401P, BDE-BLEM401P-U, BDE-BLEM401P Bluetooth Low Energy Module, Bluetooth Low Energy Module, Low Energy Module, Module

References

- BDE Technology Inc.
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