

Test Report

FCC Part15 Subpart C

Product Name : Wireless Module
Model No. : WF-R710-RTU1
FCC ID : 2AOKI-WFR710RTU1

Applicant : Sichuan AI-Link Technology Co., Ltd.
Address : Anzhou Industrial Park, Mianyang, Sichuan

Tested by : Heaven Yang
(Testing Engineer: Heaven Yang)

Reviewed by : Harry Zhao
(Technical Manager: Harry Zhao)

Approved by : Harry Zhao
(Technical Manager: Harry Zhao)

Performed Location : Suzhou EPIN Electrical Testing Technology Co., Ltd.
Building B, No.5 Minsheng Road, Suzhou Industrial Park,
Suzhou, China Tel: +86-512-67997780

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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TABLE OF CONTENTS

Description	Page
1. General Information.....	4
1.1. EUT Description	4
1.2. Working Frequency of Each Channel:	4
1.3. Antenna information	5
1.4. Mode of Operation by antenna	5
1.5. Power Setting	5
1.6. Tested System Details	6
1.7. Configuration of Tested System.....	7
1.8. EUT Exercise Software.....	7
1.9. Mode of Operation.....	8
2. Technical Test	9
2.1. Summary of Test Result.....	9
2.2. Test Lab Description	10
2.3. Test Environment.....	10
2.4. Measurement Uncertainty.....	10
2.5. Test Equipment.....	11
2.6. Duty Cycle Factor checking:	12
3. AC Power Line Conducted Emission.....	14
3.1. Test Setup	14
3.2. Limit.....	15
3.3. Test Procedure	15
3.4. Test Result.....	16
4. Emissions in restricted frequency bands	18
4.1. Test Setup	18
4.2. Limit.....	19
4.3. Test Procedure	22
4.4. EUT test Axis definition.....	23
4.5. Test Result.....	24
5. Fundamental emission output power	29
5.1. Test Setup	29
5.2. Limit.....	29
5.3. Test Procedure	30
5.4. EUT test definition	31
5.5. Test Result.....	32
6. Occupied Bandwidth.....	34
6.1. Test Setup	34
6.2. Limit.....	35

6.3.	Test Procedure	35
6.4.	EUT test definition	36
6.5.	Test Result.....	37
7.	Power Spectral Density	40
7.1.	Test Setup	40
7.2.	Limit.....	40
7.3.	Test Procedure	40
7.4.	EUT test definition	41
7.5.	Test Result.....	42
8.	Emissions in non-restricted frequency bands	45
8.1.	Test Setup	45
8.2.	Limit.....	46
8.3.	Test Procedure	47
8.4.	EUT test Axis definition.....	48
8.5.	Test Result.....	49
9.	Radiated Emission Band Edge	52
9.1.	Test Setup	52
9.2.	Limit.....	52
9.3.	Test Procedure	53
9.4.	EUT test definition	54
9.5.	Duty Cycle	55
9.6.	Test Result.....	56
10.	Antenna Requirement.....	68
10.1.	Limit.....	68
10.2.	Antenna Connector Construction.....	68

1. General Information

1.1. EUT Description

Product Name	Wireless Module
Brand Name	N/A
Model No.	WF-R710-RTU1
EUT Voltage	DC 3.3V
Frequency Range	802.11b/g/n(20MHz): 2412 ~ 2462 MHz
Channel Number	802.11b/g/n(20MHz): 11
Type of Modulation	802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g/n: OFDM-BPSK, QPSK, 16QAM, 64QAM
Data Rate	802.11b: 1/2/5.5/11 Mbps 802.11g: 6/9/12/18/24/36/48/54 Mbps 802.11n (HT20): 7.2/14/4/21.7/28.9/43.3/57.8/65/72.2 Mbps
Antenna Type	FPC
Peak Antenna Gain	1dBi

1.2. Working Frequency of Each Channel:

Wi-Fi 802.11b/g/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz		

1.3. Antenna information

Antenna Manufacturer			
Antenna Delivery	<input checked="" type="checkbox"/> 1*TX+1*RX	<input type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX
Antenna Technology	<input checked="" type="checkbox"/> SISO		
	<input type="checkbox"/> MIMO	<input type="checkbox"/> Basic	
		<input type="checkbox"/> Sectorized antenna systems	
		<input type="checkbox"/> Cross-polarized antennas	
		<input type="checkbox"/> Unequal antenna gains, with equal transmit powers	
		<input type="checkbox"/> Spatial Multiplexing	
		<input type="checkbox"/> CDD	
Antenna Type	<input type="checkbox"/> External	<input type="checkbox"/> Dipole	
	<input checked="" type="checkbox"/> Internal	<input type="checkbox"/> PIFA	
		<input type="checkbox"/> PCB	
		<input type="checkbox"/> Ceramic Chip Antenna	
		<input type="checkbox"/> Metal plate type F antenna	
		<input checked="" type="checkbox"/> FPC	
		<input type="checkbox"/> Cross-polarize Antenna	
Antenna Gain	1dBi		

1.4. Mode of Operation by antenna

Antenna Technology	SISO
Test mode	ANT 1
802.11b	√
802.11g	√
802.11n(20MHz)	√
802.11n(40MHz)	N/A

1.5. Power Setting

Test Software	UI_mptool 1V12	
Antenna technology	SISO	
Test Mode	Test Frequency	Ant 1
802.11b	2412	35

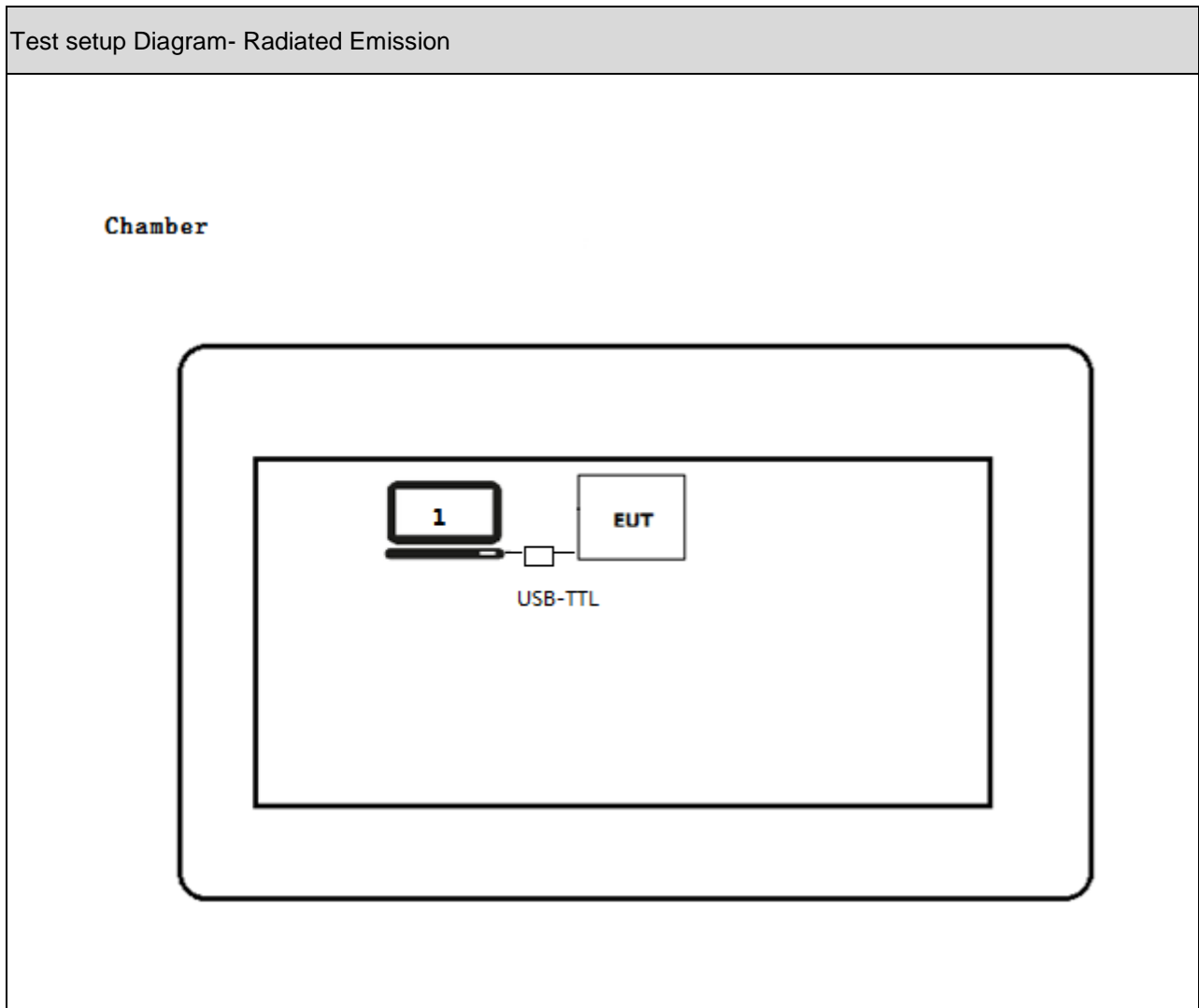
	2437	40
	2462	38
802.11g	2412	35
	2437	40
	2462	38
802.11n(20MHz)	2412	35
	2437	40
	2462	38
802.11n(40MHz)	Not Supporting	
	Not Supporting	
	Not Supporting	

1.6. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Think Pad	20KN-A001CD	PF-17SAMW	Power by adapter
Power Adapter information: Model :ADLX65YDC3A Input: 100-240V~ 1.8A 50-60Hz Output: 20V3.25A AC Cable: 1.1m unshielded and no ferrite core DC Cable 1.8m unshielded and no ferrite core					
2	USB-TTL Converter	N/A	CP2102	N/A	N/A

1.7. Configuration of Tested System



1.8. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	Run the software UI_mptool 1V12, and set the test mode and channel, then press start to continue for transmitting testing.

1.9. Mode of Operation

See the all test mode shown in this test report and defined as:

Test Mode Listed		
Mode 1: Transmit by 802.11b		
Mode 2: Transmit by 802.11g		
Mode 3: Transmit by 802.11n (20MHz)		
According to the test items in part 2.1, the following channels may be selected to be the test channel:		
Lowest channel:	Channel 01	2412MHz
Middle channel:	Channel 06	2437MHz
Highest channel:	Channel 11	2462MHz

2. Technical Test

2.1. Summary of Test Result

For FCC rule

Performed Test Item	Normative References	Limit	Result
AC Power Line Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.207	FCC 15.207	PASS
Emissions in restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.209	FCC 15.209	PASS
Fundamental emission output power	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.247(b)(3)	$\leq 30\text{dBm}$	PASS
6dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.247(a)(2)	$\geq 500\text{kHz}$	PASS
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.247(e)	$\leq 8\text{dBm}/3\text{kHz}$	PASS
Emissions in non-restricted frequency bands	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.247(d)	$\geq 30\text{dBc}$	PASS
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2020 15.247(d)	FCC 15.209	PASS
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C: 2020 Section 15.203	FCC 15.203	PASS

2.2. Test Lab Description

The test is performed in the location of:

Suzhou EPIN Electrical Testing Technology Co., Ltd.

Building B, No.5 Minsheng Road, Suzhou Industrial Park, Suzhou, China

Tel: +86-512-67997780

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Designation Number: CN1285

ISED– Recognition Number: CN0106

2.3. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	25
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

2.4. Measurement Uncertainty

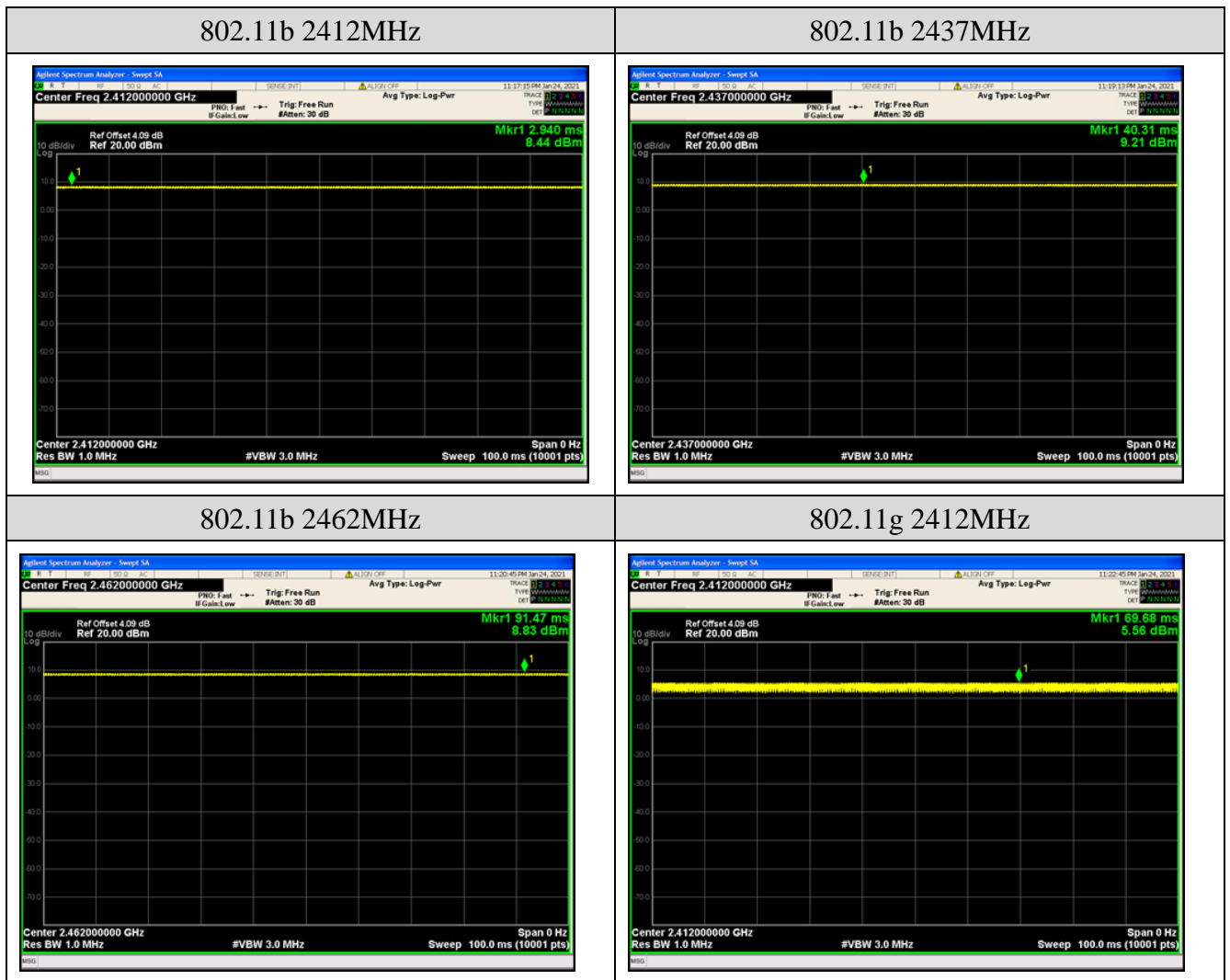
Test Items	Uncertainty
AC Power Line Conducted Emission	The maximum measurement uncertainty is evaluated as: Mains: 9kHz~150kHz: 1.70dB 150kHz~30MHz: 2.50dB
Radiated Emission	Horizontal: 30MHz~300MHz: 3.38 dB 300MHz~1GHz: 3.17 dB 1GHz~18GHz: 4.27 dB 18~40GHz: 4.34 dB Vertical: 30MHz~300MHz: 3.93 dB 300MHz~1GHz: 3.19 dB 1GHz~18GHz: 4.84 dB 18~40GHz: 4.90 dB
RF Antenna Port Conducted Emission	± 1.27dB
Radiated Emission Band Edge	± 4.84dB
Occupied Bandwidth	± 1kHz
Power Spectral Density	± 1.27dB

