HJ8258 BLE Module

datasheet

Latest version|V1.0

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About Datasheet

The specification of HJ8258 module provides an introduction of the basic functions of WLT8258 module, including the electrical specification, RF performance, pin size, and design of reference schematic diagram, etc. Readers can refer to this document to have a detailed understanding of the overall functional parameters of the module application,

Revision History

Version information management

版本号	time	*Update record*	*editors*
V1.0	2020.09.18	The initial release	

directory

1.*Summary*

HJ8258 is a Bluetooth low energy transmission module. This module is mainly used in data communication of Internet of things, and data acquisition and control are realized through rich peripheral interface. In the transmission mode, the user's product can quickly complete the docking with the module, and communicate with the mobile device to achieve intelligent control and management of the product.

HJ8258 is based on the Bluetooth low energy 5.0 protocol and can be used for point to point data transparent transmission and encryption transmission, users do not need to care about the transmission protocol, just a simple set up can be communication.

The module supports Ble (Up to Bluetooth 5.0) , Ble Mesh. Built-in 512kB FLASH SUPPORTS DYNAMIC STACK and protocol Profile configurations, and the product features can be configured via software, providing the ultimate flexibility. At the same Time Support Hardware Ota upgrade, allowing convenient product function launch and upgrade.

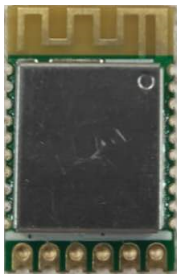


Figure 1-1： HJ8258 module

1.1.*Functions*

- Built-in high performance 32-bit MCU, 512KB Flash, 64KB SRAM
- Comply with Bluetooth 5.0 standard, RF link data up to 2Mbps
- Transmission power: maximum +2.5dBm
- Receiving sensitivity
  - -96dBm@BLE 1Mbps
  - -93dBm@ BLE 2Mbps mode
  - -99dBm@ BLE 500kbps mode
  - -101dBm@ BLE 125kbps mode
- Support UART interface
- Support AT instruction
- Support APP parameter configuration
- Onboard high performance PCB antenna
- Stamp hole pin, easy and reliable welding
- Super small package: 12.6x20mm
- Operating temperature: -40℃~+85℃

HJ8258 module only needs to connect VCC, GND, TX and RX to complete data transmission function. It also supports the use of the AT instruction to modify the default name and other related parameters (see the HJ8258 user manual for details).

1.2.**Application fields**

Personal equipment:

Wearable, mouse and keyboard, remote control toys;

Retail logistics:

Electronic shelf label, cold chain transport;

Smart home:

Lighting, sensor, intelligent lock, remote control, lawn mower, voice control, intelligent printer, lift table and chair;

Industrial control:

Security monitoring, special printers, medical equipment;

2.2 *Electrical specifications*

Table2-1：Maximum rated parameter

Item	Symbol	Min	Max	Unit
The power supply voltage	VDD	-0.3	3.6	V
Pin input voltage	Vin	-0.3	VDD+0.3	V
Pin output voltage	Vout	0	VDD	V
Storage temperature	Tstr	-65	150	ºC
Welding temperature	Tsld	-	260	ºC

> ***Note:***:
>
> 1. ***The listed electrical characteristics are target specifications for reference only. Some data may be updated based on actual test results.***
> 2. ***The voltage value shown is based on GND in the module. Any voltage exceeding the maximum rating may cause permanent damage to the equipment.***

Table2-2：Recommended operating conditions

Item	Symbol	Min	Typ.	Max	Unit
The power supply voltage	VDD	1.8	3.3	3.6	V
Power supply voltage rise time (from 1.6v to 2.8v)	TR	-	-	10	ms
Operating temperature range	Topr	-40	-	85	ºC

Table2-3：Working current(VDD=3.3V, T=25℃)

Item	Sym.	Min	Typ.	Max	Unit	Condition
RX current	IRx	-	5.3	-	mA	Whole Module Working
TX current	ITx	-	4.8	-	mA	Whole Module Working @0dBm With DCDC enable
Sleep patterns		-	1.2	-	uA	

Table2-4： Broadcast Current (VDD= 3.3v, T=25℃,2.5dBm)

Broadcast Interval	100ms	200ms	300ms	1s	2s	Unit
1 Channel	147	74	31	16	9	uA
3 Channel	266	98	54	28	18	uA

