

VG4142TxxxN0M1 Wireless transparent transmission Module specification

V1.2



Table of contents

1. Overview	1
2. Technical parameters	2
3. Pin location diagram	3
4. Pin description	4
5. Hardware design guidance and precautions	5
5.1. Hardware connection diagram	5
5.2. Power supply design and related precautions	5
5.3. Antenna design and guidance	7
6. Precautions for programming development	10
7. Serial port configuration command	11
1. Set configuration mode	11
2. Set up wireless channel	12
3. Set wireless transmission power	13
4. Set wireless baud rate	14
5. Set the serial port baud rate	15
6. Set wireless channel interval bandwidth	16
7. Set configuration parameters to factory settings	16
8. Set software to reset system	17
9. Get current configuration information	18
10. Get the current software version	19
8. Reflow soldering curve chart	20
9. Static electricity damage warning	20
10. Packaging information	21
Mechanical dimensions (unit: mm)	21
11. Version update instructions	22
12. Procurement selection table	22
13. Statement	22
14. Contact Us	23

1. Overview

VG4142TxxxN0M1 The series of wireless transparent transmission modules is a small, low-power, long-distance bidirectional serial port transceiver module.

Transparent transmission firmware has been defaulted at the factory, and working parameters can be customized through relevant configuration commands to flexibly adapt to different application scenarios. Hardware only need 4 Root connection can be used for data transparent transmission applications, including power supply VCC, GND, serial port Tx ,Rx.

The module integrates all radio frequency related functions and devices. Users do not need to have an in-depth understanding of radio frequency circuit design to use this module to easily develop Wireless solutions and wireless IoT devices with stable performance and high reliability. Built-in high performance M3 Kernel MCU, rich GPIO It can be used by developers for secondary development.

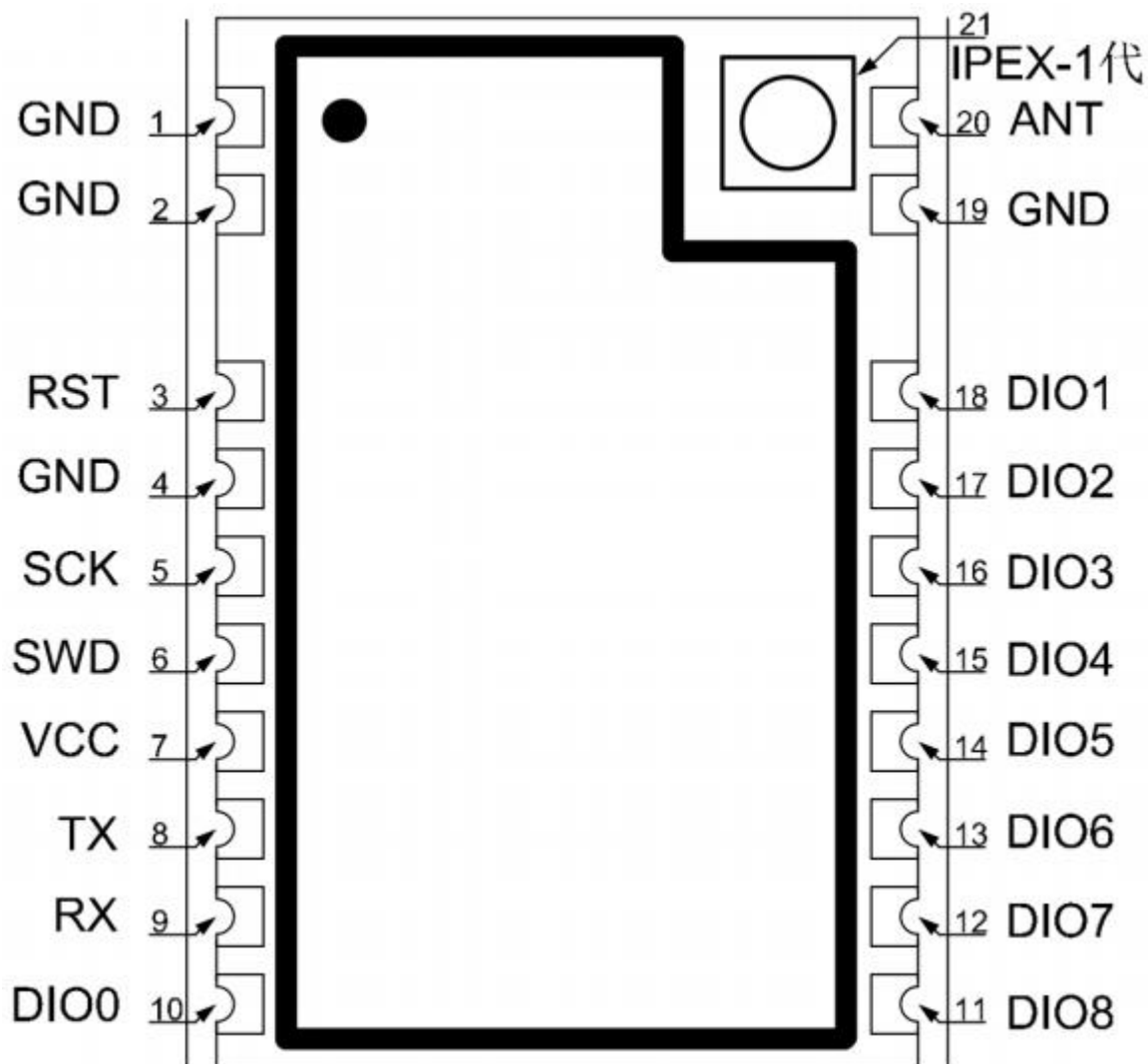
application:

- 1.smart meter
- 2.Supply chain and logistics
- 3.Building automation
- 4.agricultural sensors
- 5.retail store sensors
- 6.street lamp
- 7.parking sensor
- 8.environmental sensor
- 9.medical insurance
- 10.Safety and Security Sensors
- 11.Remote control application

2. Technical Parameters

Technical indicators	parameter	Remark
voltage range	1.8 ~3.6V	generally 3.3V
Frequency Range	See the serial port command description for details.	
channel	32 For details, please refer to the serial port command description.	
Output Power	-7dBm to +20dBm	
Wireless speed	See the serial port command description for details.	
Serial port baud rate	See the serial port command description for details.	
Emission current	150mA	Transmit power = 20dBm, RF + MCU Power consumption
receive current	20mA	RF+MCU Power consumption
Sleep current	<20uA	
Driver interface	TTL/serial port	
Maximum data packet long	MAX=64 byte	If the serial port transparent transmission data packet is larger than 64 bytes, the data packet needs to be divided into packets and sent first.
Antenna impedance	50 ohm	
Antenna connection side Mode	Side stamp hole or IPEX Seat	Choose one of the two applications, if you choose the IPEX base external antenna, the stamp hole position needs to be left floating
storage temperature	-55℃~ +125℃	
Operating temperature	-40℃~ +85℃	Industrial grade
Size	16.0 x 24.0mm	