2.5. Test Equipment

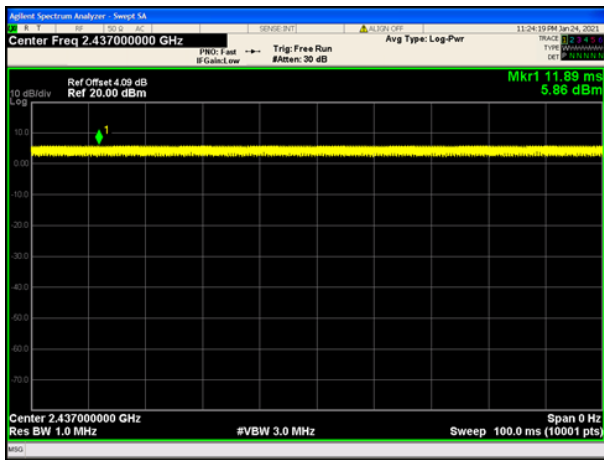
Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
USB Wideband power sensor	Keysight	U2021XA	MY54320002	2021.05.11
USB Wideband power sensor	Keysight	U2021XA	MY55060009	2021.05.11
USB Wideband power sensor	Keysight	U2021XA	MY55240005	2021.05.11
USB Wideband power sensor	Keysight	U2021XA	MY55060008	2021.05.11
USB Modular Simultaneous Sampling Multifunction DAQ Devices	Agilent	U2531A	TW59323513	N/A
MXA Signal Analyzer	Agilent	N9020A	MY51110329	2021.09.22
MXG Analog Signal Generator	Agilent	N5181A	MY50143487	2021.09.22
MXG Vector Signal Generator	Agilent	N5182A	MY0140036	2021.03.16
WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	1201.00022K50-109958-Ag	2021.05.11
Radio frequency control box	MW	MW100-RFCB	N/A	N/A
Power detection box	MW	MW100-PSB	N/A	N/A
Horn Antenna	ZKY	LOG 70180	YP-LBTX-001	2021.05.23
Horn Antenna	Schwarzbeck	BBHA9120D	01938	2021.09.22
Pre Amplifier	SKET	LNPA_0118G-45	SK2018063001	2021.02.26
Broadband Amplifier	Schwarzbeck	BBV 9721	79	2021.10.10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	01029	2021.10.10
RF Cable	SHX-SH	PT40-KMKM-2M	N/A	2021.09.18
RF Cable	SHX-SH	PT40-KMKM-8M	N/A	2021.09.18
RF Cable	SHX-SH	PT40-KMKM-1M	N/A	2021.09.18
Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.				

2.6. Duty Cycle Factor checking:

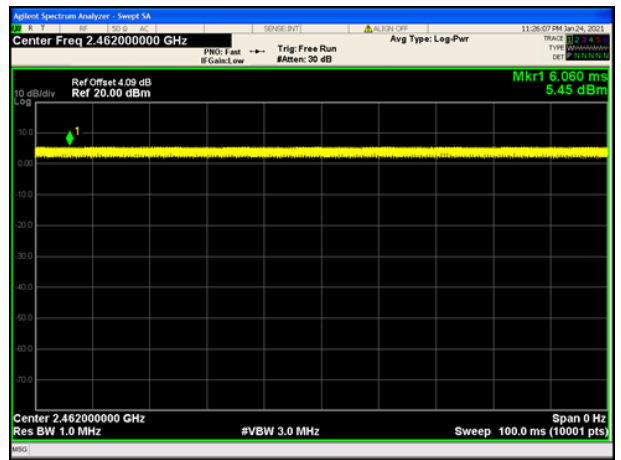
Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)
b	2412	Ant1	100	0
b	2437	Ant1	100	0
b	2462	Ant1	100	0
g	2412	Ant1	100	0
g	2437	Ant1	100	0
g	2462	Ant1	100	0
n20	2412	Ant1	100	0
n20	2437	Ant1	100	0
n20	2462	Ant1	100	0



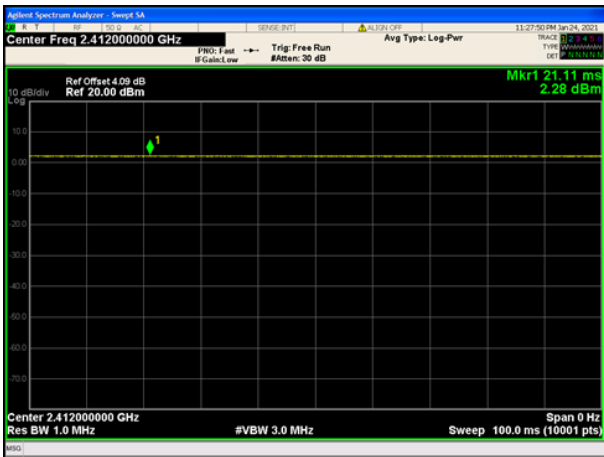
802.11g 2437MHz



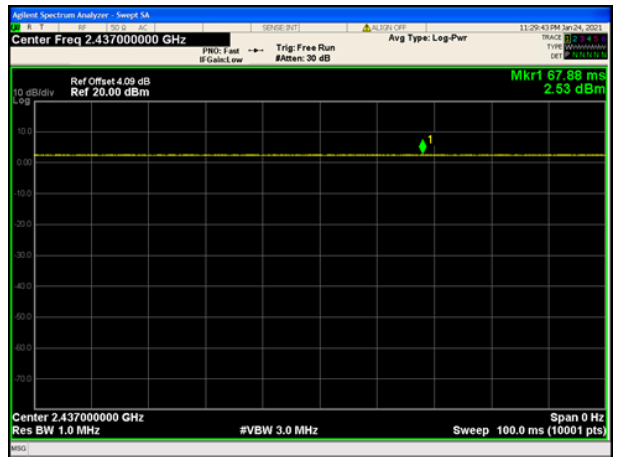
802.11g 2462MHz



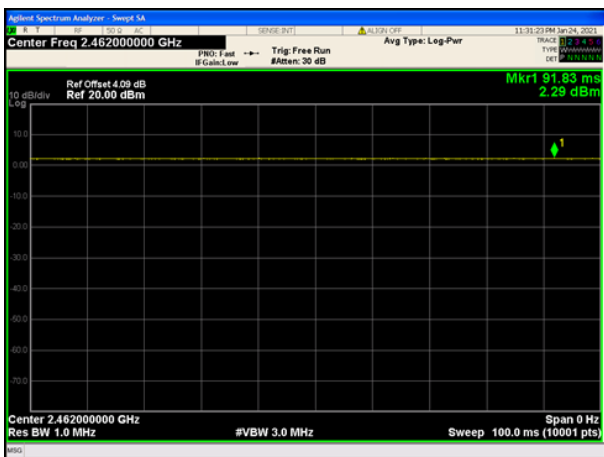
802.11n20 2412MHz



802.11n20 2437MHz



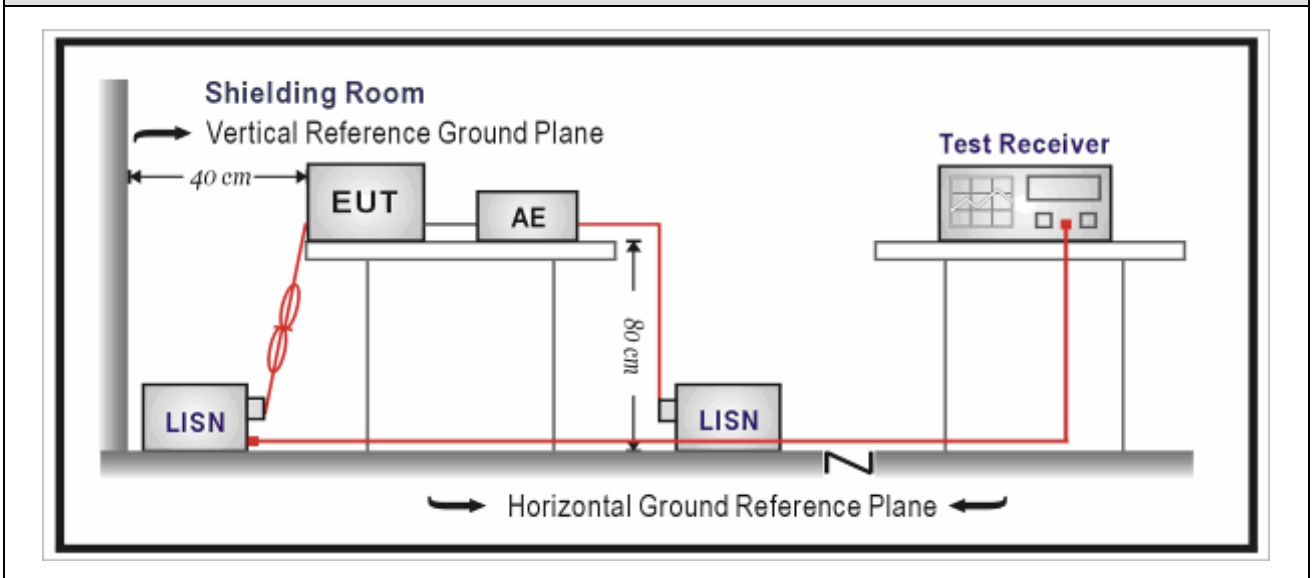
802.11n20 2462MHz



3. AC Power Line Conducted Emission

3.1. Test Setup

AC Power Line Conducted Emission test setup



3.2. Limit

Frequency of Emission (MHz)	Conducted Limit	
	Quasi-peak (dBµV)	Average(dBµV)
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

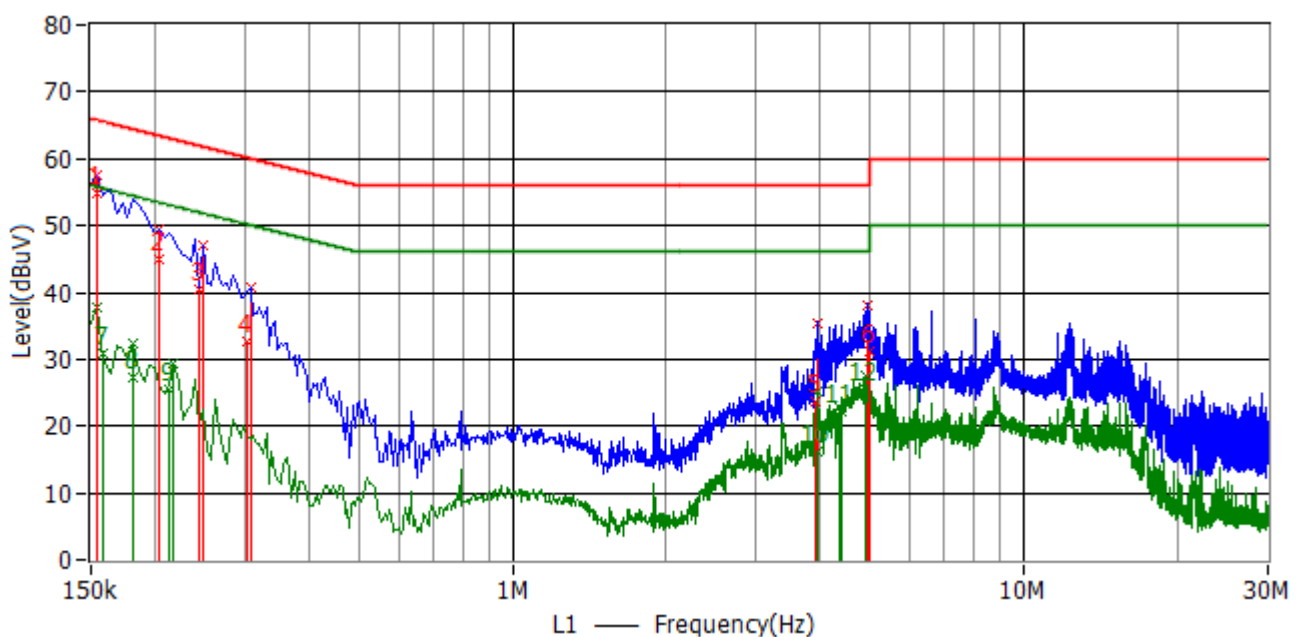
Note 1: The lower limit shall apply at the transition frequencies.
 Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.3. Test Procedure

Test Method			
	References Rule	Chapter	Item
<input checked="" type="checkbox"/>	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices
<input checked="" type="checkbox"/>	ANSI C63.4-2014	7	AC power-line conducted emission measurements

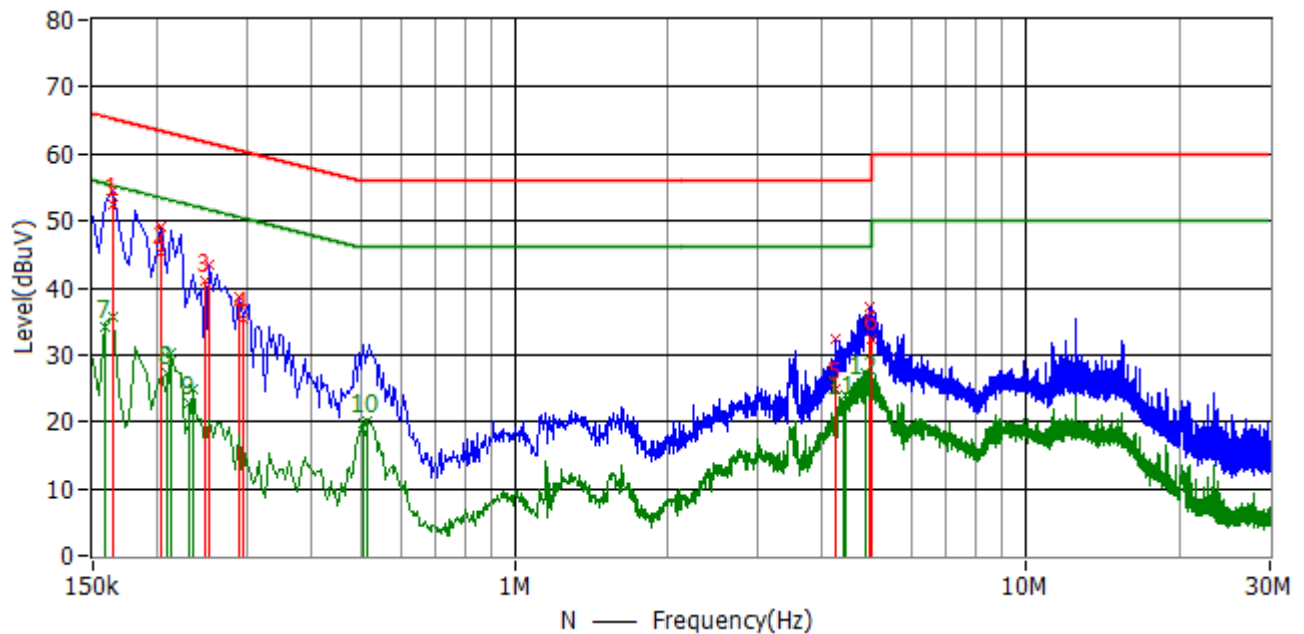
3.4. Test Result

Test Site	Shielding Room	Date of Test	2021.01.25
EUT	Wireless Module	Test Voltage	120V/60Hz
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 1: Transmitting by 802.11b at 2412MHz		
Note	Mains terminal disturbance voltage (Test line L)		



