

## General Description

BDE-RFM207P is a multiprotocol 2.4G wireless module targeted at low power sensors and PC/Phone accessories. It supports Thread, Zigbee, Bluetooth 5.2 Low Energy, IEEE 802.15.4g, IPv6-enabled smart objects (6LoWPAN), Wi-SUN, proprietary systems, SimpleLink TI 15.4-Stack (2.4 GHz), and Dynamic Multiprotocol Manager (DMM) driver.



BDE-RFM207P has an integrated power amplifier, which enable 20 dBm output power.

BDE-RFM207P 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 the applications that are sensitive to power consumption, size and cost.

## Key Features

- Microcontroller
  - Powerful 48-MHz Arm® Cortex®-M4F processor
  - 352KB of in-system Programmable Flash
  - 256KB of ROM for protocols and library functions
  - 8KB of Cache SRAM (Alternatively available as general-purpose RAM)
  - 80KB of ultra-low leakage SRAM. The SRAM is protected by parity to ensure high reliability of operation.
  - 2-Pin cJTAG and JTAG debugging RF performance
  - Supports Over-the-Air upgrade (OTA)
- Ultra-low power sensor controller with 4KB of SRAM
  - Sample, store, and process sensor data
  - Operation independent from system CPU
  - Fast wake-up for low-power operation BQB, FCC, CE, RoHS compliant
- TI-RTOS, drivers, Bootloader, Bluetooth® 5 Low Energy Controller, and IEEE 802.15.4 MAC in ROM for optimized application size
- Peripherals
  - Digital peripherals can be routed to any GPIO
  - 4× 32-bit or 8× 16-bit general-purpose timers
  - 12-Bit ADC, 200 kSamples/s, 8 channels
  - 2× comparators with internal reference DAC
  - (1× continuous time, 1× ultra-low power)
  - Programmable current source
  - 2× UART
  - 2× SSI (SPI, MICROWIRE, TI)
  - I2C
  - I2S
  - 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
- External system
  - On-chip Buck DC/DC converter
- Low power
  - Wide supply voltage range: 1.8 V to 3.8 V
  - Active-Mode RX: 6.9 mA
  - Active-Mode TX 0 dBm: 7.3 mA
  - Active-Mode TX 5 dBm: 9.6 mA
  - Active-Mode TX at +10 dBm: 22 mA
  - Active-Mode TX at +20 dBm: 85 mA
  - Active-Mode MCU 48 MHz (CoreMark):
    - 3.4 mA (71  $\mu$ A/MHz)
  - Sensor Controller, Low Power-Mode, 2 MHz, running infinite loop: 30.1  $\mu$ A
  - Sensor Controller, Active-Mode, 24 MHz, running infinite loop: 808  $\mu$ A
  - Standby: 0.94  $\mu$ A (RTC on, 80KB RAM and CPU retention)
  - Shutdown: 150 nA (wakeup on external events)
- Radio section
  - 2.4 GHz RF transceiver compatible with Bluetooth 5.2 Low Energy compliant and IEEE 802.15.4 PHY and MAC
  - Excellent receiver sensitivity:
    - 100 dBm for 802.15.4 (2.4 GHz),
    - -105 dBm for Bluetooth 125-kbps (LE Coded PHY)
  - Output power up to +20 dBm with temperature compensation
  - Suitable for systems targeting compliance with worldwide radio frequency regulations
- Wireless protocols
  - Thread, Zigbee®, Bluetooth® 5 Low Energy, IEEE 802.15.4g, IPv6-enabled smart objects (6LoWPAN), Wi-SUN®, proprietary systems, SimpleLink™ TI 15.4-Stack (2.4 GHz), and Dynamic Multiprotocol Manager (DMM) driver.
- Size: 29.86 mm x 19.98 mm x 2.15 mm (With Shielding)
- Certification
  - FCC ID: 2ABRU-RFM207P
  - IC: 25657-RFM207P
  - CE-RED

## Applications

- 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)

