

VGdd79TxxxX0M1 High power wireless transparent transmission

Module specification

V1.0



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1. Overview

VGdd79TxxxX0M1 series of wireless transparent transmission modules, which are small in size and have maximum transmit power. 1W Long-distance bidirectional serial port transceiver module. within module

Set up high efficiency PA and LNA, greatly improves the wireless transmission link budget .

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.

The hardware only requires

Simple connection for data transparent transmission applications, including power supply VCC, GND, TX, RX, if you need to control the module sleep mode, you need to connect them DIO0 module

Enable feet.

The module integrates all radio frequency related functions and devices. Users can use this module to easily develop wireless solutions and wireless IoT devices with stable performance and high reliability without having an in-depth understanding of radio frequency circuit design. Built-in high performance M0 + low power core MCU, rich GPIO Available to developers for secondary use

Development and use.

application:

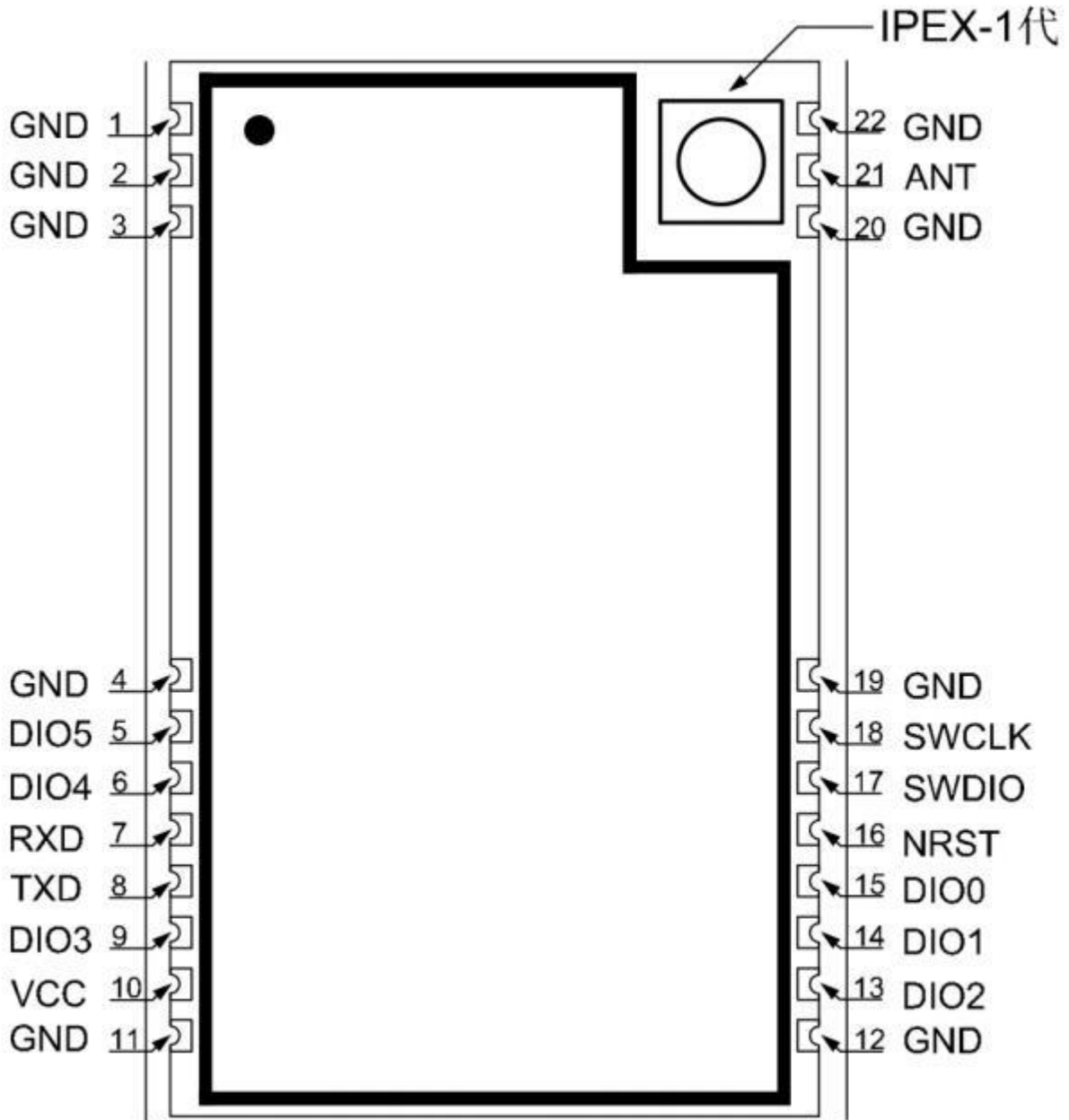
1. Smart meter
2. Supply chain and logistics
3. Building automation
4. Agricultural sensors
5. Retail store sensors
6. Street lights
7. Parking sensor
8. Environmental sensors
9. Medical care
10. Safety and Security Sensors
11. Remote control application

