

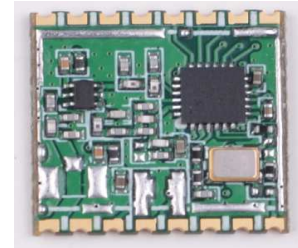
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## RFM90 - Low Power Long Range Transceiver Module

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### ➤ General Description

RFM90 sub-GHz radio transceivers are ideal for long range wireless applications. It is designed for long battery life with just 8mA of active receive current consumption. It can transmit up to +22dBm with highly efficient integrated power amplifiers. These devices support LoRa® modulation for LPWAN use cases and (G)FSK modulation for legacy use cases. The devices are highly configurable to meet different application requirements utilizing the global LoRaWAN™ standard or proprietary protocols. The devices are designed to comply with the physical layer requirements of the LoRaWAN™ specification released by the LoRa Alliance™. The radio is suitable for systems targeting compliance with radio regulations including but not limited to ETSI EN 300 220, FCC CFR 47 Part 15, China regulatory requirements and the Japanese ARIB T-108. Continuous frequency coverage from 150 MHz to 960 MHz allows the support of all major sub-GHz ISM bands around the world.



Picture1: RFM90 Appearance

### ➤ KEY PRODUCT FEATURES

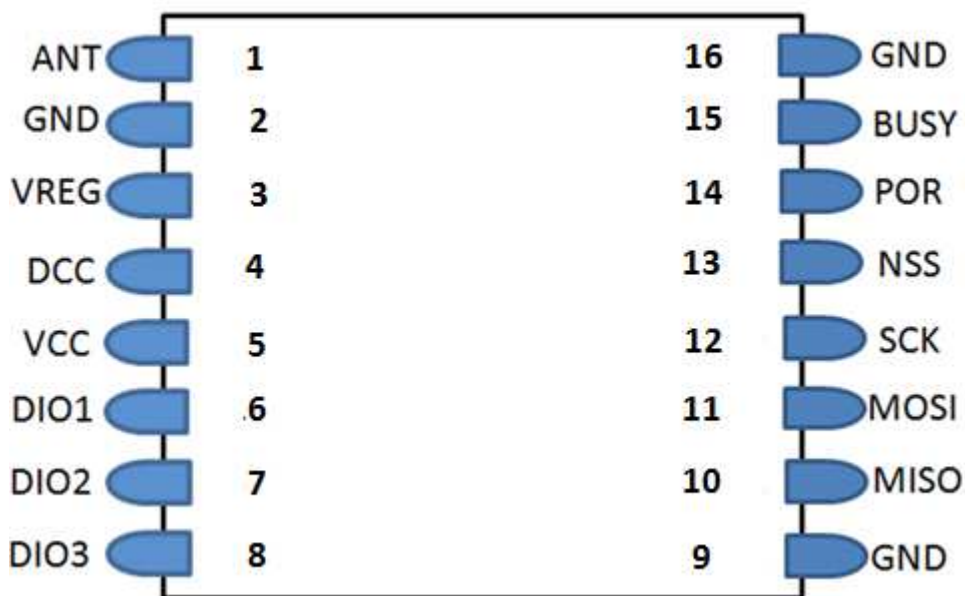
- ◆ LoRa™ Modem.
- ◆ +22dBm RF output .
- ◆ Programmable bit rate up to 300kbps(FSK)/62.5K(LORA).
- ◆ High sensitivity: down to -137dBm@LoRa BW 125KHz ; SF12. -118dBm @FSK, 4.8kbps.
- ◆ Excellent blocking immunity.
- ◆ Low RX current of 8mA, 600 nA register retention.
- ◆ Fully integrated synthesizer with step 0.95 Hz.
- ◆ (G)FSK, (G)MSK, LoRa™ modulation.
- ◆ Built-in bit synchronizer for clock recovery.
- ◆ Preamble detection.
- ◆ 127dB Dynamic Range instantaneous/ Packet RSSI.
- ◆ Automatic CAD .
- ◆ Module Size: 16\*16mm

## ➤ Applications

The level of integration and the low consumption within RFM90 enable a new generation of Internet of Things applications.