Table2-5： Connecting current (VDD= 3.3v, T=25℃,2.5dBm)

Interval	20ms	50ms	100ms	200s	500s	Unit
Current	643	263	134	68	43	uA

Table2-6：Pin input/output characteristics(VDD=3.3V, T=25℃)

Item	Sym.	Min	Typ.	Max	Unit	Condition
Input high level	VIH	0.7VDD	-	VDD	V	
Input low level	VIL	VSS	-	0.3VDD	V	
Output high level	VOH	0.9VDD	-	VDD	V	
Output low level	VOL	VSS	-	0.1VDD	V	

Table2-7：RF performance parameter

Item	Sym.	Min	Typ.	Max	Unit	Condition
Frequency range	Freq.	2380	-		MHz	1MHz programmable frequency interval
Data rate	BLE/2.4G Proprietary 1Mbps, ±250kHz deviation BLE/2.4G Proprietary 2Mbps, ±500kHz deviation BLE 125kbps, ±250kHz deviation BLE 500kbps, ±250kHz deviation					

3. *The Bluetooth specification*

Table3-1： BLE 1Mbps RF_Rx performance(±250kHz deviation)

Item	Sym.	Min	Typ.	Max	Unit	Condition
The sensitivity	1Mbps	-	-96	-	dBm	
Frequency offset error	-	-250	-	+300	KHz	
Same frequency suppression	-	-	-11	-	dB	Received signal strength -67dBm
Image reject	-	-	37	-	dB	Received signal strength -67dBm
Intra-band blocking rejection（modulation interference）	±1 MHz offset	-	1/3	-	dB	Received signal strength -67dBm
	±2 MHz offset	-	37/39	-	dB	
	>=3 MHz offset	-	42	-	dB	

Table3-2：BLE 1Mbps RF_Tx performance

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Maximum output	-	-	2.5	-	dBm	
Minimum output	-	-	-45	-	dBm	
Programmable power output range	-	55	55	55	dBm	
20dB modulation bandwidth	-	-	2.5	-	MHz	

Table3-3：BLE 2Mbps RF_Rx performance(±500kHz deviation)

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
The sensitivity	2Mbps	-	-93	-	dBm	
Frequency offset error	-	-300	-	+200	KHz	
Same frequency suppression	-	-	-10	-	dB	Received signal strength -67dBm
Image reject	-	-	25	-	dB	Received signal strength -67dBm
Intra-band blocking rejection（modulation interference）	±2 MHz offset	-	6/6	-	dB	Received signal strength -67dBm
	±4 MHz offset	-	39/38	-	dB	
	>=4 MHz offset	-	42	-	dB	

Table3-4：BLE 2Mbps RF_Tx performance

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Maximum output	-	-	2.5	-	dBm	
Minimum output	-	-	-45	-	dBm	
Programmable power output range	-	55	55	55	dB	
20dB modulation bandwidth	-	-	1.4	-	MHz	

Table3-5：BLE 500kbps RF_Rx performance(±250kHz deviation)

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
The sensitivity	500kbps	-	-99	-	dBm	
Frequency offset error	-	-150	-	+50	KHz	
Same frequency suppression	-	-	-1	-	dB	Received signal strength -67dBm
Image reject	-	-	42	-	dB	Received signal strength -67dBm
Intra-band blocking rejection（modulation interference）	±1 MHz offset	-	34/36	-	dB	Received signal strength -67dBm
	±2 MHz offset	-	42/42	-	dB	
	>=3 MHz offset	-	42	-	dB	

Table3-6：BLE 500kbps RF_Tx performance

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Maximum output	-	-	2.5	-	dBm	
Minimum output	-	-	-45	-	dBm	
Programmable power output range	-	55	55	55	dB	
20dB modulation bandwidth	-	-	2.5	-	MHz	

Table3-7：BLE 125kbps RF_Rx performance(±250kHz deviation)

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
The sensitivity	125kbps	-	-101	-	dBm	
Frequency offset error	-	-150	-	+50	KHz	
Same frequency suppression	-	-	-3	-	dB	Received signal strength -67dBm
Image reject	-	-	42	-	dB	Received signal strength -67dBm
Intra-band blocking rejection（modulation interference）	±1 MHz offset	-	32/34	-	dB	Received signal strength -67dBm
	±2 MHz offset	-	42/42	-	dB	
	>=3 MHz offset	-	42	-	dB	

