WS8854FLS

Wireless Transceiver Module

Data Sheet

Wireless Transceiver Module

- Support for a wide range of frequency band 861-930 MHz
- Supports 1,000 node-like networks
- Support for high air rate, up to 300 kbps
- Support for the Wi-SUN FAN 1.0 protocol stack
- Support up to 14 dBm output power, multi-stage power adjustable
- Support for multi-channel frequency hopping transmission
- Supports the bidirectional communication between the repeater and the terminal to establish a mesh network
- Support for multi-hop networks between repeaters (relay function)
- Support the serial port command parameter configuration
- Antenna interface stamp hole (50 Ω impedance)
- Small size: 22mm x 15mm x 2.8mm

Document information		
product model	**WS8854FLS**	
Product overview	861-930MHz Wireless Transceiver Module	
type of documentation	Data sheet	
Document number		
Document version	V 1.0	2023.05.29

Document version update				
order number	**version number**	**Revised content**	**Revised date**	**Revised**
1	V1.0	The initial version	2023.05.29	ZJX

1 Product overview 4
1.1 Product Introduction 4
1.2 Features 4
1.3 Application Scenario 4
2 Pound definition 5
3 Hardware design 7
4 Electrical and other parameters 7
4.1 Limit parameters 7
4.2 Working parameters 7
4.3 RF performance parameters 7
4.4 Crystal vibration parameters 8
4.5 Other parameters 8
5. Module package dimensions 9
6 Production guidance 10
6.1 Reflow welding curve graph 10
6.2 Reflow welding temperature and time 10
7 FCC Warning Statement 11
8 Contact us 14

1 Product overview

1.1 Product Introduction

WS8854FLS Is an 861-930 MHz serial port Wireless Transceiver module independently developed by Chengdu Silent Information Technology, The maximum emission power can reach 14 dBm, The module adopts TI's CC 1312R7 high-performance RF chip, Support for IEEE 802.15.4g, smart objects (6LoWPAN) for IPv6, miotic ®, Wi-SUN ®, proprietary systems (including TI 15.4-Stack (Sub-1GHz)), and concurrent multiple protocols via Dynamic Multi-protocol Manager (DMM) drives.

WS8854FLS Serial port Wi-Sun module contains boundary routing (border router), routing (router) two modes, mode can be through serial command set function configuration, module has the network function, multiple Wi-SUN network, node replacement, network topology acquisition and automatic routing function, remote configuration, multicast transmission function, UDP transmission function, to meet the needs of various application scenarios, with strong flexible use and large-scale use.

1.2 Features

Features
Support for the 861-930 MHz frequency band
Support a mesh network with 1000 nodes
The maximum emission power is 14 dBm
Support protocol Wi-SUN ®, miotic ®, Amazon Sidewalk, wireless M-Bus, 6LoWPAN, proprietary system
Supports the bidirectional communication between the repeater and the terminal to establish a mesh network
Support for multi-hop (multi hop) networks between repeaters (relay function)
Support for 300 kbps high-speed rate
Support for multilevel power adjustable
Operating range of support voltage: 1.8V~3.8V
Support-40℃ ~85℃ for long time use