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Factor dB	Detector	Phase
1	154.500 kHz	65.8	54.9	-10.9	9.5	QP	L1
2	204.000 kHz	63.4	45.0	-18.4	9.4	QP	L1
3	244.500 kHz	61.9	40.5	-21.4	9.5	QP	L1
4	303.000 kHz	60.2	32.7	-27.4	9.5	QP	L1
5	3.921 MHz	56.0	23.6	-32.4	9.6	QP	L1
6	4.987 MHz	56.0	31.1	-24.9	9.6	QP	L1
7	159.000 kHz	55.5	31.0	-24.6	9.5	CAV	L1
8	181.500 kHz	54.4	27.4	-27.0	9.5	CAV	L1
9	213.000 kHz	53.1	25.6	-27.5	9.4	CAV	L1
10	3.957 MHz	46.0	16.3	-29.7	9.6	CAV	L1
11	4.389 MHz	46.0	22.3	-23.7	9.6	CAV	L1
12	4.893 MHz	46.0	25.4	-20.6	9.6	CAV	L1

Test Site	Shielding Room	Date of Test	2021.01.25
EUT	Wireless Module	Test Voltage	120V/60Hz
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 1: Transmitting by 802.11b at 2412MHz		
Note	Mains terminal disturbance voltage (Test line N)		

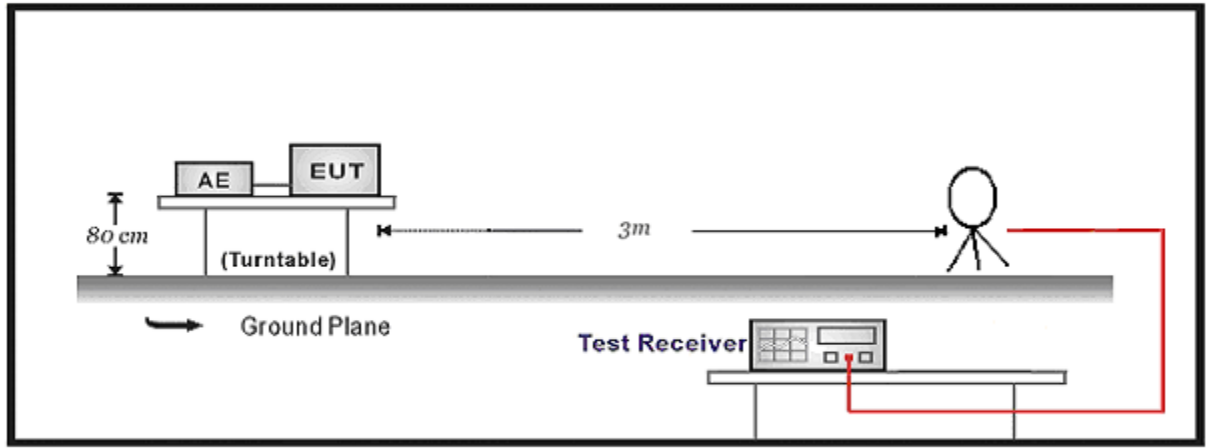


No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Factor dB	Detector	Phase
1	163.500 kHz	65.3	52.5	-12.7	9.5	QP	N
2	204.000 kHz	63.4	45.2	-18.3	9.5	QP	N
3	249.000 kHz	61.8	41.0	-20.8	9.4	QP	N
4	294.000 kHz	60.4	35.5	-24.9	9.4	QP	N
5	4.240 MHz	56.0	25.0	-31.0	9.5	QP	N
6	4.997 MHz	56.0	32.5	-23.5	9.6	QP	N
7	159.000 kHz	55.5	34.1	-21.4	9.5	CAV	N
8	208.500 kHz	53.3	27.4	-25.9	9.5	CAV	N
9	231.000 kHz	52.4	22.9	-29.5	9.5	CAV	N
10	514.500 kHz	46.0	20.0	-26.0	9.4	CAV	N
11	4.398 MHz	46.0	22.8	-23.2	9.5	CAV	N
12	4.853 MHz	46.0	25.7	-20.3	9.6	CAV	N

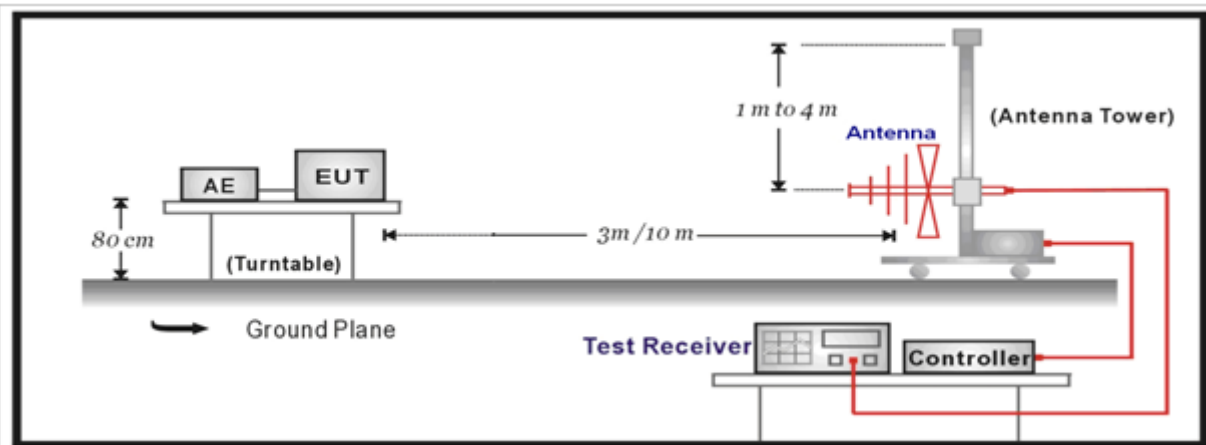
4. Emissions in restricted frequency bands

4.1. Test Setup

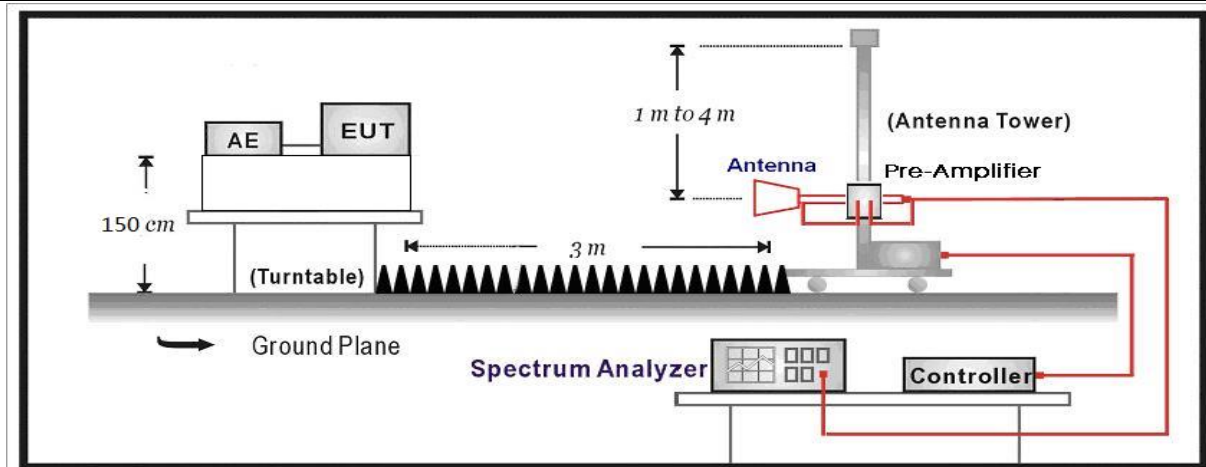
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.2. Limit

For FCC

Restricted Bands of operation			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	
13.36 – 13.41			

For IC:

Restricted Bands of operation			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090-0.110	13.36-13.41	1645.5-1646.5	9.0-9.2
2.1735-2.1905	16.42-16.423	1660-1710	9.3-9.5
3.020-3.026	16.69475-16.69525	1718.8-1722.2	10.6-12.7
4.125-4.128	16.80425-16.80475	2200-2300	13.25-13.4
4.17725-4.17775	25.5-25.67	2310-2390	14.47-14.5
4.20725-4.20775	37.5-38.25	2655-2900	15.35-16.2
5.677-5.683	73-74.6	3260-3267	17.7-21.4
6.215-6.218	74.8-75.2	3332-3339	22.01-23.12
6.26775-6.26825	108-138	3345.8-3358	23.6-24.0
6.31175-6.31225	156.52475-156.52525	3500-4400	31.2-31.8
8.291-8.294	156.7-156.9	4500-5150	36.43-36.5
8.362-8.366	240-285	5350-5460	Above 38.6
8.37625-8.38675	322-335.4	7250-7750	
8.41425-8.41475	399.9-410	8025-8500	
12.29-12.293	608-614		
12.51975-12.52025	960-1427		
12.57675-12.57725	1435-1626.5		

Restricted Band Emissions Limit			
Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

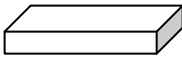
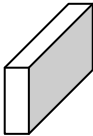




Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.3. Test Procedure

Test Method			
	References Rule	Chapter	Description
<input type="checkbox"/>	ANSI C63.10	11.11	Emissions in non-restricted frequency bands
	<input type="checkbox"/> ANSI C63.10	11.11.2	Reference level measurement
	<input type="checkbox"/> ANSI C63.10	11.11.3	Emission level measurement
<input checked="" type="checkbox"/>	ANSI C63.10	11.12	Emissions in restricted frequency bands
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.1	Radiated emission measurements
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2.7	Radiated spurious emission test
	<input checked="" type="checkbox"/> ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
	<input checked="" type="checkbox"/> ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
	<input checked="" type="checkbox"/> ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	<input type="checkbox"/> ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2.4	Peak power measurement procedure
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2.5	Average power measurement procedures
	<input type="checkbox"/> ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
	<input type="checkbox"/> ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

4.4. EUT test Axis definition

Item	Emissions in restricted frequency bands			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input checked="" type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input checked="" type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input type="checkbox"/>	Conducted		
	<input type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

4.5. Test Result

Test Site	3m Semi -Anechoic Chamber	Date of Test	2021.01.25
EUT	Wireless Module	Test Voltage	DC 3.3V
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 1: Transmitting by 802.11b		

CH	Antenna	Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measured Level (dBμV/m)	Limit (dBμV/m)	Delta (dB)	Detector
1	H	4824	42.2	-1.6	40.6	54.0(Note1)	-13.4	PK
	H	9648	37.9	4.1	42.0	54.0(Note1)	-12.0	PK
	V	4824	43.1	-1.6	41.5	54.0(Note1)	-12.5	PK
	V	9648	37.6	4.1	41.7	54.0(Note1)	-12.3	PK
6	H	4874	43.1	-1.7	41.4	54.0(Note1)	-12.6	PK
	H	7311	37.3	4.2	41.5	54.0(Note1)	-12.5	PK
	V	4874	42.6	-1.7	40.9	54.0(Note1)	-13.1	PK
	V	7311	36.9	4.2	41.1	54.0(Note1)	-12.9	PK
11	H	4924	42.1	-1.0	41.1	54.0(Note1)	-12.9	PK
	H	9848	37.8	5.1	42.9	54.0(Note1)	-11.1	PK
	V	4924	42.6	-1.0	41.6	54.0(Note1)	-12.4	PK
	V	9848	37.9	5.1	43.0	54.0(Note1)	-11.0	PK

Note 1: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Note 2: Measured Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss – Pre-amplifier gain

Note 3: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report

Test Site	3m Semi -Anechoic Chamber	Date of Test	2021.01.25
EUT	Wireless Module	Test Voltage	DC 3.3V
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 2: Transmitting by 802.11g		

CH	Antenna	Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measured Level (dB μ V/m)	Limit (dB μ V/m)	Delta (dB)	Detector
1	H	4824	41.7	-1.6	40.1	54(Note1)	-13.9	PK
	H	9648	36.7	4.1	40.8	54(Note1)	-13.2	PK
	V	4824	42.5	-1.6	40.9	54(Note1)	-13.1	PK
	V	9648	36.8	4.1	40.9	54(Note1)	-13.1	PK
6	H	4874	42.1	-1.7	40.4	54(Note1)	-13.6	PK
	H	7311	37.1	4.2	41.3	54(Note1)	-12.7	PK
	V	4874	41.8	-1.7	40.1	54(Note1)	-13.9	PK
	V	7311	35.6	4.2	39.8	54(Note1)	-14.2	PK
11	H	4924	42.6	-1.0	41.6	54(Note1)	-12.4	PK
	H	9848	38.1	5.1	43.2	54(Note1)	-10.8	PK
	V	4924	42.8	-1.0	41.8	54(Note1)	-12.2	PK
	V	9848	36.9	5.1	42.0	54(Note1)	-12.0	PK

Note 1: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Note 2: Measured Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss – Pre-amplifier gain

Note 3: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report

Test Site	3m Semi -Anechoic Chamber	Date of Test	2021.01.25
EUT	Wireless Module	Test Voltage	DC 3.3V
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 3: Transmitting by 802.11n20		

CH	Antenna	Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measured Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	H	4824	42.8	-1.6	41.2	54(Note1)	-12.8	PK
	H	9648	39.2	4.1	43.3	54(Note1)	-10.7	PK
	V	4824	42.9	-1.6	41.3	54(Note1)	-12.7	PK
	V	9648	38.1	4.1	42.2	54(Note1)	-11.8	PK
6	H	4874	42.0	-1.7	40.3	54(Note1)	-13.7	PK
	H	7311	37.2	4.2	41.4	54(Note1)	-12.6	PK
	V	4874	40.7	-1.7	39.0	54(Note1)	-15.0	PK
	V	7311	37.1	4.2	41.3	54(Note1)	-12.7	PK
11	H	4924	41.8	-1.0	40.8	54(Note1)	-13.2	PK
	H	9848	38.2	5.1	43.3	54(Note1)	-10.7	PK
	V	4924	41.9	-1.0	40.9	54(Note1)	-13.1	PK
	V	9848	38.9	5.1	44.0	54(Note1)	-10.0	PK

