

User Manual

Wi-SUN Comm Module

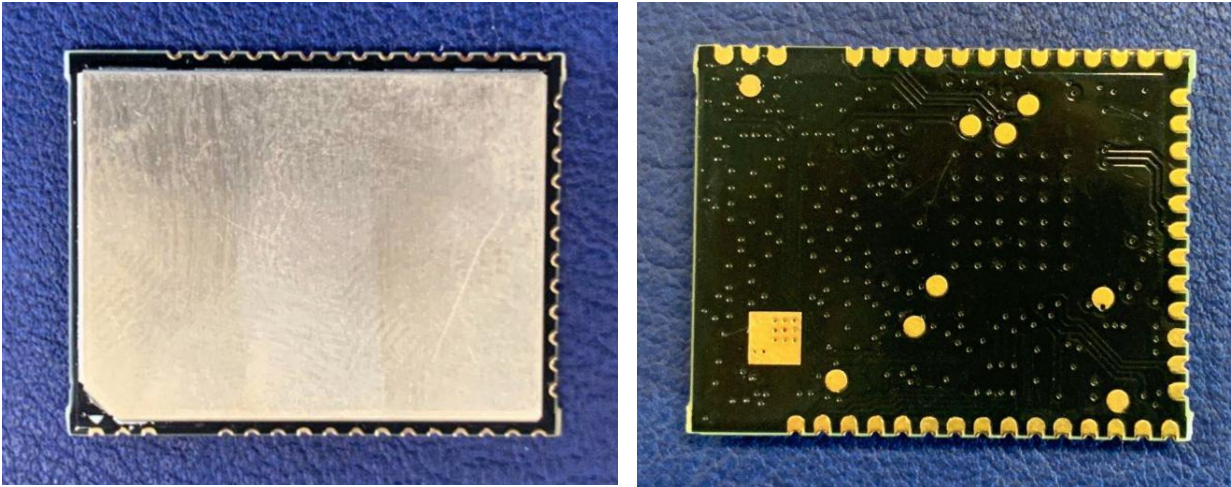
Product Model: MSN00



Document Edit History

No	Date	Author	Version	Content
1	2020-04-18	Calvin	1.0	Create this document
2	2020-06-12	Calvin	1.1	1. Add new model with flash, W139 2. New design, change 34 pin to 43 pin
3	2020-06-18	Calvin	1.2	Fixed some text error
4	2020-07-06	Calvin	1.3	Optimized some text

1. Overview



The MSN00.W139/W149 is a low power and high performance wireless communication module based on WiSUN chip, which can be widely used in many short distance IoT wireless communication field. The MSN00.W139 not only features with small size, low power consumption, long transmission distance and strong anti-interference ability, but also meets the Wi-SUN standard, therefore it is very suitable for IO network and sensor applications where powerful computing capability is needed.

2. Features

- **Working frequency**
 - 902.2~927.8MHz(50 kbps), 902.4~927.6(150 kbps)
- **Radio Frequency**
 - Sensitivity up to: -110dBm@50kbps_h1_GFSK
 - Transmitting power: 27.79dBm(50kbps) and 27.95dBm(150kbps)
- **Tiny Size**
 - 28*22mm

3. Application

AMI(Advanced Metering Infrastructure)

IOT(Internet of Things)