1.3 Application Scenario

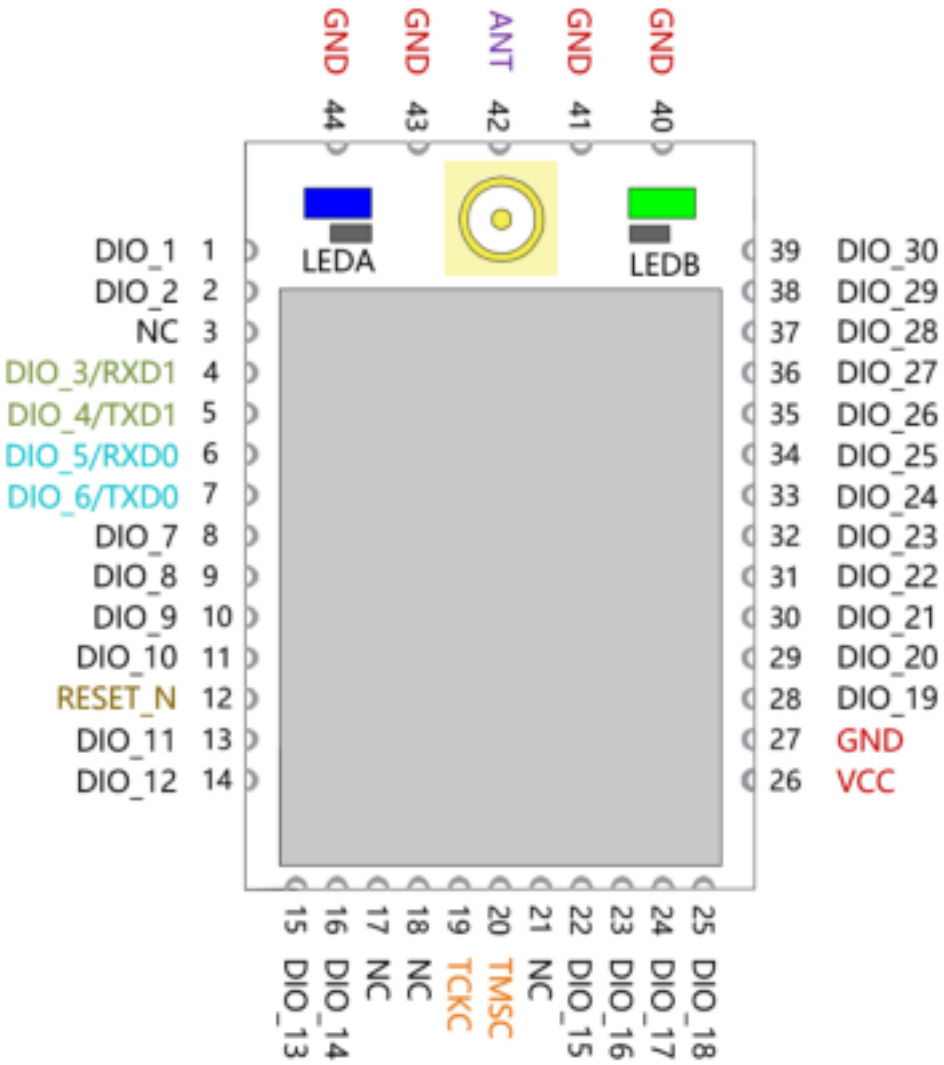
Application scenarios
Advanced urban traffic management system: intelligent traffic lamp management system; intelligent street lamp management system, etc
Advanced factory intelligent system: intelligent factory wireless management system; intelligent factory automation system, etc
Power grid infrastructure
Intelligent building system
Retail automation and payment applications
Personal electronic products

The Home Smart Energy Management (HEMS) controller

Electric vehicle charging infrastructure

Fire safety

2 Pound definition



	Feet name	type	description
1	DIO_1	I/O	be in common use IO
2	DIO_2	I/O	be in common use IO
3	NC	-	-
4	DIO _3/RXD1	I	Serial port: 1 RXD
5	DIO _4/TXD1	O	Serial port: 1 TXD
6	DIO_5/RXD0	I	Serial port, 0 RXD
7	DIO_6/TXD0	O	Serial port, 0 TXD
8	DIO_7	I/O	be in common use IO

9	DIO_8	I/O	be in common use IO
10	DIO_9	I/O	be in common use IO
11	DIO_10	I/O	be in common use IO
12	RESET_N	I	Modulreset input, low level effective
13	DIO_11	I/O	be in common use IO
14	DIO_12	I/O	be in common use IO
15	DIO_13	I/O	be in common use IO
16	DIO_14	I/O	be in common use IO
17	NC	-	-
18	NC	-	-
19	TCKC	I	The JTAG download port
20	TMSC	I/O	The JTAG download port
21	NC	-	-
22	DIO_15	I/O	be in common use IO
23	DIO_16	I/O	be in common use IO
24	DIO_17	I/O	be in common use IO
25	DIO_18	I/O	be in common use IO
26	VCC	I	Total power input
27	GND	I	Power reference
28	DIO_19	I/O	be in common use IO
29	DIO_20	I/O	be in common use IO
30	DIO_21	I/O	be in common use IO
31	DIO_22	I/O	be in common use IO
32	DIO_23	I/O	be in common use IO
33	DIO_24	I/O	be in common use IO
34	DIO_25	I/O	be in common use IO
35	DIO_26	I/O	be in common use IO
36	DIO_27	I/O	be in common use IO
37	DIO_28	I/O	be in common use IO
38	DIO_29	I/O	be in common use IO
39	DIO_30	I/O	be in common use IO
40	GND	I	Power reference
41	GND	I	Power reference
42	ANT	I/O	RF antenna interface can be used with IPEX according to the application
43	GND	I	Power reference
44	GND	I	Power reference
LEDA	BLUE	-	Connect to DIO_1, high level lighted
LEDB	GREEN	-	Connect to DIO_2, high level lighted