3. Pin location diagram



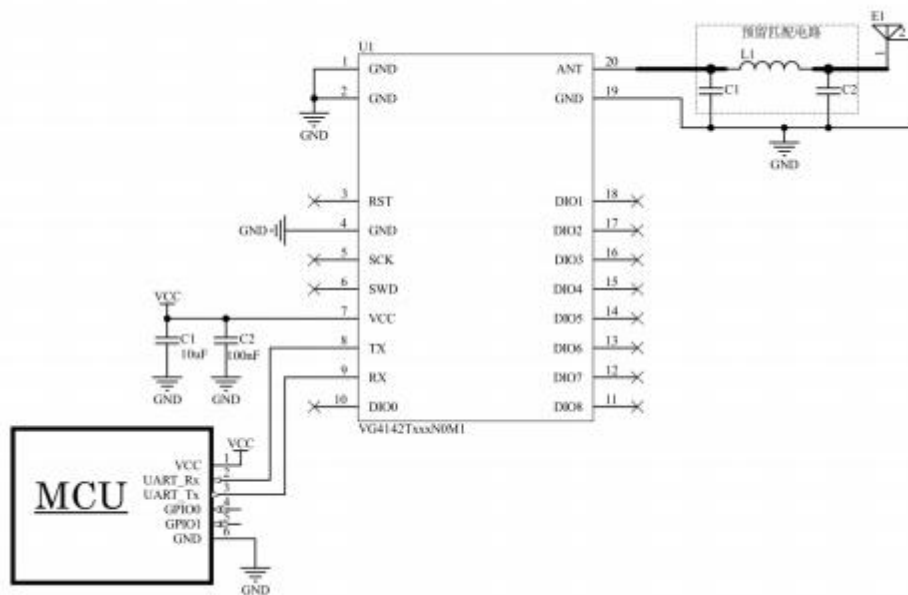
picture3-1 top view

4. Pin description

number	pin	type	describe
1	GND	power supply	Power-Ground
2	GND	power supply	Power-Ground
3	RST	I	reset pin, Active low
4	GND	power supply	Power-Ground
5	SCK	O	Programming and burning interface, communication clock pin
6	SWD	I/O	Programming and burning interface, communication data pin
7	VCC	power supply	Power supply-positive pole
8	Tx	O	Serial port sending pin
9	RX	I	Serial port receiving pin
10	DI00	I/O	Reserved function pins
11	DI08	I/O	Reserved function pins
12	DI07	I/O	Reserved function pins
13	DI06	I/O	Reserved function pins
14	DI05	I	FTRY_KEY, parameter initialization, the IO port remains low 3.1S You can achieve factory settings of parameters
15	DI04	I	AT_STA, configuration operation control pin. When the level is high, you need to enter the configuration mode before sending configuration commands. When the level is low, you can directly send relevant configuration commands.
16	DI03	I/O	Reserved function pins
17	DI02	I/O	Reserved function pins
18	DI01	O	BUSY_STA, busy status indication. High level indicates that the current working status of the device is busy and serial port operations are not possible.operation, low level indicates that the peripheral can perform serial port operations
19	GND	power supply	Power-Ground
20	ANT	I/O	match 50Ω
twenty one	IPEX - 1	I/O	IPEX-1 generation antenna base

5. Hardware design guidance and precautions

5.1. Hardware connection diagram



picture 5-1 Programming Development Hardware Connection

5.2. Power supply design and related precautions

1. Please pay attention to the correct connection of the positive and negative poles of the power supply. And ensure that the power supply voltage is within the recommended power supply voltage range, If the maximum allowable power supply range of the module is exceeded, Can make The module may be permanently damaged; the decoupling capacitor of the module power pin should be as close as possible to the module power pin.

2. In the module power supply system, Excessive ripple may be coupled to lines susceptible to interference through wires or ground planes, such as antennas, feeders, and clocks.

lines and other sensitive signal lines, It is easy to cause the module' s radio frequency performance to deteriorate. Therefore, we recommend using LDO or linear voltage regulator as the power supply of the wireless module.

3. Select LDO When using a linear regulator chip or a linear voltage regulator chip, you need to pay attention to the heat dissipation of the power supply and the driving ability of the power supply to stabilize the output current; consider the long-term stable operation of the entire machine. It is recommended to reserve More than 50% current output margin.

4. It is best to use one module separately LDO Or linear regulator power supply; If adopted DC-DC power supply chip, you can add one later LDO or linear regulator The circuit breaker serves as an isolation module power supply to prevent the noise of the switching power supply chip from interfering with the working performance of the radio frequency.

5. MCU If the communication line between the module and the module is used 5V level, must be connected in series 1K-5.1K Resistor (not recommended, still risk of damage).

6. Keep the RF module as far away from high-voltage devices as possible, because the electromagnetic waves of high-voltage devices will also have a certain impact on RF signals.

7. High-frequency digital traces, high-frequency analog traces, and high-current power traces should be kept away from the bottom of the module. If they have to pass under the module , they need to be routed.

Put the module PCB Another layer of the bottom board, and ensure that the copper underneath the module is well grounded.

5.3. Antenna design and guidance

5.3.1 stamp hole interface RF design

When selecting the module RF output interface in the form of a stamp hole, use a 50ohm characteristic impedance trace to connect to the base plate during design. Antenna on PCB. consider to the attenuation of high frequency signals, Need to pay attention to the bottom plate PCB. The length of RF traces needs to be as short as possible. It is recommended that the longest trace length does not exceed 20mm, and the trace width requires or right angles when you need to turn . It is recommended to take the arc line.

