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Report No.: 2305TWQ501-U2
Report Version: 1.0
Issue Date: 2023-08-04

MEASUREMENT REPORT

FCC ID	:	SLB-WSM
APPLICANT	:	SINBON Electronics Co., Ltd.
Application Type	:	Certification
Product	:	Wi-SUN Module
Model No.	:	WSM-A01
Brand Name	:	SINBON
Trademark	:	SINBON
FCC Classification	:	(DSS) FCC Part 15 Spread Spectrum Transmitter
FCC Rule Part(s)	:	Part 15.247
Test Procedure(s)	:	ANSI C63.10-2013
Received Date	:	May 30, 2023
Test Date	:	June 13, 2023 ~ July 4, 2023

Tested By : Owen Tsai
(Owen Tsai)

Reviewed By : Paddy Chen
(Paddy Chen)

Approved By : Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

The test results only relate to the tested sample.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2305TWQ501-U2	1.0	Original Report	2023-08-04	

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§2.1033 General Information

Applicant	SINBON Electronics Co., Ltd.
Applicant Address	4F-13, No.79, Sec.1, Hsin Tai Wu Rd., Hsi-Chih Dist., New Taipei City, Taiwan
Manufacturer	SINBON Electronics Co., Ltd.
Manufacturer Address	4F-13, No.79, Sec.1, Hsin Tai Wu Rd., Hsi-Chih Dist., New Taipei City, Taiwan
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT FCC Registration No.	291082
FCC Rule Part(s)	Part 15.247
Test Device Serial No.	#1-1 ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Canada, EU and TELEC Rules.

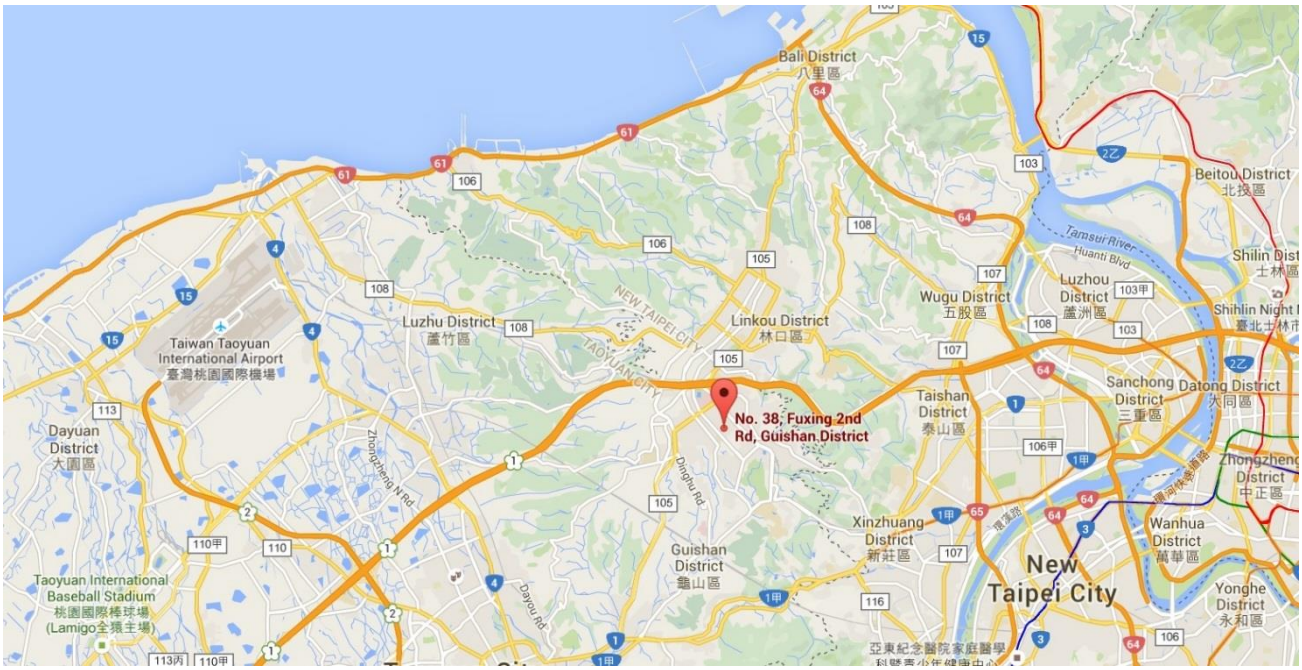
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	Wi-SUN Module
Model No.	WSM-A01
Supports Radios Spec.	Wi SUN: 902~928MHz

2.2. Product Specification Subjective to this Standard

Operating Frequency	902~928MHz
Type of modulation	FHSS (GFSK)
Data Rate	50kbps

2.3. Test Mode

Test Mode	Mode1: Transmit by Wi SUN

Note:

1. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.

2.4. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	902.2	29	908	58	913.8
1	902.4	30	908.2	59	914
2	902.6	31	908.4	60	914.2
3	902.8	32	908.6	61	914.4
4	903	33	908.8	62	914.6
5	903.2	34	909	63	914.8
6	903.4	35	909.2	64	915
7	903.6	36	909.4	65	915.2
8	903.8	37	909.6	66	915.4
9	904	38	909.8	67	915.6
10	904.2	39	910	68	915.8
11	904.4	40	910.2	69	916
12	904.6	41	910.4	70	916.2
13	904.8	42	910.6	71	916.4
14	905	43	910.8	72	916.6
15	905.2	44	911	73	916.8
16	905.4	45	911.2	74	917
17	905.6	46	911.4	75	917.2
18	905.8	47	911.6	76	917.4
19	906	48	911.8	77	917.6
20	906.2	49	912	78	917.8
21	906.4	50	912.2	79	918
22	906.6	51	912.4	80	918.2
23	906.8	52	912.6	81	918.4
24	907	53	912.8	82	918.6
25	907.2	54	913	83	918.8
26	907.4	55	913.2	84	919
27	907.6	56	913.4	85	919.2
28	907.8	57	913.6	86	919.4

Channel	Frequency	Channel	Frequency	Channel	Frequency
87	919.6	116	925.4	--	--
88	919.8	117	925.6	--	--
89	920	118	925.8	--	--
90	920.2	119	926	--	--
91	920.4	120	926.2	--	--
92	920.6	121	926.4	--	--
93	920.8	122	926.6	--	--
94	921	123	926.8	--	--
95	921.2	124	927	--	--
96	921.4	125	927.2	--	--
97	921.6	126	927.4	--	--
98	921.8	127	927.6	--	--
99	922	128	927.8	--	--
100	922.2	--	--	--	--
101	922.4	--	--	--	--
102	922.6	--	--	--	--
103	922.8	--	--	--	--
104	923	--	--	--	--
105	923.2	--	--	--	--
106	923.4	--	--	--	--
107	923.6	--	--	--	--
108	923.8	--	--	--	--
109	924	--	--	--	--
110	924.2	--	--	--	--
111	924.4	--	--	--	--
112	924.6	--	--	--	--
113	924.8	--	--	--	--
114	925	--	--	--	--
115	925.2	--	--	--	--

2.5. Test Configuration

This device was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.6. Test Software

The test utility software used during testing was “Tera Term”.

2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.8. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) were used in the measurement of the **Wi-SUN Module.**

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x3' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.10.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beamwidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

Radiated emissions test results are shown in Section 7.8 & 7.9

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the Wi-SUN Module**,** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

Antenna List

No.	Brand	Part No.	Peak Gain
1	antenova	SRFI065	1.33dBi

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2024/3/7
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2024/3/8

Radiated Emissions – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2024/5/22
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2023/12/21
Broadband Hornantenna	RFSPIN	DRH18-E	MRTTWA00087	1 year	2024/5/17
Broadband Preamplifier	EMC Instruments corporation	EMC118A45SE	MRTTWA00088	1 year	2024/5/17
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2024/3/8
Signal Analyzer	R&S	FSVA3044	MRTTWA00092	1 year	2023/6/23
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00034	1 year	2023/6/27
Cable	HUBERSUHNER	EMC105-NM-NM-3000	MRTTWE00035	1 year	2023/6/27

Conducted Test Equipment – SR6

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2022/10/18
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2022/7/19
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2023/3/16

Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Conducted Emission- Power Line
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 2.53dB
Radiated Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 3.92dB (Below 30M) Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 4.25dB (30M~1G) Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 4.40dB (1G~18G) Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 4.45dB (18G~40G)
Frequency Error
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz
Conducted Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB
Conducted Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):± 2.65 dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 3.3%
Temp. / Humidity
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3%
DC Voltage
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.3%

7. TEST RESULT

7.1. Summary

Product Name: **Wi-SUN Module**

FCC Classification: **(DSS) FCC Part 15 Spread Spectrum Transmitter**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(1)	20dB Bandwidth	N/A	Conducted	PASS	Section 7.2
15.247(b)(1)	Output Power	<1 Watt if > 75 non-overlapping channels used		PASS	Section 7.3
15.247(a)(1)	Carrier Frequency Separation	25KHz or 20 dB BW for systems with Output Power < 125mW		PASS	Section 7.4
15.247(a)(1)(iii)	Number of Hopping Channels	> 15 Channels		PASS	Section 7.5
15.247(a)(1)(iii)	Time of Occupancy	< 0.4 sec in 31.6 sec period		PASS	Section 7.6
15.247(d)	Out-of-Band Emissions	Conducted ≥ 20dBc		PASS	Section 7.7
15.205 15.209	Spurious Emission	< FCC 15.209 limits	Radiated	PASS	Section 7.8
15.205 15.209	Band Edge Measurement	≦ 74dBuV/m(Peak) ≦ 54dBuV/m(Average)		PASS	Section 7.9
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.10

Note:

1) Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
3) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
4) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 20dB Bandwidth Measurement

7.2.1. Test Limit

N/A

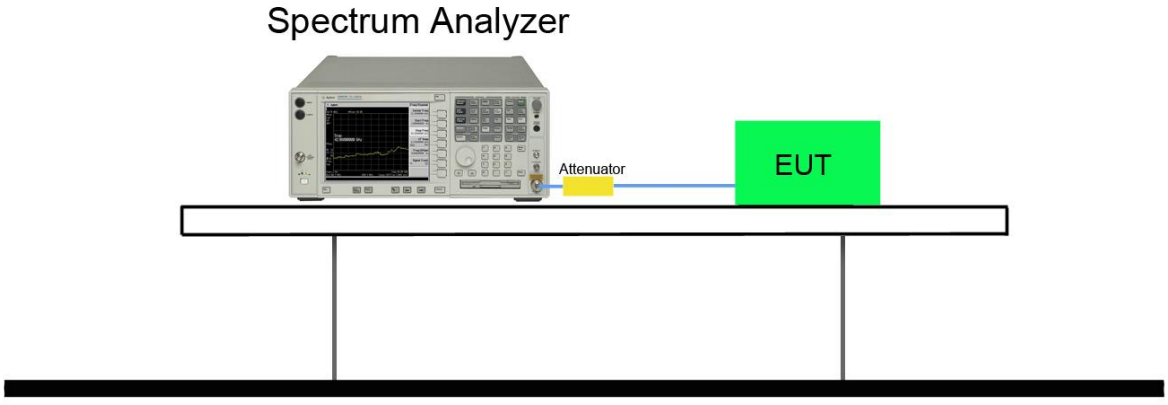
7.2.2. Test Procedure used

ANSI C63.10-2013 - Section 6.9.2

7.2.3. Test Setting

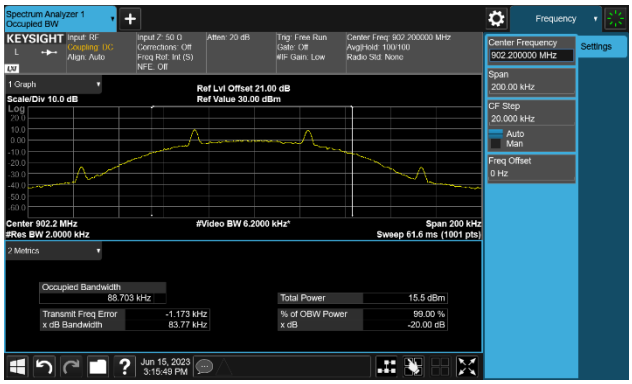
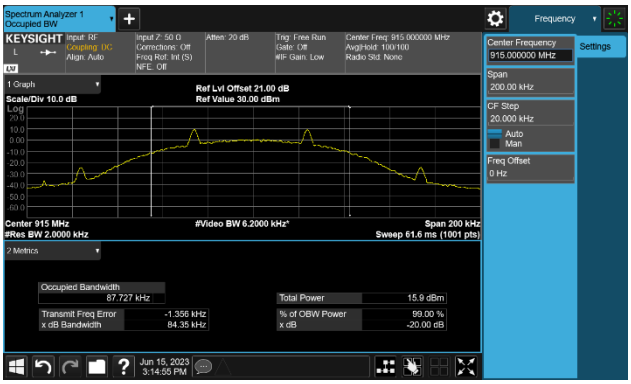
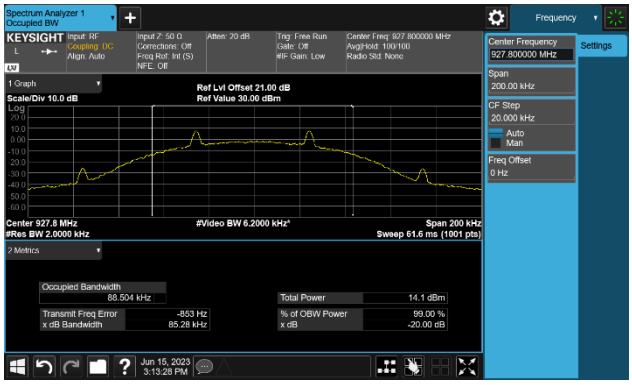
1. Set RBW ≥ 1% of the 20dB bandwidth
2. VBW ≥ 3 × RBW
3. Span = approximately 2 to 5 times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7.2.4. Test Setup



