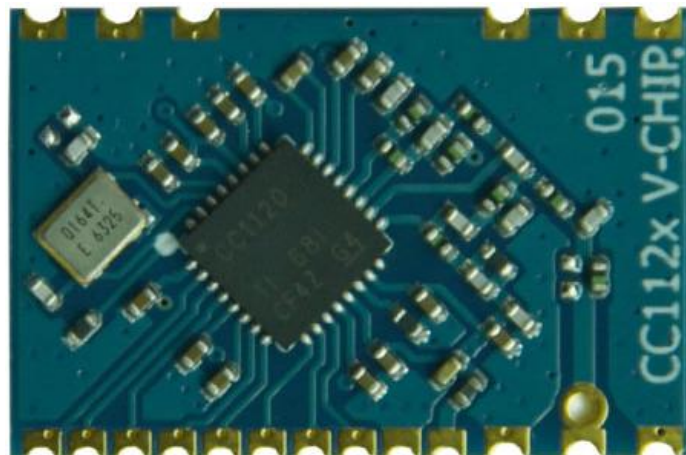# VT-CC1120-868/915M Wireless Module

User Guide

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General Description

VT-CC1120-868/915M is based on RF Transceiver CC1120 of TI Chipcon，it's a small size and ultra low power UHF wireless module. CC1120 is fully integrated single-chip radio transceiver designed for high performance at very low power and low voltage operation in cost effective wireless systems. The circuit is mainly intended for the ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency bands at 164-192 MHz, 410-480 MHz and 820-960 MHz. The MAX RF output power can be set as high as +16dBm, with data rate as high as 200Kbps. The module integrated many RF functions thus you can use it conveniently and reducing your development time.

Features

- 868MHz wireless transceiver, Frequency range:820~960MHz

- Programmable baseband modulator with 2-FSK/2-GFSK/4-FSK/4-GFSK/MSK/OOK/ASK

- Programmable output power from -11 to +16dBm

- High receiver sensitivity down to -121dBm while 1.2kbps data rate

- Programmable data rate 1.2～200Kbps

- Low power consumption and operating supply voltage：2.0～3.6V DC

- Point to point and point to multi-point communication.

- Support carrier sense and digital RSSI output.

- Separate 128-byte RX and TX FIFOs

- High stability and industrial reliability

- Small dimension：23.05mm×15.06mm×1.80 mm

Applications

- Wireless Metering and Wireless Smart Grid (AMR and AMI)

- Logistics Tracking System, Warehouse patrol, Electronic label

- Industrial monitoring and control

- AMR – Automatic Meter Reading

- Home and building automation

- Consumer Electronics products of wireless control

- Wireless alarm and security systems

- Wireless sensor networks
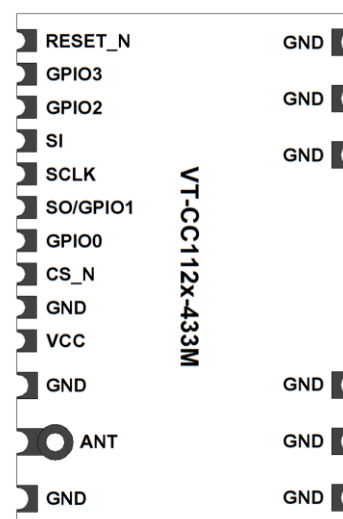
General Characteristics

Test operating conditions：Ta=25 ℃，VCC=3.3V if nothing else stated.

