HC03RFM

ISM Transceiver Module With +13dBm Output Power

Notes:
The purpose of this HC03RFM specification covers mainly for the hardware and RF parameter information of the module, and for the software information, please refer to CMT2300A chip datasheet and demo program of HopeDuino Development Kit.

HC03RFM

1. General Introduction

HC03RFM module is based on the high performance CMOSTEK NextGenRF CMT2300A chip. It operates at 433.92MHz ISM frequency band, and provides down to –118dBm receiving sensitivity coupled with up to +13dBm output power.

2. Features

- Up to 131dB maximum link budget.
- Low RX current of 7mA.
- Up to +13dBm output power.
- Programmable bit rate up to 300kbps @FSK.
- High sensitivity: down to -118dBm.
- FSK modulation.
- SMD Package (16x16X3.0mm)

3. Applications

- Meter Reading
- Wireless data collection
- Automobile security system
- Home automation and security system

4. Pin Definition

4.1 HC03RFM Pin Definition

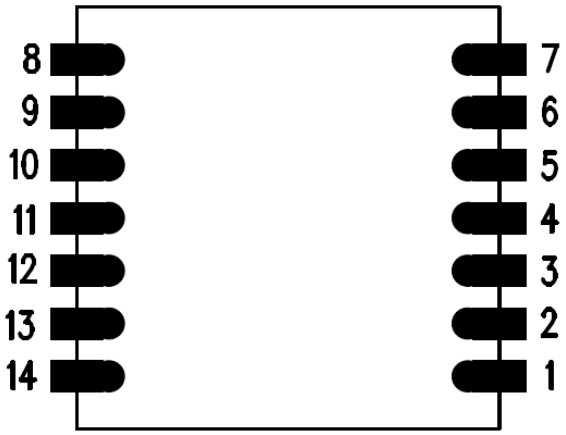


Figure 1. HC03RFM Pin Definition

Table 1. HC03RFM Pin Description

Number	Definition	Type	Function
1	ANT	AI/ AO	RF signal input/output.
2	3.3V(VDD)	PI	Power supply input, 1.8-3.6V.
3	GND	G	Ground.
4	NC		No Connect.
5	CSB	I	SPI chip select input, active low.
6	SCK	I	SPI clock input.
7	FCSB	I	SPI FIFO select input, active low.
8	SDIO	I/O	SPI data input and output.
9	GPIO1	I/O	General Purpose Digital I/O that may be configured through the registers to perform various functions.
10	GPIO3		
11	GPIO2		
12	NC		No Connect.
13	NC		No Connect.
14	GND	G	Ground.

Notes:

[1]. INT1 and INT2 are interrupts. DOUT is demodulated output. DIN is a modulation input. DCLK is a modulation or demodulation data rate synchronization clock, automatic switching in TX/RX mode.

[2]. The SCLK pin connects an internal pull-down resistor of 4.7kΩ inside the chip. Thus in low-power applications, the MCU cannot output high level (pull up), otherwise it will generate leakage current and will cause low-power implementation failure.

[3]. The SDIO pin connects an internal pull-up resistor of 15kΩ inside the chip. Thus in

low-power applications, the MCU cannot output low level (pull down), otherwise it will generate leakage current and will cause low-power implementation failure.

[4]. The GPIO pins connect an internal pull-up resistor of 15kΩ inside the chip. Thus in low-power applications, the MCU cannot output low level (pull down), otherwise it will generate leakage current and will cause low-power implementation failure.

5. Electrical Parameter

Absolute Maximum Rating

parameter	minimum	maximum	unit
Positive Power Supply	-0.3	+3.6	V
Voltage On Digital Control Inputs	-0.3	VDD + 0.3	V
Voltage On Analog Inputs	-0.3	VDD + 0.3	V
RX Input Power	-	+10	dBm
Storage Temperature	-55	+125	℃
Soldering Temperature(10s)	-	+255	℃
ESD Rating (Human Body Model)	-2	2	KV

Recommended Working Range

parameter	minimum	maximum	unit
Positive Power Supply	+1.8	+3.6	V
Working Temperature	-40	+85	℃
Supply Voltage Slew Rate	1	-	mV/us

DC Characteristic

parameter	conditions	minimum	typical	maximum	unit
HC03RFM TX Working Current	433.92MHz band, P_{out} =+13dBm	-	30		mA
HC03RFM RX Working Current	433.92MHz band,	-	7		mA
HC03RFM Sleep Current	All band	-	-	1	uA