3 Hardware design

- This recommended circuit can be used for test circuits and design circuits;
- Modulinput suggests to increase ripple suppression ratio (PSRR) better than 60dB, LDO with driving capacity above 300 mA;

4 Electrical and other parameters

4.1 Limit parameters

parameter	symbol	least value	crest value	unit
supply voltage	VCC	-0.3	4.1	V
Communication voltage	V_{IN}	-0.3	4.1	V
Storage temperature	T_{STG}	-40	150	℃
Maximum input power	PIN	-	10	dBm
Digital interface drives the current	I_{DO}	-8	+8	mA

4.2 Working parameters

parameter	symbol	least value	representative value	crest value	unit
supply voltage	VCC	1.8	3.3	3.8	V
Power Supply Voltage (boost mode)	VCC	2.1	3.3	3.8	V
Communication voltage	V_{IN}	2.1	3.3	3.8	V
working temperature	T_{OP}	-40	25	85	℃

4.3 RF performance parameters

Tc=25℃，V_{CC}=3.3V

parameter	least value	representative	crest value	unit	remarks

		value			
Work frequency band	861	868/915	930	MHz	-
transport protocol	-	Wi -SUN	-	-	-
Air rate	50	-	300	kbps	-
transmitting power	13	13.5	14	dBm	@3.3V
receiving sensitivity	-106	-107	-108	dBm	@3.3V 868MHz、2-GFSK、50 kbps 、±12.5kHz deviation 、RXBW：68kHz
emission current	-	36	30	m A	@3.3V Send data rate 500bit / s
receive current	-	5.5	6.5	m A	@3.3V