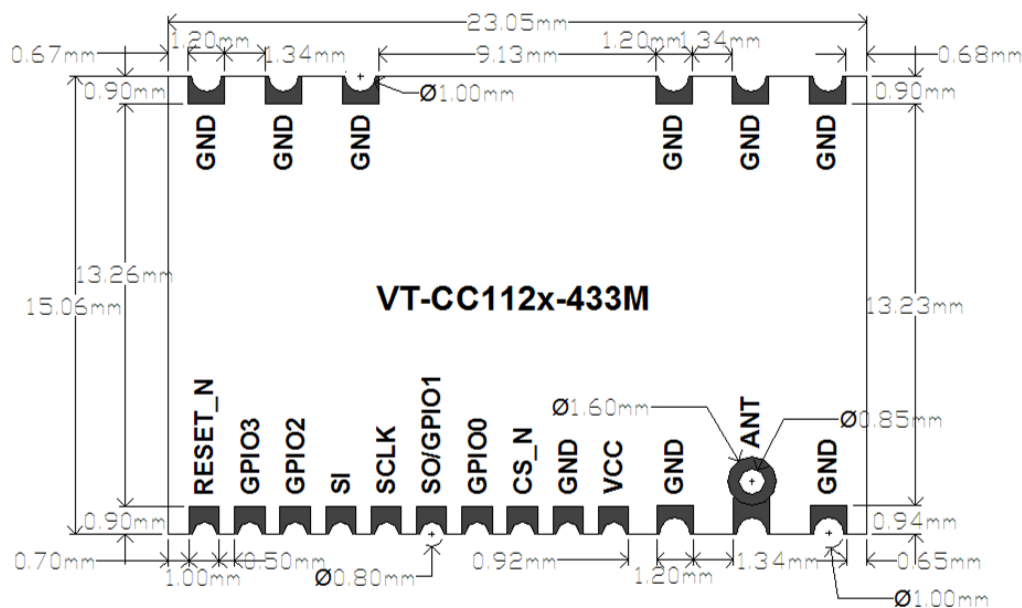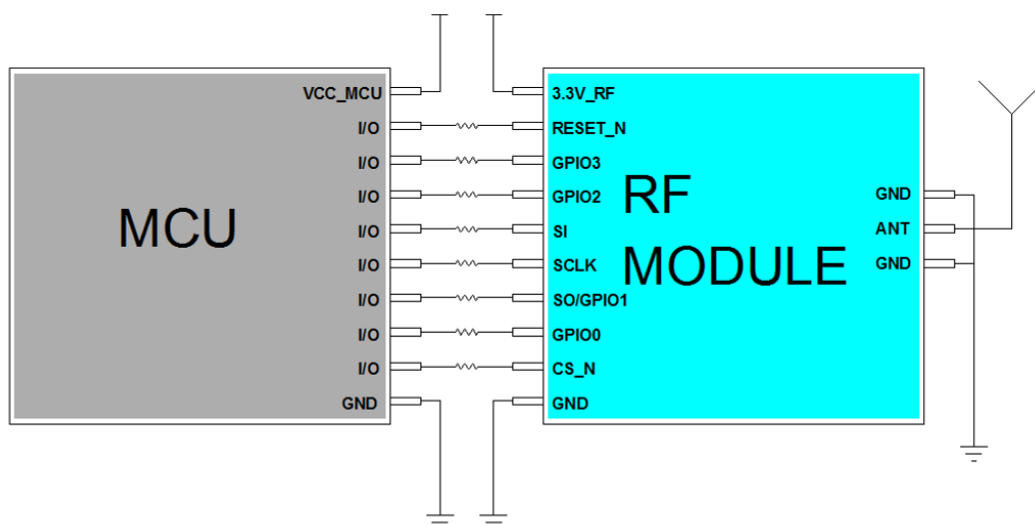| Parameter	Type	Condition/Note
Operating supply voltage	DC 2.0～3.6V	
Frequency range	820-960MHz	Programmable
Frequency accuracy	±10ppm	
Modulation format	2-FSK/4-FSK/2-GFSK/4-FSK/ MSK/OOK	Programmable
Transmit power	-11～+16dBm	Programmable
TX current consumption	<65mA	Po=16dBm
Receiver sensitivity	-121dBm	1.2kbps DEV=4KHz RX BW=25KHz
RX current consumption	<22mA	
Sleep State current consumption	<1uA	
Data rate	0～200Kbps	Programmable
Communication distance	1800m	1.2kbps
Antenna impedance	50ohm	
Operating temperature	-40～+85 ℃	
Storage temperature range	-40～+125 ℃	
Dimension	23.05 mm×15.06 mm×1.8mm	See more in PCB description

Note：

1．The module transmission data rate will affect Transmission distance ,the higher the data rate , the closer the distance, and the lower the receiving sensitivity.
2．The supply voltage to the module will affect TX power, in the operating supply voltage range, the lower the voltage, the lower the TX power.
3．The module central frequency will change as the operating temperature change, use it under suggest temperature, the module can work well.
4．The antenna will strongly affect the communication distance, please select matched antenna and connect it correctly.
5．The module mount will affect the communication distance.