7.2.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Result
GFSK	0	902.2	83.77	88.703	Pass
	64	915	84.35	87.727	Pass
	128	927.8	85.28	88.504	Pass

CH0 (902.2MHz)	CH64 (915MHz)
	
CH128 (927.8MHz)	
	

7.3. Output Power Measurement

7.3.1. Test Limit

The maximum out power permissible output power is 1 Watt (30dBm)

The E.I.R.P Power is 4 Watt (36dBm)

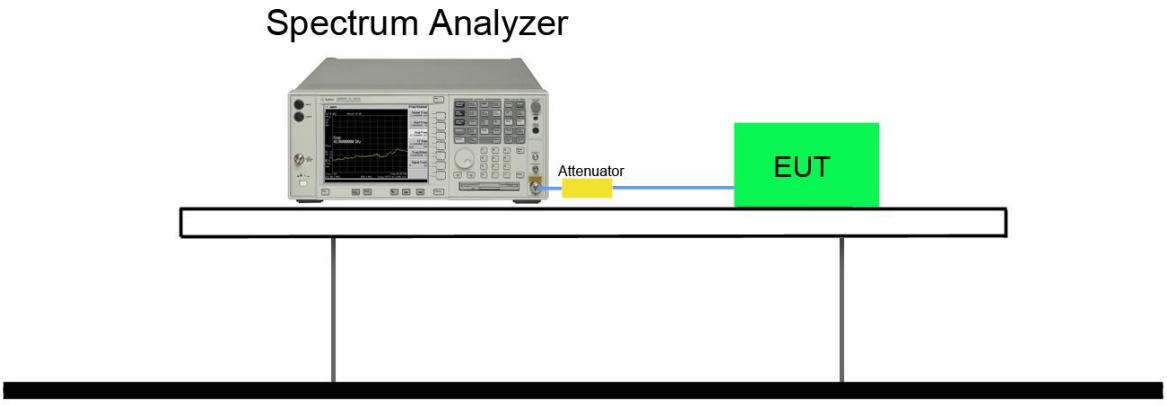
7.3.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.5

7.3.3. Test Setting

1. Set RBW ≥ the 20 dB bandwidth of the emission being measured.
2. VBW ≥ 3 × RBW
3. Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss)
8. Note: A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

7.3.4. Test Setup



7.3.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
GFSK	0	902.2	15.68	15.79	17.12	< 30	< 36
	64	915	16.10	16.18	17.51	< 30	< 36
	128	927.8	13.96	14.09	15.42	< 30	< 36

Note:

1. Peak Power Output Value = Reading value on power meter (dBm) + cable loss (dBm)
2. E.I.R.P Power = Peak Power (dBm) + Antenna Gain (dBi)
3. Antenna Gain = 1.33dBi

7.4. Carrier Frequency Separation Measurement

7.4.1. Test Limit

The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.

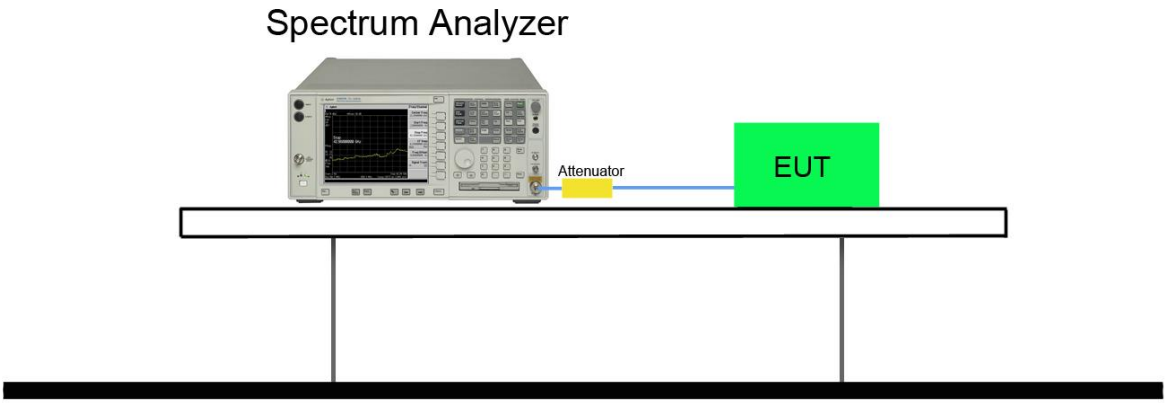
7.4.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.2

7.4.3. Test Setting

1. Span = wide enough to capture the peaks of two adjacent channels.
2. RBW ≥ 1 % of the span
3. VBW ≥ RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

7.4.4. Test Setup

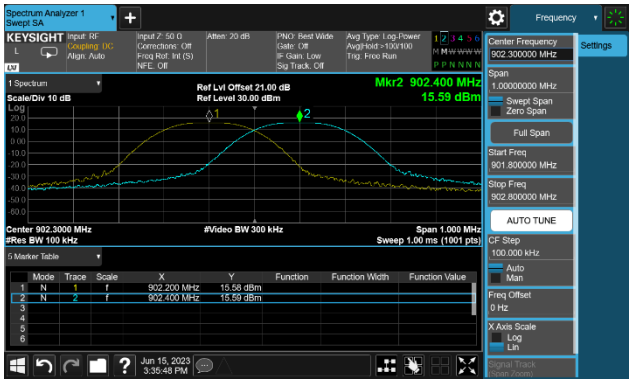
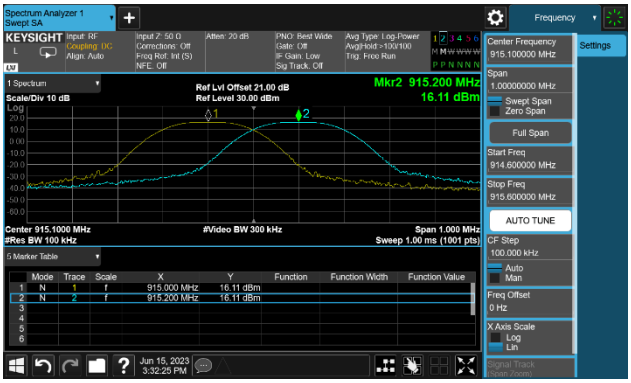
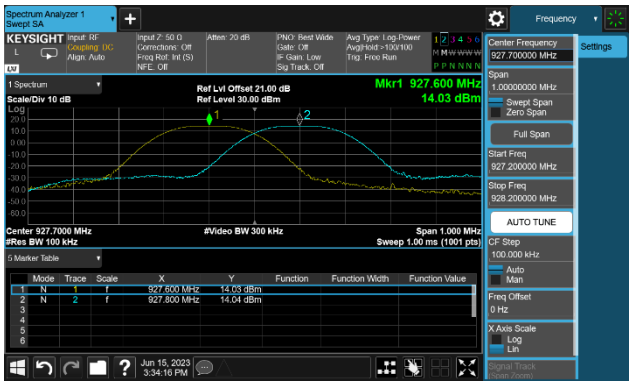


7.4.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Limit of 2/3*20dB Bandwidth (kHz)	Result
GFSK	0	902.2	200	25	55.85	Pass
	64	915	200	25	56.23	Pass
	128	927.8	200	25	56.85	Pass

Note:

1. The limit is 25 kHz or 2/3 the value of the 20dB bandwidth of the hopping channel, whichever is greater.
2. The 20dB Bandwidth is refer to section 7.2.

CH0 (902.2MHz)	CH64 (915MHz)
	
CH128 (927.8MHz)	
	

7.5. Number of Hopping Channels Measurement

7.5.1. Test Limit

This frequency hopping system must employ a minimum of 15 hopping channels.

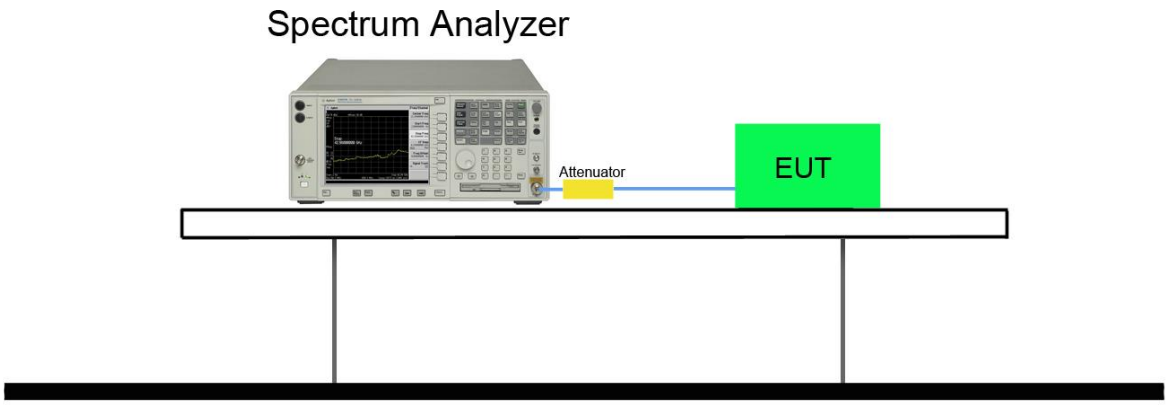
7.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.3

7.5.3. Test Settitng

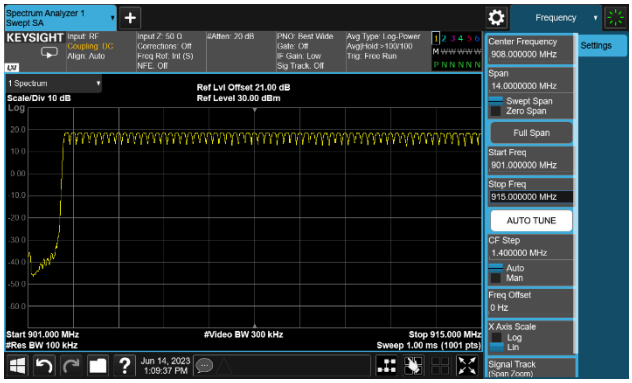
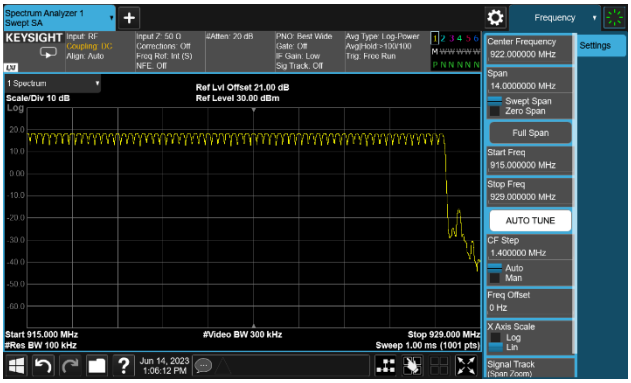
1. Span = the frequency band of operation.
2. RBW ≥ 1 % of the span
3. VBW ≥ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

7.5.4. Test Setup



7.5.5. Test Result

Test Mode (Hopping)	Channel Numbers	Frequency (MHz)	Limit (Hopping Channels)	Result
Wi SUN-TX	129	902~928	≥ 50	Pass

901MHz-915MHz	915MHz-929MHz
	

7.6. Time of Occupancy Measurement

7.6.1. Test Limit

The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

7.6.2. Test Procedure Used

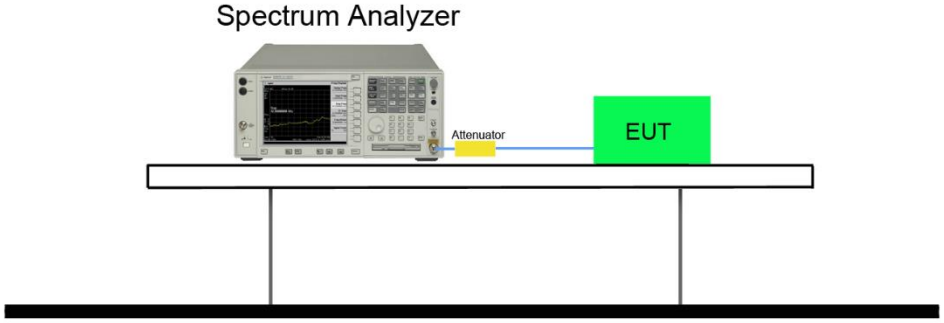
ANSI C63.10-2013 - Section 7.8.4

7.6.3. Test Settitng

1. Span = zero span, centered on a hopping channel.
2. RBW = 1MHz
3. VBW ≥ RBW
4. Sweep time = as necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (data rate, modulation format, etc.), repeat this test for each variation. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

