

Multi-Band Wireless Module Industrial Grade



Key Features

- Multi-Band, supports 2.4GHz and Sub-1GHz band
- Multiprotocol, supports Thread, Zigbee®, Bluetooth® 5 Low Energy, IEEE 802.15.4g, IPv6-enabled smart objects(6LoWPAN), Wireless M-Bus, Wi-SUN®, KNX RF, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz), and Dynamic Multiprotocol Manager (DMM) driver
- Powerful ARM Cortex-M4F processor
 - Clock speed: up to 48MHz
 - 352KB of In-System programmable flash
 - 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
 - 28 GPIOs
 - 4 x 32-Bit or 8 x 16-Bit general purpose timer
 - 12-Bit ADC, 200k 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: Output power up to +14 dBm (Sub-1G) and +5dBm (2.4G) with temperature compensation
 - RX sensitivity: -121 dBm for SimpleLink long-range mode, -110 dBm at 50 kbps, -105 dBm for Bluetooth 125 kbps (LE Coded PHY)

- Communication range: about 250 meters (LOS) – Long Range Mode (2.4G), upto 1000 meters (LOS) – Long Range Mode (Sub-1G)
- Antenna: UFL connector for Sub-1G, UFL or PCB antenna for 2.4G
- Size: 29.8 mm x 19 mm x 2.15 mm (With Shielding)
- Ultra low power consumption:
 - Shutdown: 150nA (Wake up on external events)
 - Standby: 0.85uA (RTC running and RAM/CPU retention)
11uA at +105°C operating temperature
 - RX current: 5.8mA (3.6 V, 868 MHz), 6.9 mA (3.0 V, 2.4 GHz)
 - TX current @ 0dBm: 8.0 mA (3.6 V, 868 MHz), 7.1 mA (3.0 V, 2.4 GHz)
 - TX @ 14 dBm: 24.9 mA (868 MHz)
- Industrial grade operating temperature range from -40°C to +105°C
- Long life nonvolatile memory at extreme working temperature
- Low soft error rate for long operation lifetime with always-on SRAM parity checking against corruption due to potential radiation events, suitable for no disruption industrial applications
- BQB, FCC, CE, RoHS compliant

Descriptions

BDE-RFM208-IN is a multi-band wireless module which supports Sub-1GHz and 2.4GHz band. It also supports multiprotocol, such as Thread, Zigbee, Bluetooth 5 Low Energy, IEEE 802.15.4g, IPv6-enabled smart objects (6LoWPAN), Wireless M-Bus, Wi-SUN, KNX RF, proprietary systems, including the SimpleLink™ TI 15.4-Stack (Sub-1 GHz and 2.4 GHz), and concurrent multiprotocol for both Sub-1 GHz and 2.4 GHz through a Dynamic Multiprotocol Manager (DMM) driver..

BDE-RFM208-IN highly integrates 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 extreme operating temperature and no disruption industrial applications that are sensitive to power consumption, size and cost.

Applications

- 433, 470 to 510, 868, 902 to 928, and 2400 to 2480 MHz ISM and SRD systems with down to 4 kHz of receive bandwidth
- Building automation
- Grid infrastructure
- Industrial transport – asset tracking
- Factory automation and control
- Medical
- Electronic point of sale (EPOS) – Electronic Shelf Label (ESL)