-Smart Home System

-Sensor network

- Industrial automation

-Industrial HEMS

- Electronic station signs, intelligent traffic scheduling

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4. Specification

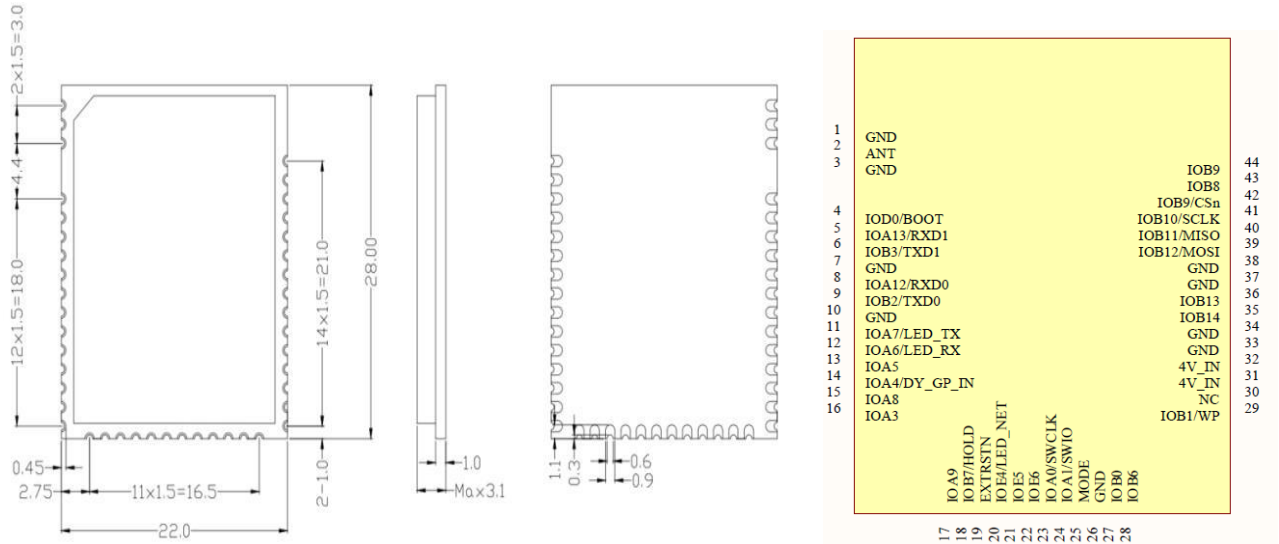
Item		Value			Note
		Min	Typical	Max	
Frequency(MHZ)		902.20	915.0	927.80	Customizable
Temperature (°C)		-40		85	
Power	Transmitting(mA)		700	770	Factory preset value
	Receiving(mA)	38			Keep receiving
Transmitting Signal(dBm)		27.73	27.78	27.79	Factory preset value, 50kbps/h=1
TX Signal Offset(dB)		±0.5			
Signal Stepping(dB)		0.75			When MCU+RF TXOM pin output power is below -4
RX Signal Offset(dB)		±0.5			
Interface Type		Stamp Hole			1.5mm gap
Communication Protocol		SPI/UART/IIC			
Size		28*22*3.1mm			
Supported Standards		Wi-SUN			
Electrostatic Grade		±1KV			Contact discharge
RF Port Impedance (Ω)		50			
Flash (W139 Only)		4Mbit			Only applicable for W139

Software: WSLN200220V1

* Based on input voltage 4V, temperature 25°C, relative humidity 20%

5. Dimension and Pin-out

5.1 Dimensions



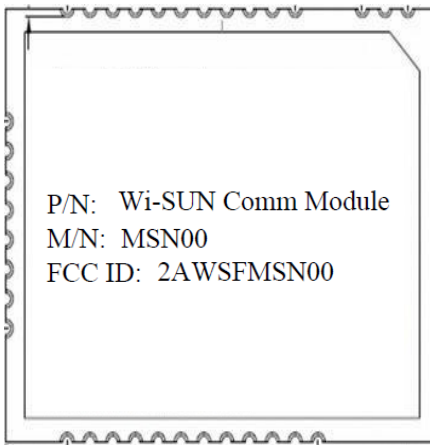
5.2 Pin-Out Definition

Pin Designator	Pin Name	Note
1	GND	
2	ANT	Module RF interface
3	GND	
4	IOD0/BOOT	Module internal drop-down
5	IOA13/RXD1	
6	IOB3/TXD1	
7	GND	
8	IOA12/RXD0	
9	IOB2/TXD0	
10	GND	
11	IOA7/LED_TX	
12	IOA6/LED_RX	

13	IOA5	
14	IOA4/DY_GP_IN	
15	IOA8	
16	IOA3	
17	IOA9	
18	IOB7/HOLD	
19	EXTRSTN	Module internal pull-up
20	IOE4/LED_NET	
21	IOE5	
22	IOE6	
23	IOA0/SWCLK	
24	IOA1/SWIO	
25	MODE	Module internal pull-up
26	GND	
27	IOB0	
28	IOB6	
29	IOB1/WP	
30	NC	
31	4V_IN	Module power supply pin
32	4V_IN	
33	GND	
34	GND	
35	IOB14	
36	IOB13	
37	GND	
38	GND	
39	IOB12/MOSI	
40	IOB11/MISO	
41	IOB10/SCLK	
42	IOB9/CSn	
43	IOB8	