2. Technical Parameters

Technical indicators	parameter	Remark
Supply voltage range	3.3 ~4.2V	In order to ensure the maximum power output of the module amplifier,It is recommended that the VCC voltage should not be lower than 3.7V
Input and output pins	3.3V	
Frequency Range	See the serial port command description for details.	
channel	32For details, please refer to the serial port command description.	
Output Power	30dBm(1W)	VCC=3.7V, Temp=25°C, CW T est
Wireless speed	See the serial port command description for details.	Default: 1.22Kbps
Serial port baud rate	See the serial port command description for details.	default value:115200, data bits8. Stop bit 1, No check digit
Emission current	680mA	Output Power 30dBm(1W), whole module
receive current	20mA	Module as a whole
Sleep current	5uA	module as a whole, Available in sleep mode DIO0 Foot call Awake
Driver interface	TTL/serial port	
Wireless transmission of data packets long	MAX=128 byte	The serial port transparent transmission data packet is larger than 128 Bytes, modules Will be automatically sent in packages
Antenna impedance	50ohm	

Antenna connection method	Side stamp hole or IPEX Seat	Choose one of the two applications, if you choose IPEX The seat is connected to the sky line, the stamp hole position needs to be left floating
storage temperature	-55°C ~ +125°C	
Operating temperature	-40°C ~ +85°C	Industrial grade
Size	26.0 x 16.0mm	