Table3-8：BLE 125kbps RF_Tx performance

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Maximum output	-	-	2.5	-	dBm	
Minimum output	-	-	-45	-	dBm	
Programmable power output range	-	55	55	55	dB	
20dB modulation bandwidth	-	-	2.5	-	MHz	

4.*Pin description*

4.1.*Pin assignment*

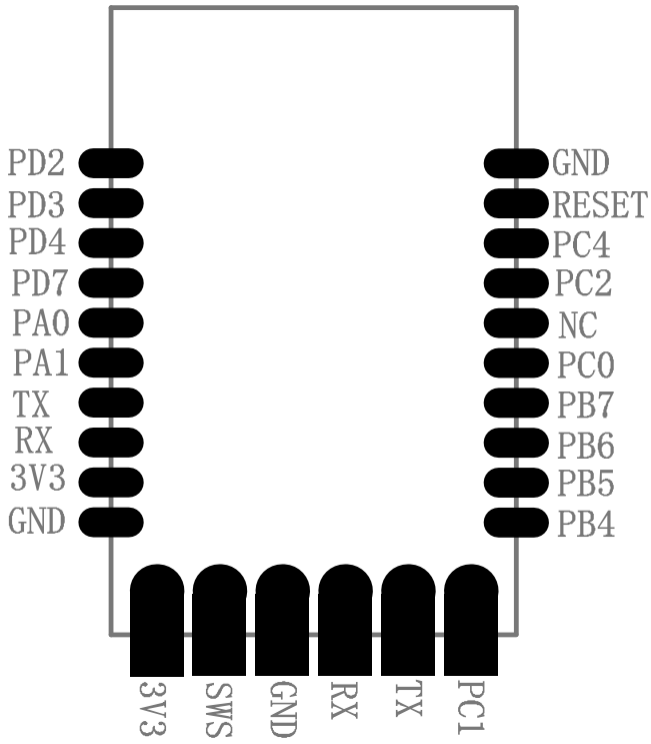


Figure 4-1： *module pin diagram*

> Note: figure 4-1 pin functions can be redefined by pin reuse

4.2.**4.2** *UART interface*

The module supports UART (universal asynchronous transceiver) and realizes full duplex transmission and reception through TX and RX interfaces. Support hardware flow control RTS and CTS.

