

General Description

BDE-BLEM215 is a Bluetooth 5.0 single-mode compliant Bluetooth low energy module targeted at low power sensors and PC/Phone accessories.



BDE-BLEM215 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 supports 2 Mbps and PHY-coded which are the new added features from BT5.0.

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

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 JTAG 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 k Samples/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
- Size: 22 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

Applications

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

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1. References

- [1] CC2642R resources: <https://www.ti.com/product/CC2642R>

2. Block Diagram

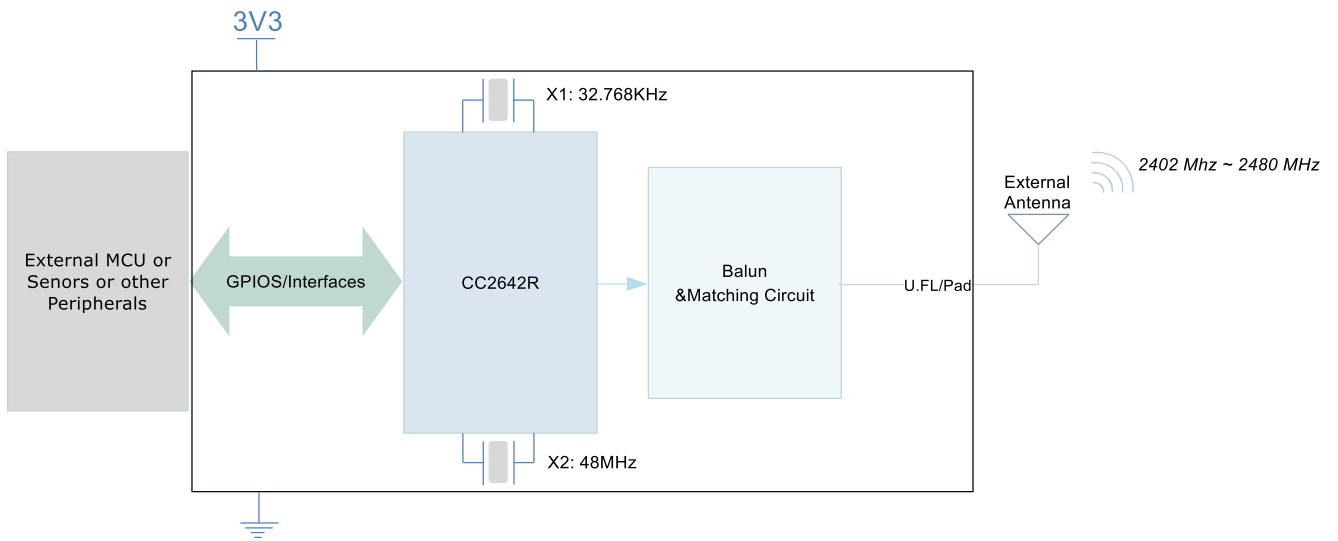


Figure 2-1. BDE-BLEM215 Module Block Diagram

3. Terminal Configuration and Functions

3.1 Pin Diagram

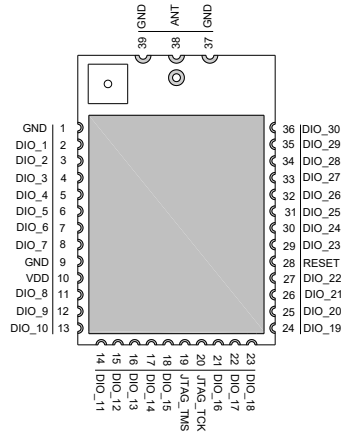


Figure 3-1. Pin Diagram (Top View)

3.2 Pin Attributes and Pin Multiplexing

Table 3-1. Pin Description

Pin #	Pin Name	Description
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 TMS, high-drive capability
20	JTAG_TCK	JTAG TCK
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

Pin #	Pin Name	Description
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
37	GND	Power ground
38	ANT	Antenna port, 50 ohm
39	GND	Power ground

4. Specifications

4.1 Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT	Notes
VDDS	-0.3	4.1	V	
Other Digital Terminals	-0.3	$V_{DDS}+0.3 \leq 4.1$	V	
Voltage on ADC input	-0.3	VDDS	V	Voltage scaling enabled
	-0.3	1.49	V	Voltage scaling disabled, internal reference
	-0.3	$V_{DDS}/2.9$	V	Voltage scaling disabled, VDDS as reference
Storage Temperature	-40	125	°C	

4.2 Recommended Operating Conditions

PARAMETER	MIN	TYP	MAX	UNIT
VDDS	1.8	3.3	3.8	V
Operating Temperature	-40	-	85	°C

5. Mechanical Specifications

5.0 Dimensions

Fig 5-1 shows the overall dimensions of BDE-BLEM215. The module measures 22 mm long by 15 mm wide by 2.1 mm high with the shield.

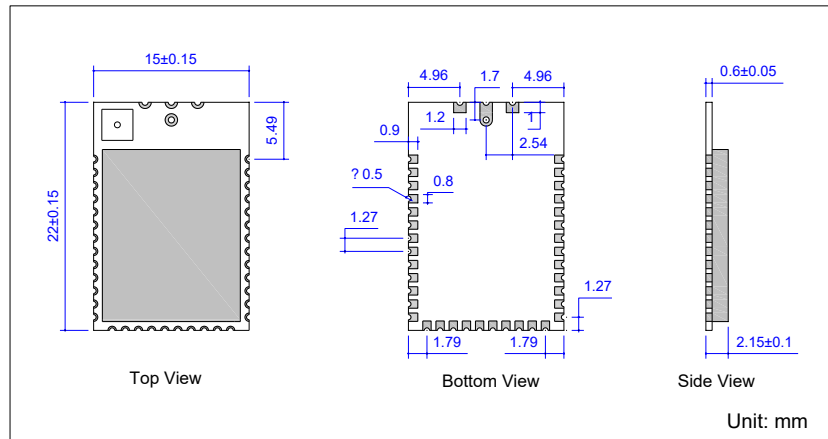


Figure 5-1. Mechanical Drawing

6. Ordering Information

Part Number	Size (mm)	Core Chip	Package	MOQ
BDE-BLEM215	22 × 15 × 2.15	CC2642R	Tape & Reel or Tray	1K

7. Revision History

Revision	Date	Description
V1.0	25-Mar-2020	Initial Release
V1.0.1	08-Jul-2021	Update dimension data
V1.0.2	16-Jul-2021	Update some typo

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