3. Pin location diagram



picture 3-1 top view

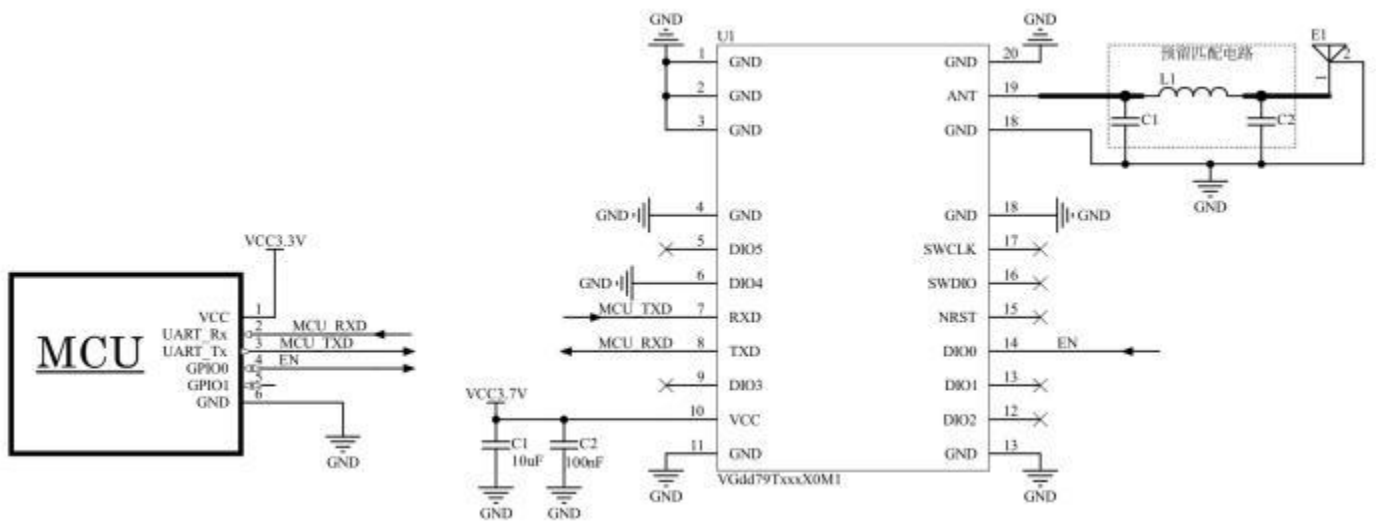
4. Pin description

number	pin	type	describe
1	GND	power supply	Power-Ground
2	GND	power supply	Power-Ground
3	GND	power supply	Power-Ground
4	GND	power supply	Power-Ground
5	DI05	I/O	Reserved function pins
6	DI04	I/O	Reserved function pins
7	RXD	I	Module serial port data receiving pin
8	TxD	O	Module serial port data sending pin
9	DI03	I/O	Reserved function pins
10	VCC	power supply	Power supply-positive pole
11	GND	power supply	Power-Ground
12	GND	power supply	Power-Ground
13	DI02	I/O	Reserved function pins
14	DI01	I	<p>AT_STA Pin, module parameter configuration mode control pin, has an internal pull-up by default.</p> <p>High level: The module needs to send AT Only after configuring the command module can you enter the parameter configuration mode.</p> <p>Low level: The module directly enters parameter configuration mode</p>
15	DI00	I/O	<p>Module enable control pin.</p> <p>High level (or floating): module sleep mode</p> <p>Low level: module enters working state</p>
16	NRST	I	module reset pin, Active low
17	SWDIO	I/O	Programming and burning interface, Communication data pin
18	SWCLK	O	Programming and burning interface, Communication clock pin
19	GND	power supply	Power-Ground
20	GND	power supply	Power-Ground

21	ANT	I/O	catch 50 Ω antenna
22	GND	power supply	Power-Ground

5. Hardware design guidance and precautions

5.1. Hardware connection diagram



picture 5-1 Application connection diagram

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 supply voltage range. If it exceeds the maximum allowable power supply range of the module, it will cause 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 ripples 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.
3. Select LDO or 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 whole machine. It is recommended to reserve More than 50% current output margin.

4. 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).

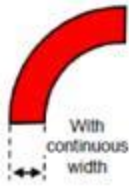


5. Keep the RF module as far away from high-voltage devices as possible, because the electromagnetic waves of high-voltage devices will also have a certain impact on RF signals.

6. High-frequency digital traces, high-frequency analog traces, and high-current power traces should be kept away from the bottom of the module as much as possible. If they must pass under the module, the traces must 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 attenuate high-frequency signals, you need to pay attention to the bottom plate PCB The length of RF traces must be as short as possible. It is recommended that the longest trace length does not exceed 20mm, and the trace width requires Maintain continuity; when you need to turn, try not to take sharp or right angles. It is recommended to take arcs.

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

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, 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. within use. When setting up the 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 the product housing structure space is sufficient, the spring antenna should be placed vertically upward; copper cannot be laid around the base plate where the antenna is placed, or the circuit board under the antenna can be hollowed out, because metal affects radio frequency signals. The absorption and shielding capabilities are very strong, it 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

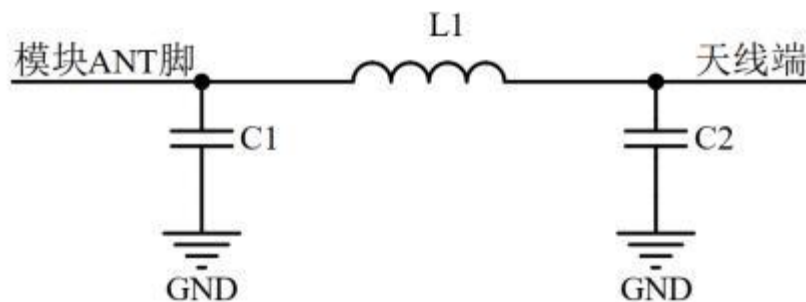
External antenna means the module passes IPEX extension cable, SMA and other standard radio frequency interfaces installed outside the product shell, including rod antennas, absorbers, dish antenna, fiberglass antenna, etc. External antennas are basically standard products. In order to better choose an antenna suitable for the module, during the antenna selection process, 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 moduleANTA simple π -type matching circuit is reserved between the pin outputs. If the antenna is already standard 50Ω , Components L1 stick 0R resistance, 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, need to be based on these factors reassessment

2, Serial port sends transparent data, 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 the 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.