Block Diagram

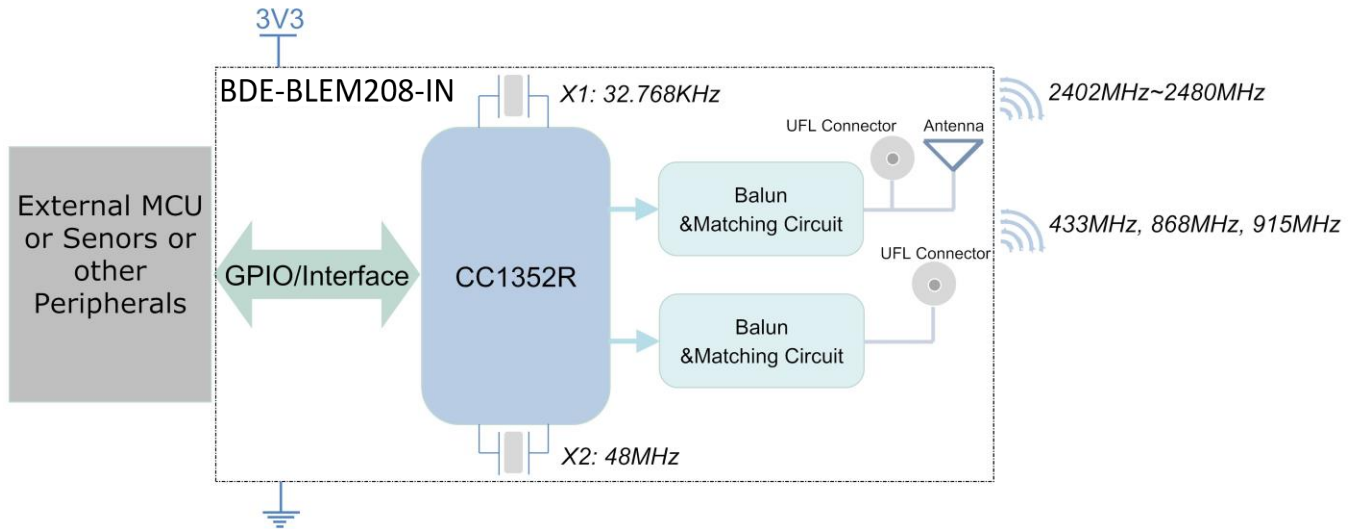


Fig. 1: The Block Diagram of BDE-RFM208-IN

Electrical Characteristics

■ Absolute maximum rating

Rating	Min	Typ	Max	Unit	Notes
Storage Temperature	-40	-	150	℃	
VDD	-0.3	-	4.1	V	
Other Digital Terminals	-0.3	-	VDD _S +0.3≤4.1	V	
Voltage on ADC input	-0.3	-	VDD _S	V	Voltage scaling enabled
	-0.3	-	1.49	V	Voltage scaling disabled, internal reference
	-0.3	-	VDD _S /2.9	V	Voltage scaling disabled, VDD _S as reference
RF pin	-	-	5	dBm	Input level, 2.4 GHz RF pins
	-	-	10	dBm	Input level, Sub-1 GHz RF pins

■ Recommended operating conditions

Rating	Min	Typ	Max	Unit
Operating Temperature	-40	-	105	°C
VDD	2.1	3.3	3.8	V

Pinout

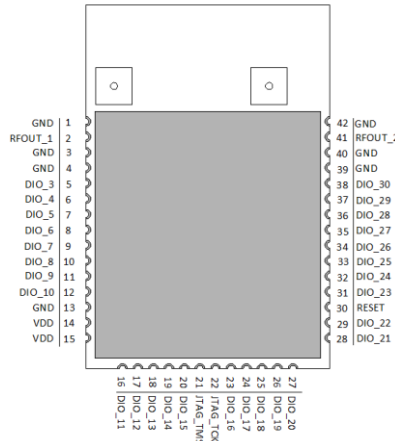


Fig. 2: The pinout of BDE-RFM208-IN (TOP VIEW)

Table 1: Pin definitions of BDE-RFM208-IN

Pin Number	Pin Name	Definitions
1	GND	Power Ground
2	RFOUT_1	Sub-1G RF Output Port
3	GND	Power Ground
4	GND	Power Ground
5	DIO_3	GPIO
6	DIO_4	GPIO
7	DIO_5	GPIO, High-drive Capability
8	DIO_6	GPIO, High-drive Capability
9	DIO_7	GPIO, High-drive Capability
10	DIO_8	GPIO
11	DIO_9	GPIO
12	DIO_10	GPIO
13	GND	Power Ground
14	VDD	Supply Power
15	VDD	Supply Power
16	DIO_11	GPIO
17	DIO_12	GPIO
18	DIO_13	GPIO
19	DIO_14	GPIO

20	DIO_15	GPIO
21	JTAG_TMSC	JTAG TMSC, High-drive Capability
22	JTAG_TCKC	JTAG TCKC
23	DIO_16	GPIO, JTAG_TDO, High-drive Capability
24	DIO_17	GPIO, JTAG_TDI, High-drive Capability
25	DIO_18	GPIO
26	DIO_19	GPIO
27	DIO_20	GPIO
28	DIO_21	GPIO
29	DIO_22	GPIO
30	RESET	Reset, Active Low
31	DIO_23	GPIO, Analog Capability
32	DIO_24	GPIO, Analog Capability
33	DIO_25	GPIO, Analog Capability
34	DIO_26	GPIO, Analog Capability
35	DIO_27	GPIO, Analog Capability
36	DIO_28	GPIO, Analog Capability
37	DIO_29	GPIO, Analog Capability
38	DIO_30	GPIO, Analog Capability
39	GND	Power Ground
40	GND	Power Ground
41	RFOUT_2	2.4G RF Output Port
42	GND	Power Ground

Overall Dimensions

Fig. 3 shows the overall dimensions of BDE-RFM208-IN. The module measures 29.8 mm long by 19 mm wide by 2.15 mm high with the shield.