Note 1: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

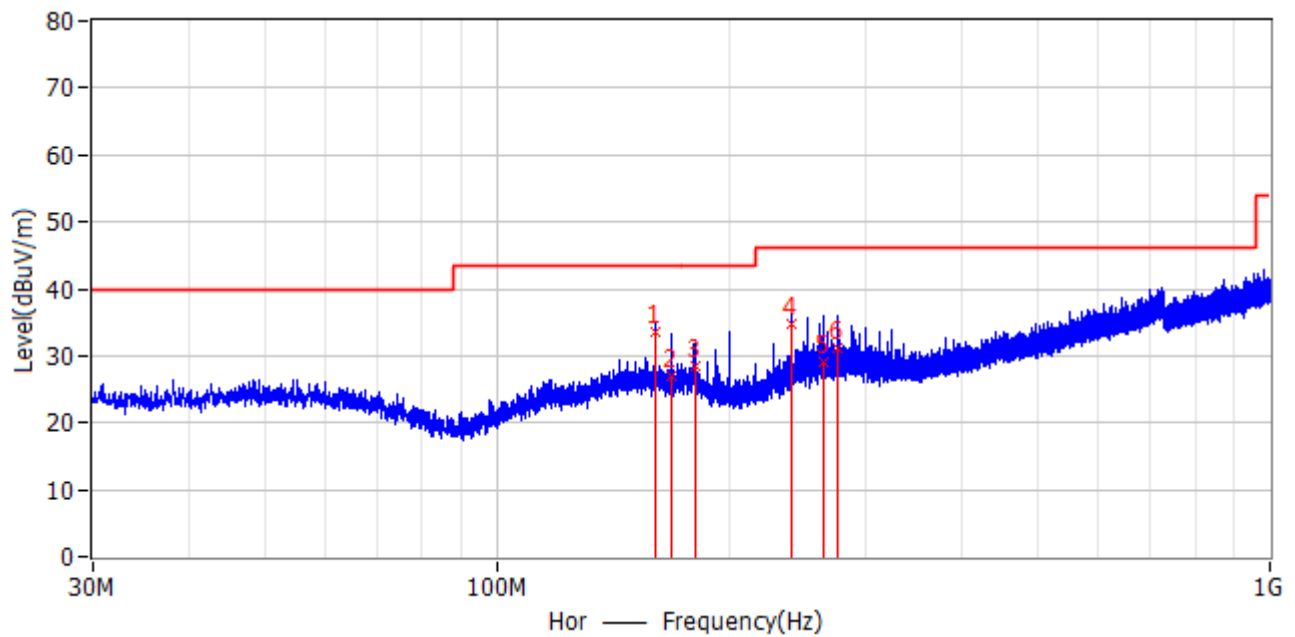
Note 2: Measured Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss – Pre-amplifier gain

Note 3: The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report

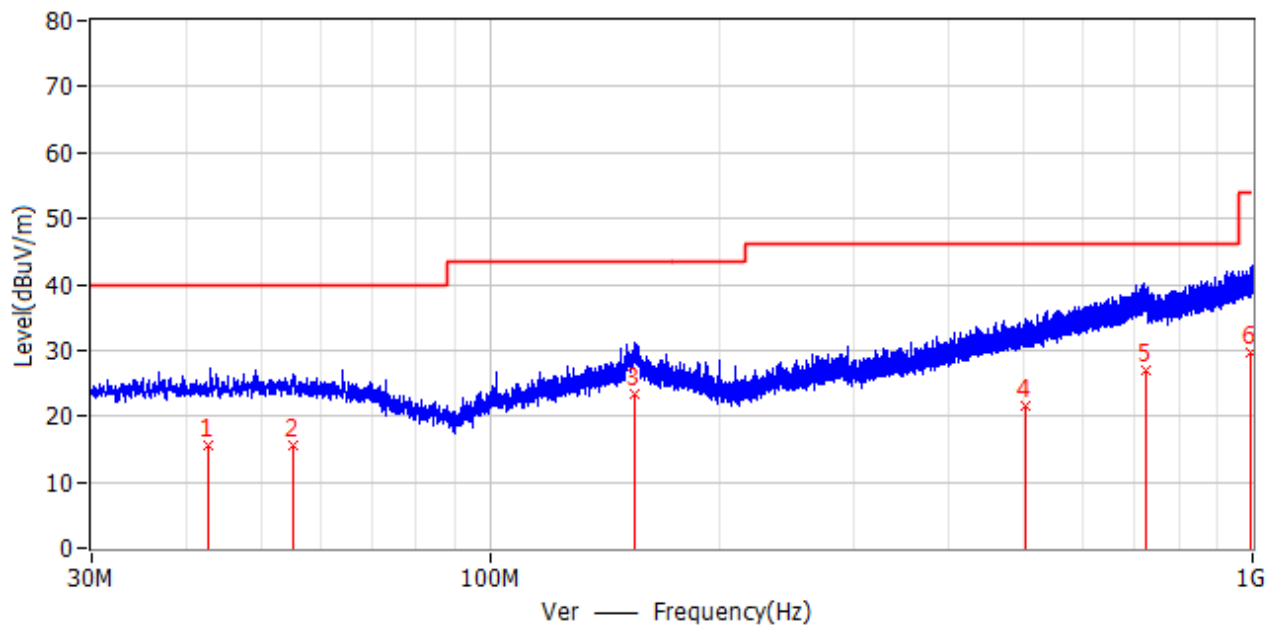
The worst case of Radiated Emission below 1GHz:

Test Site	3m Semi -Anechoic Chamber	Date of Test	2021.01.26
EUT	Wireless Module	Test Voltage	DC 3.3V
Temperature	25°C	Humidity	50%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 1: Transmit by 802.11b @2412MHz		
Polarity	Horizontal polarization		



No.	Frequency	Limit dBµV/m	Level dBµV/m	Delta dB	Factor dB/m	Detector	Polar	Height cm	Angle deg
1	160.008 MHz	43.5	33.6	-9.9	20.3	QP	Hor	100.0	350.1
2	168.262 MHz	43.5	27.1	-16.4	19.9	QP	Hor	100.0	332.1
3	180.191 MHz	43.5	28.5	-15.0	18.8	QP	Hor	100.0	162.7
4	240.008 MHz	46.0	34.8	-11.2	18.7	QP	Hor	100.0	354.8
5	264.461 MHz	46.0	29.1	-16.9	19.6	QP	Hor	100.0	233.5
6	276.337 MHz	46.0	31.1	-14.9	20.3	QP	Hor	100.0	129.9

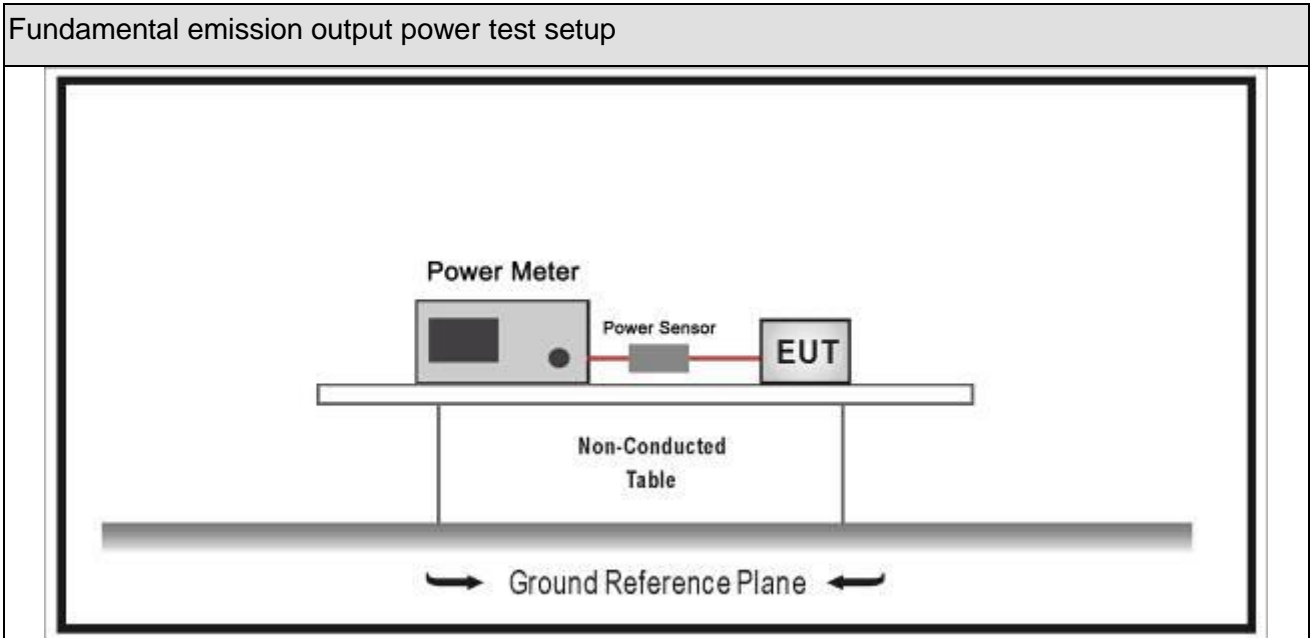
Test Site	3m Semi -Anechoic Chamber	Date of Test	2021.01.26
EUT	Wireless Module	Test Voltage	DC 3.3V
Temperature	25°C	Humidity	45%RH
Barometric Pressure	101.3kPa	Test Engineer	Heaven
Test Mode	Mode 1: Transmit by 802.11b @2412MHz		
Polarity	Vertical polarization		



No.	Frequency	Limit dB μ V/m	Level dB μ V/m	Delta dB	Factor dB/m	Detector	Polar	Height cm	Angle deg
1	42.581 MHz	40.0	15.7	-24.3	19.7	QP	Ver	100.0	71.6
2	54.955 MHz	40.0	15.7	-24.3	20.0	QP	Ver	100.0	130.1
3	155.082 MHz	43.5	23.5	-20.0	20.4	QP	Ver	100.0	40.2
4	503.638 MHz	46.0	21.6	-24.4	25.9	QP	Ver	100.0	72.8
5	724.695 MHz	46.0	27.1	-18.9	30.2	QP	Ver	100.0	287.4
6	991.860 MHz	54.0	29.6	-24.4	33.5	QP	Ver	100.0	234.5

5. Fundamental emission output power

5.1. Test Setup



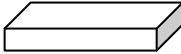
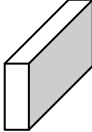




5.2. Limit

Fundamental emission output power Limit			
<input checked="" type="checkbox"/>	$G_{TX} < 6\text{dBi}$		$P_{out} \leq 30\text{dBm}$
<input type="checkbox"/>	$G_{TX} > 6\text{dBi}$		
	<input type="checkbox"/>	Non-Fix point-point	$P_{out} \leq 30 - (G_{TX} - 6)$
	<input type="checkbox"/>	Fix point-point	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
	<input type="checkbox"/>	Point-to-multipoint	$P_{out} \leq 30 - (G_{TX} - 6)$
	<input type="checkbox"/>	Overlap Beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
	<input type="checkbox"/>	Aggregate power transmitted simultaneously on all beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
	<input type="checkbox"/>	single directional beam	$P_{out} \leq 30 - [(G_{TX} - 6)]/3 + 8\text{dB}$
Note 1 : G_{TX} directional gain of transmitting antennas.			
Note 2 : P_{out} is maximum peak conducted output power .			

5.3. Test Procedure

Fundamental emission output power Test Method						
	References Rule		Chapter	Description		
<input checked="" type="checkbox"/>	ANSI C63.10		11.9	Fundamental emission output power		
	<input type="checkbox"/>	ANSI C63.10		11.9.1	Maximum peak conducted output power	
		<input type="checkbox"/>	ANSI C63.10	11.9.1.1	RBW \geq DTS bandwidth	
		<input type="checkbox"/>	ANSI C63.10	11.9.1.2	Integrated band power method	
		<input type="checkbox"/>	ANSI C63.10	11.9.1.3	PKPM1 Peak power meter method	
	<input checked="" type="checkbox"/>	ANSI C63.10		11.9.2	Maximum conducted (average) output power	
		<input type="checkbox"/>	ANSI C63.10		11.9.2.2	Measurement using a spectrum analyzer (SA)
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle \geq 98%)
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle \geq 98%)
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle \leq 98%)
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle \leq 98%)
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.4	Method AVGSA-3
			<input type="checkbox"/>	ANSI C63.10	11.9.2.2.5	Method AVGSA-3A
		<input checked="" type="checkbox"/>	ANSI C63.10		11.9.2.3	Measurement using a power meter (PM)
		<input checked="" type="checkbox"/>	ANSI C63.10	11.9.2.3.1	Method AVGPM	
<input type="checkbox"/>		ANSI C63.10	11.9.2.3.2	Method AVGPM-G		

5.4. EUT test definition

Item	Fundamental emission output power			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input checked="" type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

5.5. Test Result

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Channel	Test Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
802.11b	01	2412	15.524	30	Pass
802.11b	06	2437	16.150	30	Pass
802.11b	11	2462	15.777	30	Pass

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Channel	Test Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
802.11g	01	2412	13.655	30	Pass
802.11g	06	2437	13.819	30	Pass
802.11g	11	2462	13.465	30	Pass

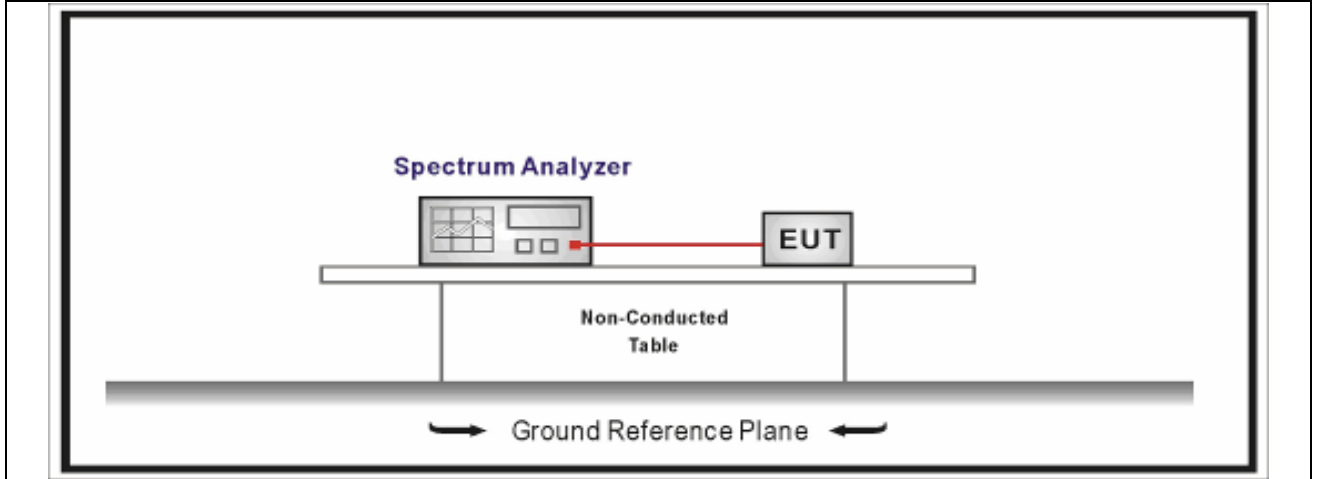
Product Name	:	Wireless Module	Power	:	DC 3.3V
Test Mode	:	Mode 3 Transmitting by 802.11n20	Test Site	:	Test Room#1
Test Date	:	2021.01.25	Test Engineer	:	Heaven

Mode	Channel	Test Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
802.11n20	01	2412	12.881	30	Pass
802.11n20	06	2437	13.158	30	Pass
802.11n20	11	2462	12.969	30	Pass

6. Occupied Bandwidth

6.1. Test Setup

Occupied Bandwidth test setup:



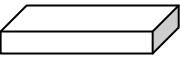
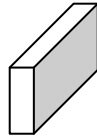
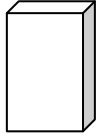
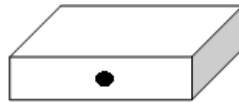

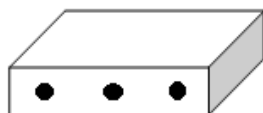
6.2. Limit

Occupied Bandwidth
Systems using digital modulation techniques operate in the 2400-2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz

6.3. Test Procedure

Test Method			
	Reference Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.8	DTS bandwidth
<input type="checkbox"/>	ANSI C63.10	11.8.1	Option 1
<input checked="" type="checkbox"/>	ANSI C63.10	11.8.2	Option 2