3.Sending serial port configuration command, no response

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

4.Default configuration table of module main parameters

sequence	Module parameters	Factory default parameters
1	Serial port parameters	Baud rate: 115200bps, stop bit: 1, data bit: 8, parity: none
2	wireless channel	channel 0
3	Wireless transmission power	+30dBm
4	Wireless communication baud rate	1. 22Kbps

5. Serial port framing mechanism

The serial port framing mechanism is based on the packaging time and packaging length. When any one of the two conditions is met, the packet is packaged and sent.

Serial port packaging time: 5ms, when the module serial port is idle 5ms If the next byte of data is not received, the currently received serial port data will be packaged for wireless processing. Send via line.

Serial port packaging length: 128 Bytes, when the module serial port continuously receives 128 Bytes are then packaged and sent wirelessly.

6. Module sleep and wake-up

When module DIO0 is high level or floating, the module enters sleep mode and the entire module does not work.

When the module wakes up from sleep mode (the module DIO0 pin changes from high level to low level) a delay greater than 2ms, waiting for module MCU to be stable. Only then can data be fed to the module serial port.

7. Parameter configuration command

If users need to change module-related parameters according to their own needs, they need to enter configuration mode first (see pin description for details, DIO Description section) to configure relevant parameters. After the configuration is completed, you need to wait for about 200ms to send a software reset command or power on again.

CRC instruction of:

- 1). The last byte of the configuration command frame is CRC Check byte, that is, pair CRC Perform previous data CRC. The value obtained by the operation, the specific calculation method is as follows: **"8. Calculation of CRC"** chapter code is shown.
- 2), CRC Parametric model: CRC-8, x^8+x^2+x+1
- 3), CRC Polynomial POLY = 0x07
- 4), CRC initial value INIT = 0x55

1, AT Entering and exiting configuration mode

length	Order	model	Check Digit
0x03	0x26	1byte	CRC
		scope: 0~1 =0, in configuration mode, Exit configuration mode. In non-configuration mode, data is considered to be transparently transmitted. =1, enter configuration mode, You can configure other commands at this time 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, 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

3. Set wireless transmission power

length	Order	Wireless transmission power	Check Digit
0x03	0x03	1byte	CRC
		scope: 0~31 =0~5, reserved, not available =6, output -3dBm ... =31, output 22dBm =Other, invalid interval 1dBm The settings take effect immediately, Support power-off saving (Note: This command sets the radio frequency The output power of the chip rather than the module The final output power is due to the external set PA chip, so the radio frequency chip is equipped with Set the maximum output power to not exceed 5dBm, otherwise PA The chip is burned out risk. General settings for RF chip output The power is in 0~5dBm. The module finally loses Just get the power out 30dBm(1W))	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0Xee	-	CRC

4. Set the 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. Support power-off saving The lower the wireless baud rate, the better	

		Long communication distance	
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Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0Xee	-	CRC

5. Set the 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 576000bps =6, corresponding to 115200bps (default) =7, corresponding to 460800 bps =Other, invalid The settings take effect after restarting and support saving after power failure.	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check

h			Digit
0x03	0Xee	-	CRC

6. Get wireless signal strength RSSI

length	Order	data	Check Digit
0x03	0x07	1byte	CRC
		=1 =0other, invalid Settings take effect immediately	

Return successfully

length	Order	Rssi value	Check Digit
0x03	0x07	1byte	CRC

		Current environmental signal strength. The signal strength value is generally a negative value. For the convenience of transmission, the original value has been optimized. receive arrive Rssi= 100 hour, The corresponding signal strength is -100.	
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Return on failure

length	Order	data	Check Digit
0x03	0Xee	-	CRC

7. Set the serial port transparent transmission printing packet format

length	Order	Packet mode	check Bit
0x03	0x08	1byte	CRC
		scope: 0~1 =0, direct format, that is, direct transparent transmission of packets. Whatever data is received wirelessly, the serial port will directly print it all. =1, with RSSI Format, After receiving wireless data, add at the end of the packet RSSI Signal strength value, see signal strength for details No. 7 Section (default) =Others are invalid 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

8, Set up wireless auto-answer

length	Order	state	check Bit
0x03	0x09	1byte	CRC

		scope: 0~1 =0, turn off the automatic answering function =1, turn on the automatic answering function, when receiving the wireless signal , automatically start the radio frequency to send a string of data (03 55 xx crc) (default) =Others are invalid 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