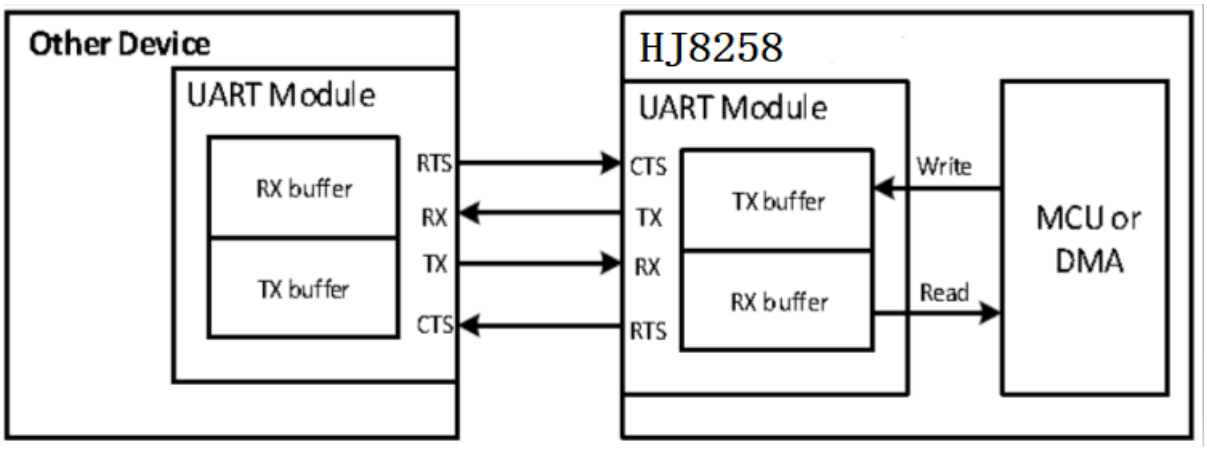


Figure 4- 2： UART *communication*

4.3.*Pin definition*

PIN #	Pin name	Type	describe
1	PD<2>	Digital I/O	SPI_CN/I2S_LR/PWM3/PD<2>
2	PD<3>	Digital I/O	PWM1_N/I2S_SDI/7816_TRX/PD<3>
3	PD<4>	Digital I/O	SWM/I2S_SDO/PWM2_N/PD<4>
4	PD<7>	Digital I/O	SPI_CK/I2S_BCK/7816_TRX/PD<7>
5	PA<0>	Digital I/O	DMIC_DI/PWM0_N/UART_RX/PA<0>
6	PA<1>	Digital I/O	DMIC_CLK/7816_CLK/I2S_CLK/PA<1>
7	TX	Digital I/O	PWM4/UART_TX/ATSEL2/lc_comp_ain<1>/sar_aio<1>/PB<1>
8	RX	Digital I/O	PWM1/UART_RX/I2C_SCK/XC32K_I/PGA_N1/PC<3>
9	3V3	POWER	3.3V Power Supply
10	GND	POWER	Ground
11	3V3	POWER	3.3V Power Supply
12	SWS	Digital I/O	SWS/UART_RTS/PA<7>
13	GND	POWER	Ground
14	RX	Digital I/O	PWM1/UART_RX/I2C_SCK/XC32K_I/PGA_N1/PC<3>
15	TX	Digital I/O	PWM4/UART_TX/ATSEL2/lc_comp_ain<1>/sar_aio<1>/PB<1>
16	PC<1>	Digital I/O	I2C_SCK/PWM1_N/PWM0/PGA_N0/PC<1>
17	PB<4>	Digital I/O	SDM_P0/PWM4/lc_comp_ain<4>/sar_aio<4>/PB<4>
18	PB<5>	Digital I/O	SDM_N0/PWM5/lc_comp_ain<5>/sar_aio<5>/PB<5>
19	PB<6>	Digital I/O	SDM_P1/SPI_DI/UART_RTS/lc_comp_ain<6>/sar_aio<6>/PB<6>
20	PB<7>	Digital I/O	SDM_N1/SPI_DO/UART_RX/lc_comp_ain<7>/sar_aio<7>/PB<7>
21	PC<0>	Digital I/O	I2C_SDA/PWM4_N/UART_RTS/PGA_P0/PC<0>
22	NC	NC	NC
23	PC<2>	Digital I/O	PWM0/7816_TRX/I2C_SDA/XC32K_O/PGA_P1/PC<2>
24	PC<4>	Digital I/O	PWM2/UART_CTS/PWM0_N/sar_aio<8>/BIAS/PC<4>
25	RESET	RESET	Power on reset, active low
26	GND	POWER	Ground

> ***Note: All digital IOs can be used as GPIOs with configurable pull-up/pull-down resistors.***

