

# Low Power, Long Range Sub-1 GHz Module



FCC ID: 2ABRUBDRFM216

## Key Features

- Ultra low power Sub-1 GHz
- Supports 915 MHz
- Supports 2-GFSK modulation, both fixed channel mode and FHSS mode
- Supports WB-DSSS mode over 2-GFSK modulation
- Supports 30kbps, 60kbps, 120kbps, 240kbps data rate in WB-DSSS mode over 2-GFSK modulation
- Supports 5kbps, 50kbps, 200kbps data rate in FHSS mode over 2-GFSK modulation
- Powerful Cortex-M4F MCU for your IoT products
  - Clock Speed: up to 48MHz
  - Up to 352KB of In-System-Programmable Flash
  - 80KB of Ultra-Low-Leakage SRAM
  - 30 GPIOs
- RF performance
  - TX power: Up to +14 dBm
  - RX sensitivity: up to -121 dBm using Long-Range Mode, -110 dBm at 50 kbps (Sub-1 GHz)
- Communication range
  - At least 1000 meters (LOS) @ +14 dBm, 2.5 kbps
- Ultra-low power
  - Power supply: 1.8 V ~ 3.8 V
  - RX: 5.8 mA
  - TX @ +14 dBm: 24.9 mA
  - Standby: 0.85 uA (RTC running and RAM/CPU retention)
  - Shutdown: 150 nA (Wake up on external events)
- Antenna: UFL connector or Half-hole (Select by resistor on board)
- Small Size
  - 22 mm x 15 mm x 1.7 mm (Without Shielding)
  - 22 mm x 15 mm x 2.15 mm (With Shielding)
- FCC, CE, RoHS compliant

## Descriptions

BDE-RFM216 is an ultra-low power, long-range Sub-1 GHz module targeted at low power sensors and long range applications.

BDE-RFM216 integrates a high performance RF core and also a powerful ARM cortex-M4F processor, which makes it suitable for certain products that need high performance MCU to deal with difficult applications.

The module supports 915 MHz bands, with the maximum output power up to 14 dBm, along with its Long-Range Mode feature, the module is to be the best choice for IoT products which utilize battery supply and require long range communication.

## Applications

- Long-range sensor applications
- Smart grid and automatic meter reading
- Wireless healthcare applications
- Industry monitoring and control
- Home and building automation
- Energy-harvesting applications

## Block Diagram

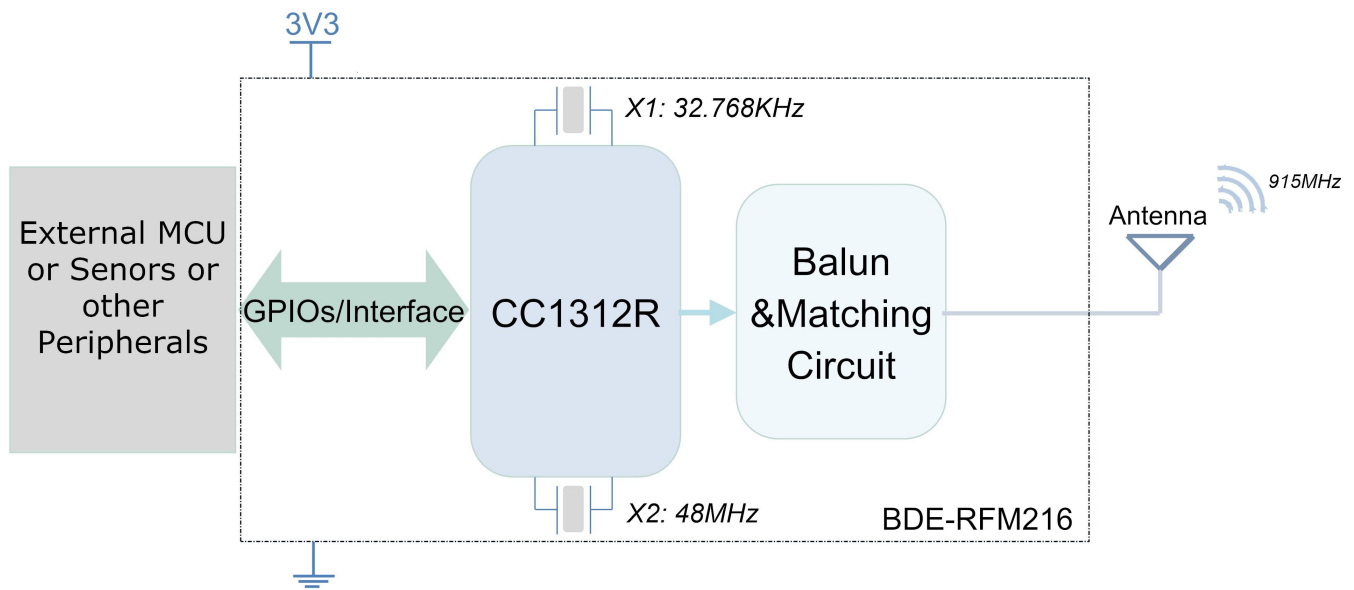


Fig. 1: The Block Diagram of BDE-RFM216

## Electrical Characteristics

### ■ Absolute maximum rating

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

### ■ Recommended operating conditions

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

## Pinout

Fig. 2 shows the pinout of BDE-RFM216.