- Smart meters
- Supply chain and logistics
- Building automation
- Agricultural sensors
- Smart cities
- Retail store sensors
- Asset tracking
- Street lights
- Parking sensors
- Environmental sensors
- Healthcare
- Safety and security sensors
- Remote control applications

## ➤ Pin Diagram



Picture 2: RFM90 Pin Diagram

## ➤ Pin Description

NO.	Name	Description
1	ANT	RF signal output/input
2	GND	Ground
3	VREG	Regulated output voltage from the internal regulator
4	DCC	DC-DC output
5	VCC	Power supply
6	DIO1	Multipurpose digital output
7	DIO2	Multipurpose digital output/RF switch control
8	DIO3	Multipurpose digital output/External XO power supply
9	GND	Ground
10	MISO	SPI slave output
11	MOSI	SPI slave input
12	SCK	SPI clock
13	NSS	SPI slave Select
14	POR	Reset
15	BUSY	Busy indicator
16	GND	Ground

## ➤ Electrical Characteristics

### ● Absolute Maximum Ratings

Symbol	Descriptio	Min	Max	Unit
VDDmr	Supply Voltage	-0.5	3.9	V
Tmr	Temperature	-55	+125	°C
Tj	Junction temperature	-	+125	°C
Pmr	RF Input Level	-	+10	dBm

### ● Operating Range

Symbol	Descriptio	Min	Max	Unit
VDD	Supply voltage	1.8	3.7	V
Temperature	Operational temperature range	-20	+70	°C
CL	Load capacitance on digital ports	-	20	pF
ML	RF Input Power	-	0	dBm

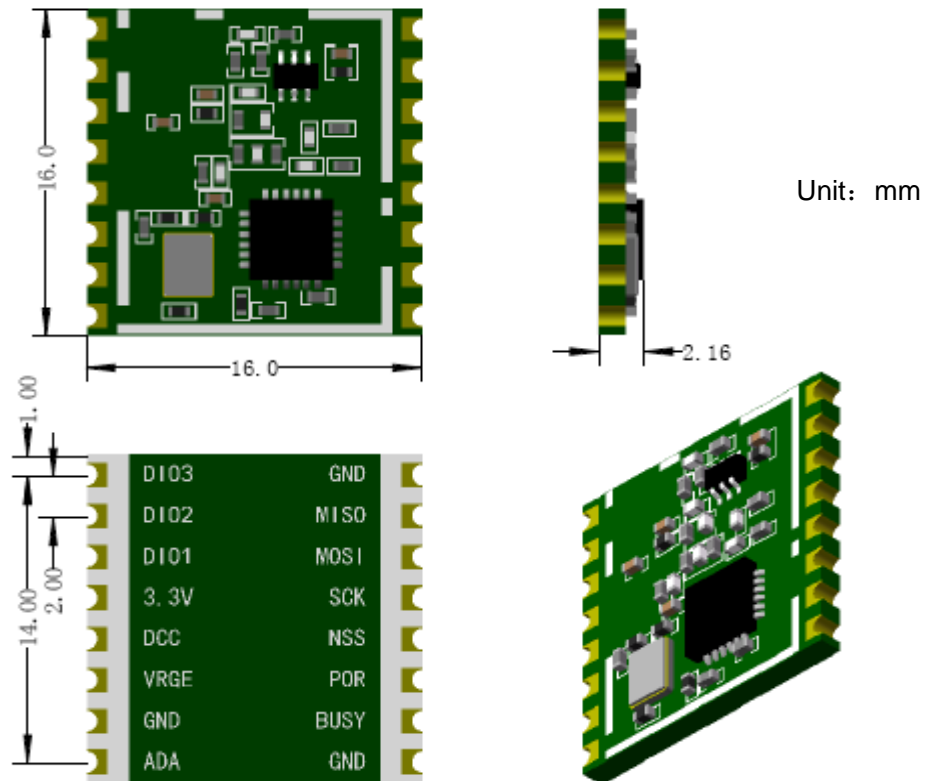
## ● Transmit Mode Specifications

Specification	Condition	Min	Typical	Max	Unit
Frequency Range	433 MHz band,	-	433.92	-	MHz
	868 MHz band,	-	868	-	
	915 MHz band,	-	915	-	
Tx Power	433MHz	-	22	-	dBm
	868MHz	-	22	-	
	915MHz	-	22	-	
Tx Drop	22dBm Vbat=2.7V	-	2	-	dB
	22dBm Vbat=2.4V	-	3	-	
	22dBm Vbat=1.8V	-	6	-	
IDDTX	433MHz	-	107	-	mA
	868MHz	-	118	-	
	915MHz	-	118	-	

## ● Receive Mode Specifications

Specification	Condition	Min	Typical	Max	Unit
Sensitivity	FSK: Rate=4.8kbps,FDA=5KHz				
	433MHz band	-	-118	-	dBm
	868MHz band	-	-118	-	
	915MHz band	-	-118	-	
	LoRa: SF=12,BW=125KHz				
	433MHz band	-	-137	-	dBm
868MHz band	-	-137	-		
915MHz band	-	-137	-		
IDDRX	FSK: Rate=4.8kbps	-	8	-	mA
	LoRa: SF=12, BW=125KHz	-	8.8	-	

**Configuration of Module**



**Picture 3: RFM90 Module Configuration**

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