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## 1. References

- [1] CC2652P resources: <https://www.ti.com/product/CC2652>

## 2. Block Diagram

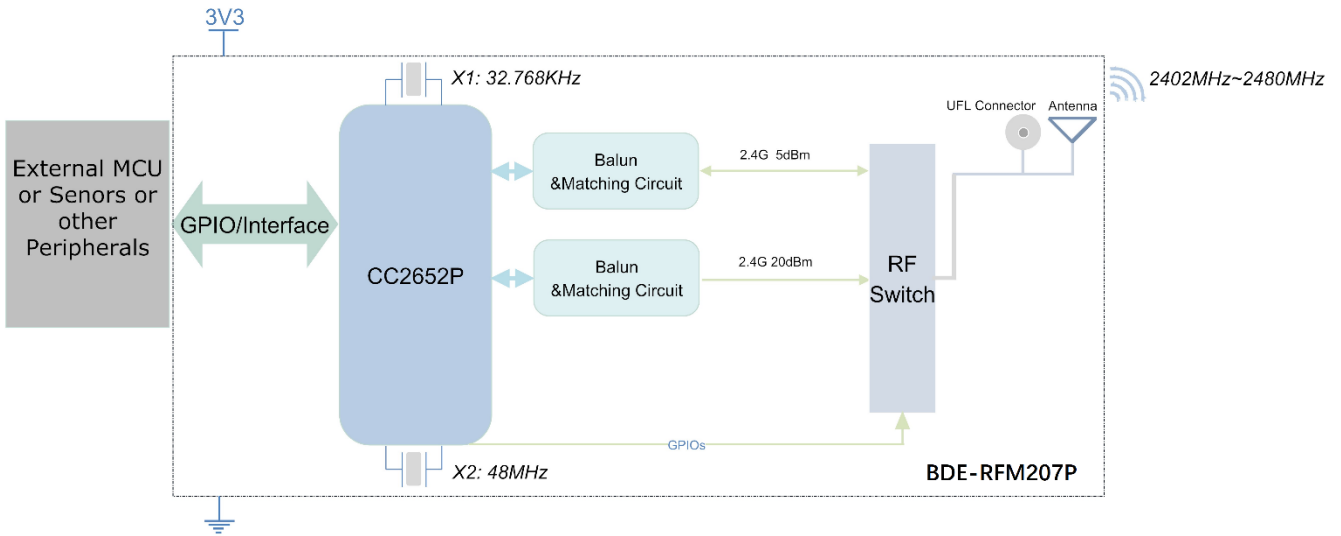


Figure 2-1. BDE-RFM207P Module Block Diagram

### 3. Terminal Configuration and Functions

#### 3.1 Pin Diagram

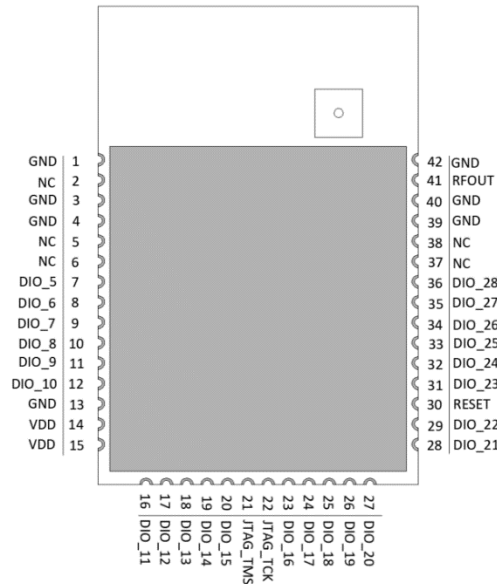


Figure 3-1. Pin Diagram (Top View)

#### 3.2 Pin Attributes and Pin Multiplexing

Table 3-1. Pin Description

Pin #	Pin Name	Description
1	GND	Power Ground
2	NC	NC
3	GND	Power Ground
4	GND	Power Ground
5	NC	NC
6	NC	NC
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 TMS, High-drive Capability
22	JTAG_TCKC	JTAG TCK
23	DIO_16	GPIO, JTAG_TDO, High-drive Capability

Pin #	Pin Name	Description
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	NC	NC
38	NC	NC
39	GND	Power Ground
40	GND	Power Ground
41	RFOUT	2.4G RF Output Port
42	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	$V_{DD5}+0.3 \leq 4.1$	V	
Voltage on ADC input	-0.3	VDDS	V	Voltage scaling enabled
	-0.3	1.49	V	Voltage scaling disabled, internal reference
	-0.3	$V_{DD5}/2.9$	V	Voltage scaling disabled, VDDS as reference
RF pin	-	2	dBm	
Storage Temperature	-40	125	°C	