5.3 Shield laserprinting

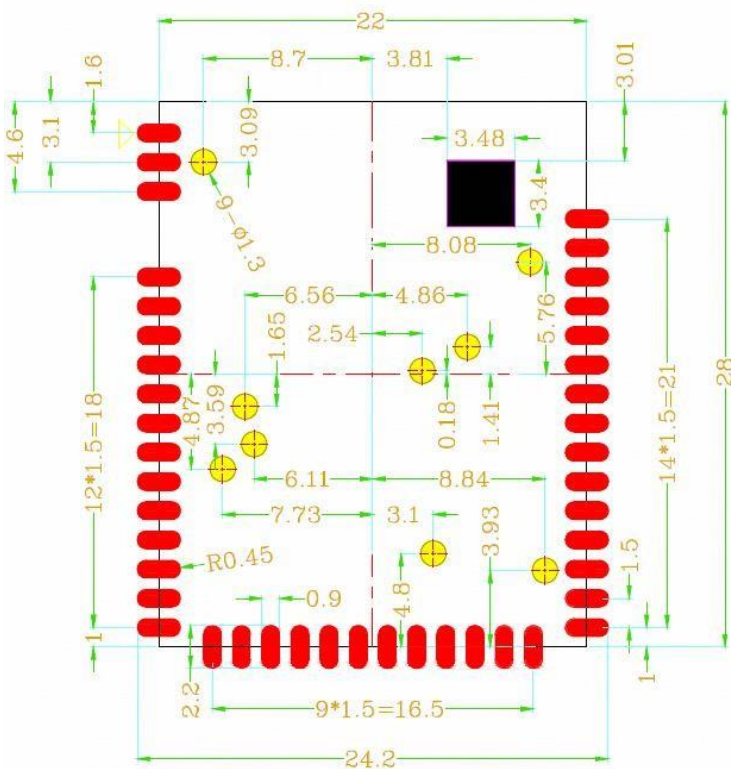
There is laser information on the shield, as shown below:



5.4 Module PCB Package

The recommended modules PCB packaging is shown as below, pay attention to:

1. The black area is the PA circuit part, which needs to be hollowed-out on the PCB of the motherboard (for heat dissipation), and the temperature sensitive elements should not be placed around.
2. The 9 yellow dots are the module bottom test points, the corresponding position on the mount motherboard PCB must NOT be placed with wire;



6. Attentions to hardware layout

1. The 50Ω impedance line shall be used between RF outlet and the antenna pad part, add a π circuit if possible.
2. At least 5mm area clearance is required around the antenna.
3. Pay attention to good grounding, it is best to ensure a large area grounding.
4. Away from high voltage circuit, high frequency switching circuit.

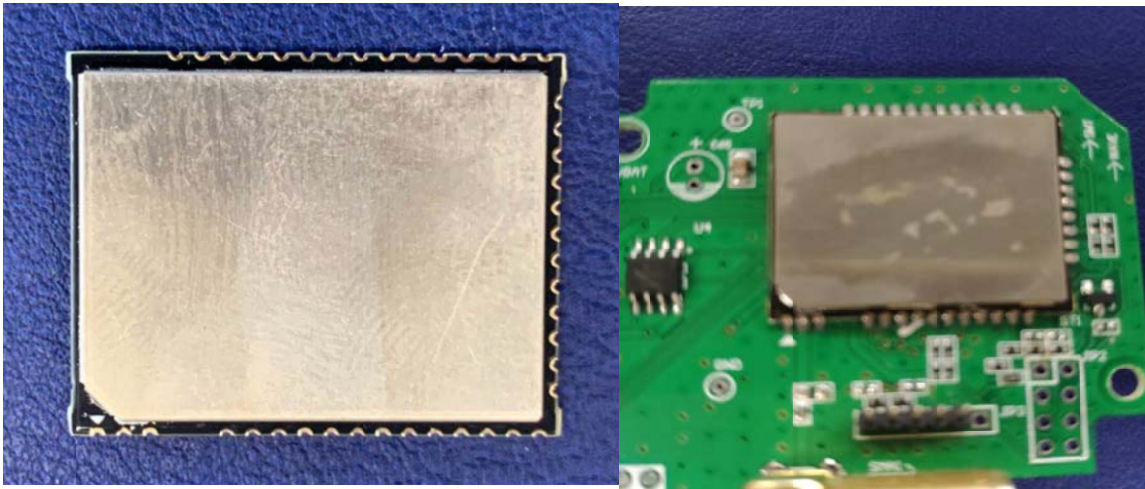
7. Installation :

Attention: Installation should be performed by a qualified professional.