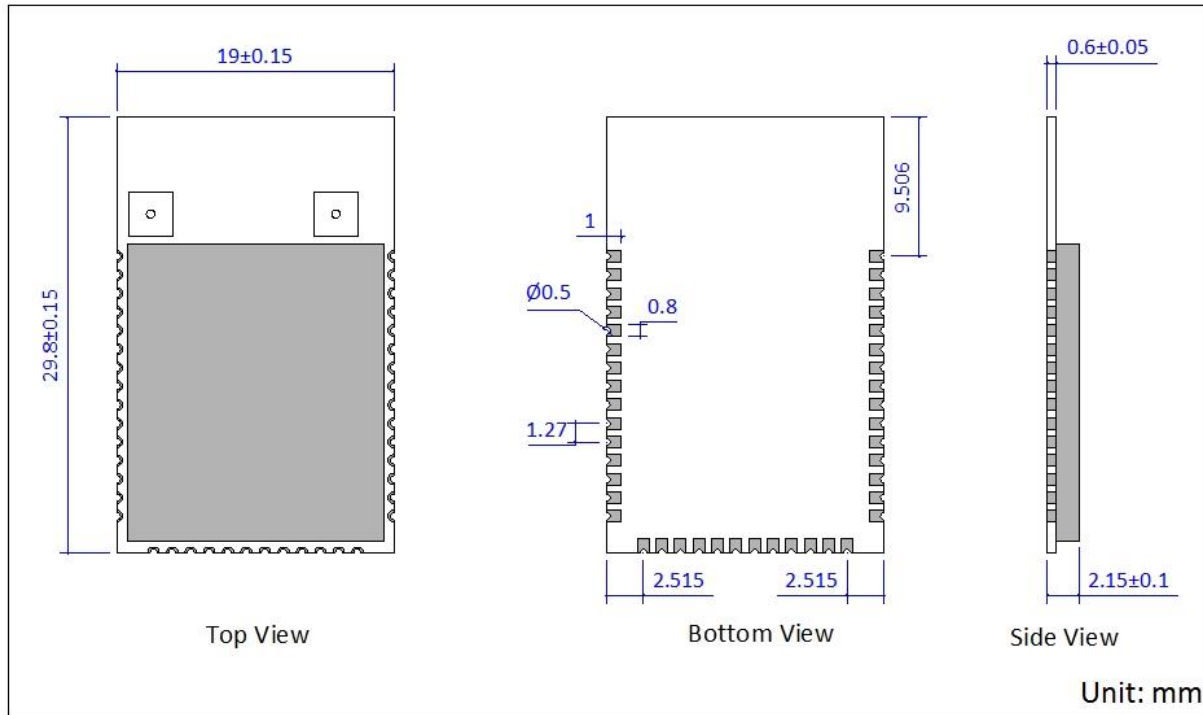


Fig. 3: Overall Dimensions of BDE-RFM208-IN

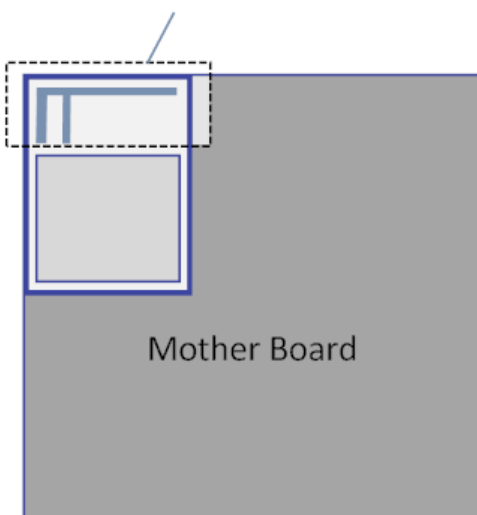
Module Location

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



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



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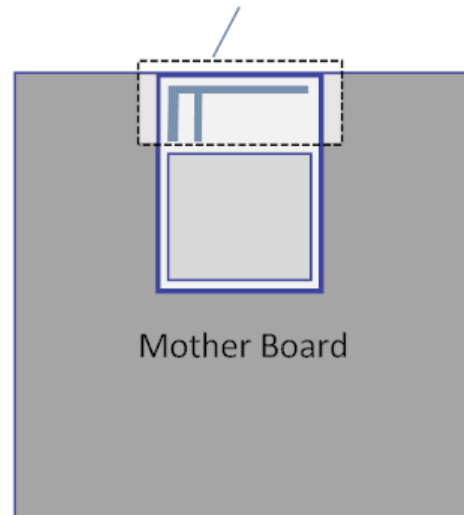


