Semtech's SX1231 Chip Based FSK Transceiver Module

SPECIFICATION

Model No.: DL-RFM69HC

Version: V1.0

DL-RFM69HC
433/868/915MHz

Before using this module, please pay attention to the following important matters:

This RF module is an electrostatic sensitive product, which should be used in a dry environment. Please operate it on an anti-static workbench during installation and testing, and make sure no liquid substance come into this module.

This DL-RFM69HC wireless module uses an external antenna by default, which is intended to be embedded in your product or application, and does not provide a casing itself. The antenna can be a spring antenna or a FPC antenna. You can choose a specific antenna according to the actual situation.

Metal objects and wires should be kept away from the antenna as much as possible. If the product uses a metal shell, be sure to install the antenna outside the metal shell. Otherwise, the RF signal will be seriously attenuated, which will affect the effective distance.

Please use an independent voltage regulator circuit to supply power to this module, and avoid sharing with other circuits. The tolerance of the power supply should not be less than 5%.

Disclaimer:

This specification is just for your information, all the charts and pictures used in this specification are for reference only. The actual test shall prevail for details. We do not assume any responsibility for personal injury or property loss caused by user's improper operation.

This specification is subject to change due to the continuous improvement and upgrading of the product version, and the latest version specification shall prevail. DREAMLNK reserves the right of final interpretation and modification of all contents in this specification.

Date	Version	Formulation / Revision of Contents	Approved by
2017-8-10	V1.0	DL-RFM69HC Standard Version RF Module	Fagan Xu

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1. Module Introduction

1.1 Brief Introduction

This DL-RFM69HC is a wireless transceiver module designed base on **Semtech**'s radio frequency chip SX1231, which is capable of operation over a wide frequency range, including the 315,433,868 and 915MHz license-free ISM (Industry Scientific and Medical) frequency bands. All major RF communication parameters are programmable and most of them can be dynamically set. The DL-RFM69HC offers the unique advantage of programmable narrowband and wide- band communication modes. The DL-RFM69HC is optimized for low power consumption while offering high RF output power and channelized operation. Compliance ETSI and FCC regulations.

1.2 Features

● High Sensitivity: down to -123dBm at 1.2 kbps

● High Selectivity: 16-tap FIR Channel Filter

● Bullet-proof front end: IIP3 = -18 dBm, IIP2 = +35 dBm, 80 dB Blocking Immunity, no Image Frequency response

● Low current: Rx = 16 mA, 100nA register retention

● Programmable Pout: -18 to +17 dBm in 1dB steps

● Constant RF performance over voltage range of module

● FSK Bit rates up to 300 kb/s

● Fully integrated synthesizer with a resolution of 61Hz

● FSK, GFSK, MSK, GMSK and OOK modulations

● Built-in Bit Synchronizer performing Clock Recovery.

● Incoming Sync Word Recognition, Optional Address Code and Data

● Support wireless data packets

● Support RSSI Listen mode

● 115 dB+ Dynamic Range RSSI

● Automatic RF Sense with ultra-fast AFC

● Packet engine with CRC-16, AES-128, 66-byte FIFO

● Built-in temperature sensor

● Module Size:16X16mm

1.3 Typical Application

● Wireless automatic meter reading (water meter, electric meter, gas meter)

● Ultra-long distance data communication

● Home and Building Automation

● Intelligent security monitoring

● Wireless Sensor Networks

● Industrial Monitoring and Control

● Agricultural automation solutions

● Remote control and telemetry of field data

● All kinds of transmitter, flow meter intelligent instrument

● Wireless Alarm and Security Systems

● Wireless M-BUS

2. Technical Parameter

| Parameter	Min.	Typical	Max.	Unit	Remarks
Operating conditions					
Working voltage range	1.8	3.3	3.6	V	
Working temperature range	-40	25	85	℃	
Current consumption					
Receiving current		16		mA	
Transmission current		95		mA	+17dbm
Standby current		<1		uA	
RF parameters					
Frequency Range	290		340	MHz	315M
	424		510	MHz	433M
	862		890	MHz	868M
	890		1020	MHz	915M
Modulation Frequency	1.2		300	Kbps	FSK modulation
Band width	2.6		500	kHz	
Transmit power range	-18		+16.5	dBm	PA_BOOST
Receiving sensitivity		-123		dBm	FSK modulation Bit Error Rate = 0.1% Frequency deviation = 5 kHz, Rate = 1.2 kb/s Receive bandwidth = 10 kHz
		-105		dBm	FSK modulation Bit Error Rate = 0.1% Frequency deviation = 5 kHz, Rate = 38.4 kb/s Receive bandwidth = 40 kHz