9, Set wireless data output direction

length	Order	Output direction	Check Digit
0x03	0x0A	1byte	CRC
		scope: 0~1 =0, after receiving wireless data, the transparent data is forwarded and output from the serial port (default) =1, after receiving the wireless data, the transparent transmission data is forwarded and output from the wireless =0others are invalid 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

10. 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 hour, The actual channel spacing is 1MHz 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

11. Set configuration parameters to factory settings

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

12. Set 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

13. Get current configuration information

length	Order	-	Check
--------	-------	---	-------

h			Digit
0x03	0x24	1byte	CRC
		=1 =0ther, 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 frequency band range BYTE 13 : Current wireless transmission power BYTE 14 : Current wireless baud rate BYTE 15: Current serial port baud rate BYTE 16: Current packet format BYTE 17 : Current wireless automatic answer BYTE 18 : Current wireless data output direction BYTE 19 : Current wireless channel interval bandwidth For specific corresponding meanings, please refer to the corresponding configuration instructions.	
--	--	--

Return on failure

length	Order	data	Check Digit
0x03	0Xee	-	CRC

14. Get the current software version

length	Order		Check Digit
0x03	0x25	1byte	CRC
		=1 =Other, 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

15. Set up the device ID

length	Order	ID	check Bit
0x06	0x0D	4byte	CRC
		Range: 0~ 4294967295 , low byte first set up 0 hour, ID invalid Set non 0 , when transparently transmitting data wirelessly, it will automatically ID this 4 Bytes of data are forced to be inserted at the front of the data packet For example, the serial port receives the data "78 0A 0B", device ID is "02", this is the data received by the other device as "02" 00 00 00 78 0A 0B" if the device ID is "00", then it is "78 0A 0B"	

Return successfully

length	Order	data	Check Digit
0x03	0x55	-	CRC

Return on failure

length	Order	data	Check Digit
0x03	0Xee	-	CRC

8. CRC calculation

```

/**
 * @function:crc8 polynomial redundancy check
 * @param 1:pData, calculate data source address
 * @param 2:dataLen, calculate the length of the data source
 * @param 3:initialValue,crc Result initial value
 * @param 4:polynomial, polynomial
 * @return
 :Verification
 result */
uint8_t crc8( uint8_t *pDa ta,
              uint16_t dataLen,
              uint8_t initialValue,
              uint8_t polynomial )
{
  uint8_t i;

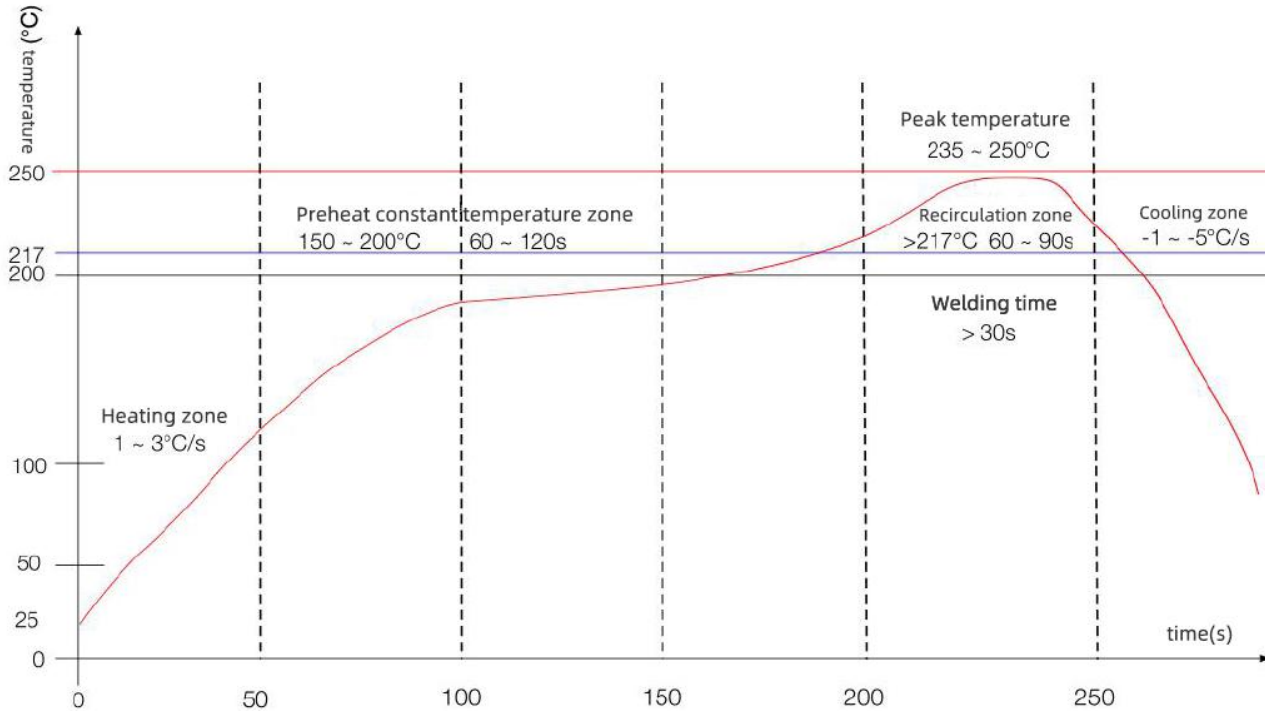
```

```
uint8_t crc;

crc= initialValue;
while (dataLen --)
{
    crc ^= *pData ++;
    for( i = 0; i < 8; i++ )
    {
        if(crc& 0x80)
        {
            crc <<= 1; // shift left once
            crc ^= polynomial; // XOR with polynomial
        }
        else
        {
            crc <<= 1; // shift left once
        }
    }
}
return crc;
}

/**
 * @function :
 *
 * @param 1:pData, calculate data source address
 * @param 2:dataLen, calculate the
length of the data source *
 * @return :return CRC
result */
int get_crc8( uint8_t *pData, uint16_t dataLen)
{
    return crc8(pData, dataLen , 0x55, 0x07);
}
```