The primary recommended turning method for RF cabling	
The second recommended RF wiring turning method	
A poor way to turn RF cables, not recommended	

In order to ensure that the impedance of the backplane RF trace is 50 Ohms, depending on the thickness of the board, Adjust according to the following parameters. The following simulation values are for reference only Test.

RF wiring adopts 20mil Line width	The plate thickness is 1.0mm When , the spacing between ground copper and traces is 5.3mil
	The plate thickness is 1.2mm When , the spacing between ground copper and traces is 5.1mil
	The plate thickness is 1.6mm When , the spacing between ground copper and traces is 5mil
RF wiring adopts 25mil Line width	The plate thickness is 1.0mm When , the spacing between ground copper and traces is 6.3mil _
	The plate thickness is 1.2mm When , the spacing between ground copper and traces is 6mil
	The plate thickness is 1.6mm When , the spacing between ground copper and traces is 5.7mil
RF wiring adopts 30mil Line width	The plate thickness is 1.0mm When , the spacing between ground copper and traces is 7.6mil
	The plate thickness is 1.2mm When , the spacing between ground copper and traces is 7.1mil
	The plate thickness is 1.6mm When , the spacing between ground copper and traces is 6.6mil

5.3.2 Built-in antenna

The built-in antenna refers to the one welded on PCB. The antenna placed inside the product shell on the base plate specifically includes patch ceramic antennas, spring antennas, etc. While using the built-in antenna, the structure of the product and the installation position of the antenna have a great impact on the radio frequency performance. On the premise that there is enough structural space in the product shell, the spring antenna should be as large as possible. Place it vertically upward; no copper should be laid around the base plate where the antenna is placed. Or you can hollow out the circuit board under the antenna because metal absorbs radio frequency signals. The reception and shielding capabilities are very strong, which will seriously affect the communication distance. In addition, the antenna should be placed on the edge of the base plate as much as possible.

5.3.3 external antenna

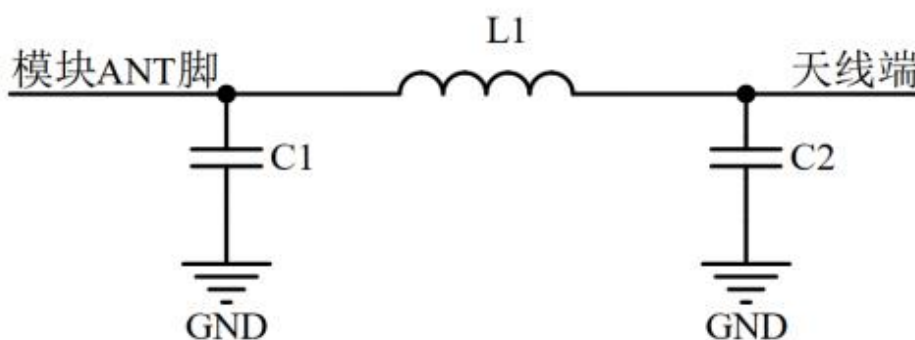
External antenna means the module passes IPEX Extension cable, SMA and other standard radio frequency interfaces are installed outside the product housing. Specifically include rod antenna, absorber Dish antenna, fiberglass antenna, etc. External antennas are basically standard products. In order to better choose an antenna suitable for the module, you need to check the antenna during the antenna selection process.

When selecting line parameters, the following should be noted:

1. The working frequency of the antenna and the working frequency of the corresponding module should be consistent.
2. The input characteristic impedance of the antenna should be 50ohm.
3. The size of the antenna interface should match the size of the antenna interface of the module.
4. The standing wave ratio (VSWR) of the antenna is recommended to be less than 2, and the antenna should have a suitable frequency bandwidth (covering the frequencies used in the actual application of specific products).

5.3.4 Antenna matching

Antennas are critical to the transmission distance of RF modules. In practical applications, it is to facilitate users' later antenna matching adjustments. It is recommended that users design schematics. When the antenna and module ANT A simple π -type matching circuit is reserved between the pin outputs. If the antenna is already standard 50 Ω , Components L1 stick 0R resistor, device C1,C2 No welding is required, otherwise you need to use a network analyzer to measure the actual impedance of the antenna and match it to determine C1,L1,C2 The value of . module ANT The trace from the pin to the antenna end should be as short as possible. It is recommended that the longest trace length does not exceed 20mm.