Table 1: Technical Parameter

3. Pin Definitions
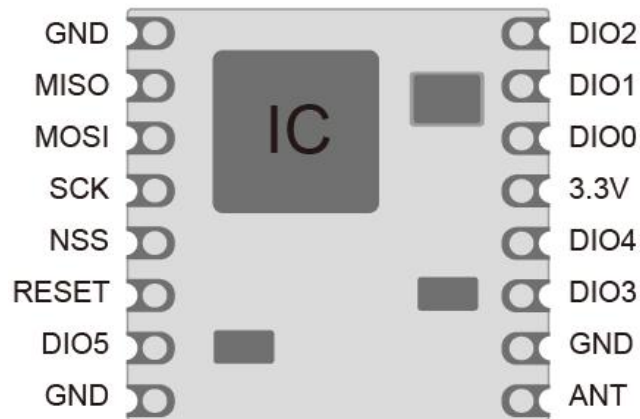
Number	Name	Type	Description
1	GND	-	Ground
2	MISO	O	SPI Data output
3	MOSI	I	SPI Data input
4	SCK	I	SPI Clock input
5	NSS	I	SPI Chip select input
6	RESET	I	Reset trigger input
7	DIO5	I/O	Digital I/O, software configured
8	GND	-	Ground
9	ANT	-	RF signal output/input.
10	GND	-	Ground
11	DIO3	I/O	Digital I/O, software configured
12	DIO4	I/O	Digital I/O, software configured
13	3.3V	-	Supply voltage
14	DIO0	I/O	Digital I/O, software configured
15	DIO1	I/O	Digital I/O, software configured
16	DIO2	I/O	Digital I/O, software configured

Table 2: DL-RFM69HC Pinouts

4. Module Size & SMT
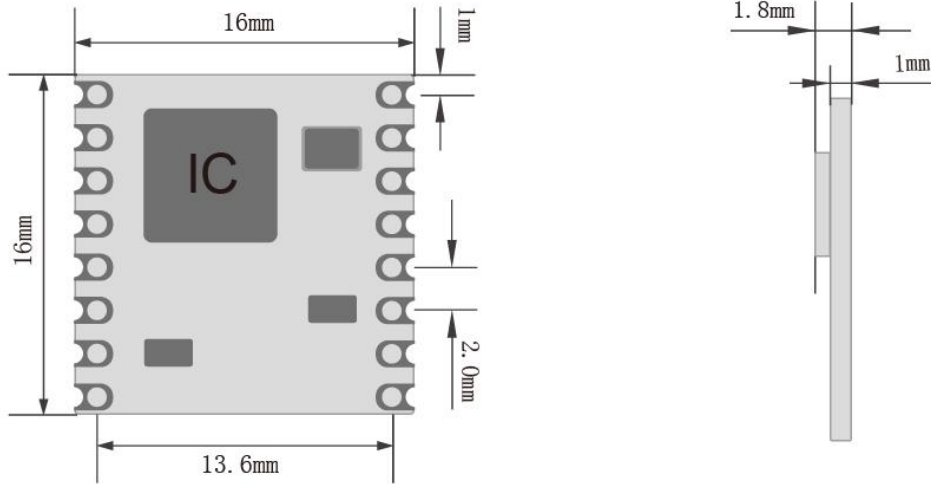

DL-RFM69HC Package Outline Drawing

Please apply for module packaging from our technical support: SMT patch package, DIP in-line package file (refer to schematic diagram)

Package files format description:

* .ASC format can be opened with Protel99se;

* .DXF format can be opened with CAD;

* .PCB format can be opened with PADS software;