### 4.2 Recommended Operating Conditions

PARAMETER	MIN	TYP	MAX	UNIT
VDDS	2.1	3.3	3.8	V
Operating Temperature	-40	-	85	°C

## 5. Reference Design

### 5.1 Design Recommendations

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

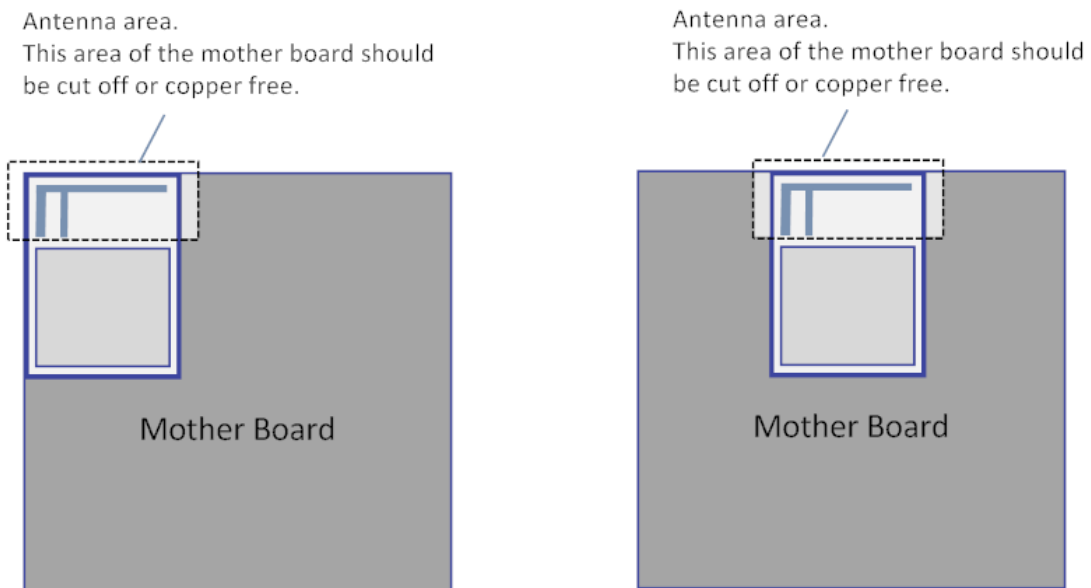


Figure 5-1. Recommended location in X-Y plane

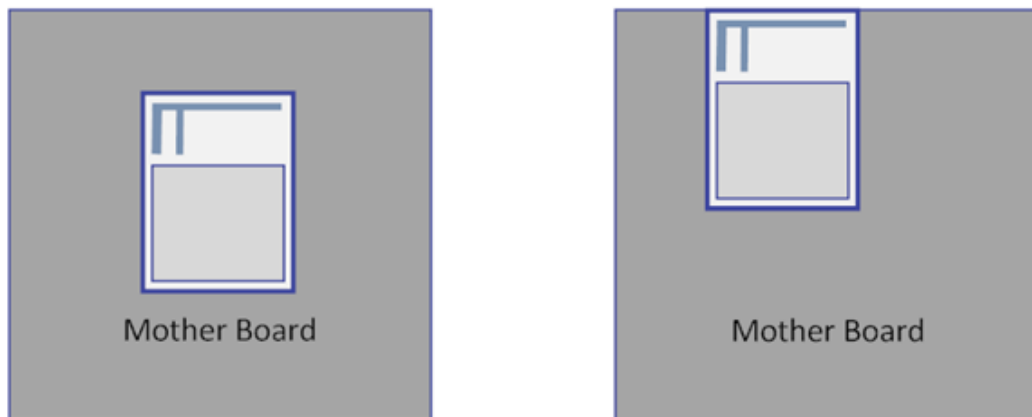


Figure 5-2. Not recommended location in X-Y plane

■ Location in Z plane

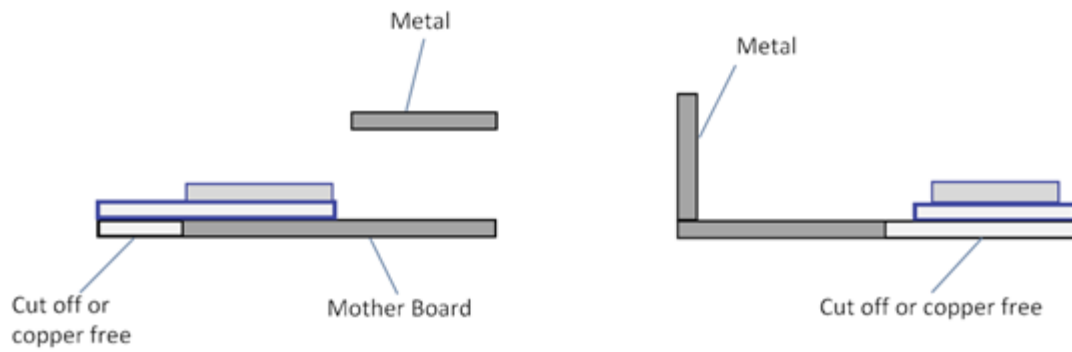


Figure 5-3. Recommended location in Z plane



Figure 5-4. Not recommended location in Z plane

## 6. Typical Solder Reflow Profile

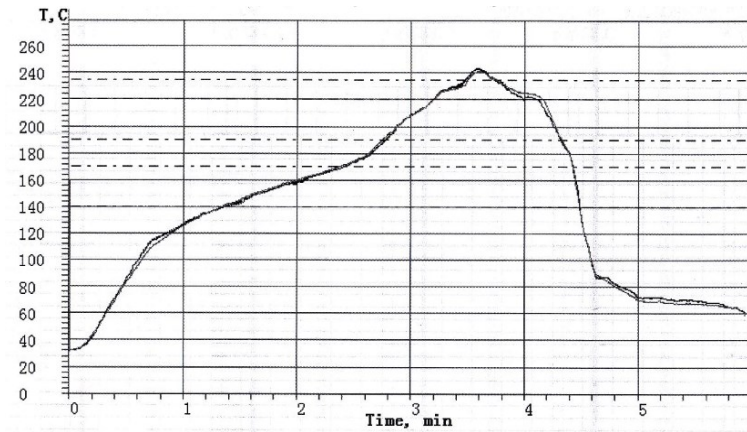


Figure 6-1. Typical Solder Reflow Profile