7.6.4. Test Setup

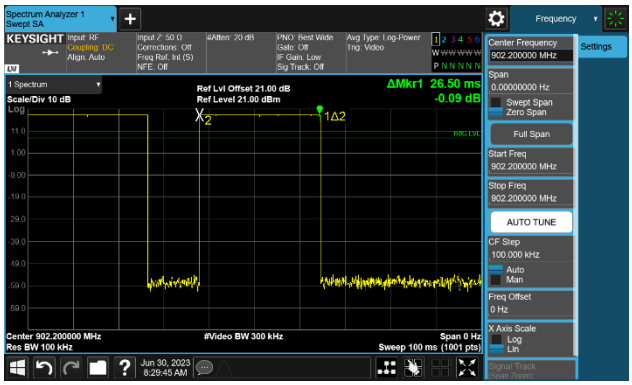
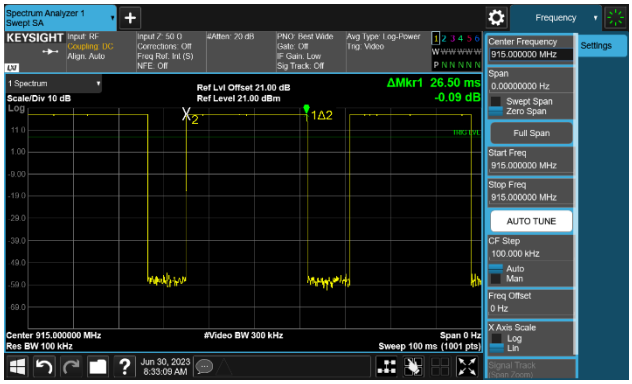
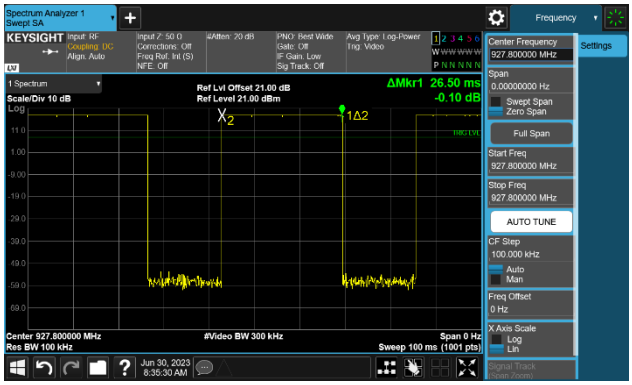


7.6.5. Test Result

Test Mode	Frequency (MHz)	Time of Occupancy (ms)	Hopping of Numbers	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
GFSK	902.2	53	2	20000	0.005	0.025	0.4	Pass
	915	79.5	4	20000	0.016	0.076	0.4	Pass
	927.8	79.5	2	20000	0.008	0.038	0.4	Pass

Note:

1. Duty cycle = ((Time slot length (ms)*Hopping of Number) / Sweep time (ms) 。
2. Dwell time = ((Duty cycle *(Time Period <0.4*129>)) / (Total Hopping of Number<129>))。
3. Time of Occupancy (ms): 26.5ms*2= 53ms; 26.5ms*3= 79.5ms

CH0 (902.2MHz)- Duty Cycle	CH0 (902.2MHz)- Dwell time
	
CH64 (915MHz)- Duty Cycle	**CH64 (915MHz)- Dwell time**
	
CH128 (927.8MHz)- Duty Cycle	**CH128 (927.8MHz)- Dwell time**
	

7.7. Out-of-Band Spurious Emissions Emissions Measurement

7.7.1. Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

7.7.2. Test Procedure Used

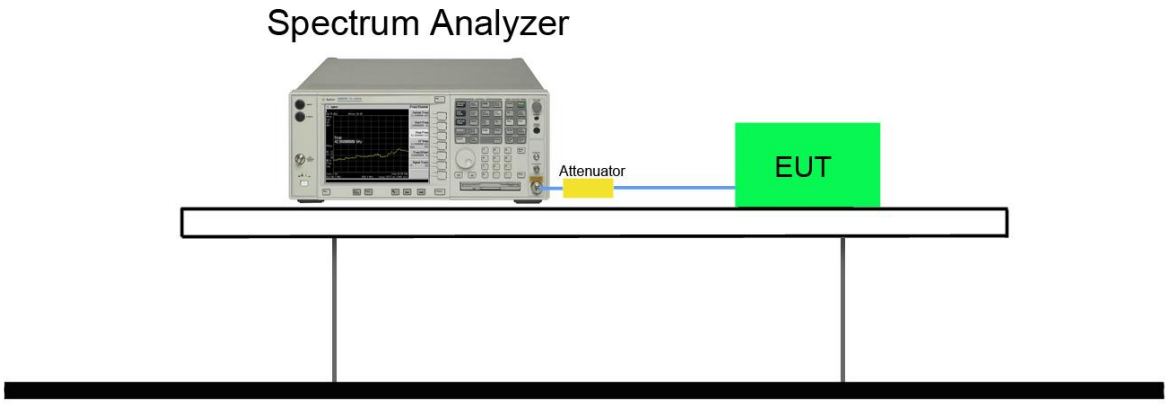
ANSI C63.10-2013 - Section 7.8.8

7.7.3. Test Setting

1. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2. RBW = 100 KHz
3. VBW ≥ RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

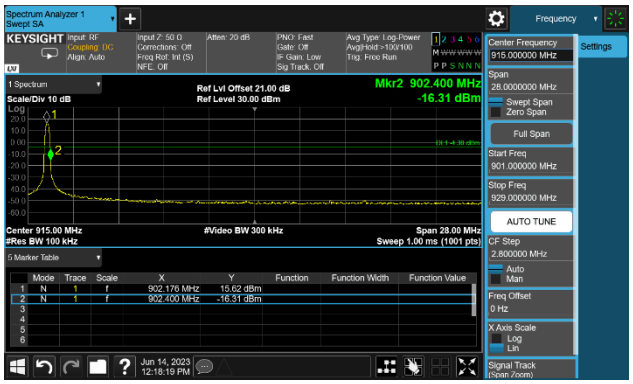
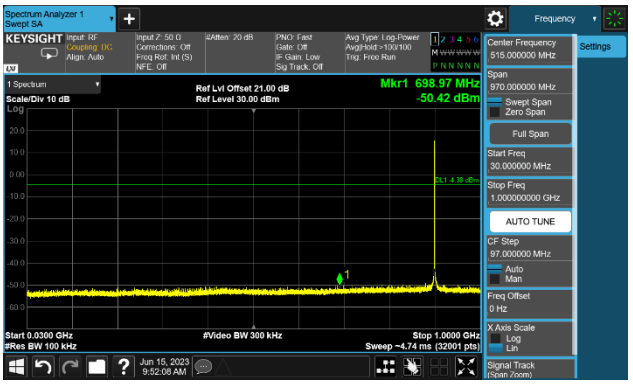
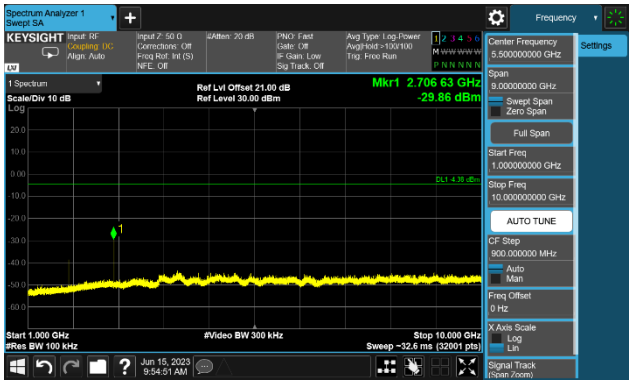
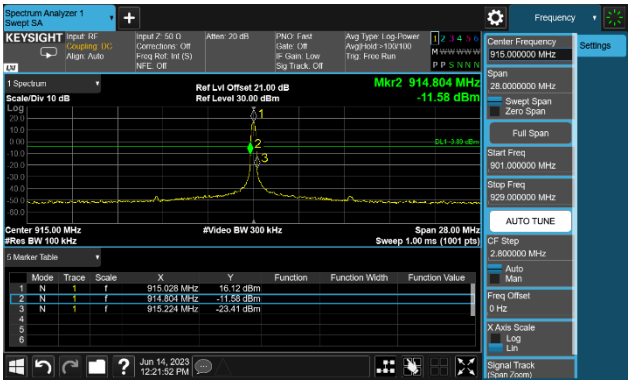
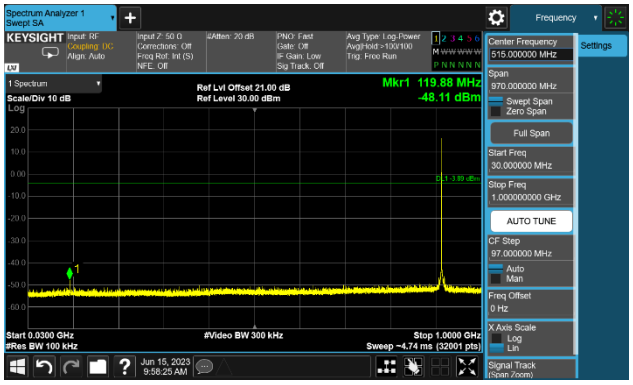
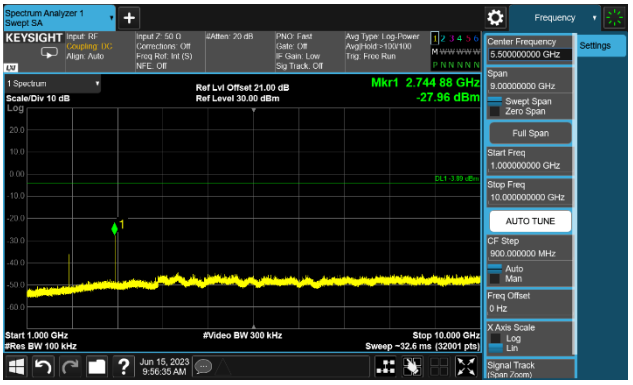
   Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

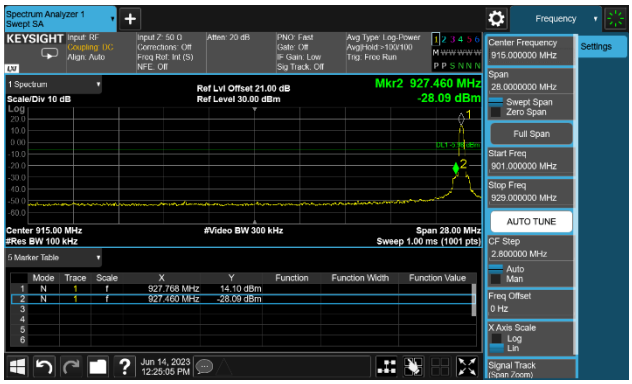
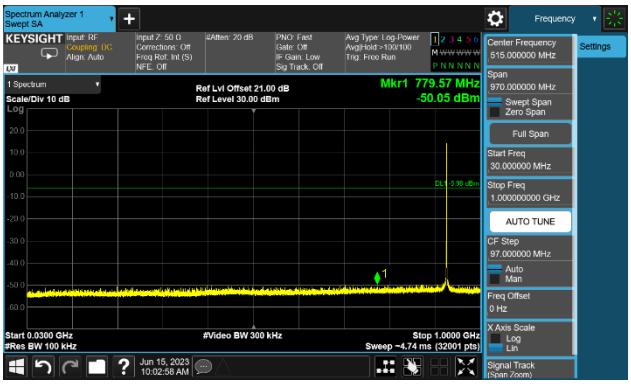
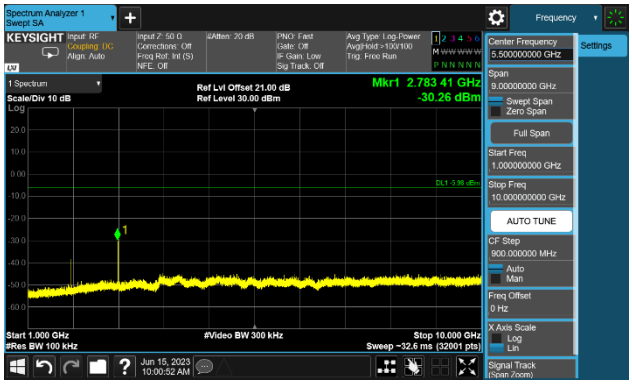
7.7.4. Test Setup



7.7.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	Limit (MHz)	Result
GFSK	0	902.2	20dBc	Pass
	64	915	20dBc	Pass
	128	927.8	20dBc	Pass

CH0 (902.2MHz)	CH0 (902.2MHz)
	
CH0 (902.2MHz)	**CH64 (915MHz)**
	
CH64 (915MHz)	**CH64 (915MHz)**
	

CH128 (927.8MHz)	CH128 (927.8MHz)
	
CH128 (927.8MHz)	
	

7.8. Radiated Spurious Emission Measurement

7.8.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

7.8.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.12.1

7.8.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3 * RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