5-2 π type matching circuit

6. Precautions for programming development

1, Transmission distance is not ideal

The transmission distance is related to wireless transmission power, wireless baud rate, antenna performance, and surrounding environment. When the transmission distance is not ideal, you need to follow these factors reassessment

2, external antenna PCB layout considerations

Pay attention to the extension cord of the external antenna 50 Ω matching.

3. The serial port sends transparent data, but no data is printed on the serial port of the other node device.

- 1) There is no one-to-one correspondence between the two parties in wireless configuration. For example, the wireless frequency and baud rate are different
- 2) The serial port configuration of the serial host is inconsistent with that of the wireless module.

4. Sending serial port configuration command, no response

- 1) The configuration command format is incorrect
- 2) CRC Incorrect test
- 3) Serial port configuration is inconsistent
- 4) Send other configuration commands without entering configuration mode

7. Serial port configuration commands

When command configuration is required, you need to enter the configuration mode first (see [setting the configuration mode for details](#)), or change AT_STA Pull the pin low to operate other configuration commands. After the operation is completed Will be needed AT_STA Only when the pin is pulled high can normal transparent communication be carried out.

After sending the configuration command, you need to wait It takes about 200ms to send [a software reset command](#) or power on again.

CRC illustrate:

Parametric model: CRC-8, x^8+x^2+x+1

Polynomial POLY = 0x07

initial value INIT = 0x55

1, CRC, yes CRC Perform previous data CRC Operation

1. Set configuration mode

length	Order	Operating mode	Check Digit
0x03	0x26	1byte	CRC
		scope: 0~1 =0, in configuration mode, exit configuration mode, in non-configuration mode , Considered to be transparent transmission of data =1, enter configuration mode, at this time you can configure other commands Default is non-configuration mode Settings take effect immediately	

Return successfully

length	Order	data	Check Digit
0x03	0x55	—	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	—	CRC

2. Set up wireless channel

length	Order	wireless channel	Check Digit
0x03	0x01	1byte	CRC
		scope: 0~31 The specific corresponding frequency is related to the wireless frequency band range and channel spacing bandwidth settings. Such as channel spacing 1MHz, the wireless frequency band range is 433MHz frequency band, =0, corresponding to 433MHz =1, corresponding to 434MHz ... =31, corresponding to 464MHz The wireless frequency range is 868MHz frequency band, =0, corresponding to 868MHz =1, corresponding to 869MHz ... =31, corresponding to 899MHz The default is 0 channel The settings take effect immediately and can be saved after power off.	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	-	CRC

3. Set wireless transmission power

length	Order	Wireless transmission power	Check Digit
0x03	0x03	1byte	CRC
		scope: 0~27 =0, output -7dBm =1, output -6dBm =2, output -5dBm ... =27, output 20dBm (default) = other, invalid interval 1dBm The settings take effect immediately, Support power- off saving	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	-	CRC

4. Set wireless baud rate

length	Order	Wireless baud rate	Check Digit
0x03	0x04	1byte	CRC
		scope: 0~6 =0, reserved =1, reserved =2, corresponding to 1220bps (default) =3, corresponding to 2440bps =4, corresponding to 5000bps =5, corresponding to 12500bps =6, corresponding to 37500bps =other, invalid The settings take effect after restarting and support saving after power failure. The lower the wireless baud rate, the better Long communication distance	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	-	CRC

5. Set serial port baud rate

length	Order	Serial port baud rate	Check Digit
0x03	0x05	1byte	CRC
		scope: 0~7 =0, unavailable =1, corresponding to 2400bps =2, corresponding to 4800bps =3, corresponding to 9600bps =4, corresponding to 38400bps =5, corresponding to 57600bps =6, corresponding to 115200bps (default) =7, corresponding to 460800bps =0other, invalid The settings take effect after restarting. Support power-off saving	

Return successfully

length	Order	data	Check Digit
0x03	0x55	–	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

6. Set wireless channel interval bandwidth

length	Order	channel spacing	Check Digit
0x03	0x0B	1byte	CRC
		Range: 25~200, this value is not the actual value and needs to be converted to get the actual value. Default = 100 Conversion formula: Actual value = setting value * 10 * 1000Hz, such as setting 100 When , the actual channel spacing is 1MHz The settings take effect immediately and can be saved after power off.	