5.*Reference design*

5.1.*Reference schematic*

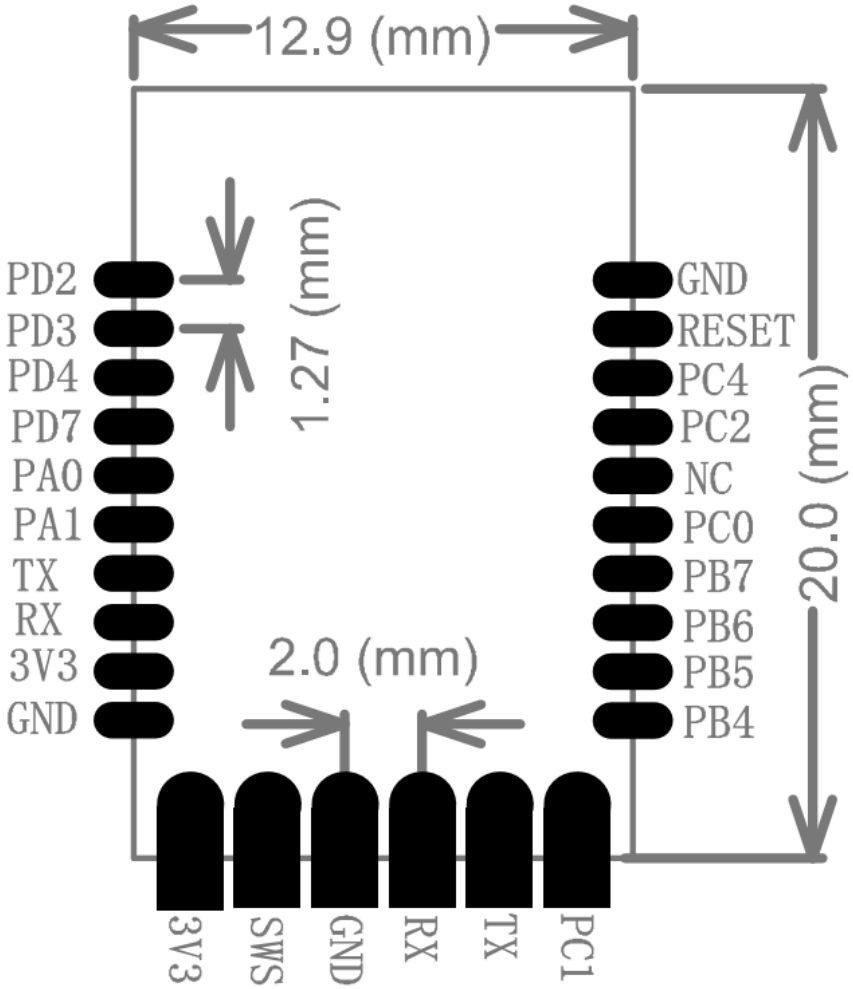


Figure 5-1： Top View (Seen from Top) Bottom View (Seen from Bottom)

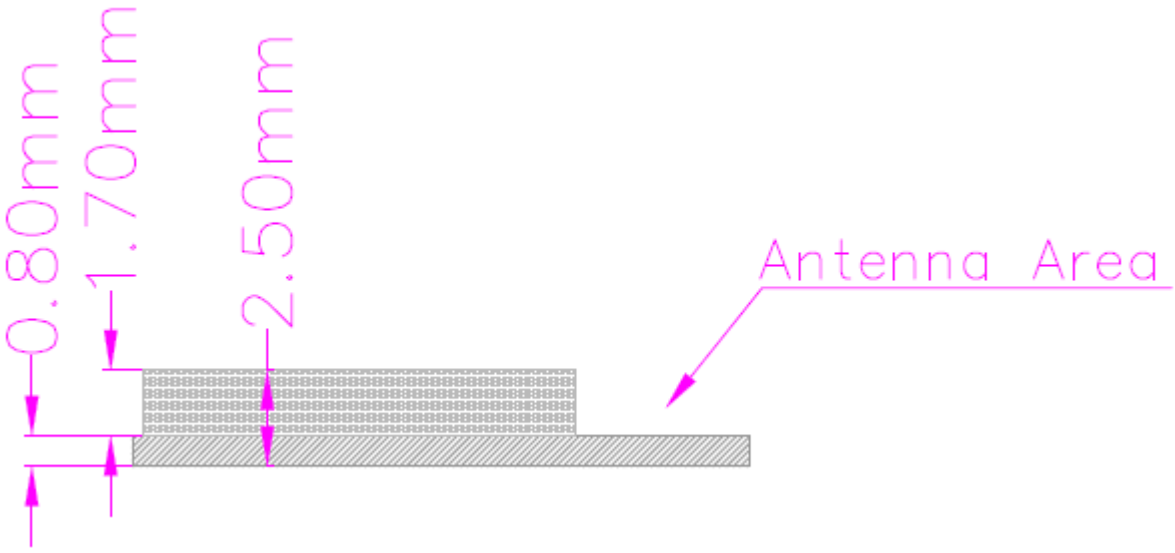


Figure 5-2: Module thickness

Module outline dimensions (including process edges)	**Length (X)**	**11.50± 0.3mm**
	Width (Y)	16.40± 0.3 mm
Antenna Position Dimension	Length (X)	11.20 mm± 0.15 mm
	Width (Y)	4.34 mm± 0.15 mm
PCB Thickness	Height (H)	0.80 ± 0.05 mm
Total thickness of module (including shielding case)	Height (H)	2.50 ± 0.1 mm
Total thickness of module (including shielding case)	Height (H)	1.67 ± 0.05 mm

Table5-1： Module design dimensions

5.2.*Matters needing attention*

Bluetooth working at 2.4GHz frequency, should try to avoid the impact of various factors on wireless transceiver, pay attention to the following points:

- Avoid using metal in the product shell that surrounds the module. If the shell is metal, consider using an external antenna.
- Metal screws inside the product should be away from the RF part of the module.
- To maximize RF performance, the user motherboard layout should follow the following recommendations:
  - Antenna clearance area: the user mainboard located directly below the module antenna area shall not have any copper foil wiring (including power supply, ground and signal layer).
  - 1) Module position: the module should ideally be placed in the corner of the user's main board, and the PCB antenna is located at the far end of the main board. This position minimizes the clearance area of the antenna.