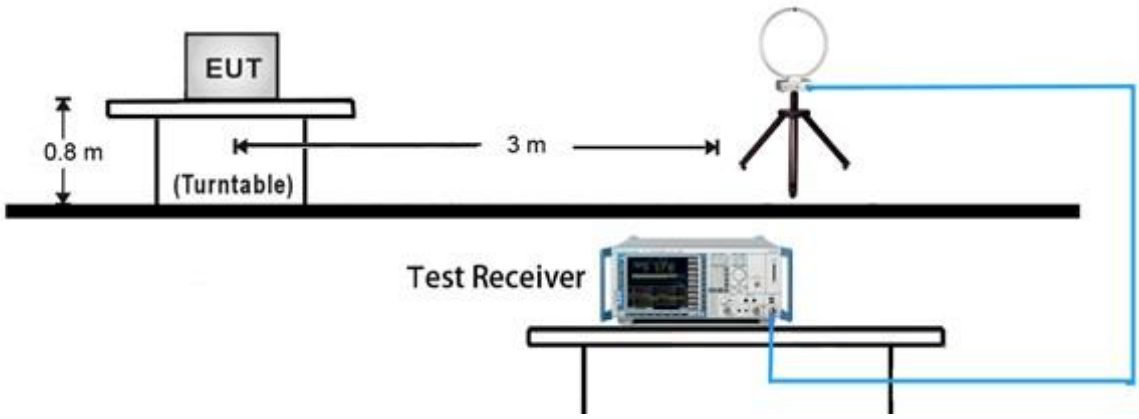
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

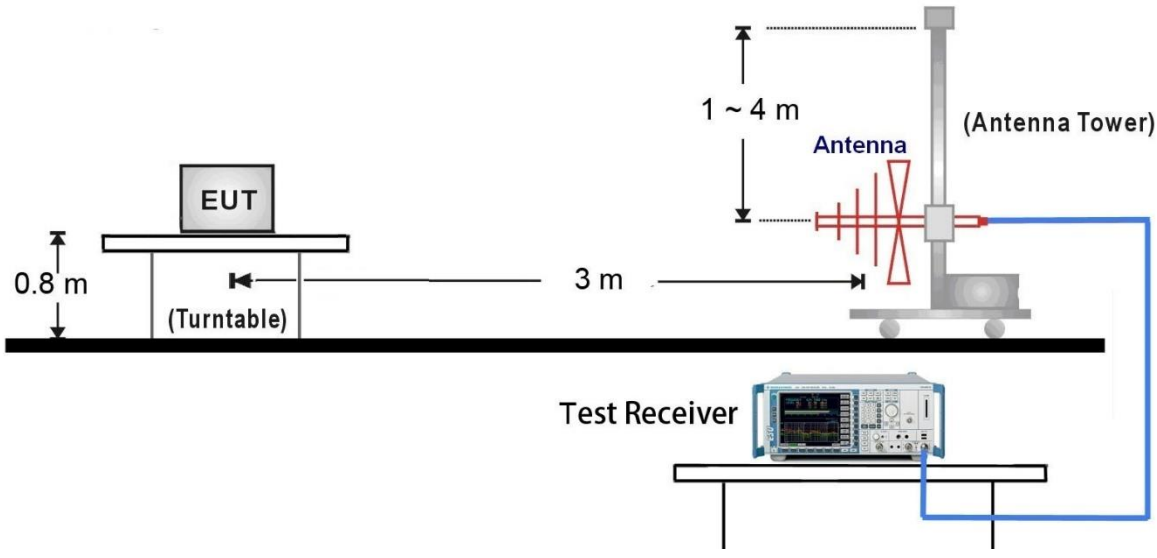
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.8.4. Test Setup

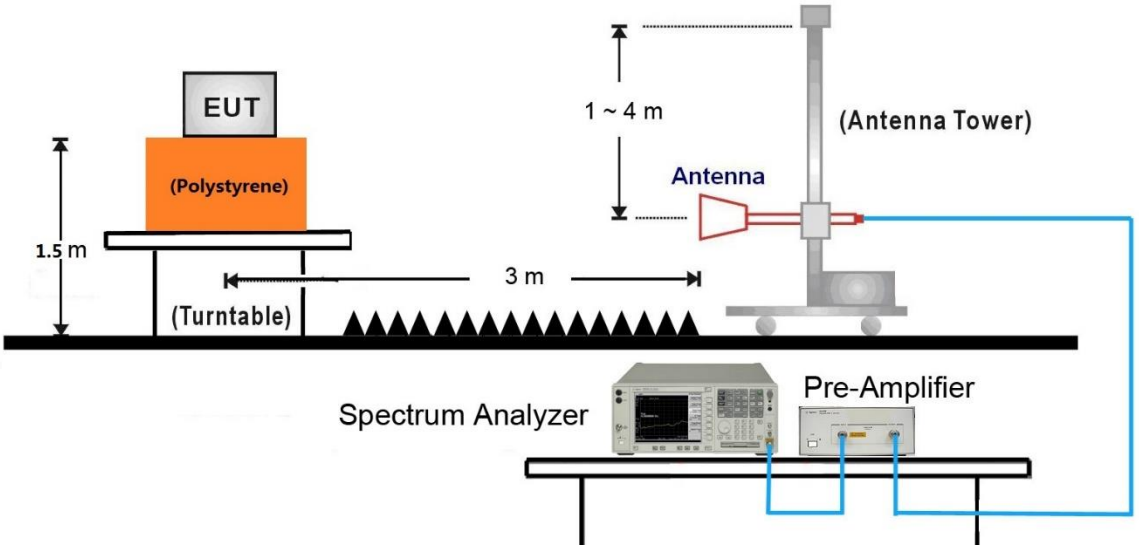
9kHz ~ 30MHz Test Setup:



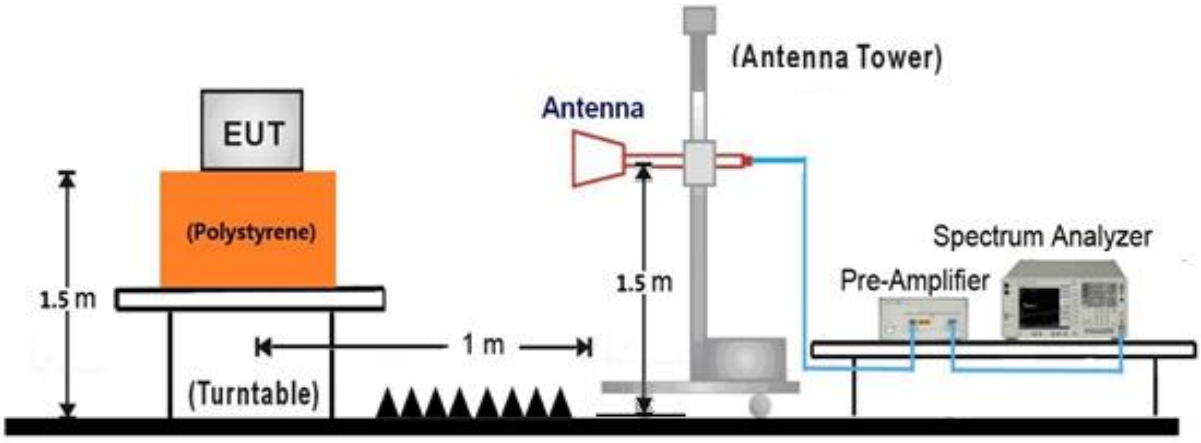
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:

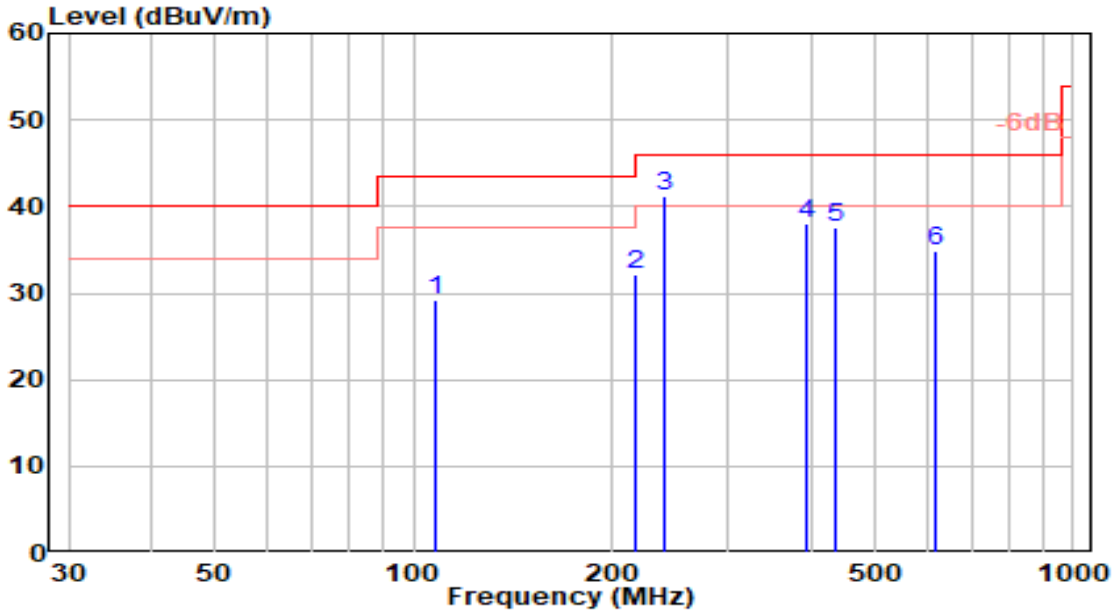


18GHz ~40GHz Test Setup:



7.8.5. Test Result

EUT	Wi Sun	Date of Test	2023-06-13
Factor	VULB 9162	Temp. / Humidity	21°C /64%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH64	Test Voltage	By Notebook PC

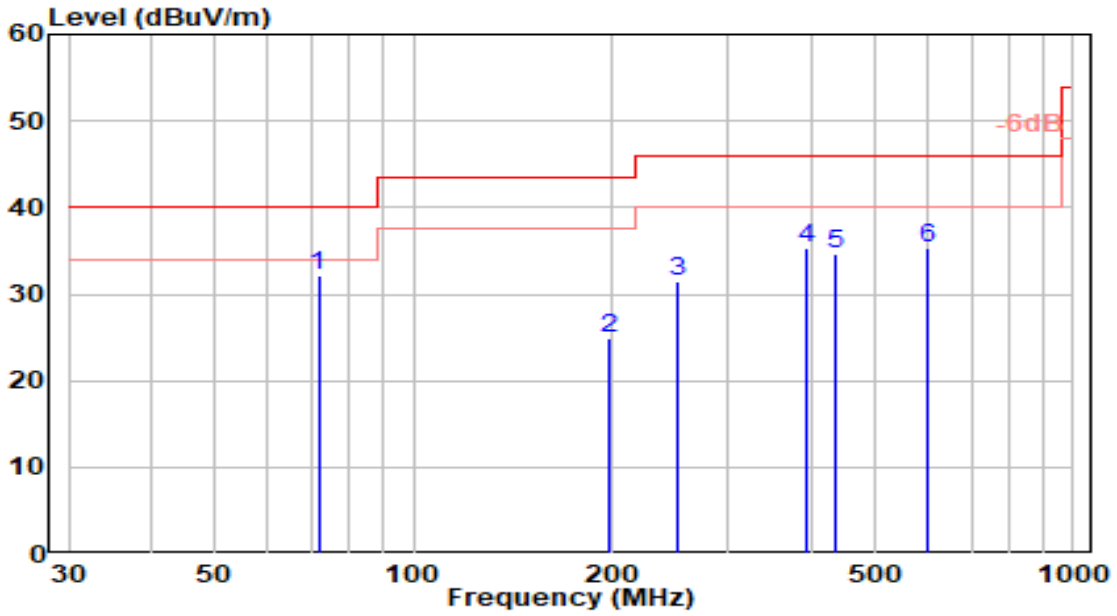


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		107.600	10.62	18.54	29.16	-14.34	43.50	200	144	QP
2		216.240	13.62	18.42	32.04	-13.96	46.00	126	0	QP
3	*	239.520	21.38	19.78	41.16	-4.84	46.00	111	0	QP
4		392.780	14.50	23.43	37.93	-8.07	46.00	200	328	QP
5		435.460	13.71	23.82	37.53	-8.47	46.00	200	308	QP
6		620.730	7.65	27.32	34.98	-11.02	46.00	150	328	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi Sun	Date of Test	2023-06-13
Factor	VULB 9162	Temp. / Humidity	21°C /64%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH64	Test Voltage	By Notebook PC