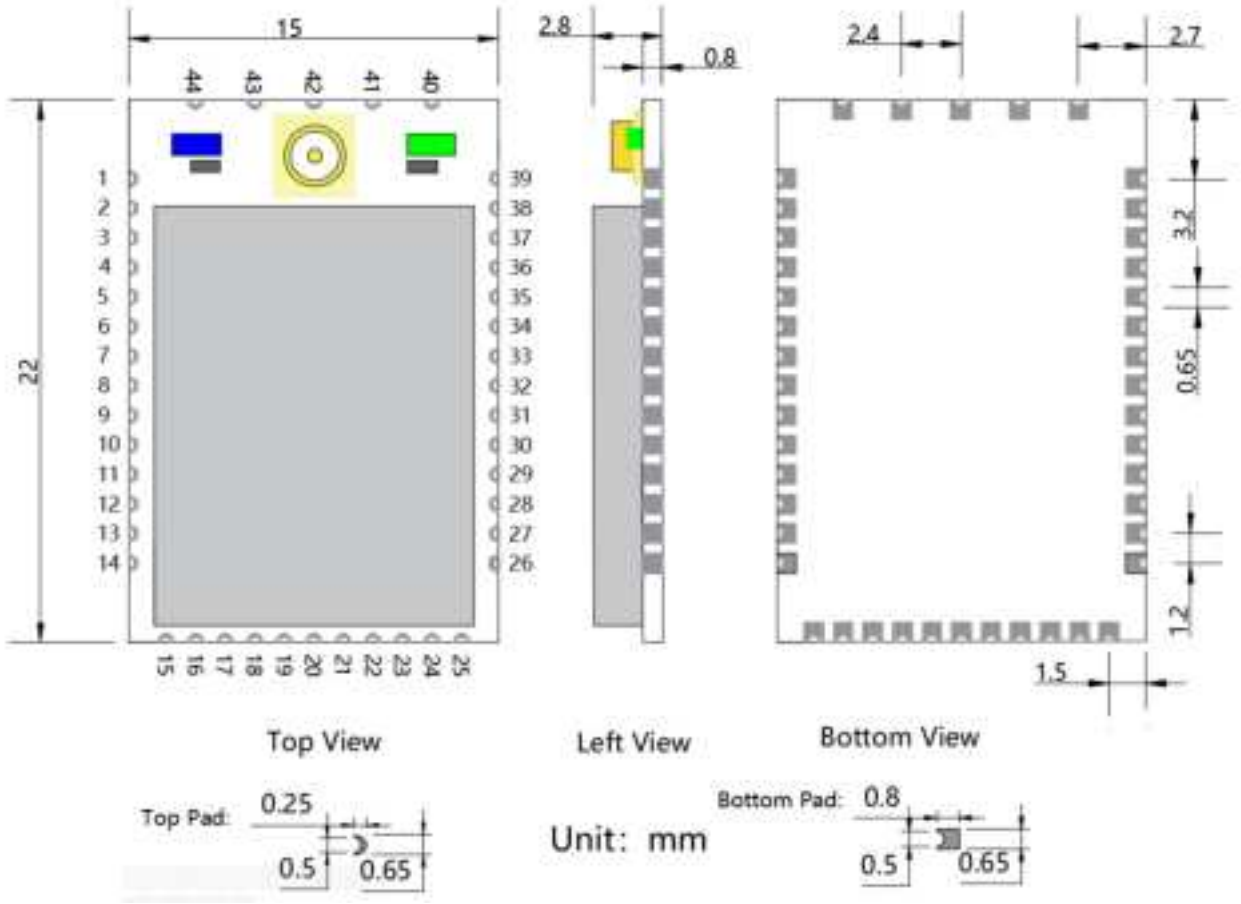
4.4 Crystal vibration parameters

crystal oscillator	Frequency deviation	frequency stability	load capacitor	working temperature	Matching capacitance
48MHz	±10ppm	±30ppm	8pF	-40℃~85℃	Register setting of 0x 03
32.768kHz	±20ppm	--	9pF	-40℃~85℃	

4.5 Other parameters

parameter	description
CI	UART
radio frequency interface	Stamp hole + IPEX generation
Packaging method	Patch type
Interface mode	1.2mm spacing stamp hole
outline dimension	22*15*2.8mm (Including the shield cover)
Hardware version	V 1.0