(Refer to the definition of antenna clearance area below)

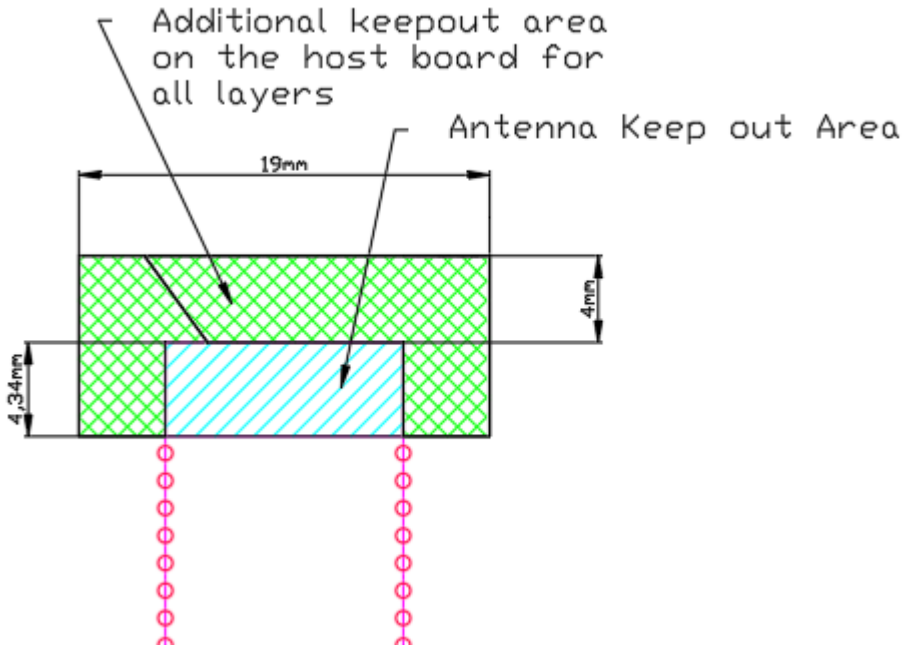


Figure 5- 3： Antenna Keep out

6.*Reflux parameter*

Backflow parameters can be set as follows:

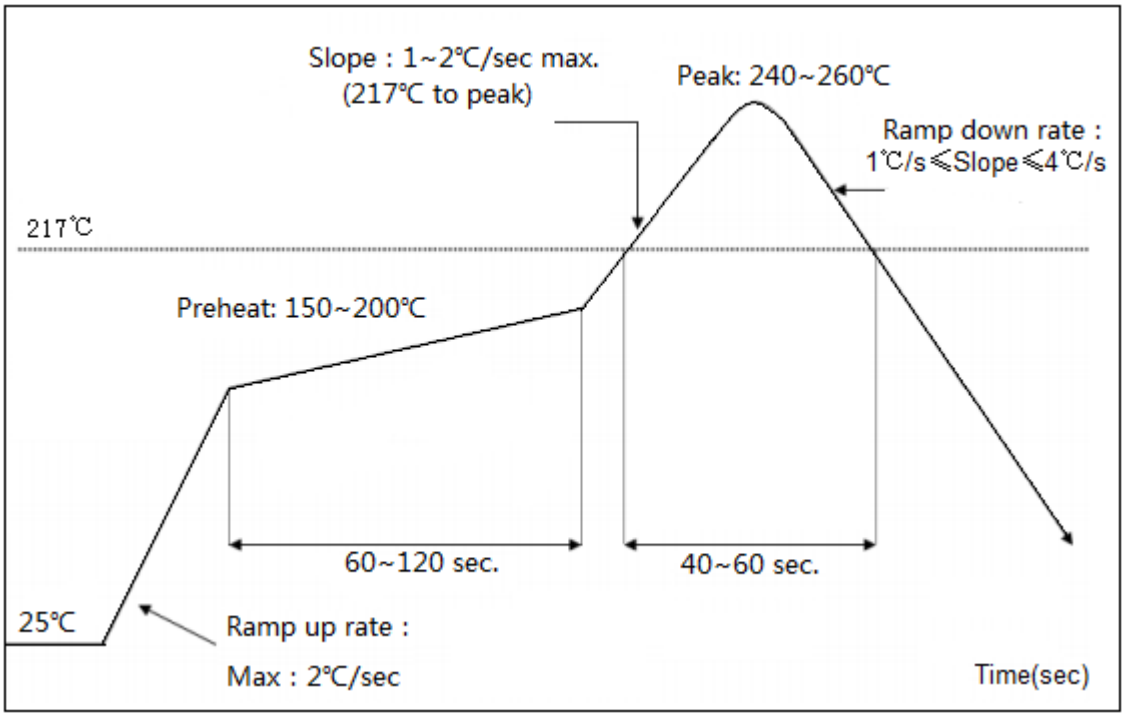


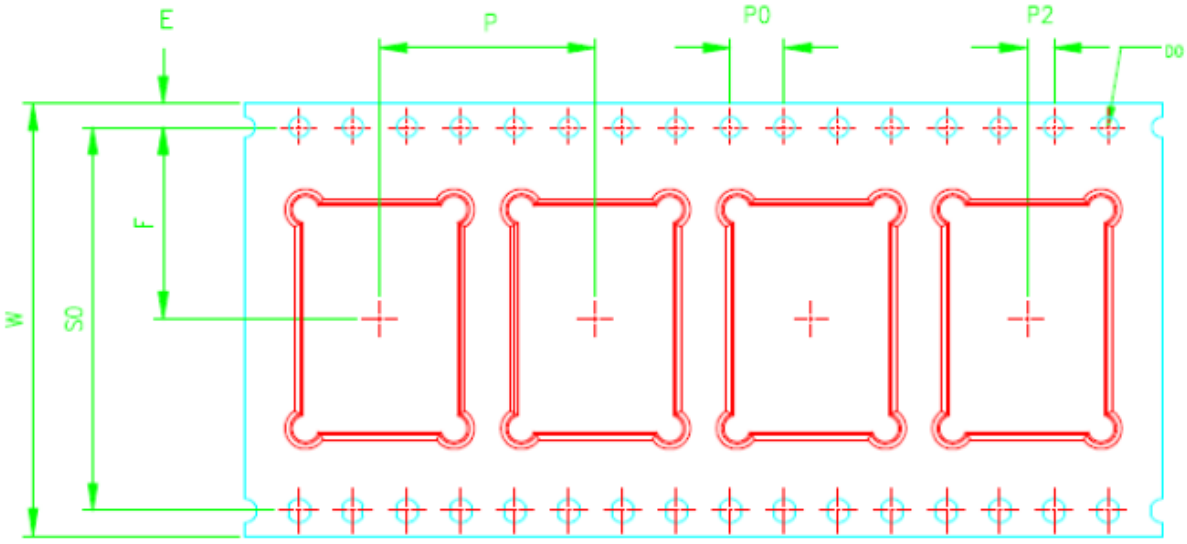
Figure 6- 1： *reflux recommendation curve*

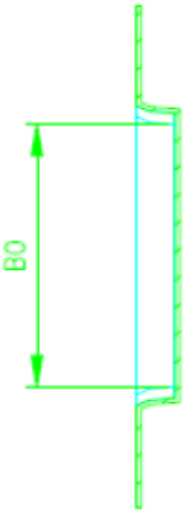
Temperature range	Time	Key parameters
Preheat zone(<150℃)	60-120S	Ramp up rate:≤2S
Uniform temperature zone(150-200℃)	60-120S	Ramp up rate:<1S
Recirculation zone(>217℃)	40-60S	Peak:240-260℃
Cooling zone	Ramp down rate:1℃/s≤Slope≤4℃/s	

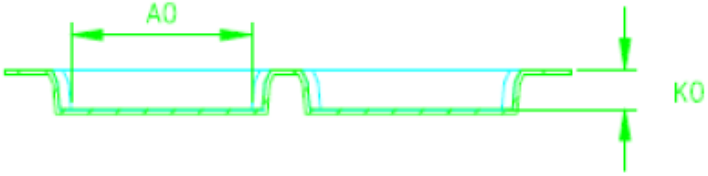
Table6- 1： *recommended reflux parameters*