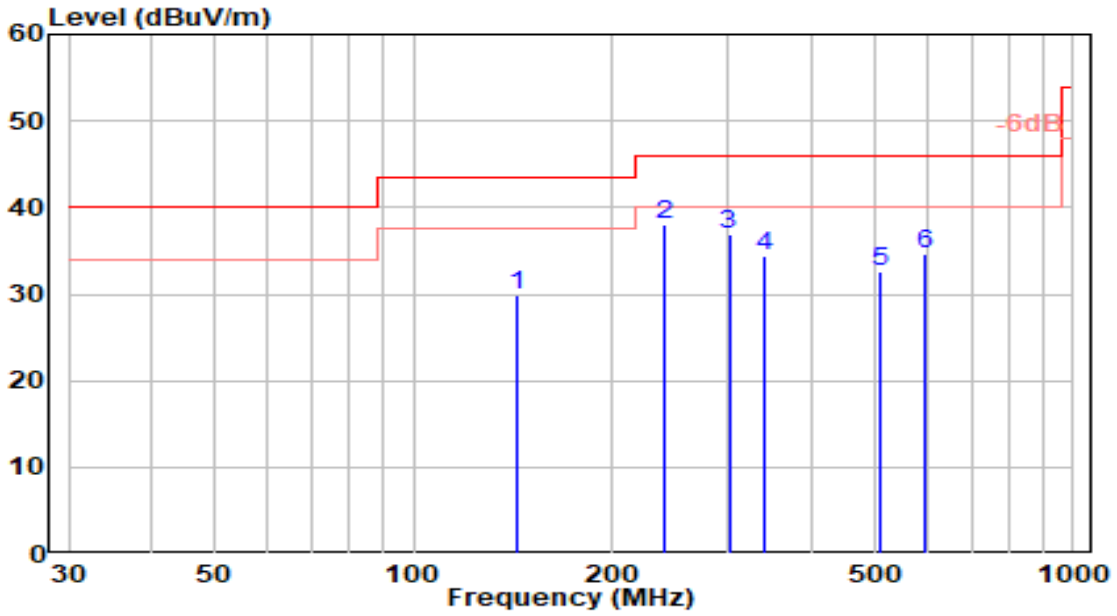


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	71.710	16.55	15.62	32.17	-7.83	40.00	150	30	QP
2		198.780	6.65	18.26	24.90	-18.60	43.50	100	303	QP
3		252.130	11.17	20.26	31.43	-14.57	46.00	150	312	QP
4		392.780	11.92	23.43	35.35	-10.65	46.00	200	337	QP
5		435.460	10.76	23.82	34.58	-11.42	46.00	100	292	QP
6		599.390	8.15	27.28	35.43	-10.57	46.00	100	1	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi Sun	Date of Test	2023-06-13
Factor	VULB 9162	Temp. / Humidity	21°C /64%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_RX_CH64	Test Voltage	By Notebook PC

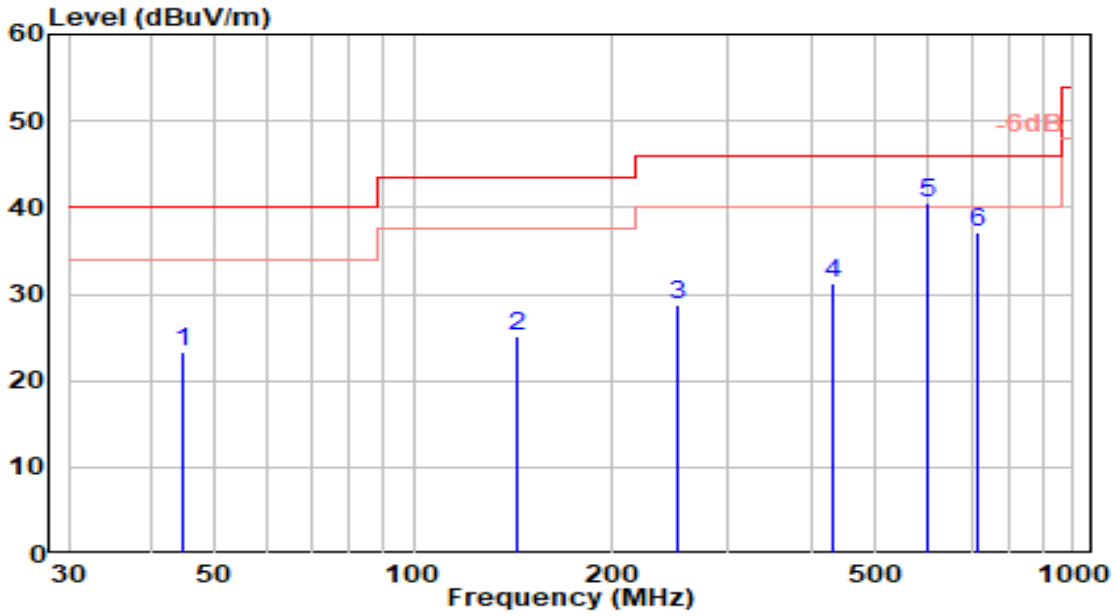


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		143.490	14.77	15.06	29.82	-13.68	43.50	150	121	QP
2	*	239.520	18.28	19.78	38.06	-7.94	46.00	100	3	QP
3		300.630	16.05	20.88	36.94	-9.06	46.00	100	96	QP
4		339.430	12.00	22.35	34.35	-11.65	46.00	100	75	QP
5		510.150	7.35	25.36	32.71	-13.29	46.00	200	0	QP
6		598.420	7.29	27.26	34.55	-11.45	46.00	200	48	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi Sun	Date of Test	2023-06-13
Factor	VULB 9162	Temp. / Humidity	21°C /64%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_RX_CH64	Test Voltage	By Notebook PC

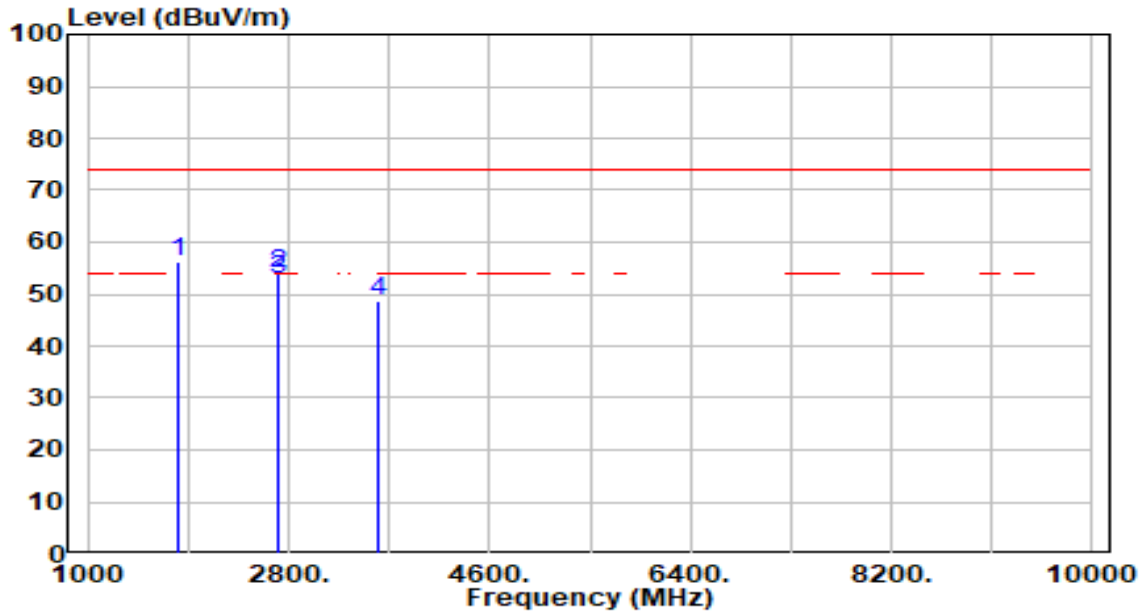


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		44.550	2.65	20.67	23.33	-16.67	40.00	100	73	QP
2		143.490	9.98	15.06	25.03	-18.47	43.50	182	0	QP
3		252.130	8.49	20.26	28.75	-17.25	46.00	150	326	QP
4		432.550	7.35	23.79	31.15	-14.85	46.00	100	360	QP
5	*	600.360	13.31	27.30	40.61	-5.39	46.00	108	360	QP
6		713.850	8.54	28.49	37.04	-8.96	46.00	150	35	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 0	Test Voltage	By Notebook PC

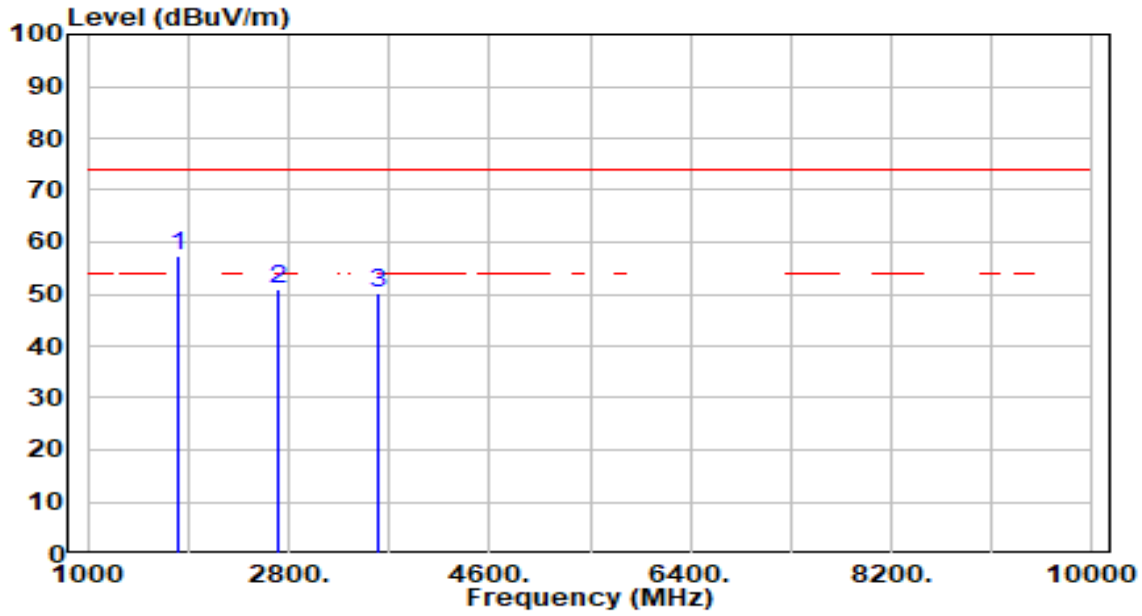


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1804.400	63.44	-7.22	56.22	-17.78	74.00	200	274	Peak
2		2706.600	58.66	-4.73	53.93	-20.07	74.00	214	193	Peak
3	*	2706.600	57.60	-4.73	52.87	-1.13	54.00	214	193	Average
4		3608.800	51.66	-2.81	48.86	-25.14	74.00	200	250	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 0	Test Voltage	By Notebook PC

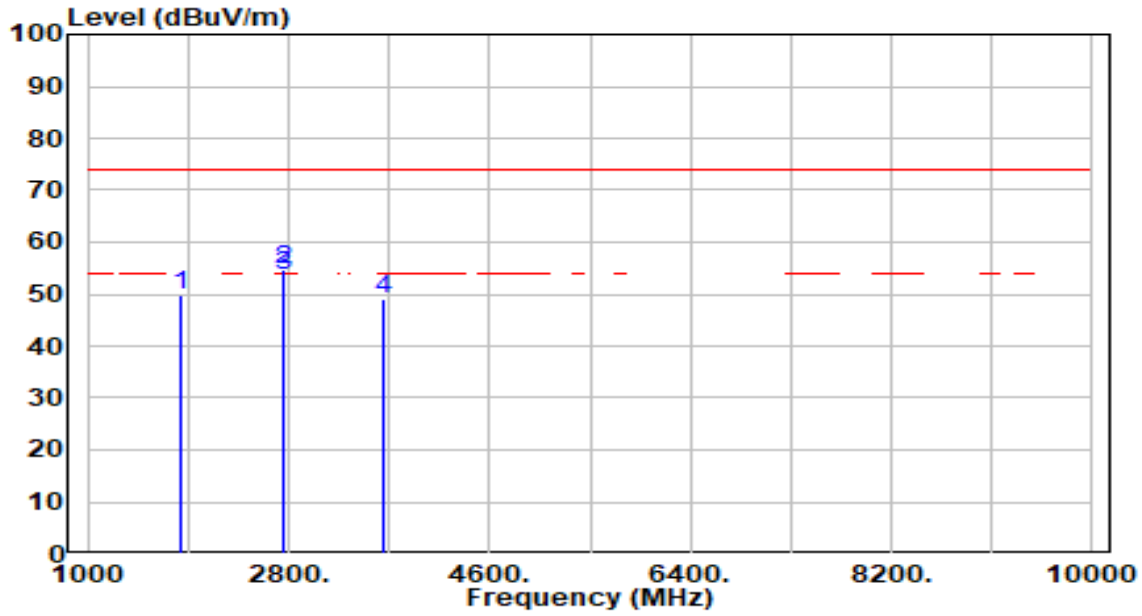


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1804.400	64.58	-7.22	57.36	-16.64	74.00	200	146	Peak
2		2706.600	55.70	-4.73	50.97	-23.03	74.00	200	82	Peak
3		3608.800	52.83	-2.81	50.03	-23.97	74.00	200	38	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 64	Test Voltage	By Notebook PC