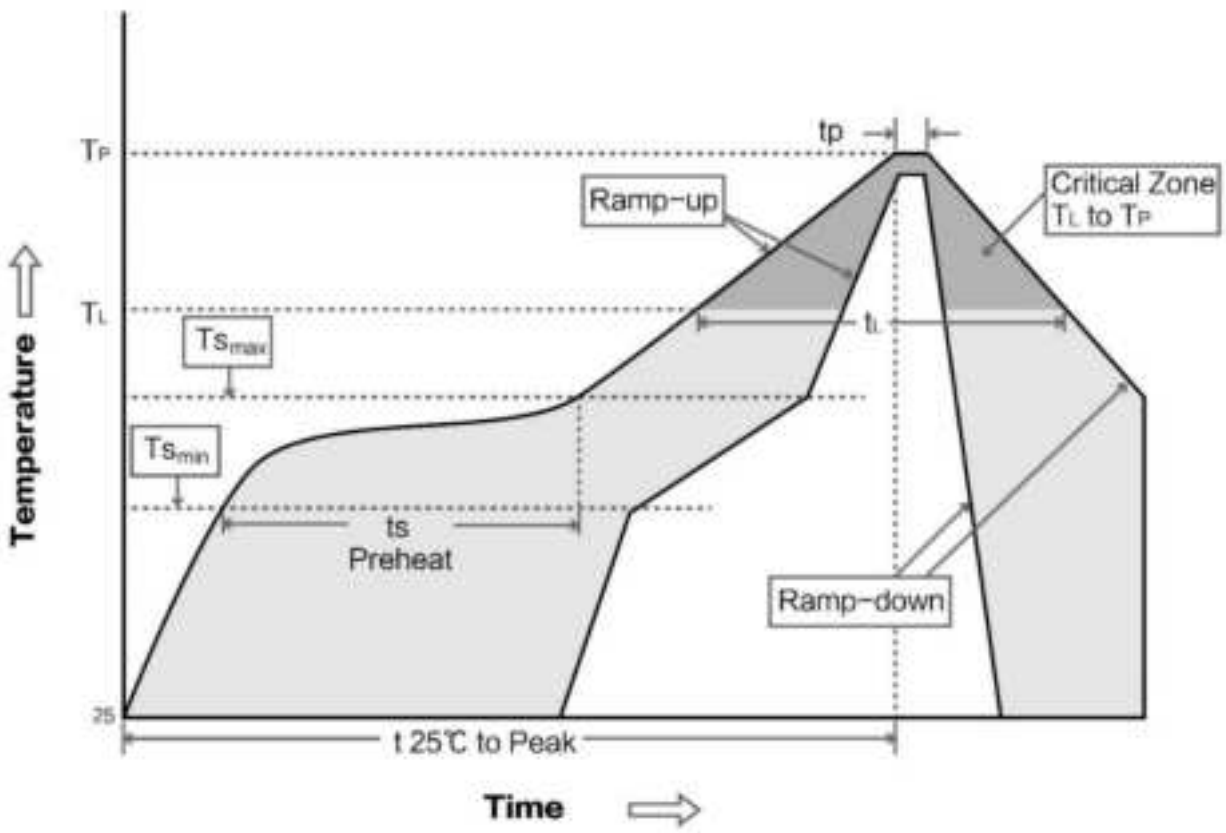
5. Module package dimensions



- Recommended pad design: length 2*0.8mm = 1.6mm and width 0.65mm.

6 Production guidance

6.1 Reflow welding curve graph



6.2 Reflow welding temperature and time

Curve characteristics	Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
solder paste	Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Minimum preheating temperature	Preheat Temperature min (Tsmin)	100℃	150℃
Maximum preheating temperature	Preheat temperature max (Tsmax)	150℃	200℃
preheating time	Preheat Time (Tsmin to Tsmax)(ts)	60-120 sec	60-120 sec
Average rise rate	Average ramp-up rate(Tsmax to Tp)	3℃/second max	3℃/second max
Fluid phase temperature	Liquidous Temperature (TL)	183℃	217℃

Time above the liquid-phase line	Time (tL) Maintained Above (TL)	60-90 sec	30-90 sec
Peak temperature	Peak temperature (Tp)	220-235℃	230-250℃
Average decrease rate	Aveage ramp-down rate (Tp to Tsmax)	6℃/second max	6℃/second max
25℃ to peak temperature	Time 25℃ to peak temperature	6 minutes max	8 minutes max

7 FCC Warning Statement

FCC Warning Statement

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

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.

RF Exposure Statement

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm the radiator your body. This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies.

DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.3

Explanation: This module meets the requirements of Title 47 (Part 15)

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master

devices in 5 GHz DFS bands.

Explanation: The EUT uses External Antenna, antenna gain: 0dBi. There is no restriction on the installation method.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary

requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the

limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is a limited module

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout

of trace design, parts list (BOM), antenna, connectors, and isolation requirements.4

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);

b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);

c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit

(PC) board layout;

d) Appropriate parts by manufacturer and specifications;

e) Test procedures for design verification; and

f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II

permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes. The module without trace antenna designs

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions

(mobile, portable – xx cm from a person' s body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The device is mobile, portable, and the use distance is 20 cm.This module is designed to comply with the FCC statement, FCC ID is: 2BB8U-WS8854FLS

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall

also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omnidirectional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in

the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT uses External Antenna, antenna gain: 0dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication

784748.

Explanation: The host system using this module, should have label in a visible area indicated he following texts: "Contains FCC ID: 2BB8U-WS8854FLS.

2.9 Information on test modes and additional testing requirements5 Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a standalone modular transmitter in a host,

as well as for multiple simultaneously transmitting modules or other transmitters in a host product. The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with

multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’ s determination that a module as installed in a host complies with FCC requirements.

Explanation: Data transfer module demo board can control the EUT work in RF test mode at specified test channel

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as

being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B

8 Contact us

•	Cellphone	Email
Manager Chen	15000319232	chenliang@silent -smart.com
Tel.: 028-64823553		
Address: 303-7, Floor 3, Building 12, No.38, South Jinke Road, Jinniu Hi-tech Industrial Park, Chengdu,Sichuan,China		