PCB Description
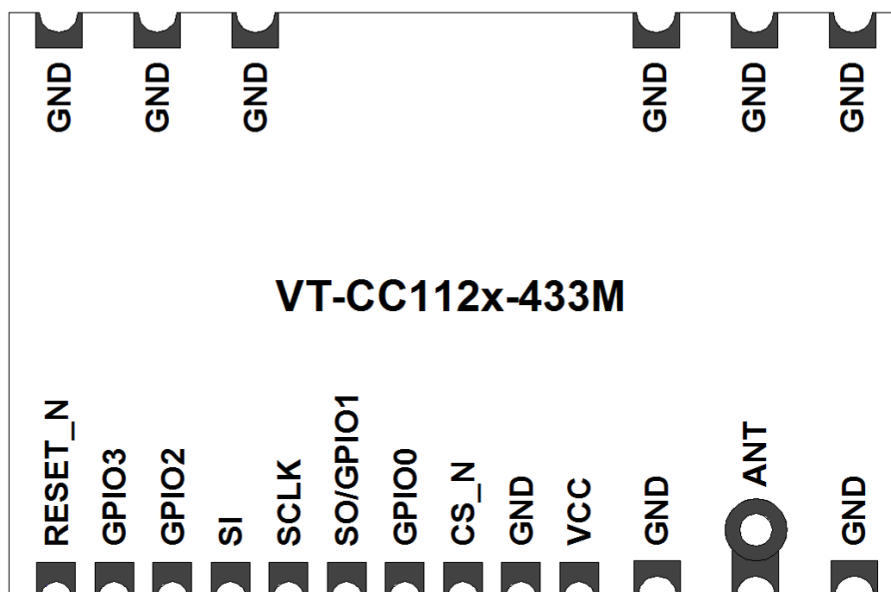
Pin Configuration

Pin name	Pin type	Description
VCC	Power(Analog)	DC 2.0-3.6V power supply
GND	Ground	
CS_N	Digital In	Chip select, active low
GDIO0	Digital I/O	Data output，configuration by register
SO/GPIO1	Digital I/O	Data output（SPI）or GPIO
SCLK	Digital In	Clock input（SPI）
SI	Digital In	Data input（SPI）
GDIO2	Digital I/O	Data input/output，configuration by register
GDIO3	Digital I/O	Data input/output，configuration by register
RESET_N	Digital In	Reset，active low
ANT	Antenna port	Impedance 50ohm

Circuit Interface

Note：

    The pin sequence above are not the actual pin sequence refer pin description. SPI, I/O interface should connect with the MCU's I/O pin in order to archive your functions. The circuit must be take ESD protect to prevent damage module. Good RF performance determines on the module position, ground and antenna fixing. Any question about the module please contact with the FAE engineer.

Configuration Registers

The configuration of CC1120 can be done with software SmartRF Studio7. Complete descriptions of the registers are given in the CC1120 datasheet. We can provide evaluation board and demo code to the customer to develop and evaluate the module's capability.

Dimension

Antenna

We can provide antenna match to the module. And if there is some special requirements to satisfy, we can coordinate with you to select antenna, match antenna to the module in order to make the product work well.

Some recommend antennas as the table below.

Spring antenna（Standard） Characteristic: small size, low cost, embedded conveniently.	
SMA rubber antenna（Optional） Characteristic: medium-scale, low cost, high gain	
Magnetic Mount Antenna（Optional） Characteristic: high gain, Magnetic Mount， suitable for mount on iron box.	

Note: Standard is for free, optional need another payment and the cost refer to the antenna price.

Questions and Answers

Description	Reason and Solution
Can't communication	1．The power supply connect not well, check the module VCC whether it is out of maximum rating. 2．The signal line connect not well, check the module SPI interface. 3．The settings of the transmitter module and receiver module are not the same. Check these modules' register configuration. 4．Signal block. If the transmitter work with a high TX power, and the receiver was put at a short distance(<0.5m), maybe there is a signal block to make no communication.
Communication distance is too short	1．The application environment is too bad or the antenna is shield. Put the antenna to a better place outside or higher throw a coaxial line , replace it with a higher gain antenna. 2．The work space contains a same frequency interference source, or a strong magnetic field interference, power source disturbance. Try to change the carrier frequency or get far away from the source of the disturbance. 3．The power supply is not strong. Check the voltage and the current whether it is enough.
High data error	1．The power supply ripple is too big, Change the power supply. 2．Check the module register configuration, it is recommended to set as the CC1120-datasheet. 3．There is a carrier frequency interference, change the channel. 4．The antenna unmatched to the module RF interface, change another matched antenna.

Development Package:

1. CC1120 datasheet（CC1120.pdf）

2. CC1120 register configuration tool（SmartRF Studio 7 v1.4.9.zip）

3. CC1120 demo code (CC1120 Demo Code.rar）

4. Hard ware tools（TI Chipcon Evaluation Board）

Note：

   1. You can get the development package above from the salesman when you order the module.

   2. As version update，please refer to our latest development materials.

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