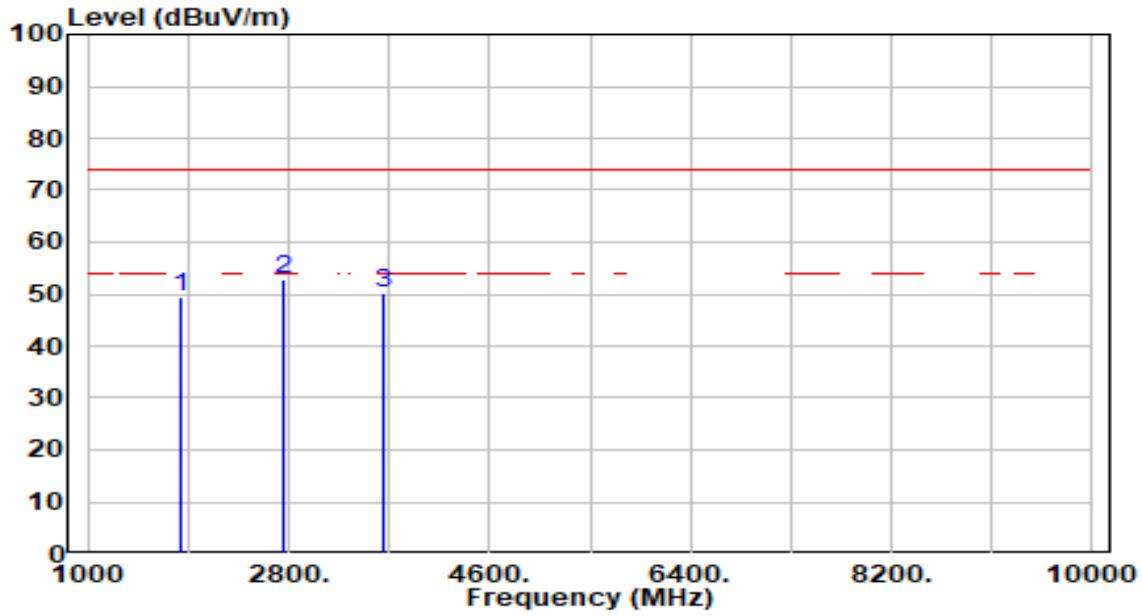


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1830.000	56.73	-7.09	49.64	-24.36	74.00	200	307	Peak
2	*	2745.000	59.34	-4.55	54.79	-19.21	74.00	200	143	Peak
3	*	2745.000	57.98	-4.55	53.43	-0.57	54.00	200	143	Average
4		3660.000	51.83	-2.72	49.10	-24.90	74.00	200	260	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 64	Test Voltage	By Notebook PC

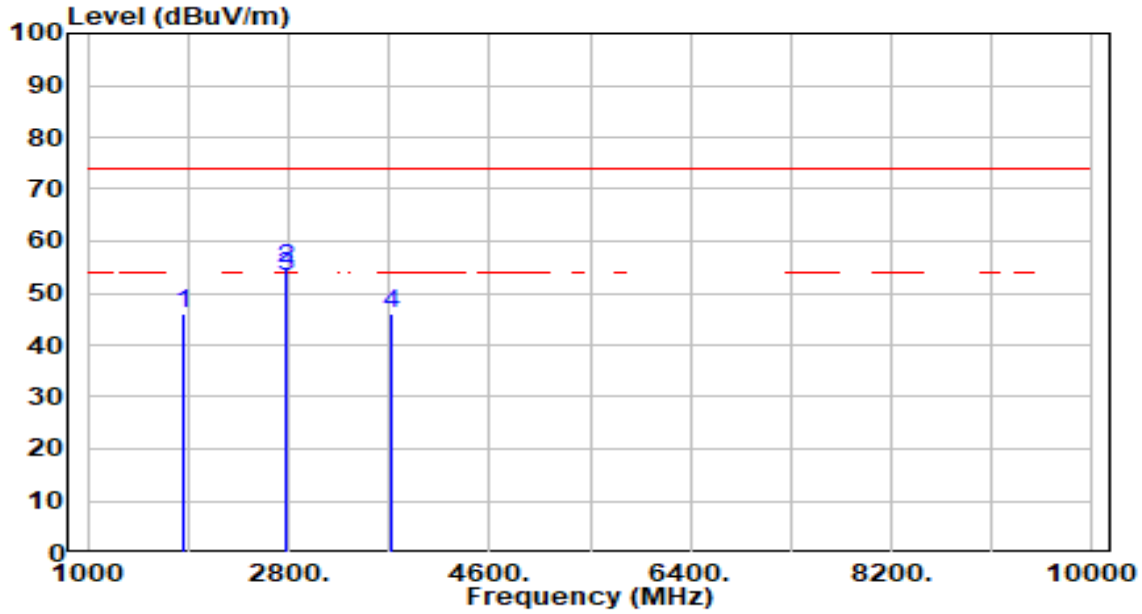


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1830.000	56.64	-7.09	49.55	-24.45	74.00	200	149	Peak
2	*	2745.000	57.33	-4.55	52.78	-21.22	74.00	200	69	Peak
3		3660.000	52.90	-2.72	50.17	-23.83	74.00	200	34	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 128	Test Voltage	By Notebook PC

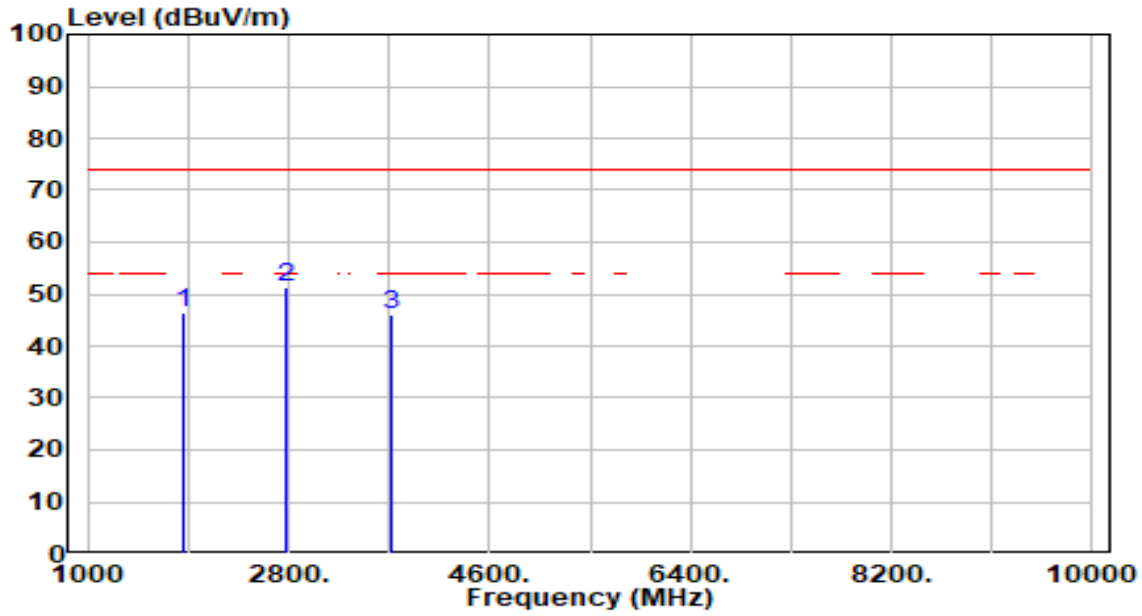


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1855.600	52.91	-6.96	45.95	-28.05	74.00	200	250	Peak
2	*	2783.400	59.04	-4.37	54.67	-19.33	74.00	206	148	Peak
3	*	2783.400	57.75	-4.37	53.38	-0.62	54.00	206	148	Average
4		3711.200	48.67	-2.64	46.03	-27.97	74.00	200	255	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-13
Factor	DRH18-E	Temp. / Humidity	23°C /61%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 128	Test Voltage	By Notebook PC



No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1855.600	53.56	-6.96	46.60	-27.40	74.00	200	182	Peak
2	*	2783.400	55.73	-4.37	51.36	-22.64	74.00	200	67	Peak
3		3711.200	48.79	-2.64	46.15	-27.85	74.00	200	35	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamplifier(dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.9. Radiated Restricted Band Edge Measurement

7.9.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

7.9.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.12.1

7.9.3. Test Setting

Peak Field Strength Measurements

8. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
9. RBW = as specified in Table 1
10. VBW = 3 * RBW
11. Detector = peak
12. Sweep time = auto couple
13. Trace mode = max hold

14. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

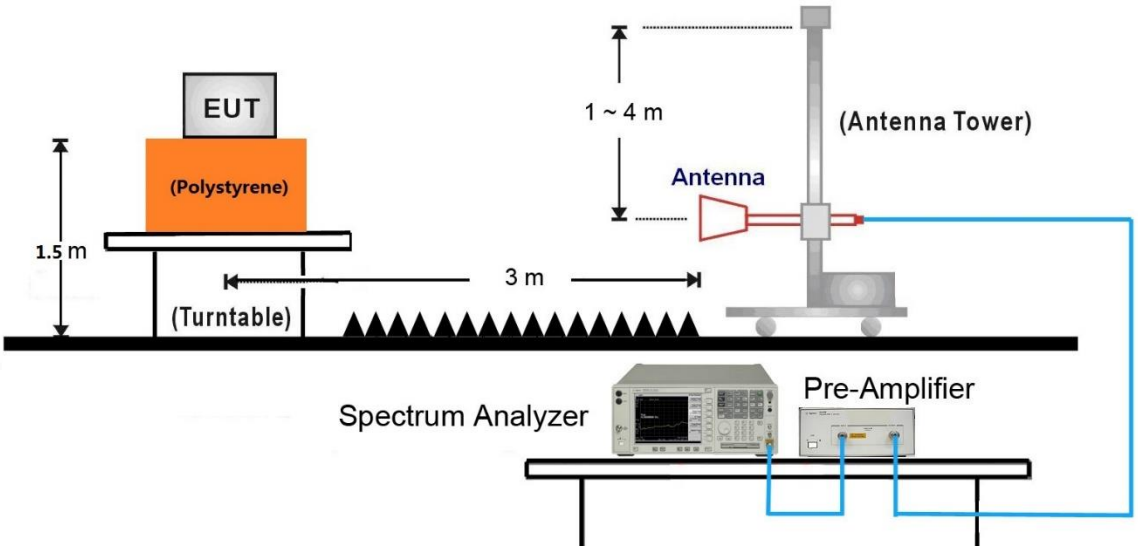
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

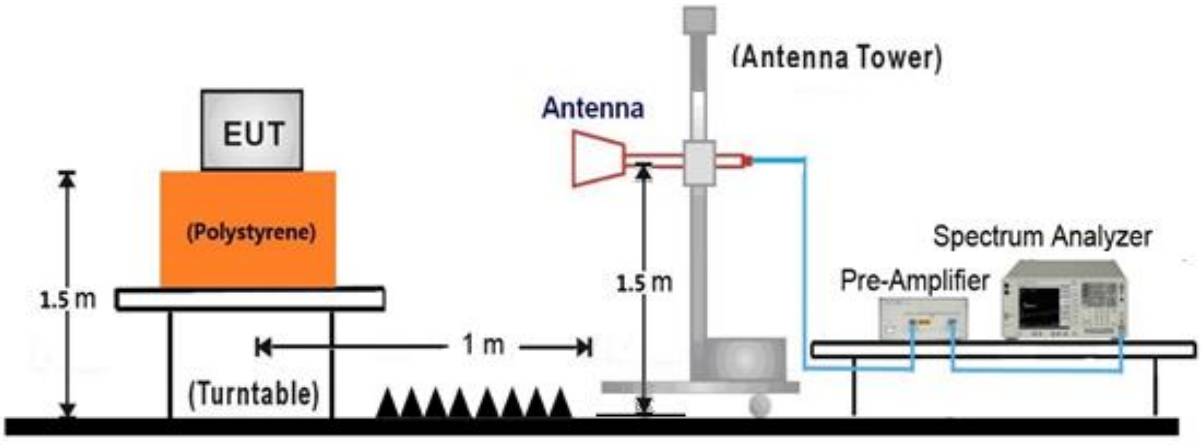
9. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
10. RBW = 1MHz
11. VBW ≥ 1/T
12. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
13. Detector = Peak
14. Sweep time = auto
15. Trace mode = max hold
16. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.9.4. Test Setup

1GHz ~ 18GHz Test Setup:

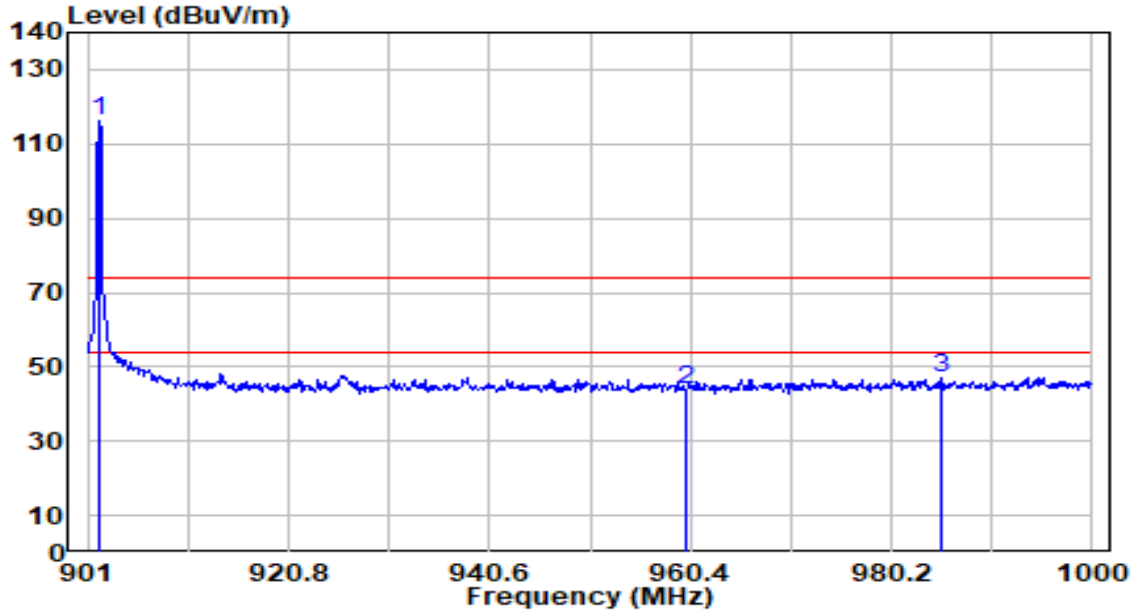


18GHz ~40GHz Test Setup:



7.9.5. Test Result

EUT	Wi-SUN Module	Date of Test	2023-06-15
Factor	VULB 9162	Temp. / Humidity	23°C /61%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 23	Test Voltage	By Notebook PC

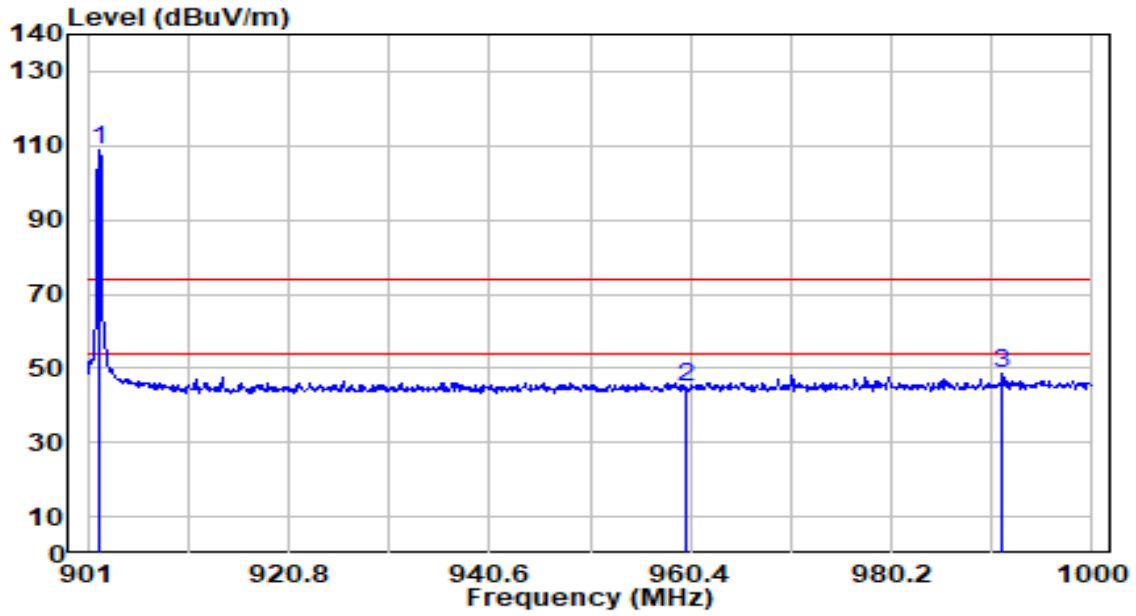


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	902.188	85.30	30.89	116.19	42.19	74.00	150	360	Peak
2		960.000	12.74	31.18	43.93	-30.07	74.00	150	360	Peak
3		985.249	15.47	31.40	46.86	N/A	N/A	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-15
Factor	VULB 9162	Temp. / Humidity	23°C /61%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 23	Test Voltage	By Notebook PC

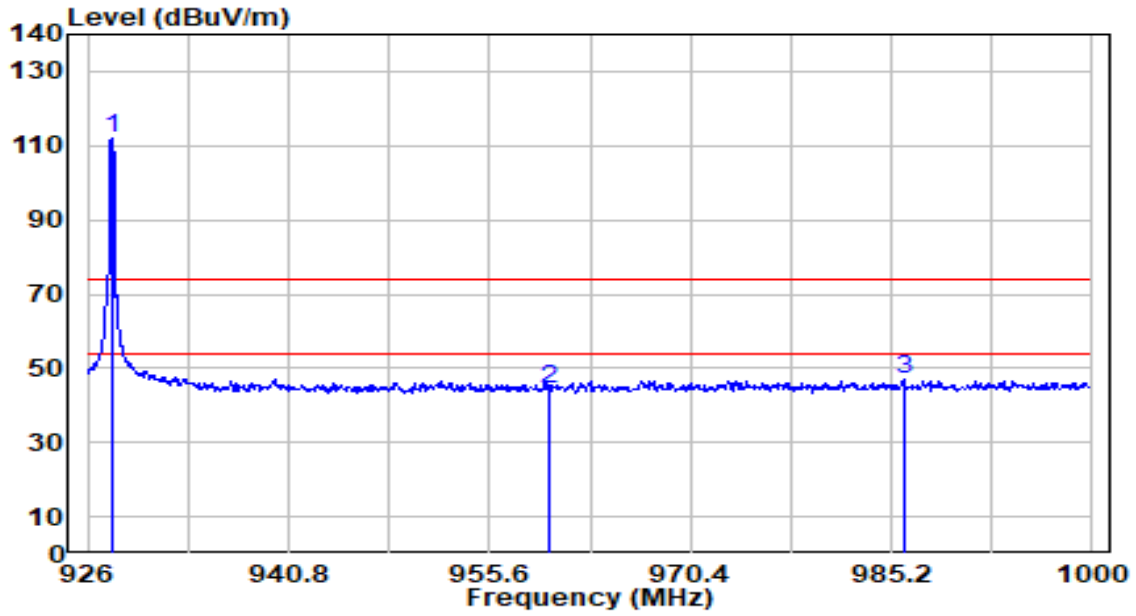


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	902.188	78.20	30.89	109.09	35.09	74.00	139	18	Peak
2		960.000	13.55	31.18	44.73	-29.27	74.00	139	18	Peak
3		991.189	16.96	31.45	48.41	N/A	N/A	139	18	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-15
Factor	VULB 9162	Temp. / Humidity	23°C /61%
Polarity	Horizontal	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 128	Test Voltage	By Notebook PC

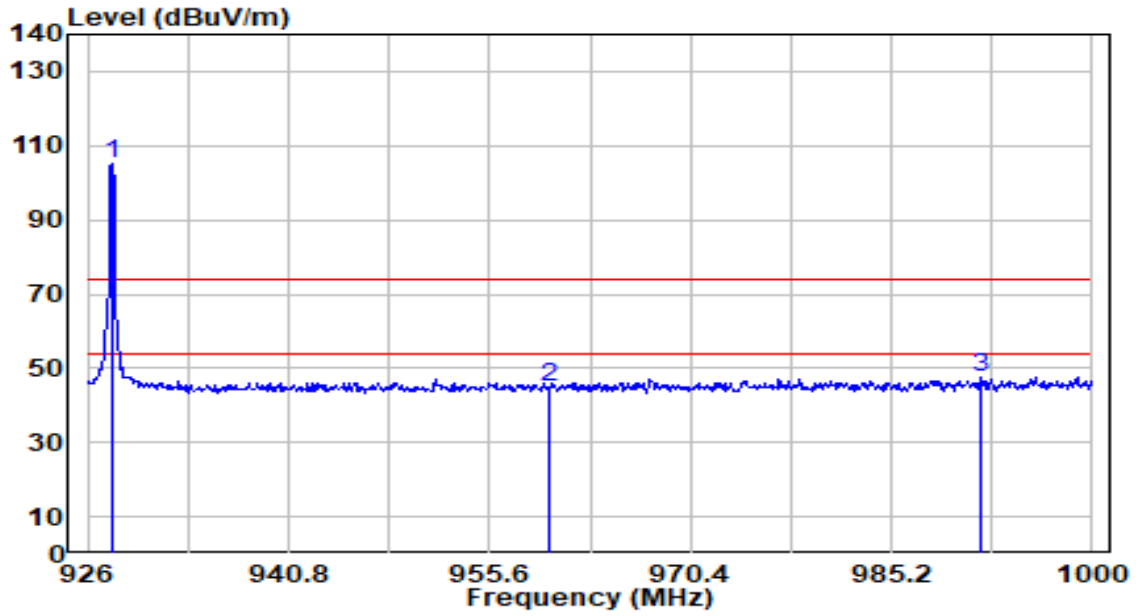


No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		927.776	80.76	31.00	111.76	N/A	N/A	150	360	Peak
2		960.000	13.07	31.18	44.25	-29.75	74.00	150	360	Peak
3	*	986.088	15.47	31.40	46.88	-27.12	74.00	150	360	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	Wi-SUN Module	Date of Test	2023-06-15
Factor	VULB 9162	Temp. / Humidity	23°C /61%
Polarity	Vertical	Site / Test Engineer	AC2 / Stanley
Test Mode	Wi SUN_TX_CH 128	Test Voltage	By Notebook PC



No		Frequency (MHz)	Reading (dBuV)	C.F (dB/m)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		927.776	74.21	31.00	105.21	N/A	N/A	132	38	Peak
2		960.000	13.67	31.18	44.85	-29.15	74.00	132	38	Peak
3	*	991.712	16.27	31.45	47.72	-26.28	74.00	132	38	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB/m) + Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.10. AC Conducted Emissions Measurement

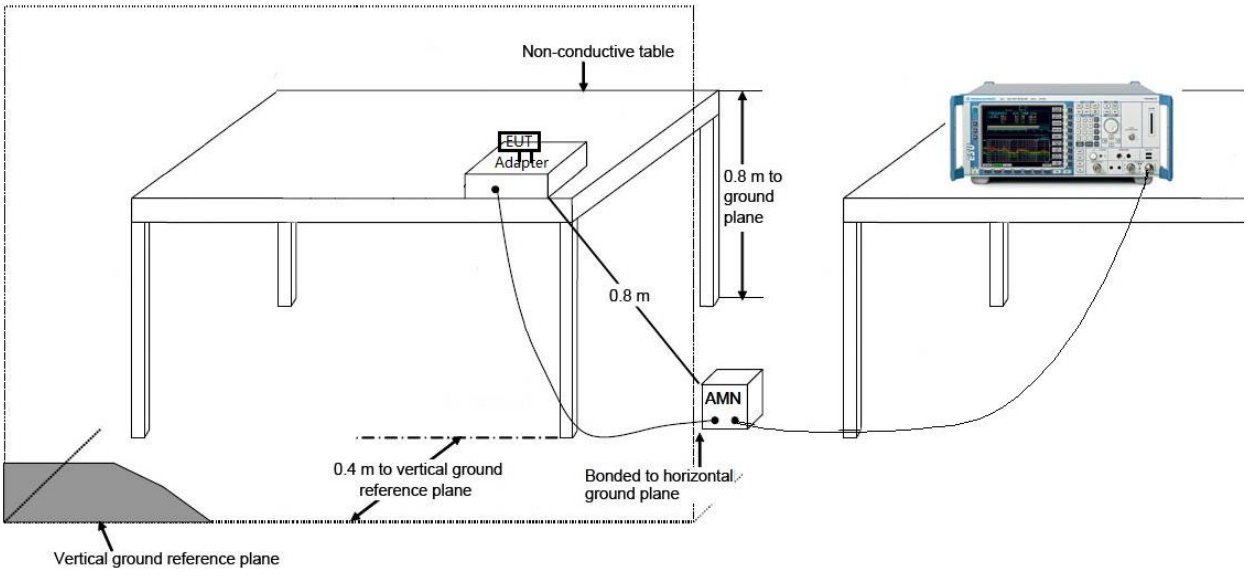
7.10.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 / RSS-Gen Limits		
Frequency (MHz)	QP (dBμV)	Average (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

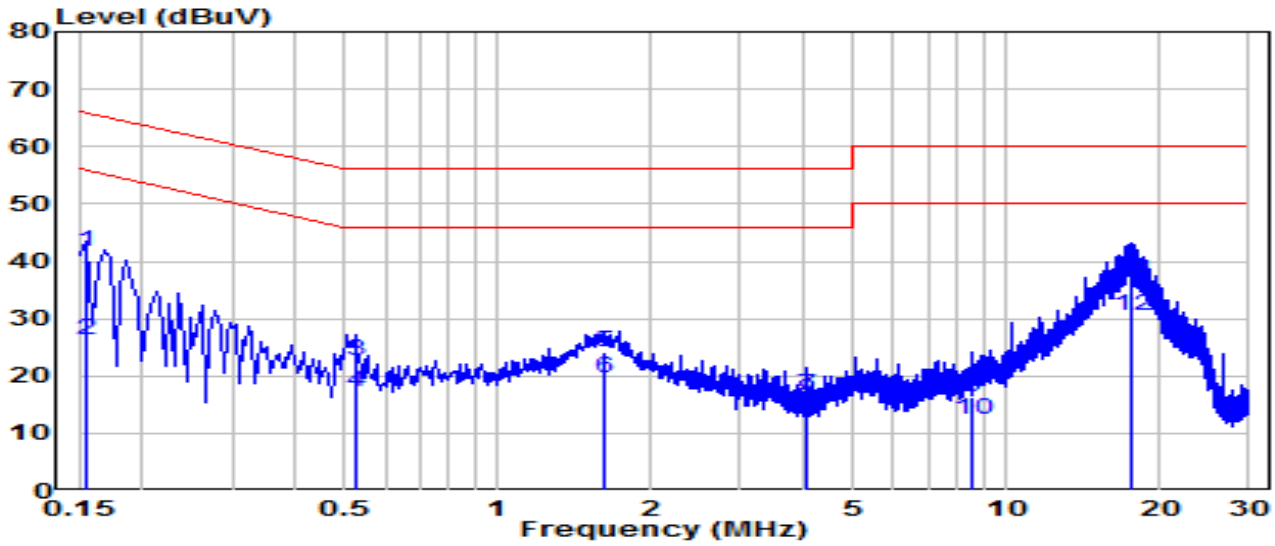
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.10.2. Test Setup