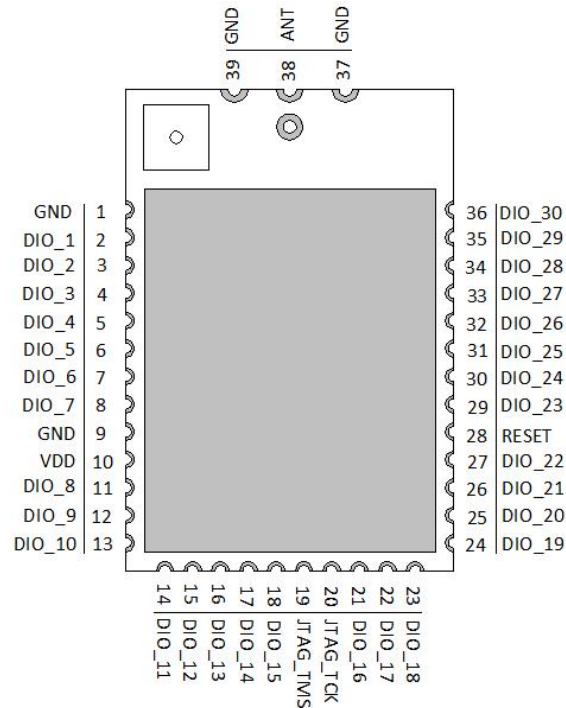


Fig. 2: The pinout of BDE-RFM216 (TOP VIEW)

Table 1: Pin definitions of BDE-RFM216

| Pin Number | Pin Name | Definitions                                                      |
|------------|----------|------------------------------------------------------------------|
| 1          | GND      | Power Ground                                                     |
| 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                                                             |
| 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 (When disconnected with UFL, this port can be used) |
| 39         | GND      | Power Ground                                                     |

## Overall Dimensions

Fig. 3 shows the overall dimensions of BDE-RFM216. The module measures 22 mm long by 15 mm wide by 2.15 mm high with the shield.

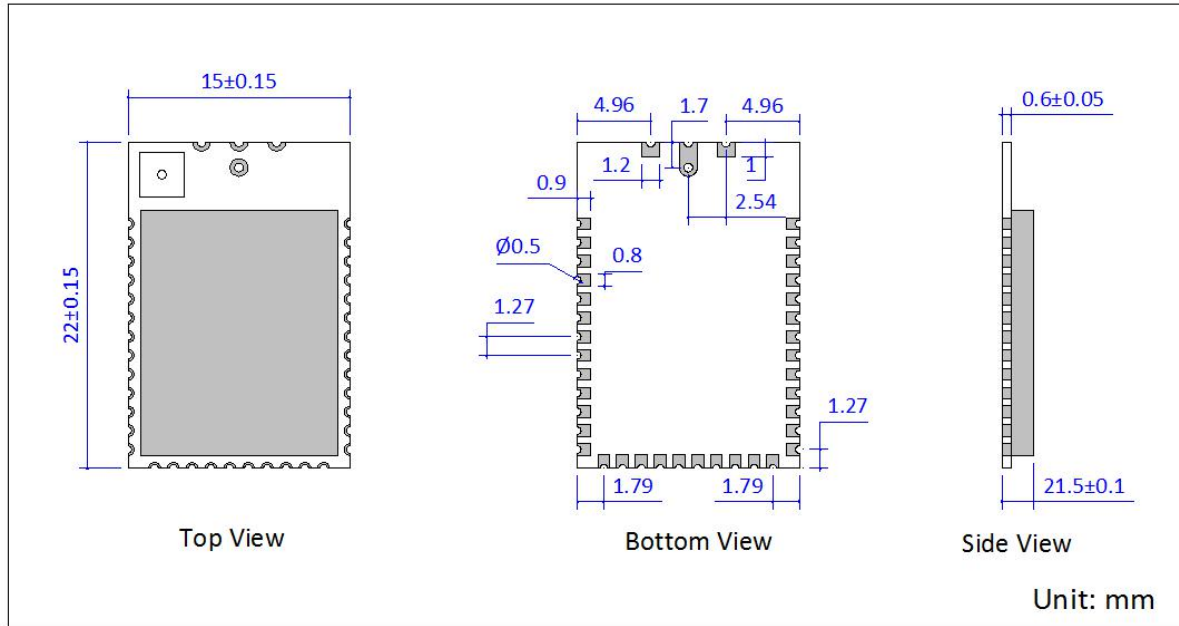


Fig. 3: Overall Dimensions of BDE-RFM216

RF exposure information: To maintain compliance with FCC RF exposure requirements, use the product that maintain a 20cm separation distance between the user's body and the host.

MPE limit for RF exposure at prediction frequency is 0.6mW/cm<sup>2</sup> for 915MHz .The MPE for 915MHz is 0.015mW/cm<sup>2</sup> . It satisfy RF exposure compliance.

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.



## Contacts

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