7. Packing size

The HJ8258 module adopts taping package by default. Taping dimensions are as follows::

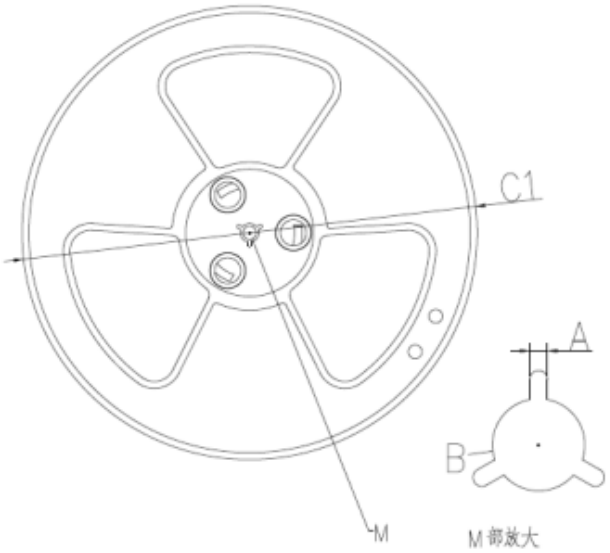


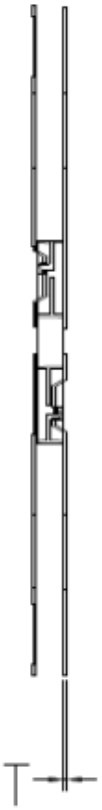


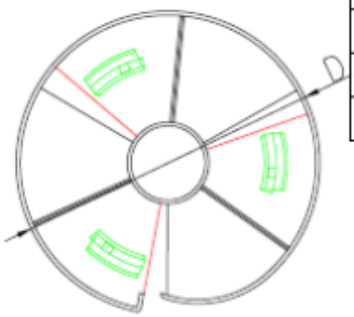


W	32.00 ±0.30	P	16.00 ±0.10	A0	11.60 ±0.10	B0	16.80 ±0.10
S0	28.40 ±0.10	P0	4.00 ±0.10	A1		B1	
E	1.75 ±0.10	P2	2.00 ±0.10	A2		B2	
F	14.20 ±0.10	D0	1.50 $^{+0.10}_{-0.00}$	K0	2.50 ±0.10	K1	
T	0.30 ±0.05	D1		SCALE:	1:1 UNIT:	mm REV.	R1

Reel dimensions are as follows：







Available Reel Sizes(mm)		
Tape Width	D ±0.5mm	H +1mm
12mm	ø100mm	12.6mm
16mm		16.6mm
24mm		24.6mm
32mm		32.6mm

SPEC	13"
C1±1	φ330
A±0.2	2.6
B±0.2	φ13.5
T±0.2	1.4

8.*Regulatory Module Integration Instructions*

List of applicable FCC rules

This device complies with part 15.247 of the FCC Rules.

Limited module procedures

Not applicable

Summarize the specific operational use conditions

This module can be applied in remote control toys, sports and fitness sensors , health sensors, mobile accessories as well as smart home. The input voltage to the module should be nominally 1.8-3.6 V DC , typical value 3.3V DC and the ambient temperature of the module should not exceed 85℃.

Trace antenna designs

Not applicable

RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .If the device built into a host as a portable usage， the additional RF exposure evaluation may be required as specified by 2.1093.

Antennas

This module using PCB antennas with maximum gain is 3 dBi .

Label and compliance information

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as:"Contains Transmitter Module FCC ID: 2AJJGHJ8258 " , Any similar wording that expresses the same meaning may be used.

Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected The HJ8258 module is based on TLSR8258 chip .support standard Bluetooth 5.0 commands. For the testing module on your product, user can refer to specification of the Bluetooth system on how to configure and evaluate the module. This specification can also be found on the official Bluetooth website:

https://www.bluetooth.org/en-us/specification/adopted-specifications.

Additional testing, Part 15 subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device .

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

Frequency spectrum to be investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

Operating the host product

When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable

activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.The product under test is placed into a normal 'paired' mode with another BLE device, as per the normal intended use of the product (for example, transferring data).

FCC Statement

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. 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. The module is limited to OEM installation ONLY. The OEM integrator is responsible for ensuring that the end user has no manual instruction to remove or install module.