Return successfully

length	Order	data	Check Digit
0x03	0x55	–	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

7. Set configuration parameters to factory default

length	Order	–	Check Digit
0x03	0x21	1byte	CRC
		=1 =Other, invalid Settings take effect immediately After the setting is completed, the device will automatically restart to take effect.	

Return successfully

length	Order	data	Check Digit
0x03	0x55	–	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

8. Setup software to reset the system

length	Order	–	Check Digit
0x03	0x22	1byte	CRC
		=1 =Other, invalid settings take effect immediately	

Return successfully

length	Order	data	Check Digit
0x03	0x55	–	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

9. Get current configuration information

length	Order	–	Check Digit
0x03	0x24	1byte	CRC
		=1 =0other, invalid settings take effect immediately	

Return successfully

length	Order	Configuration information	Check Digit
0x15	0x24	19byte	CRC
		BYTE1: software version BYTE2~5: reserved BYTE6~9: reserved BYTE10: reserved BYTE11: Current wireless channel BYTE12: Current wireless BYTE13: frequency band range BYTE14: Current wireless BYTE15: transmission power BYTE16: Current wireless baud rate BYTE17: rate BYTE18: Current serial port baud rate BYTE19: reserved Current wireless auto-answer reserved Current wireless channel spacing bandwidth For specific corresponding meanings, please refer to the corresponding configuration instructions.	

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

10. Get current software version

length	Order	–	Check Digit
0x03	0x25	1byte	CRC
		=1 =0other, invalid settings take effect immediately	

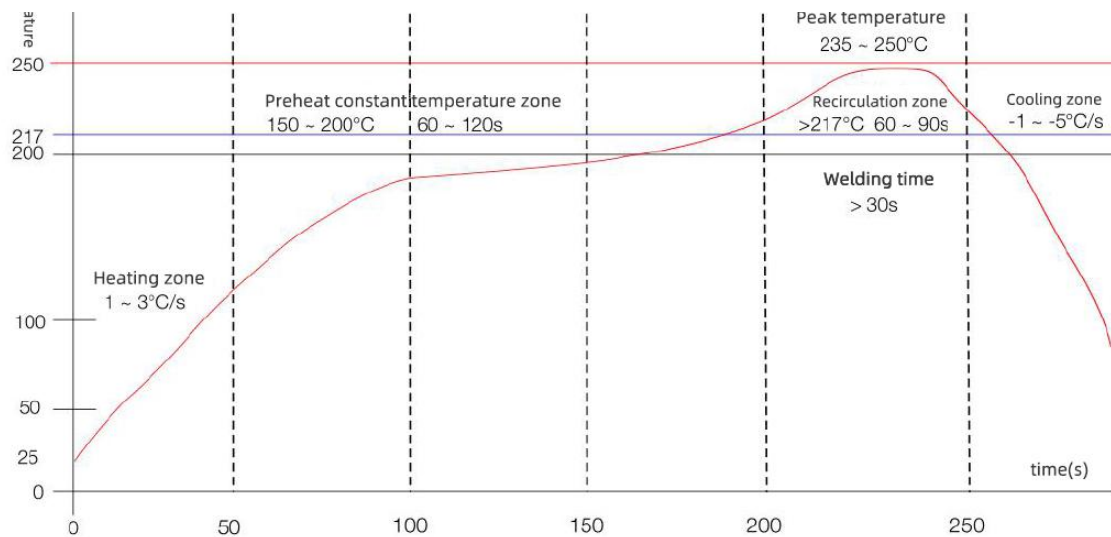
Return successfully

length	Order	Software version	Check Digit
0x03	0x25	For example =0x10, the corresponding version number is V1.0	CRC