9. 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)

10. Static electricity damage warning

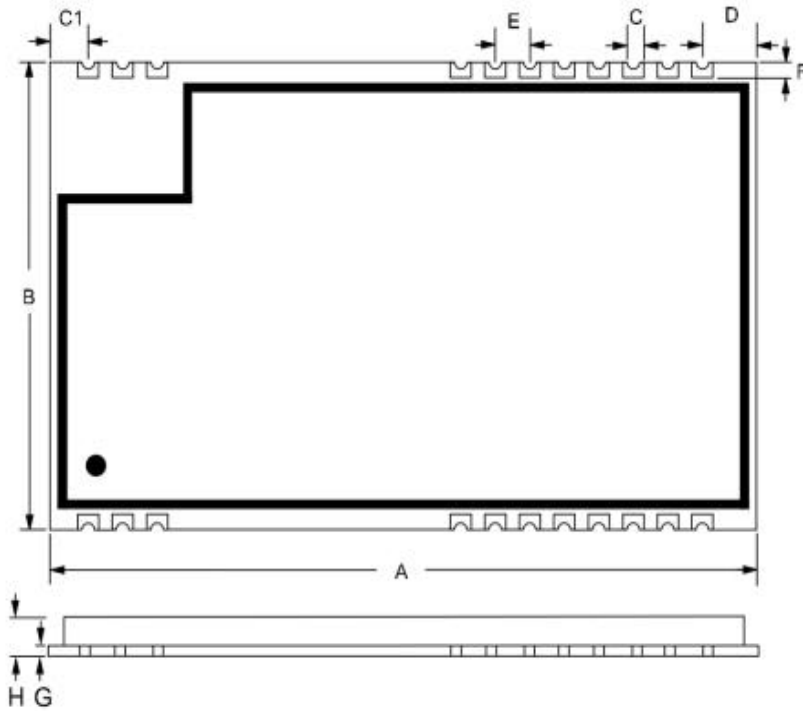
The RF module is a high-voltage electrostatic sensitive device. In order to prevent static electricity from damaging the module

- 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.



11. Packaging information

Mechanical dimensions (unit: mm)



serial number	Dimensions (mm)	Error (mm)
A	26.0	±0.5
B	16.0	±0.5
C	0.8	±0.1
C1	1.4	±0.1
D	2.0	±0.1
E	1.27	±0.1
F	0.5	±0.1
G	1.0	±0.1
H	2.6	±0.2

12. Version update instructions

Version	update content	Updated
V1.0	first release	2022 Year 11 moon 26th

13. Procurement selection table

Serial number	model	illustrate
1	VGdd79T433X0M1	433MHz Band, tape packaging\tray packaging
2	VGdd79T490X0M1	490MHz Band, tape packaging\tray packaging

14. 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.

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