Module packaging: SMT placement (steel mesh thickness ≥1.2mm)

5. Application Connection Diagram
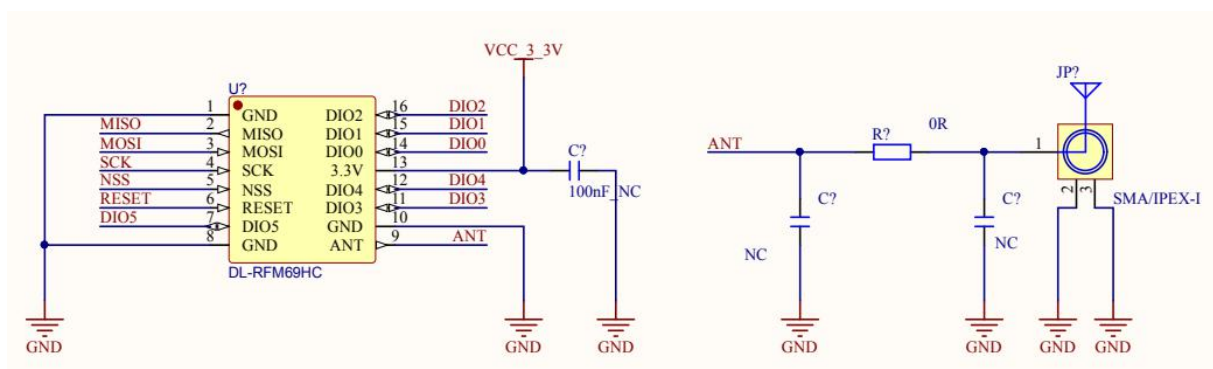
Note: This schematic diagram is for your reference only. If you have any question, please contact us for more help.

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6. Circuit Design

6.1 Power Supply Design
● Please pay attention to the power supply voltage of the device, exceeding the recommended voltage range may cause function abnormally and permanently damage;

● Try to use a DC stabilized power supply, and the power ripple coefficient should be as small as possible; the power load when transmitting the maximum power needs to be also considered;

● The module needs to be grounded reliably, and a good grounding can achieve better performance output and reduce the impact of RF on other sensitive devices.

6.2 RF Routing Design
● The module should be far away from RF interference sources, such as high-frequency circuit transformer, and it is forbidden to route the wires directly under the module, otherwise it may affect the receiving sensitivity;

● When using the on-board antenna, the antenna needs to be clear on both sides, and the ground should not be too close to the antenna at the same time, otherwise it will absorb the radiated energy;

● Route 50Ω impedance line, lay the ground and drill more ground holes;

● The PCBA space allows to reserve a π-type matching network, first connect it through a 0R resistor, otherwise the antenna is open.

6.3 Antenna Design
● There are many types of antennas, choose the appropriate antenna according to your needs;

● Choose a suitable placement position, according to the Antenna polarity, and it is recommended to be vertically upward;

● There should be no metal objects in the antenna radiation path, otherwise the transmission distance will be affected (such as a closed metal casing).

6.4 I/O design
● Not all the 6 DIOx pins of DL-RFM69HC need to be connected;

● When doing the hardware design, for the data packet mode (SPI transmission), if hardware resources is limited, lead DIO0 out is enough, which can meet most applications;

● For details, please refer to the chip manual: 5.3.2. DIO Pins Mapping in Packet Mode

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7. Notice for module application

(1) This module is an electrostatic sensitive product. Please operate on an anti-static workbench during installation and testing;

(2) When installing the module, ensure that nearby objects keep a sufficient safe distance from the module to prevent short-circuit damage;

(3) Never allow any liquid substance to come into contact with this module, and this module should be used in a dry environment;

(4) Please Use an independent voltage stabilizing circuit to supply power to this module, and avoid sharing with other circuits. The tolerance of the power supply should not be less than 5%.

(5) The indicators of this module are accord to commonly used international standard. If special certifications needed, we can adjust certain indicators according to your needs.

8. Contact us

Shenzhen DreamLnk Technology Co., Ltd
★ Data collection, Smart home, Internet of Things applications, Wireless remote control technology, Remote active RFID, Antennas ★

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