6.4. EUT test definition

Item	Occupied Bandwidth			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input checked="" type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

6.5. Test Result

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	CH.	Test Frequency (MHz)	6dB Occupied Bandwidth (MHz)	Limit (kHz)	Result
802.11b	01	2412	10.072	>500	Pass
802.11b	06	2437	10.070	>500	Pass
802.11b	11	2462	10.065	>500	Pass

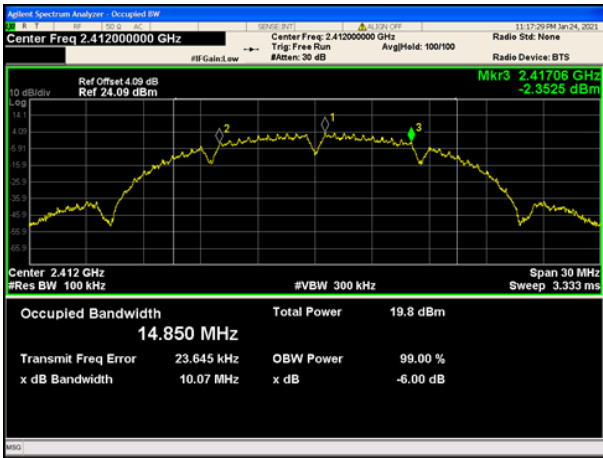
Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	CH.	Test Frequency (MHz)	6dB Occupied Bandwidth (MHz)	Limit (kHz)	Result
802.11g	01	2412	16.543	>500	Pass
802.11g	06	2437	16.527	>500	Pass
802.11g	11	2462	16.479	>500	Pass

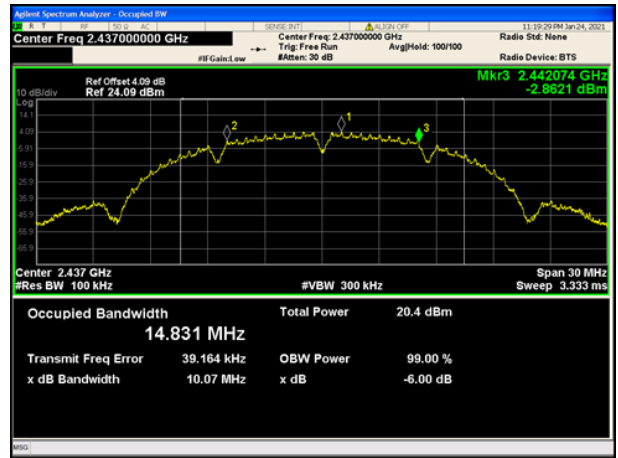
Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 3 Transmitting by 802.11n20	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	CH.	Test Frequency (MHz)	6dB Occupied Bandwidth (MHz)	Limit (kHz)	Result
802.11n20	01	2412	16.066	>500	Pass
802.11n20	06	2437	16.063	>500	Pass
802.11n20	11	2462	16.068	>500	Pass

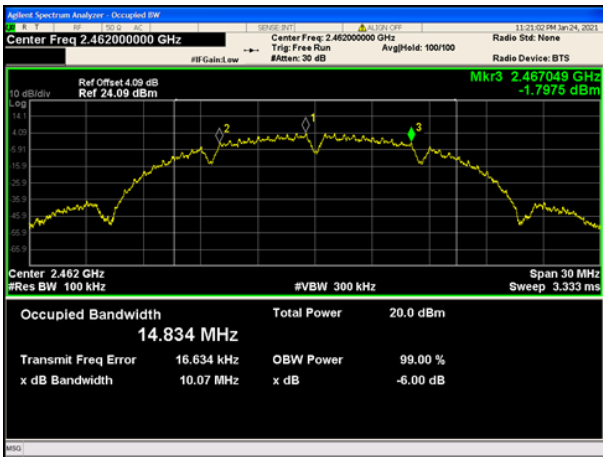
802.11b 2412MHz



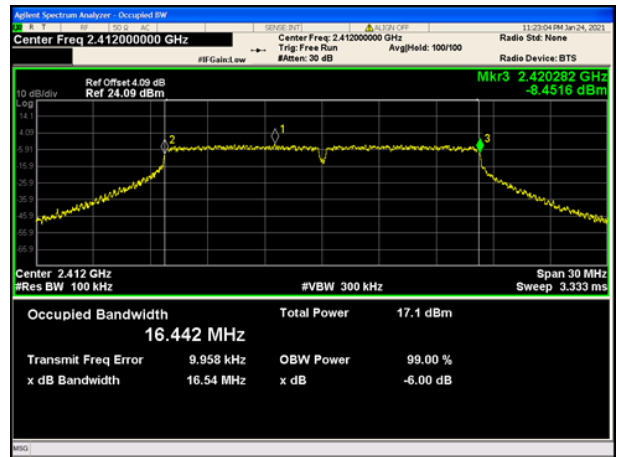
802.11b 2437MHz



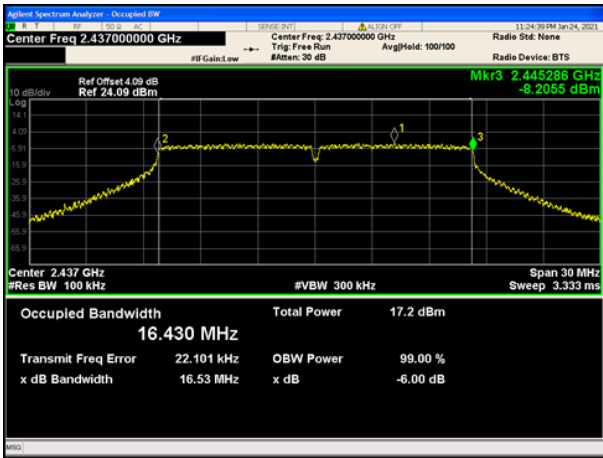
802.11b 2462MHz



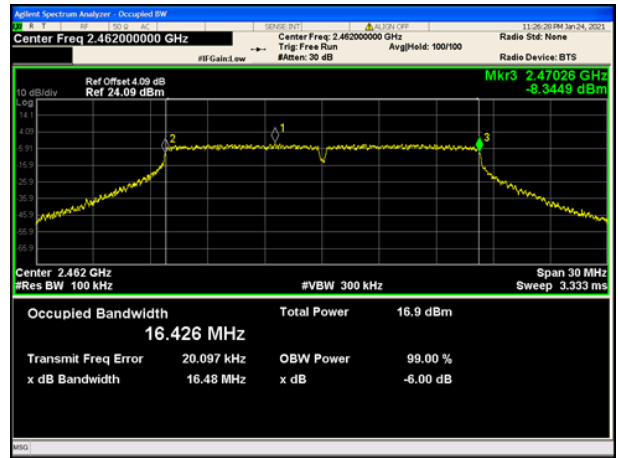
802.11g 2412MHz



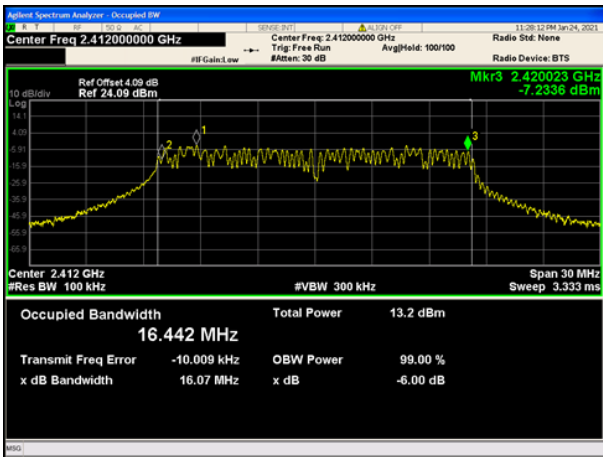
802.11g 2437MHz



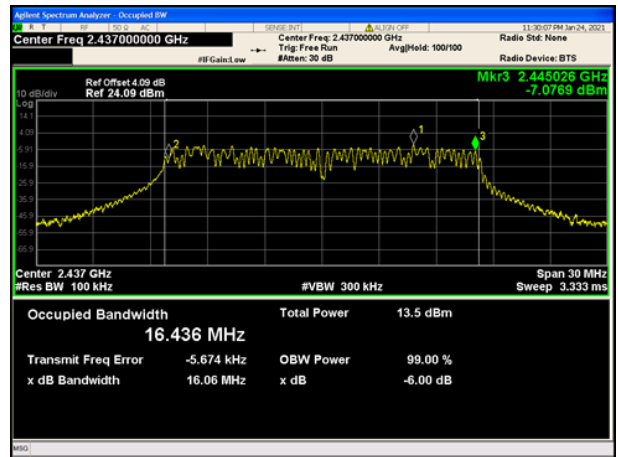
802.11g 2462MHz



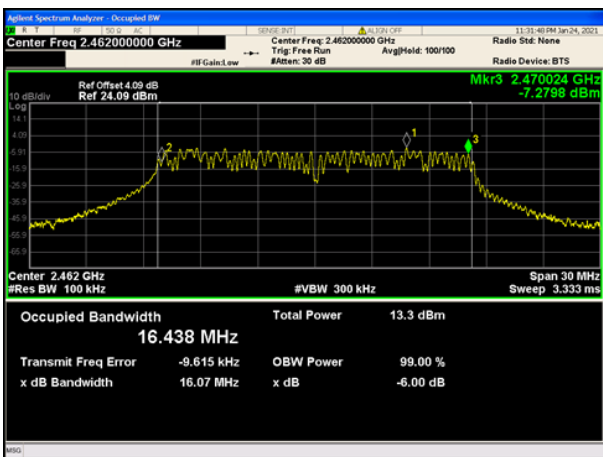
802.11n20 2412MHz



802.11n20 2437MHz

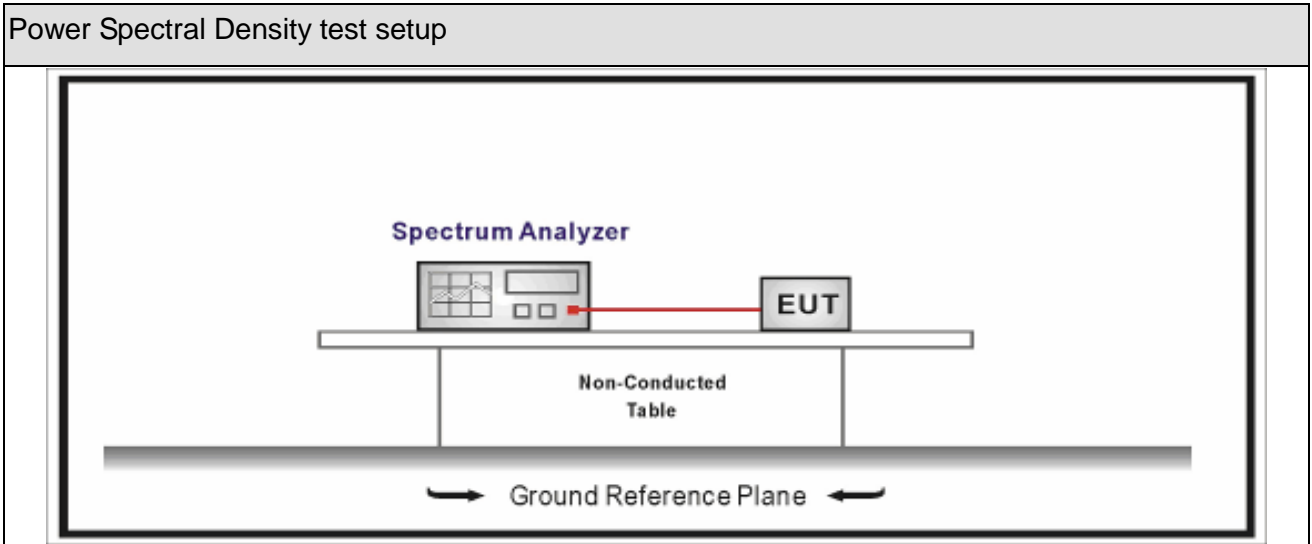


802.11n20 2462MHz



7. Power Spectral Density

7.1. Test Setup



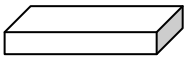
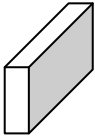
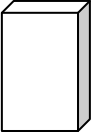
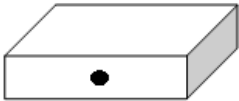


7.2. Limit

Power Spectral Density Limit
Power Spectral Density $\leq 8\text{dBm}/3\text{kHz}$

7.3. Test Procedure

Power Spectral Density Test Method			
	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.10	Maximum power spectral density level in the fundamental emission
<input checked="" type="checkbox"/>	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
<input type="checkbox"/>	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle $\geq 98\%$)
<input type="checkbox"/>	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle $\geq 98\%$)
<input type="checkbox"/>	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle $< 98\%$)
<input type="checkbox"/>	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle $< 98\%$)
<input type="checkbox"/>	ANSI C63.10	11.10.7	Method AVGPSD-3
<input type="checkbox"/>	ANSI C63.10	11.10.8	Method AVGPSD-3A

7.4. EUT test definition

Item	Power Spectral Density Test Method			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input checked="" type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

7.5. Test Result

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Test Room #1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Channel	Test Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11b	01	2412	-11.815	8	Pass
802.11b	06	2437	-12.053	8	Pass
802.11b	11	2462	-12.126	8	Pass

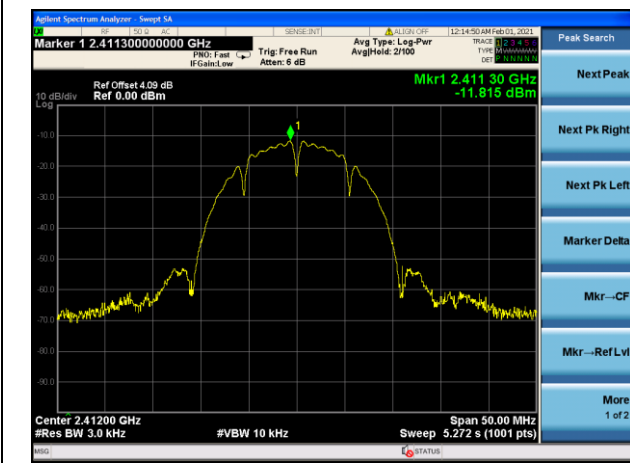
Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Test Room #1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Channel	Test Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11g	01	2412	-14.038	8	Pass
802.11g	06	2437	-13.728	8	Pass
802.11g	11	2462	-13.797	8	Pass

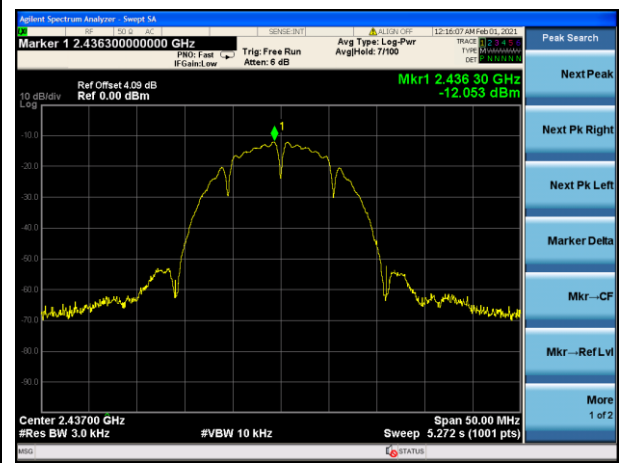
Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 3 Transmitting by 802.11n20	Test Site	: Test Room #1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Channel	Test Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11n20	01	2412	-14.895	8	Pass
802.11n20	06	2437	-14.789	8	Pass
802.11n20	11	2462	-14.505	8	Pass