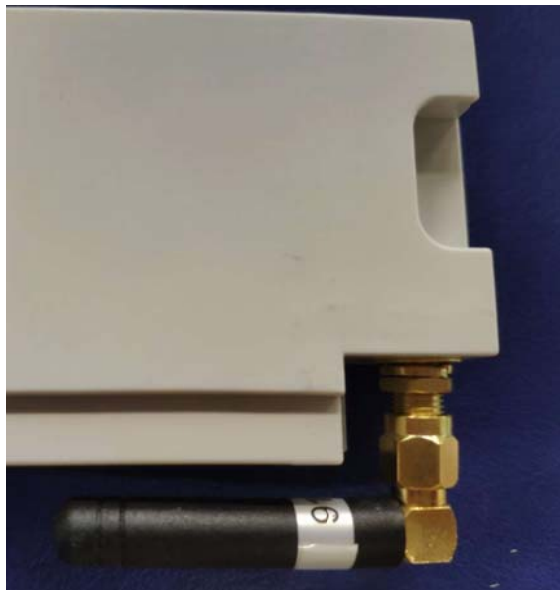
Ensure all the parts are included in your kit.

MSN00 Modules are used for gateways and meters and concentrators.
Take installing it on an electricity meter

7.1 MSN00 modules are welded on the NIC.



7.2 The NIC is connected to antenna through the adapter, and then tighten it.



7.3 The NIC is connected to the meter via a serial port, plug and play.



7.4 Install the meter

A) Installation tools

Cross screwdriver






Electric drill



Wire stripper



Lead sealing pliers	
Hairsprings	
Screw	

B) Preparation before installation

- ◆ The meter should be installed in ventilated and dry place to ensure the meter's safety and reliability. In the dirty or risky area, the meter should be installed in a protection box.
- ◆ Meter should be fixed on a firm, fire-resistant and stable support.
- ◆ Before installation, please check if the meter has been damaged during the transportation(damage of meter cover, hanger, seal, and LCD display, etc)
- ◆ As the internal part of the electrical meter is composed by the delicate electronic components, the meter should be carefully protected during the installation in order to avoid any damage.

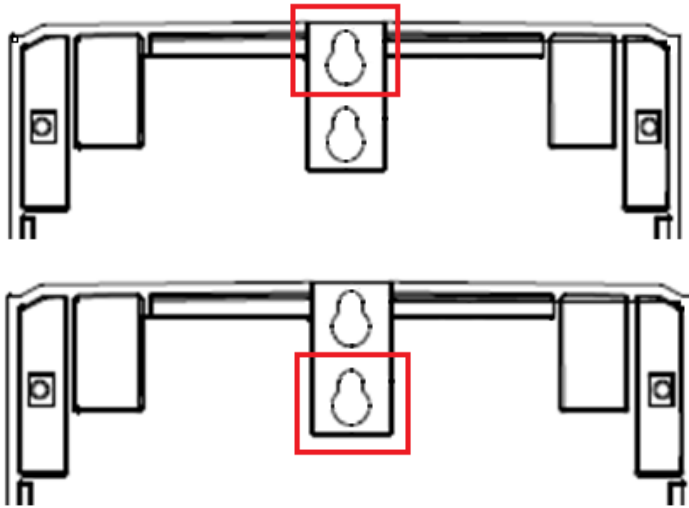


WARNING

Make sure that the power is cut off before the meter installation, otherwise it will cause a threat to life. The fuse should be disconnected and put it in a safe place to avoid the accidental power-on.

C) Installation procedure

- 1、 Select the proper position according to the meter dimensions, and indicate fixing points of the meter on the installation panel.
- 2、 Drill down holes on previously marked positions. (make sure that there's no cable behind before punching, avoid ruining the cable and threatening personal safety)



- 3、 Open the meter terminal cover, and adjust the height of hanger.
- 4、 Using the vertical installation method, the meter is hanging on the hanger screw, and fixed on the bottom by two screws. Need to ensure that the 3 screws are completely banned, and the meter is installed firmly, without shaking.

**NOTE**

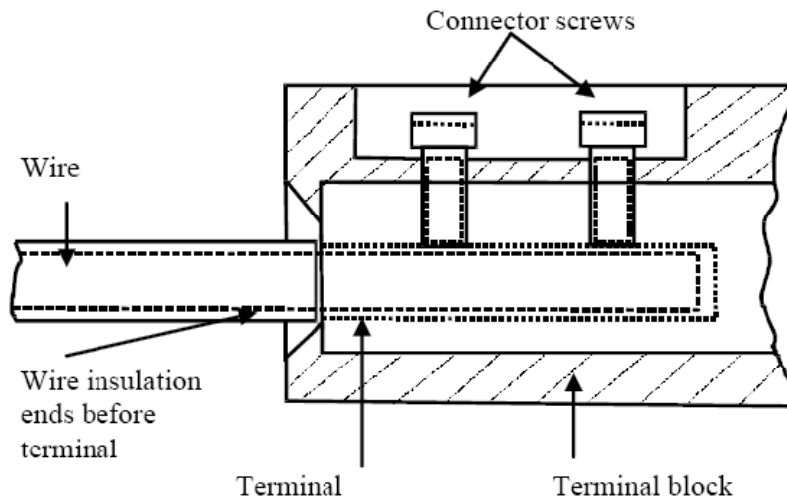
To ensure the installation stability, the diameter of hanger screw must be greater than 11mm, and the diameter of bottom fixed screws must be greater than 7mm.