Fig. 4: Recommended location in X-Y plane

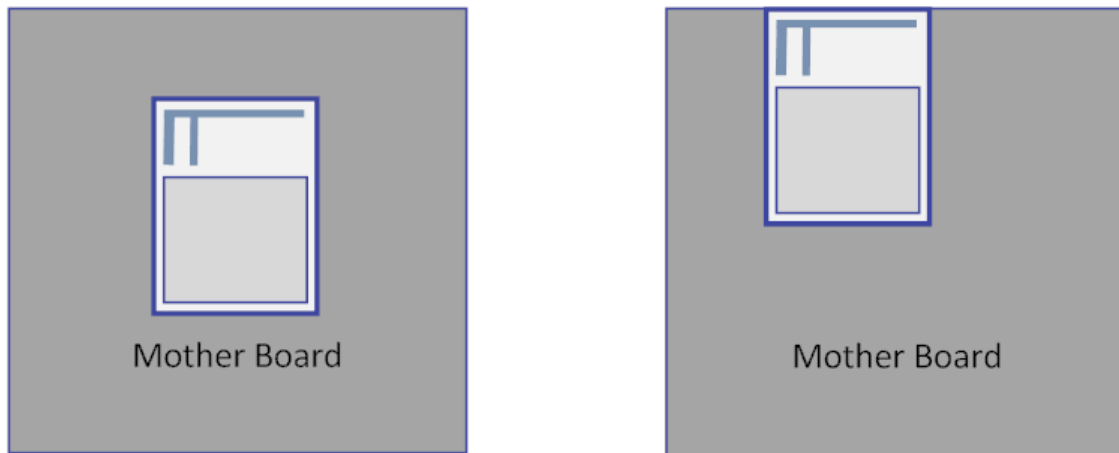


Fig. 5: Not recommended location in X-Y plane

■ Location in Z plane

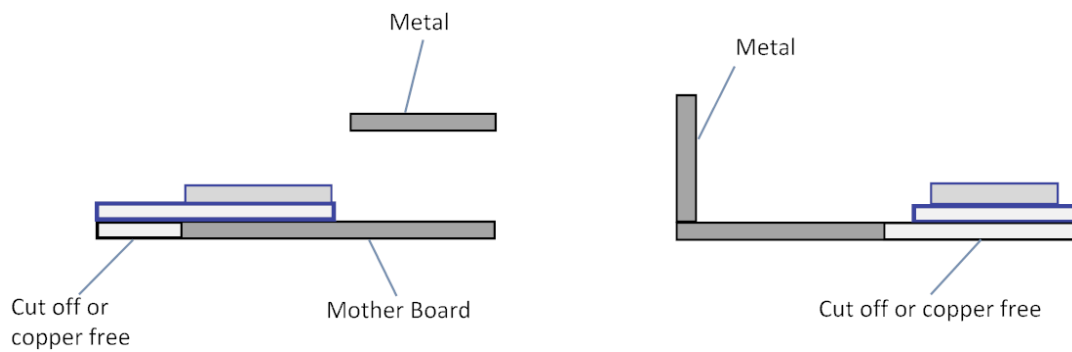


Fig. 6: Recommended location in Z plane

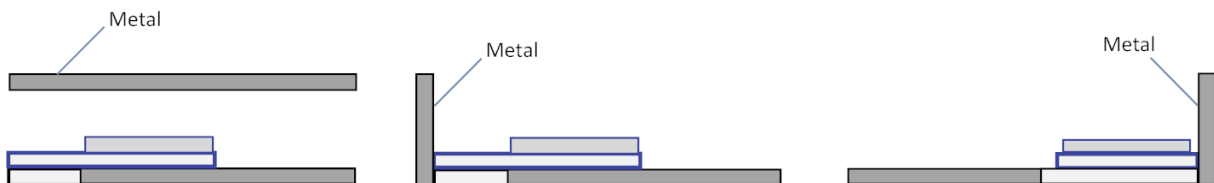


Fig. 7: Not recommended location in Z plane

Typical Solder Reflow Profile

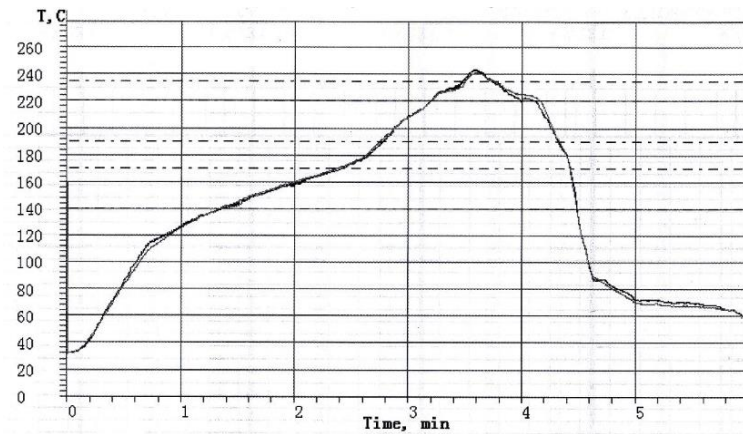


Fig. 8: Typical Solder Reflow Profile

Package Information



Fig. 9: Package

Contacts

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