## 7. Mechanical Specifications

### 7.1 Dimensions

Fig 7-1 shows the overall dimensions of BDE-RFM207P. The module measures 22.95mm long by 15mm wide by 2.15mm high with the shield.

Note: All dimensions are in mm.

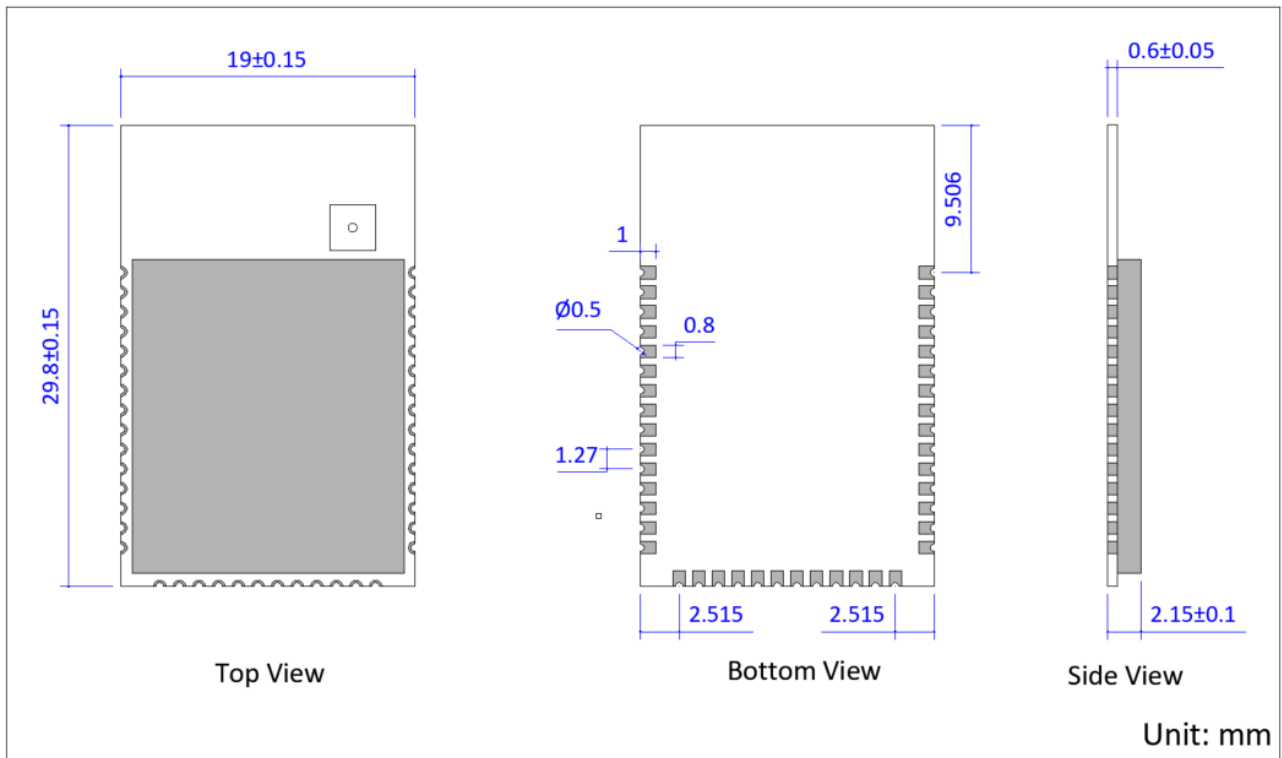


Figure 7-1. Mechanical Drawing

## 8. Packaging Information



**Figure 8-1. Package**

## 9. Ordering Information

Part Number	Size (mm)	Core Chip	Shipping Form	MOQ
BDE-RFM207P	29.8 x 19 x 2.15	CC2652P	Tray	1K

## 10. Revision History

Revision	Date	Description
V1.0	8-Jul-2019	Initial Release
V1.1	20-Jul-2019	Editorial Correction
V2.0	14-Apr-2021	Replacement of template

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