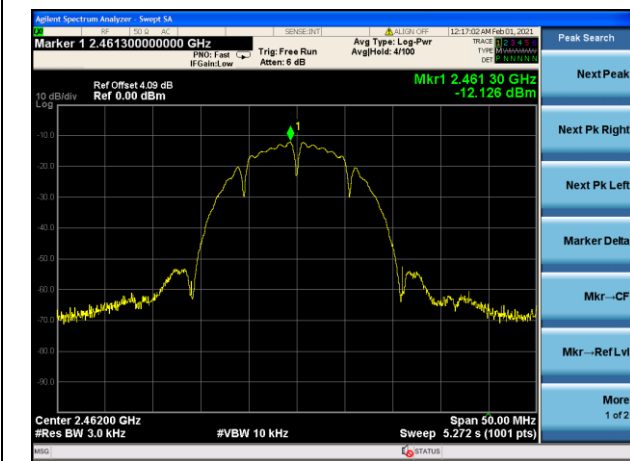
802.11b 2412MHz



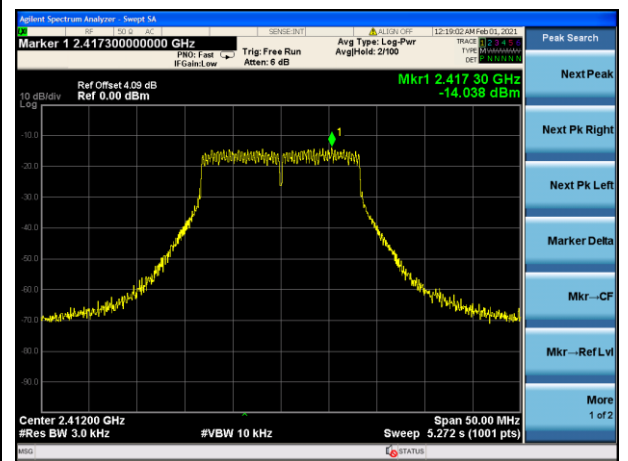
802.11b 2437MHz



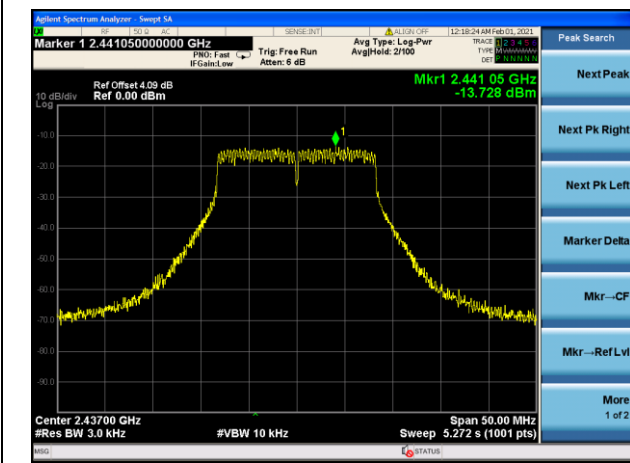
802.11b 2462MHz



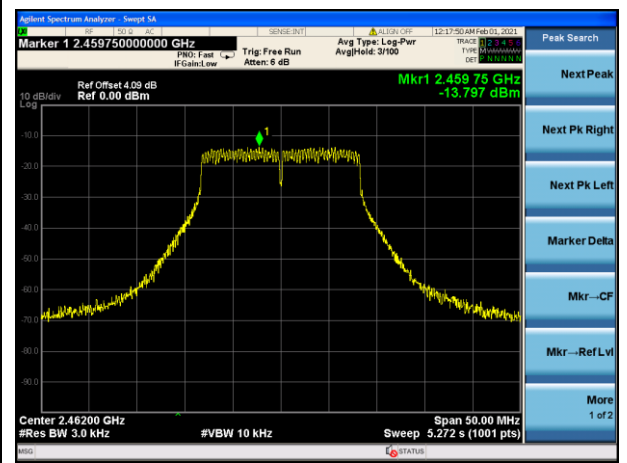
802.11g 2412MHz



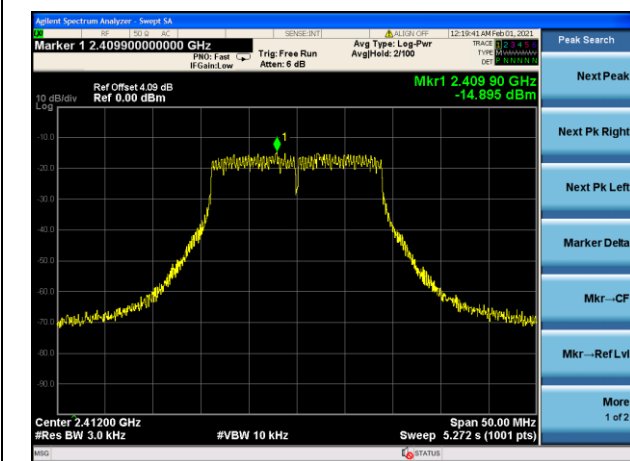
802.11g 2437MHz



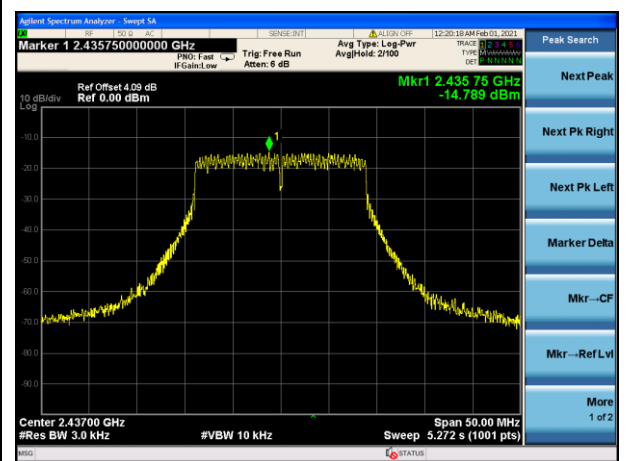
802.11g 2462MHz



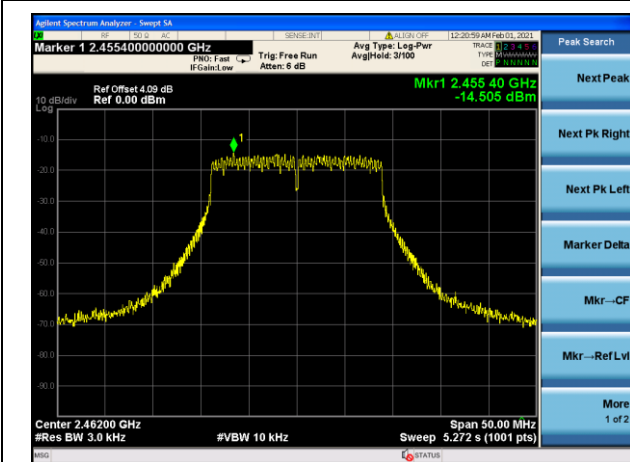
802.11n20 2412MHz



802.11n20 2437MHz



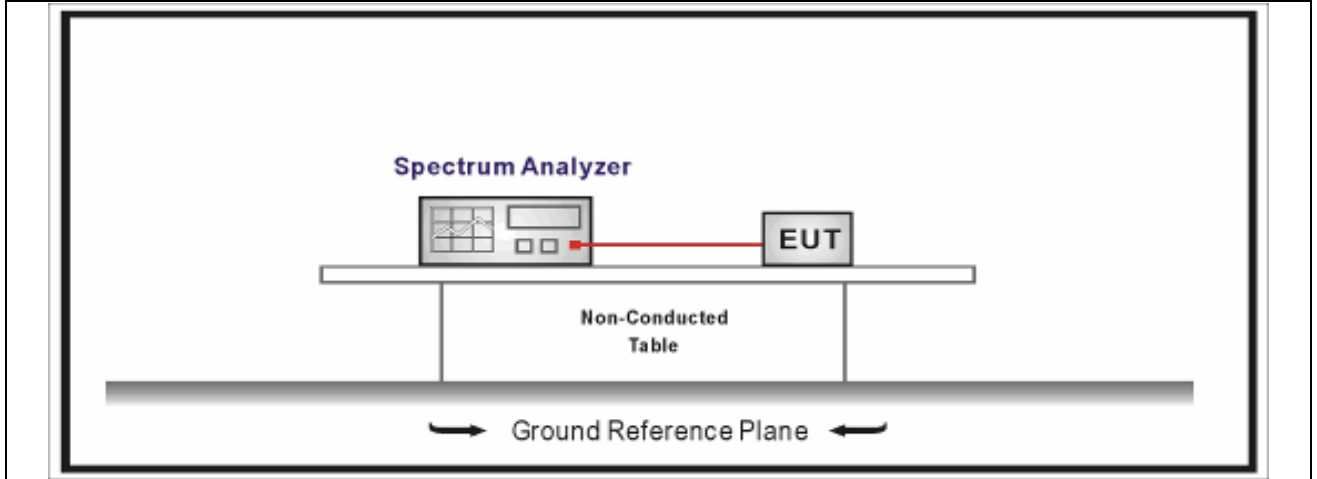
802.11n20 2462MHz



8. Emissions in non-restricted frequency bands

8.1. Test Setup

Emissions in non-restricted frequency bands test setup:



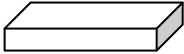
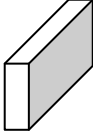
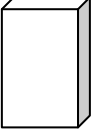



8.2. Limit

Un-Restricted Band Emissions Limit	
RF Output power (Detection methods)	Limit(dB)
RF Output power(Average detector)	30c(Note1)
RF Output power(PK detector)	20c(Note2)
<p>Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).</p> <p>Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).</p>	

8.3. Test Procedure

Test Method			
	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.11	Emissions in non-restricted frequency bands
	<input checked="" type="checkbox"/> ANSI C63.10	11.11.2	Reference level measurement
	<input checked="" type="checkbox"/> ANSI C63.10	11.11.3	Emission level measurement
<input type="checkbox"/>	ANSI C63.10	11.12	Emissions in restricted frequency bands
	<input type="checkbox"/> ANSI C63.10	11.12.1	Radiated emission measurements
	<input type="checkbox"/> ANSI C63.10	11.12.2.7	Radiated spurious emission test
<input type="checkbox"/>	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
<input type="checkbox"/>	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
<input type="checkbox"/>	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2	Antenna-port conducted measurements
	<input type="checkbox"/> ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure
	<input type="checkbox"/> ANSI C63.10	11.12.2.4	Peak power measurement procedure
	<input checked="" type="checkbox"/> ANSI C63.10	11.12.2.5	Average power measurement procedures
	<input type="checkbox"/> ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
	<input type="checkbox"/> ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
	<input type="checkbox"/> ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

8.4. EUT test Axis definition

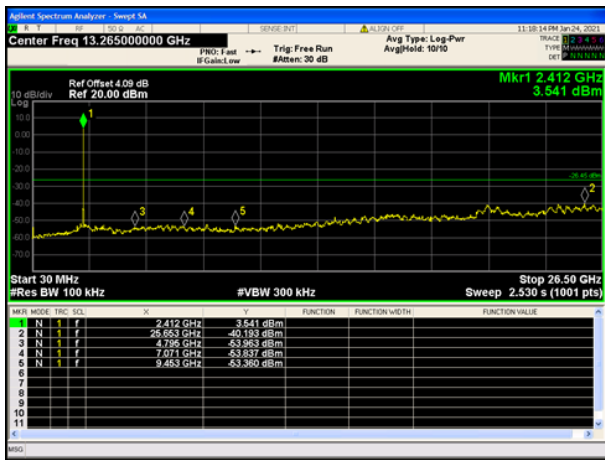
Item	Emissions in non-restricted frequency bands			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input checked="" type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

8.5. Test Result

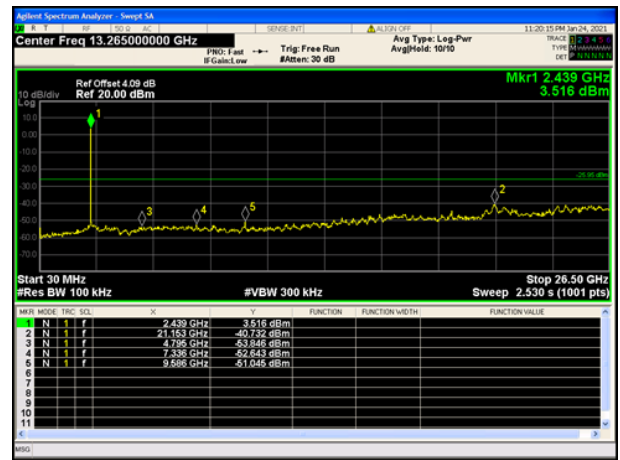
Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b Mode 2 Transmitting by 802.11g Mode 3 Transmitting by 802.11n20	Test Site	: Test Room#1
Test Date	: 2021.01.25	Test Engineer	: Heaven

Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
b	2412	Ant1	-43.74	-30	Pass
b	2437	Ant1	-44.78	-30	Pass
b	2442	Ant1	-45.32	-30	Pass
b	2462	Ant1	-44.56	-30	Pass
g	2412	Ant1	-37.87	-30	Pass
g	2437	Ant1	-37.85	-30	Pass
g	2462	Ant1	-37.12	-30	Pass
n20	2412	Ant1	-37.21	-30	Pass
n20	2437	Ant1	-37.56	-30	Pass
n20	2462	Ant1	-36.88	-30	Pass