Transmitter AC Characteristic

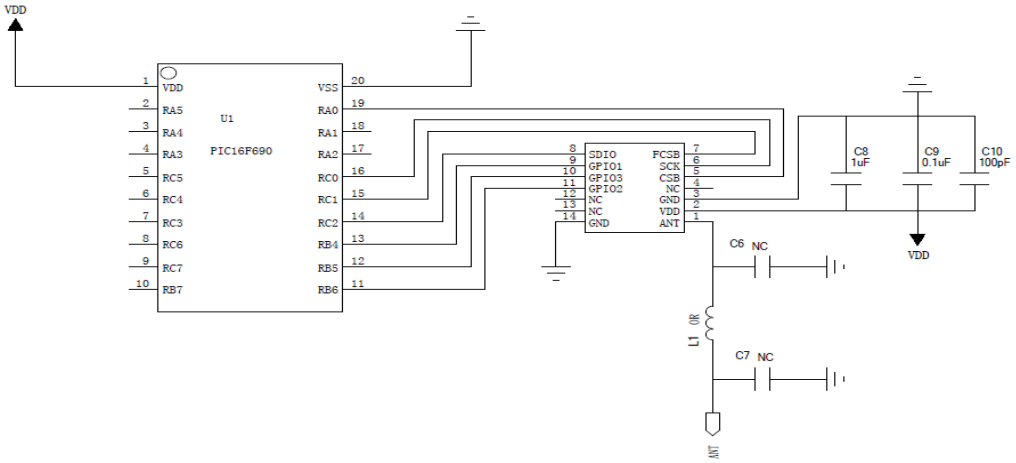
parameter	conditions	minimum	typical	maximum	unit
HC03RFM Output Power	433.92MHz band	-	+13	-	dBm
Symbol Rate, FSK Mode	Programmable	0.1	-	300	kbps
Frequency Deviation, FSK	Programmable	1	-	200	KHz
Frequency Resolution		-	24.8	-	Hz

Receiver AC Characteristic

parameter	conditions	minimum	typical	maximum	unit
RX Sensitivity FSK Mode FDEV = 10 kHz, SR = 10.6 kbps,	433.92MHz band	-	-118	-	dBm
Receiver Bandwidth		50		500	KHz
Blocking Immunity	+/-1MHz offset +/-2MHz offset +/-10MHz offset	- - -	52 74 75	- - -	dB
Image Rejection Ratio	IF=280KHz	-	35	-	dB

6. Typical Application

Figure 2. HC03RFM Application



7. Mechanical Dimension（All units in mm）

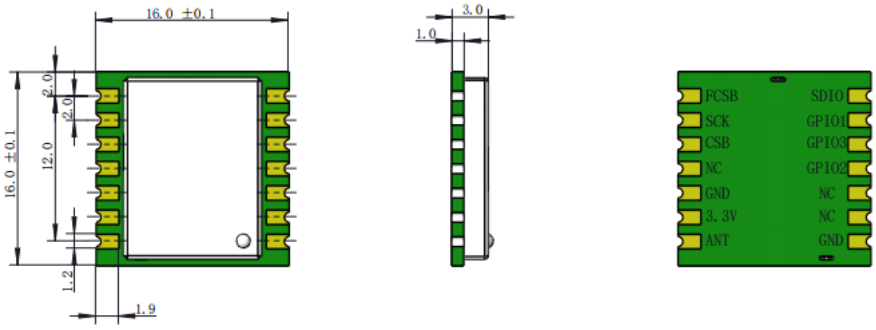


Figure5. HC03RFM Mechanical Dimension

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.107) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated" has to be labelled with an auxilliary lable stating the FCC ID of the RF Module, such as "Contains FCC ID: 2A7I8HC03RFM

"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: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Additionally, this module was tested with a detachable antenna. The specification of rubber rod antenna are as follows.
(1) Frequency Range (MHz): 433 ± 5;

(2) V.S.W.R: ⩽ 1.5;
(3) Input Impedance (Ω): 50;
(4) Gain (dBi): 3.0;

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

1) The radio elements have the radio frequency circuitry shielded.
2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
3) The modular transmitter has its own power supply regulation.
4) The module contains a PR-SMA antenna.
5) The module demonstrates compliance in a stand-alone configuration.
6) The module is labeled with its permanently affixed FCC ID label
7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
8) The module complies with RF exposure requirements.

This transmitter/module must not be collocated or operating in conjunction with any other antenna or transmitter.

NOTE:

This device complies with Innovation, Science and Economic Development Canada's (ISED)'s licence-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.
The equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment.

The ISED certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labelled to display the ISED certification number for the module, preceded by the word "contains" or similar wording expressing the same meaning, as follows:

Contains IC: 28699-HC03RFM

NOTE:

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada . Son fonctionnement est soumis aux deux conditions suivantes :
(1) Ce dispositif ne peut causer d'interférences ; et
(2) Ce dispositif doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

Host manufacturer is strongly recommended to confirm compliance with FCC/ISED requirements for the transmitter when the module is installed in the host.