Return on failure

length	Order	data	Check Digit
0x03	0xEE	–	CRC

8. Reflow soldering curve



Heating zone-temperature: 25-150°C time: 60-90s Ramp rate: 1-3°C/s
Preheat constant temperature zone-temperature: 150-200°C time: 60-120s
Reflow soldering area-temperature >217°C time: 60-90s; Peak temperature: 235-250°C time: 30-70s
Cooling zone-temperature: Peak temperature -25-150°C Cooling slope -1 ~ -5°C/s
Solder-tin-silver-copper alloy lead-free solder(SAC305)

9. Static electricity damage warning

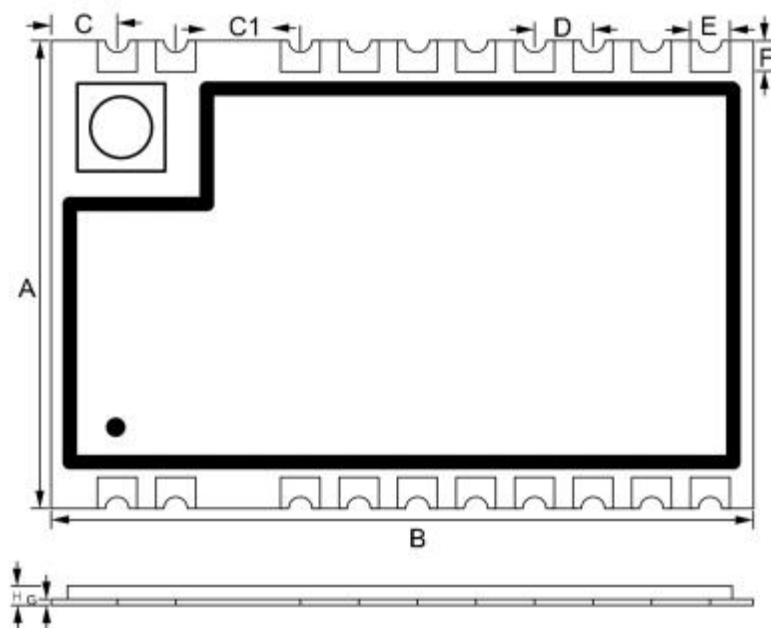
The RF module is a high-voltage electrostatic sensitive device. To prevent static electricity from damaging the module

- 1, Anti-static measures are strictly followed, and bare hands are prohibited from touching the module during the production process .
- 2, Modules should be placed in a placement area that prevents static electricity.
3. The anti-static protection circuit at the high-voltage input should be considered during product design.



10. Packaging information

Mechanical dimensions (unit: mm)



serial number	Dimensions (mm)	Error (mm)
A	16.0	± 0.5
B	24.0	± 0.5
C	2.2	± 0.1
C1	4.2	± 0.1
D	2.0	± 0.1
E	1.2	± 0.1
F	0.8	± 0.1
G	1.0	± 0.1
H	2.6	± 0.2

11. Version update instructions

Version	update content	Updated	Maintenance man
V1.0	first release	2021 Year 10 moon 6th	DropLin
V1.1	Updated hardware design considerations	2021 Year 12 moon 30th	Dying
V1.2	Correct the selection table description error	2022 Year 8 moon 4th	Dying

12. Procurement selection table

number	model	illustrate
1	VG4142T433N0M1	433MHz Band, tape packaging\tray packaging
2	VG4142T490N0M1	490MHz Band, tape packaging\tray packaging
3	VG4142T868N0M1	868MHz Band, tape packaging\tray packaging
4	VG4142T915N0M1	915MHz Band, tape packaging\tray packaging

13. Statement

1. Due to product version upgrades or other reasons, the content of this document will be updated from time to time. Unless otherwise agreed, this document is only used as a guide. All statements, information and recommendations in do not constitute any express or implied warranty.

2. The company reserves the right of final interpretation and modification of all information provided, and any changes will be made without prior notice.

14. Contact us

Company: Shenzhen Wojin Technology Co., Ltd.

Address: Sanhe Road, Gaofeng Community, Dalang Street, Longhua District,
Shenzhen City 1 Wisdom Cloud Valley C building 205-208

Telephone: 0755-23040053

Fax: 0755-21031236

Official website: www.vollgo.com

Business Cooperation: sales@vollgo.com