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- 5、 Cut the cable to the required length and use the wire stripper to uncover the cable. The recommended bare metal length after stripping is at least 20mm for this series of products.

**WARNING**

We insist on the recommended length of the stripped wire to ensure that the bare metal part is long enough and can be fixed by two connection screws at the same time. However the bare part should not exceed the terminal box wiring holes, ensure the safety and insulation effect.

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- 6、 When using a small sectional cable, such as 4mm squared, the cable must be placed in the medium to ensure that the screw is well tightened without deviation.



- 7、 The cables should be connected correctly according to the wiring diagram and the terminals should be tightened during the installation in order to avoid any damage caused by bad connection.



NOTE

The bad fixing of connection screws will lead to the raise of resistance, which can lead to electrical energy loss and heating of terminals. The heating of component is risky. Besides, $1\text{m}\Omega$ contact resistance in a circuit of 80A will result in 6.4 W power losses.

- 8、 The cables should be connected correctly according to the definition of the auxiliary terminal (such as pulse output, signal input or RS485 communication).



WARNING

Be attention to not be mistakenly connected the auxiliary terminal to the voltage or current line, so as to avoid damage to meter.

- 9、 Check connecting wire carefully and avoid any error (such as the reverse wiring for the incoming and outgoing lines, the wrong connection of live and neutral, the bad fixing of screws).



NOTE


To ensure the correct wiring, it is recommended to use the appropriate testing tools (such as multi-meters) for input/output test.

- 10、 Close the terminal cover, and sealed it.

**NOTE**

Please to ensure that the terminal cover is closed tightly, otherwise it will cause the meter relay cut off due to terminal cover open(If required, can add this relay off through terminal cover open).

7.5 Testing after installation

- Insert the fuse, connect to the grid
- Check the meter display, is there any malfunction indication, phase inverse, cover open, or strong magnetic field, no current indicator.
- Press button to display voltage value, double confirm the voltage.
- Check the relay is on the right position (if the symbol '  ' is shown on the LCD).

7.6 Un-installation

- 1、 Remove the fuse and power off the meter.

**WARNING**

Make sure that the power is cut off before the meter un-installation, otherwise it will cause a threat to life. The fuse should be disconnected and put it in a safe place to avoid the accidental power-on.

- 2、 Cut off the terminal cover seal, and remove the terminal cover.
- 3、 Use the voltage test equipment (such as multi-meter) to test meter connecting wire and confirm power-off before go to the next operation.
- 4、 Use the appropriate screwdriver to unscrew the meter auxiliary terminal screws and remove the connecting wires.
- 5、 Use the appropriate screwdriver to unscrew the current connection screws and remove the connecting wires.
- 6、 Using the appropriate screwdriver to unscrew the meter fixing screws.
- 7、 Take off the meter.

**CAUTION**

The meter un-installation should be done according to the above mentioned order. Be attention to prevent meter from dropping down, which will cause injuries and damage the meter itself.

- 8、 If necessary, please replace a new meter.



WARNING

If a new meter cannot be installed for the moment, please envelop the voltage and current connection cables in insulating material and avoid exposing any bare metal part, otherwise it will pose a threat to life.

OEM Guidance

1. Applicable FCC rules

This module is granted by Single Modular Approval. It complies to the requirements of FCC part 15C, section 15.247 rules.

2. The specific operational use conditions

This module can be used in IoT devices. The input voltage to the module is nominally 4V DC. The operational ambient temperature of the module is -40 to 85 degree C. The Rod antenna, Whip antenna and FRP antenna is allowed.

3. Limited module procedures

N/A

4. Trace antenna design

N/A

5. RF exposure considerations.

The equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. If the equipment built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by 2.1093.

6. Antenna

Antenna type: Rod antenna; Peak gain: 4.0dBi ;
Antenna type: Whip antenna; Peak gain: 2.0dBi ;
Antenna type: FRP antenna; Peak gain: 3.0dBi;

7. Label and compliance information

An exterior label on OEM's end product can use wording such as the following: "Contains Transmitter Module FCC ID: 2AWSFMSN00" or "Contains FCC ID: 2AWSFMSN00."

8. 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 have been corrected .

9. Additional testing, Part 15 Sub part 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. 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. 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 50 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 set into a link/association with a partnering device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.

FCC Warning:

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