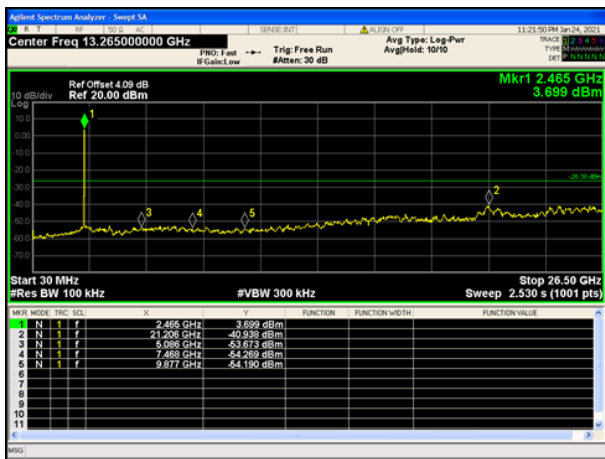
802.11b 2412MHz



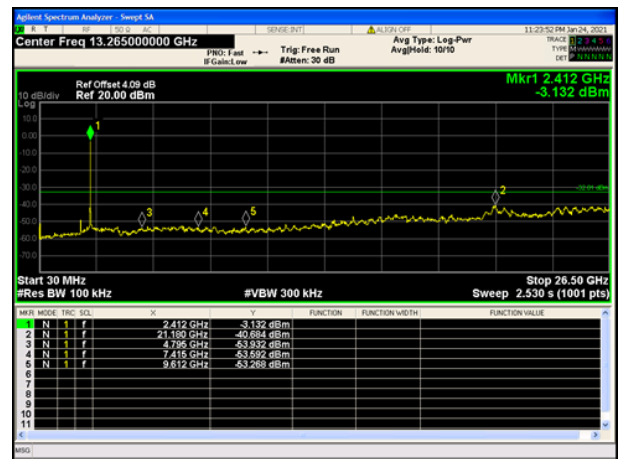
802.11b 2437MHz



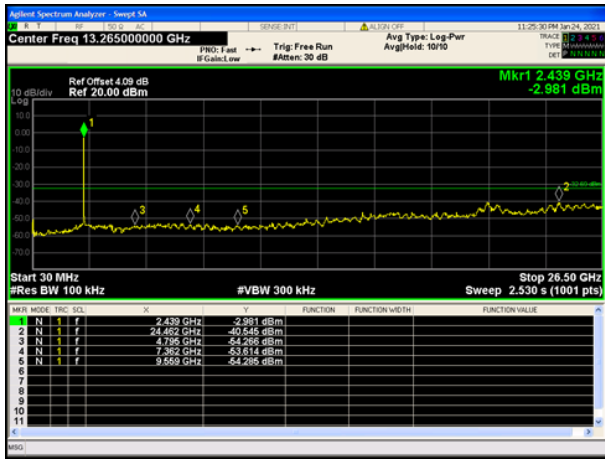
802.11b 2462MHz



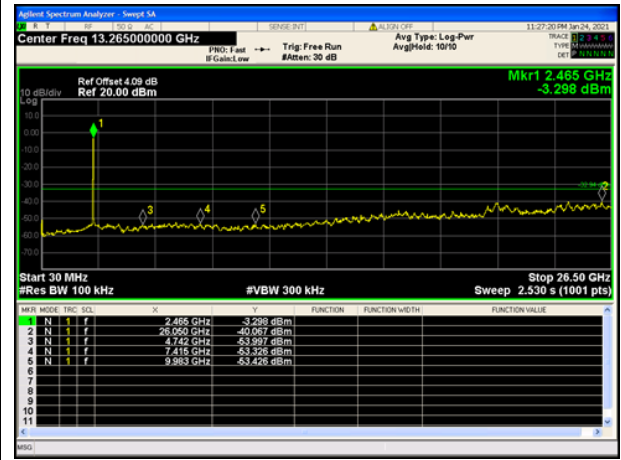
802.11g 2412MHz



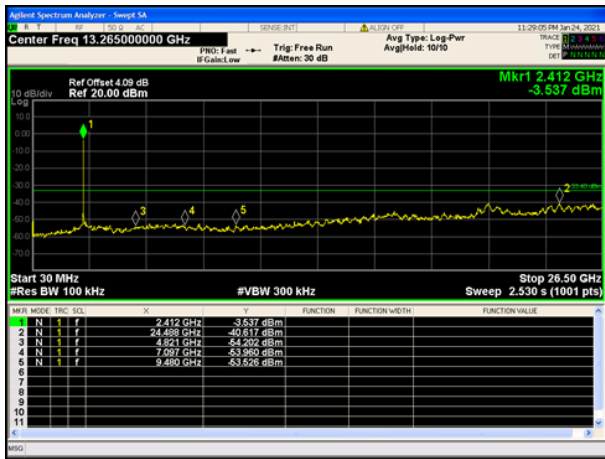
802.11g 2437MHz



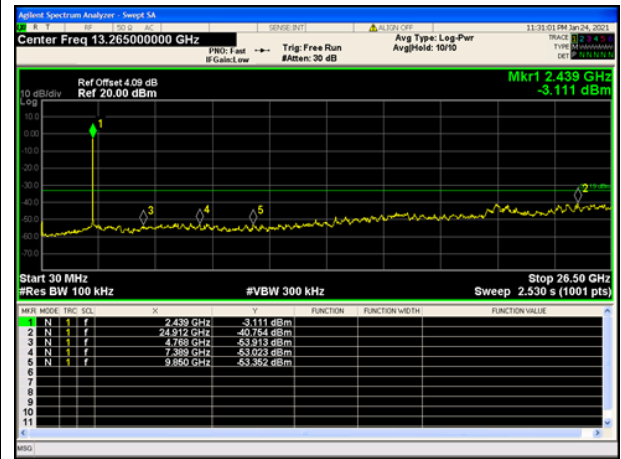
802.11g 2462MHz



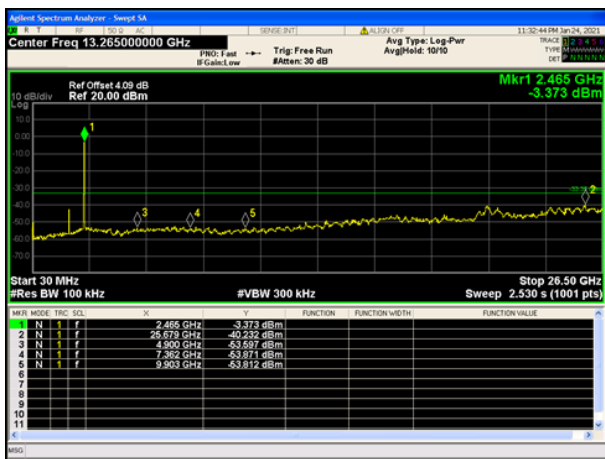
802.11n20 2412MHz



802.11n20 2437MHz

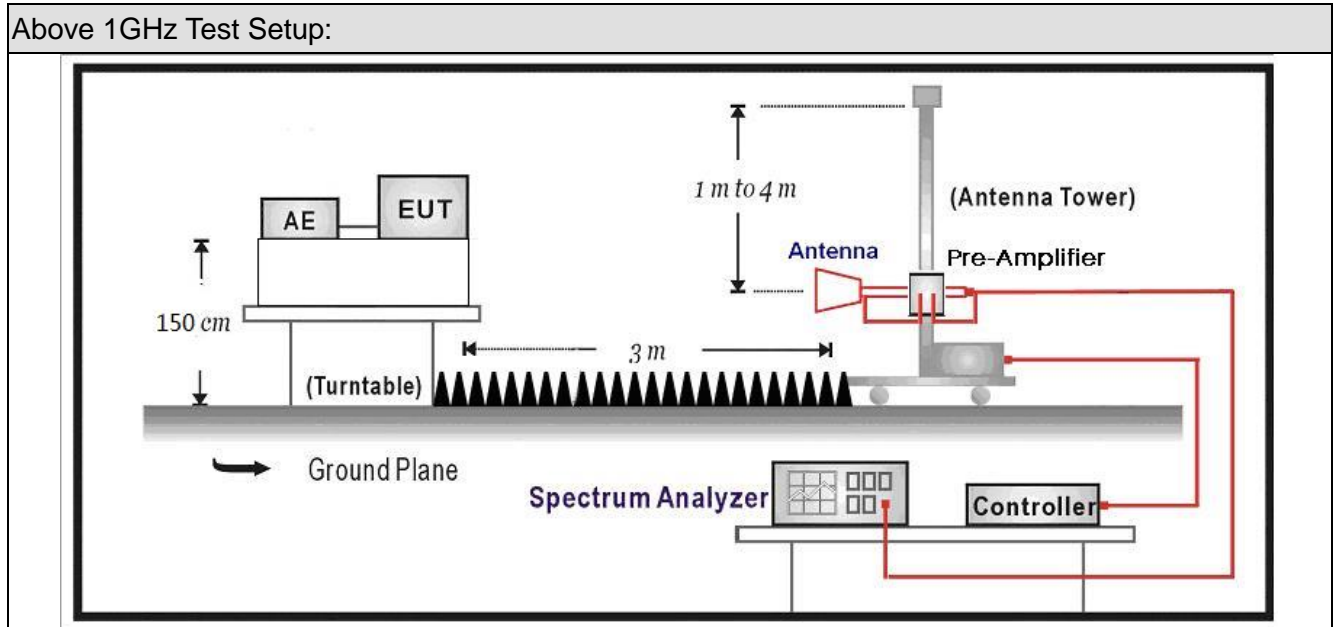


802.11n20 2462MHz



9. Radiated Emission Band Edge

9.1. Test Setup



9.2. Limit

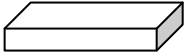
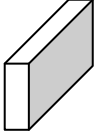
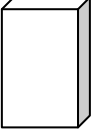
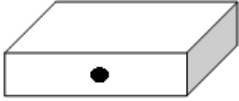


Band edge Limit				
Frequency bands (MHz)	Detector	Limit (dB μ V/m)	RBW (MHz)	Distance (m)
2310-2390	PK	74	1	3
2483.5-2500	AV	54	1	3

Note: The field strength of emissions appearing within these frequency bands shall not exceed the limits.

9.3. Test Procedure

Test Method					
	References	Rule	Chapter	Description	
<input checked="" type="checkbox"/>		ANSI C63.10	6.10	Band-edge testing	
	<input checked="" type="checkbox"/>	ANSI C63.10	6.10.5	Restricted-band band-edge measurements	
	<input type="checkbox"/>	ANSI C63.10	6.10.6	Marker-delta method	
<input checked="" type="checkbox"/>		ANSI C63.10	11.12	Emissions in restricted frequency bands	
	<input checked="" type="checkbox"/>	ANSI C63.10	11.12.1	Radiated emission measurements	
	<input checked="" type="checkbox"/>	ANSI C63.10	11.12.2.7	Radiated spurious emission test	
<input type="checkbox"/>		ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz	
<input type="checkbox"/>		ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz	
<input checked="" type="checkbox"/>		ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz	
		<input type="checkbox"/>	ANSI C63.10	11.12.2.3	Quasi-peak measurement procedure
		<input checked="" type="checkbox"/>	ANSI C63.10	11.12.2.4	Peak power measurement procedure
		<input checked="" type="checkbox"/>	ANSI C63.10	11.12.2.5	Average power measurement procedures
		<input type="checkbox"/>	ANSI C63.10	11.12.2.5.1	Trace averaging with continuous EUT transmission at full power
		<input type="checkbox"/>	ANSI C63.10	11.12.2.5.2	Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
		<input checked="" type="checkbox"/>	ANSI C63.10	11.12.2.5.3	Reduced VBW averaging across ON and OFF times of the EUT transmissions with max hold

9.4. EUT test definition

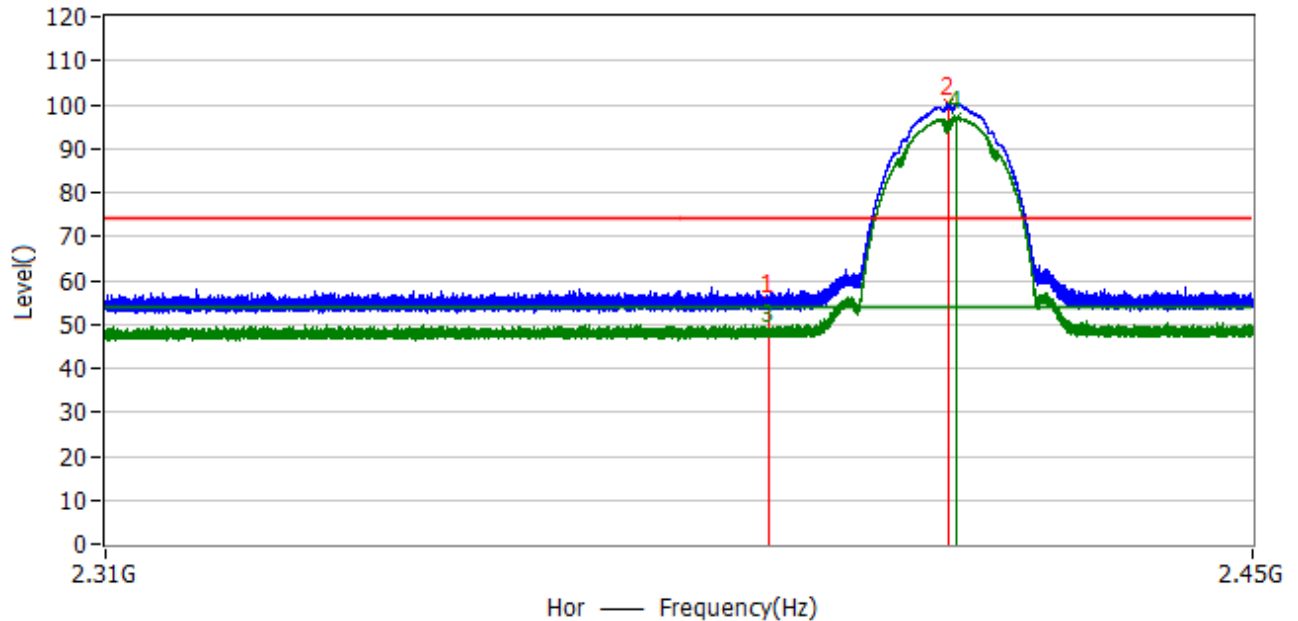
Item	Radiated Emission Band Edge			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1			
Test method	<input checked="" type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input checked="" type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input type="checkbox"/>	Conducted		
	<input type="checkbox"/>	Chain 0		
				
	<input type="checkbox"/>	Chain 0	Chain 1	
				
	<input type="checkbox"/>	Chain 0	Chain 1	Chain 2
				

9.5. Duty Cycle

See clause 2.5 for duty cycle factor checking.

9.6. Test Result

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	Low Frequency	: 2412MHz

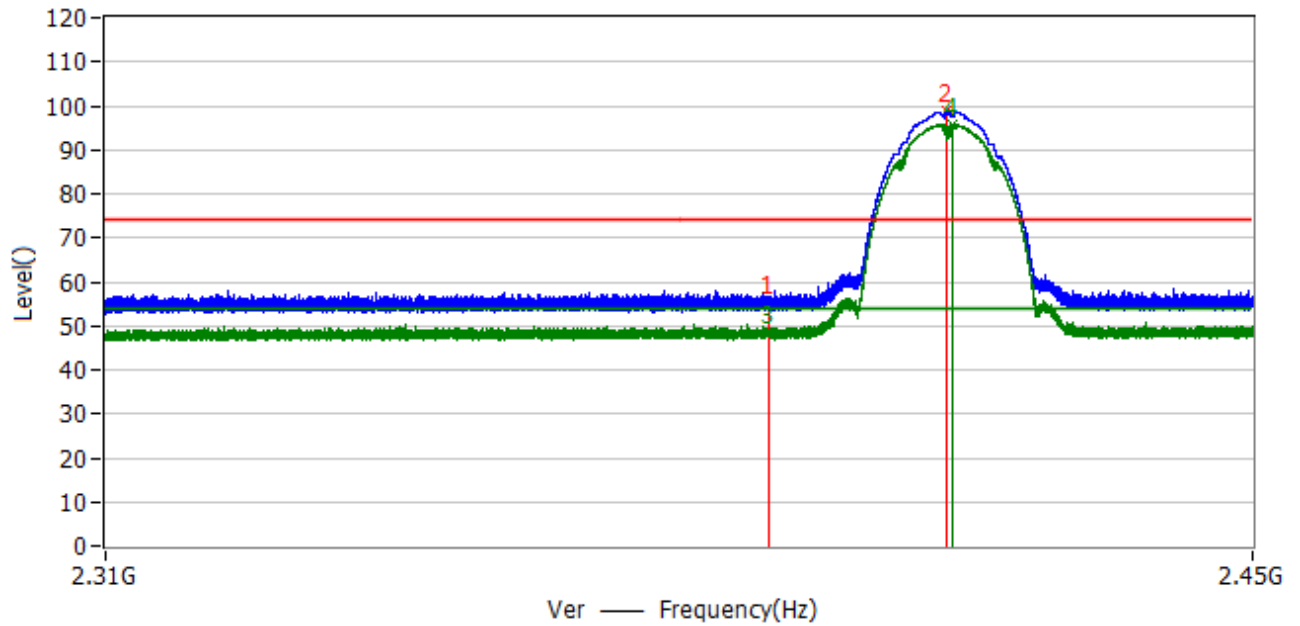


No.	Frequency (GHz)	Limit (dBμV/m)	Level (dBμV/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	55.1	-18.9	30.2	PK	Hor
2	2.412	N/A	100.1	N/A	30.3	PK	Hor
3	2.390	54.0	48.4	-5.6	30.2	AV	Hor
4	2.413	N/A	97.0	N/A	30.3	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	Low Frequency	: 2412MHz