7.10.3. Test Result

EUT	Wi-SUN Module	Date of Test	2023-07-03
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	24.6°C /51%
Polarity	Line1	Site / Test Engineer	SR2 / Bob
Test Mode	Wi SUN_TX_CH 64	Test Voltage	AC 120V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.154	32.01	9.62	41.63	-24.13	65.75	QP
2		0.154	16.67	9.62	26.29	-29.46	55.75	Average
3		0.523	13.06	9.64	22.70	-33.30	56.00	QP
4		0.523	7.70	9.64	17.35	-28.65	46.00	Average
5		1.612	14.45	9.68	24.13	-31.87	56.00	QP
6		1.612	9.93	9.68	19.61	-26.39	46.00	Average
7		4.033	6.98	9.73	16.71	-39.29	56.00	QP
8		4.033	5.89	9.73	15.62	-30.38	46.00	Average
9		8.614	6.56	9.83	16.39	-43.61	60.00	QP
10		8.614	2.70	9.83	12.52	-37.48	50.00	Average
11	*	17.707	26.51	9.91	36.42	-23.58	60.00	QP
12	*	17.707	20.57	9.91	30.48	-19.52	50.00	Average

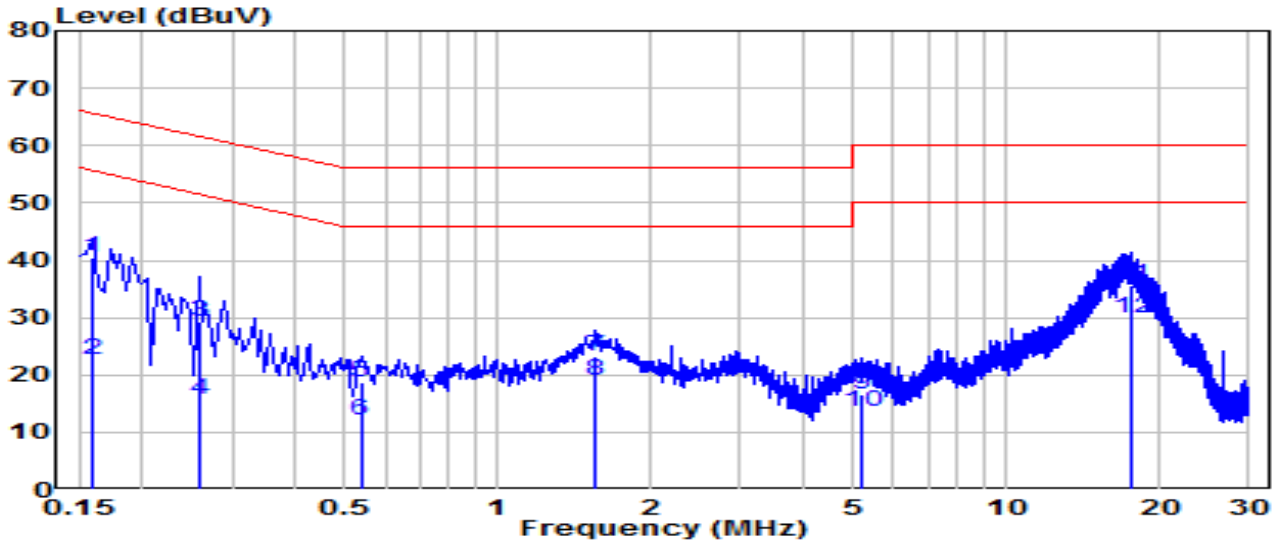
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = LISN Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV) = Reading(dBuV) + C.F (Correction Factor)

EUT	Wi-SUN Module	Date of Test	2023-07-03
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	24.6°C /51%
Polarity	Neutral	Site / Test Engineer	SR2 / Bob
Test Mode	Wi SUN_TX_CH 64	Test Voltage	AC 120V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.159	30.84	9.62	40.46	-25.06	65.52	QP
2		0.159	12.98	9.62	22.60	-32.92	55.52	Average
3		0.258	19.60	9.63	29.22	-32.27	61.50	QP
4		0.258	6.02	9.63	15.65	-35.85	51.50	Average
5		0.537	8.94	9.64	18.58	-37.42	56.00	QP
6		0.537	2.32	9.64	11.97	-34.03	46.00	Average
7		1.554	13.55	9.68	23.23	-32.77	56.00	QP
8		1.554	9.29	9.68	18.97	-27.03	46.00	Average
9		5.180	6.99	9.75	16.74	-43.26	60.00	QP
10		5.180	3.78	9.75	13.53	-36.47	50.00	Average
11	*	17.545	25.68	9.97	35.65	-24.35	60.00	QP
12	*	17.545	19.78	9.97	29.74	-20.26	50.00	Average

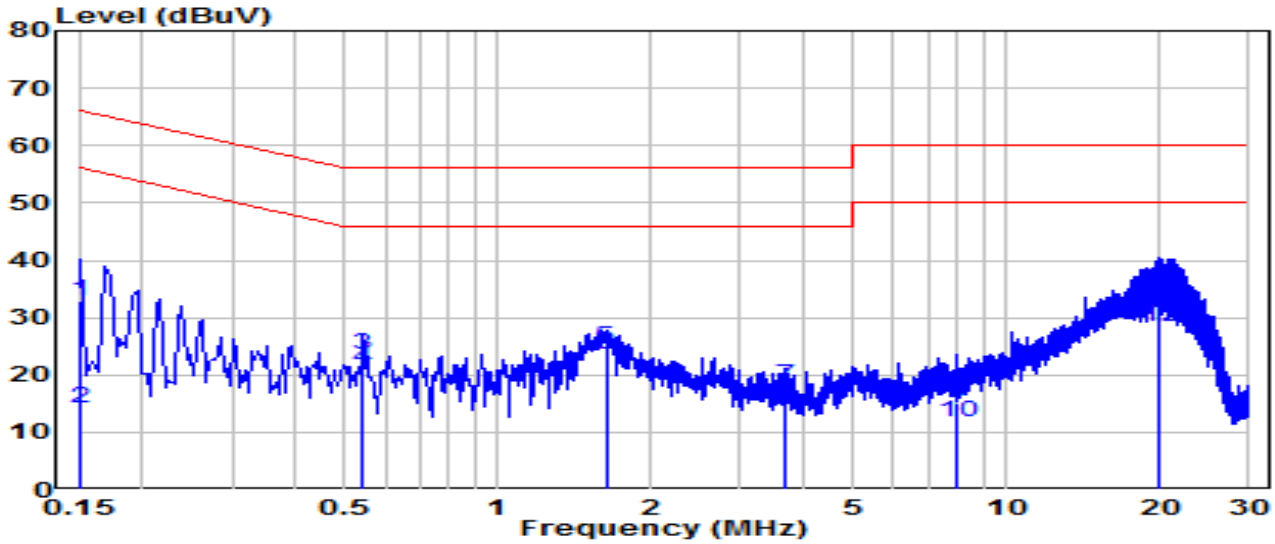
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = LISN Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV) = Reading(dBuV) + C.F (Correction Factor).

EUT	Wi-SUN Module	Date of Test	2023-07-03
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	24.6°C /51%
Polarity	Line1	Site / Test Engineer	SR2 / Bob
Test Mode	Wi SUN_TX_CH 64	Test Voltage	AC 240V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.150	23.18	9.62	32.80	-33.20	66.00	QP
2		0.150	4.42	9.62	14.04	-41.96	56.00	Average
3		0.541	13.92	9.64	23.57	-32.43	56.00	QP
4		0.541	11.46	9.64	21.10	-24.90	46.00	Average
5		1.630	15.07	9.68	24.76	-31.24	56.00	QP
6		1.630	13.72	9.68	23.40	-22.60	46.00	Average
7		3.687	8.37	9.72	18.09	-37.91	56.00	QP
8		3.687	5.72	9.72	15.44	-30.56	46.00	Average
9		8.033	5.21	9.81	15.02	-44.98	60.00	QP
10		8.033	1.93	9.81	11.75	-38.25	50.00	Average
11	*	19.867	25.23	9.93	35.16	-24.84	60.00	QP
12	*	19.867	18.30	9.93	28.23	-21.77	50.00	Average

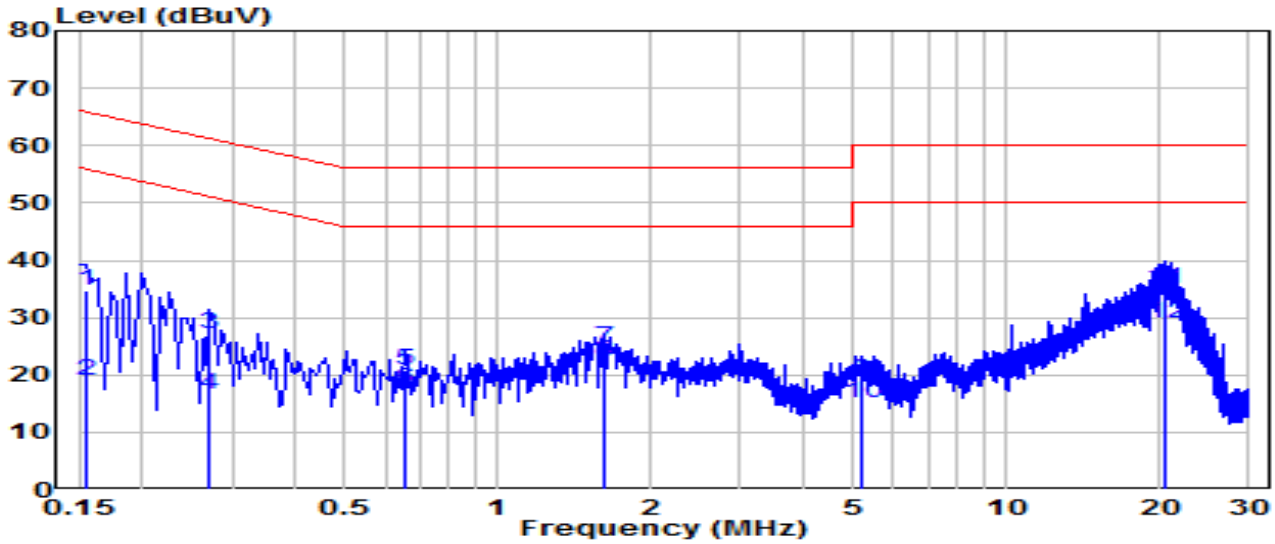
Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = LISN Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV) = Reading(dBuV) + C.F (Correction Factor).

EUT	Wi-SUN Module	Date of Test	2023-07-03
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	24.6°C /51%
Polarity	Neutral	Site / Test Engineer	SR2 / Bob
Test Mode	Wi SUN_TX_CH 64	Test Voltage	AC 240V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.154	25.02	9.62	34.64	-31.12	65.75	QP
2		0.154	9.36	9.62	18.98	-36.78	55.75	Average
3		0.271	17.49	9.63	27.12	-33.96	61.07	QP
4		0.271	6.85	9.63	16.47	-34.60	51.07	Average
5		0.658	11.25	9.65	20.90	-35.10	56.00	QP
6		0.658	7.80	9.65	17.45	-28.55	46.00	Average
7		1.612	15.09	9.68	24.77	-31.23	56.00	QP
8		1.612	12.73	9.68	22.42	-23.58	46.00	Average
9		5.185	9.29	9.75	19.04	-40.96	60.00	QP
10		5.185	5.48	9.75	15.23	-34.77	50.00	Average
11	*	20.407	24.90	10.00	34.90	-25.10	60.00	QP
12	*	20.407	18.91	10.00	28.91	-21.09	50.00	Average

Note:

1. " *", means this data is the worst emission level.

2. C.F (Correction Factor) = LISN Factor (dB)+ Cable Loss (dB).

3. Measurement (dBuV) = Reading(dBuV) + C.F (Correction Factor).

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **Wi-SUN Module** is in compliance with Part 15C of the FCC Rules.

Appendix A : Test Photograph

Refer to “2305TWQ501-UT” file.

Appendix B : EUT Photograph

Refer to “2305TWQ501-UE” file.

Appendix C : Internal Photograph

Refer to “2305TWQ501-UI” file.

The End