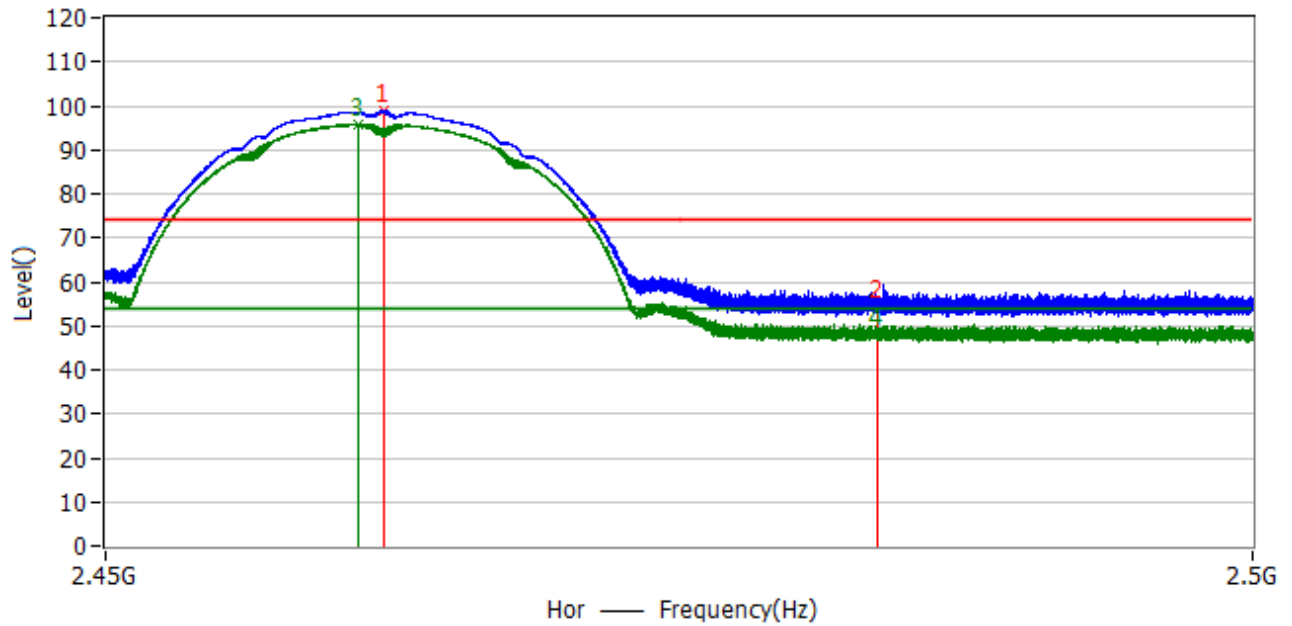


No.	Frequency (GHz)	Limit (dBμV/m)	Level (dBμV/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	55.3	-18.7	30.2	PK	Ver
2	2.412	N/A	98.9	N/A	30.3	PK	Ver
3	2.390	54.0	48.4	-5.6	30.2	AV	Ver
4	2.413	N/A	95.7	N/A	30.3	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	High Frequency	: 2462MHz

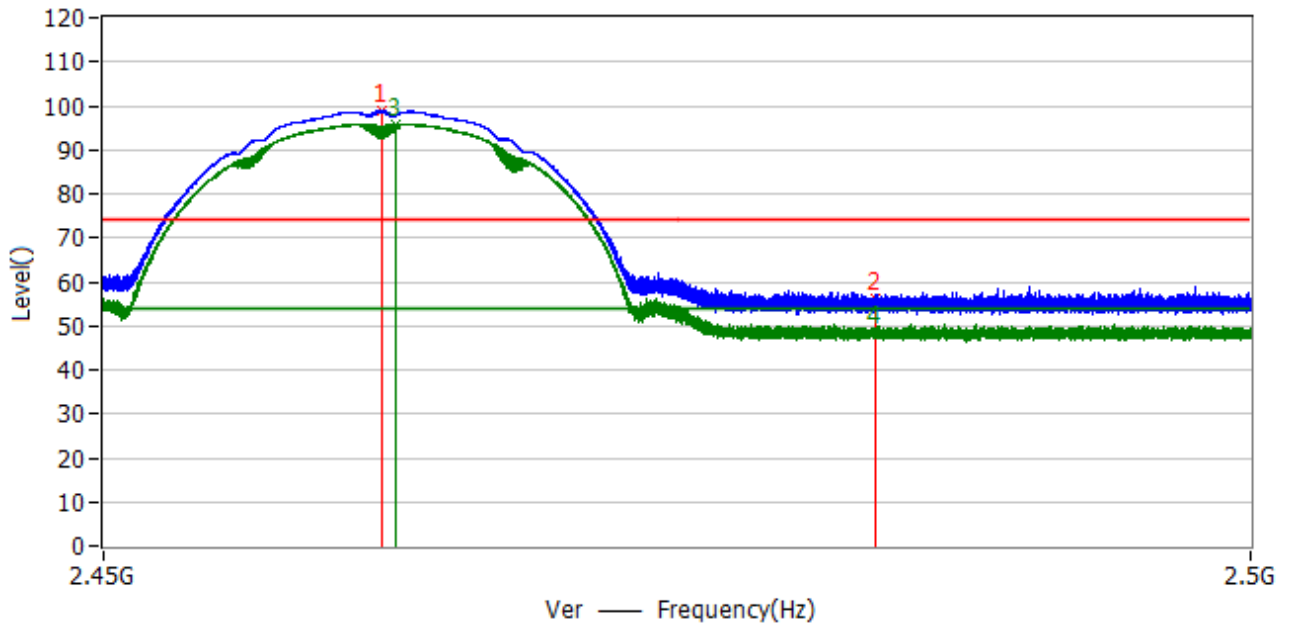


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.462	N/A	98.9	N/A	30.4	PK	Hor
2	2.4835	74.0	54.5	-19.5	30.5	PK	Hor
3	2.463	N/A	95.8	N/A	30.4	AV	Hor
4	2.4835	54.0	48.1	-5.9	30.5	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 1 Transmitting by 802.11b	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	High Frequency	: 2462MHz

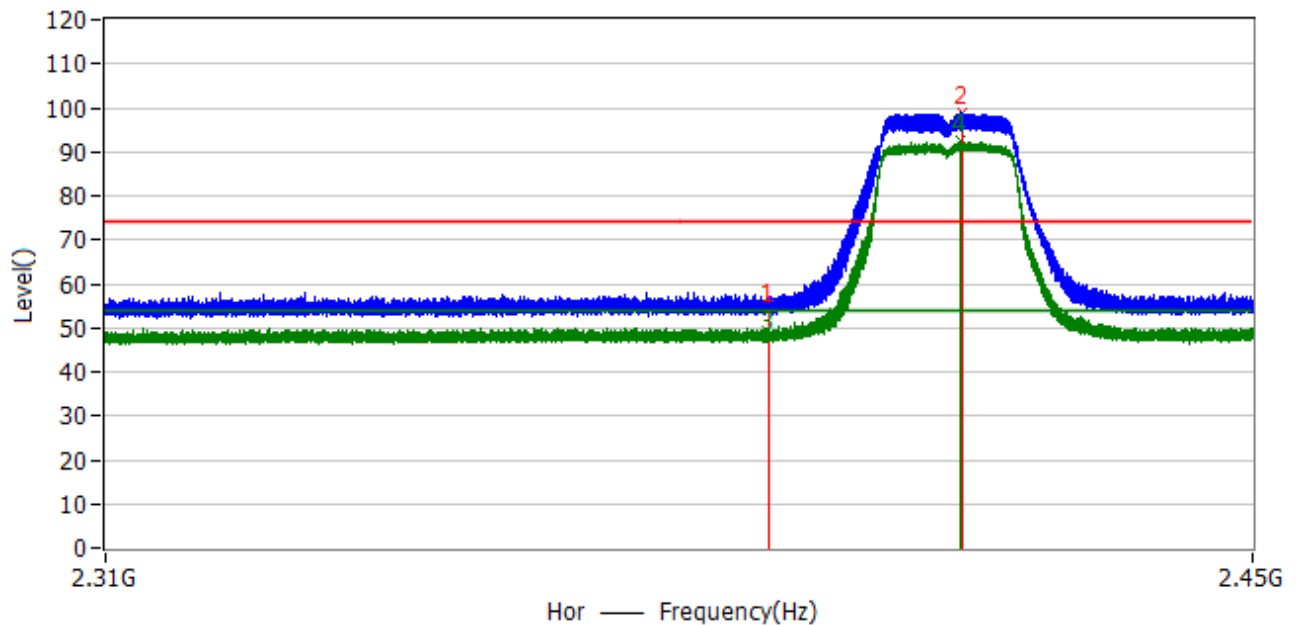


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.462	N/A	99.1	N/A	30.4	PK	Ver
2	2.4835	74.0	56.4	-17.6	30.5	PK	Ver
3	2.461	N/A	95.9	N/A	30.4	AV	Ver
4	2.4835	54.0	48.7	-5.3	30.5	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	Low Frequency	: 2412MHz

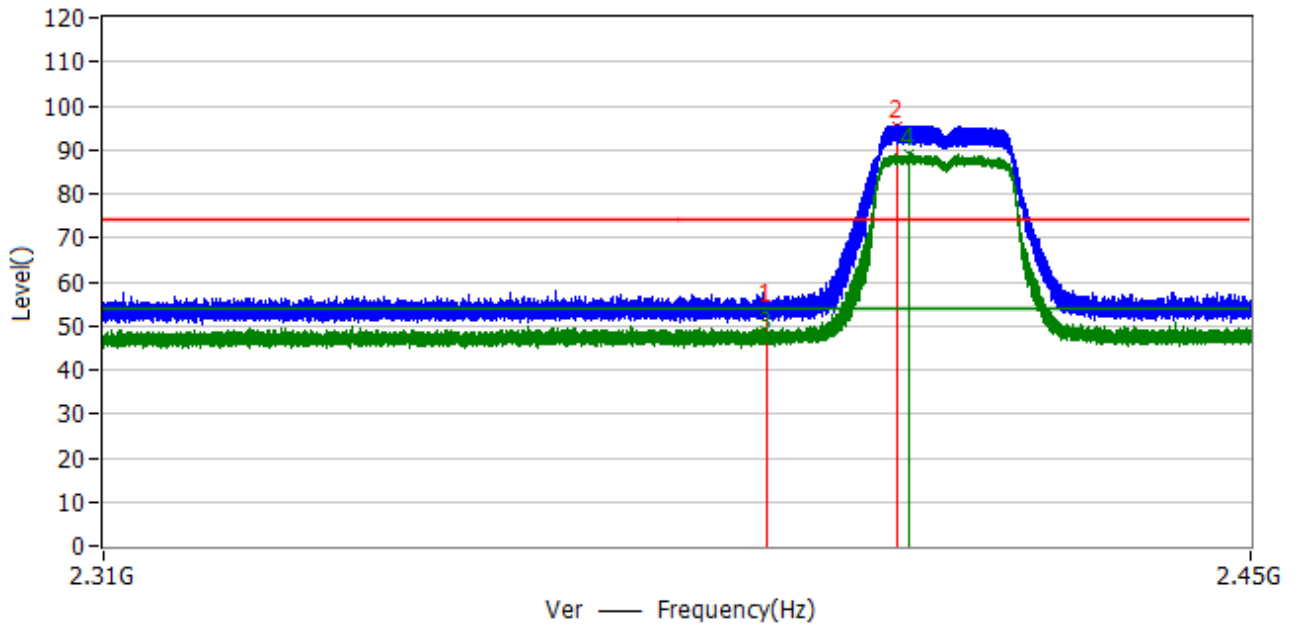


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	53.9	-20.1	30.2	PK	Hor
2	2.409	N/A	98.7	N/A	30.3	PK	Hor
3	2.390	54.0	47.5	-6.5	30.2	AV	Hor
4	2.413	N/A	92.5	N/A	30.3	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	Low Frequency	: 2412MHz

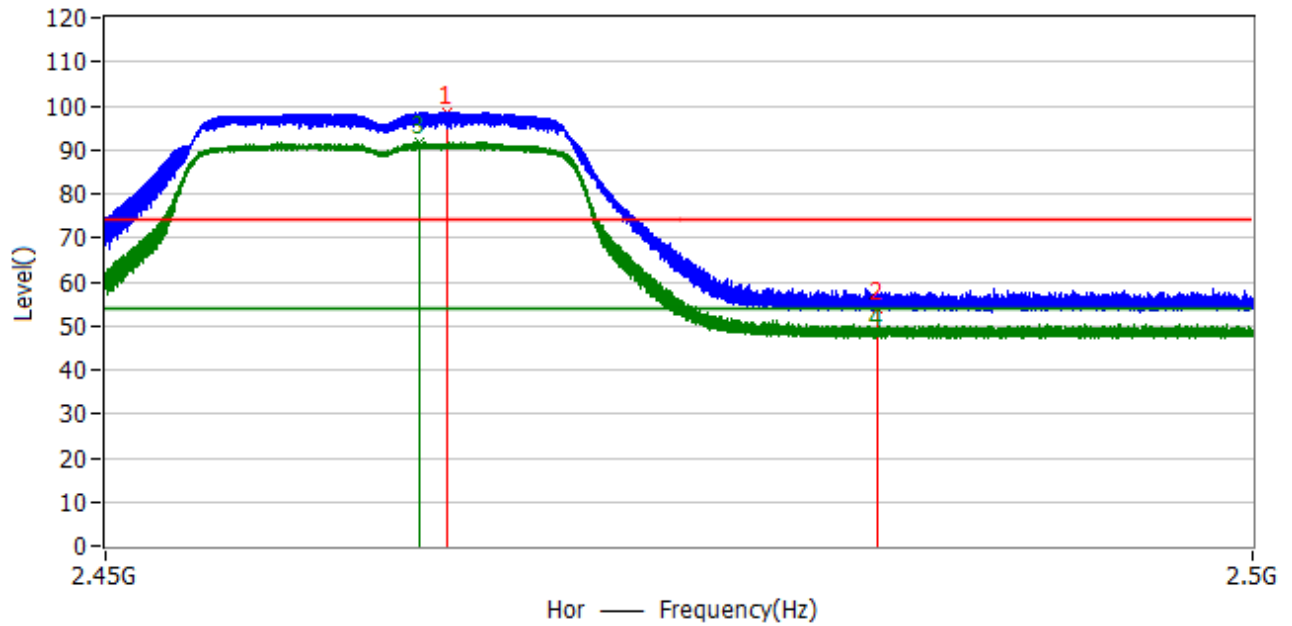


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	53.6	-20.4	30.2	PK	Ver
2	2.409	N/A	95.5	N/A	30.3	PK	Ver
3	2.390	54.0	47.4	-6.6	30.2	AV	Ver
4	2.407	N/A	89.2	N/A	30.3	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	High Frequency	: 2462MHz

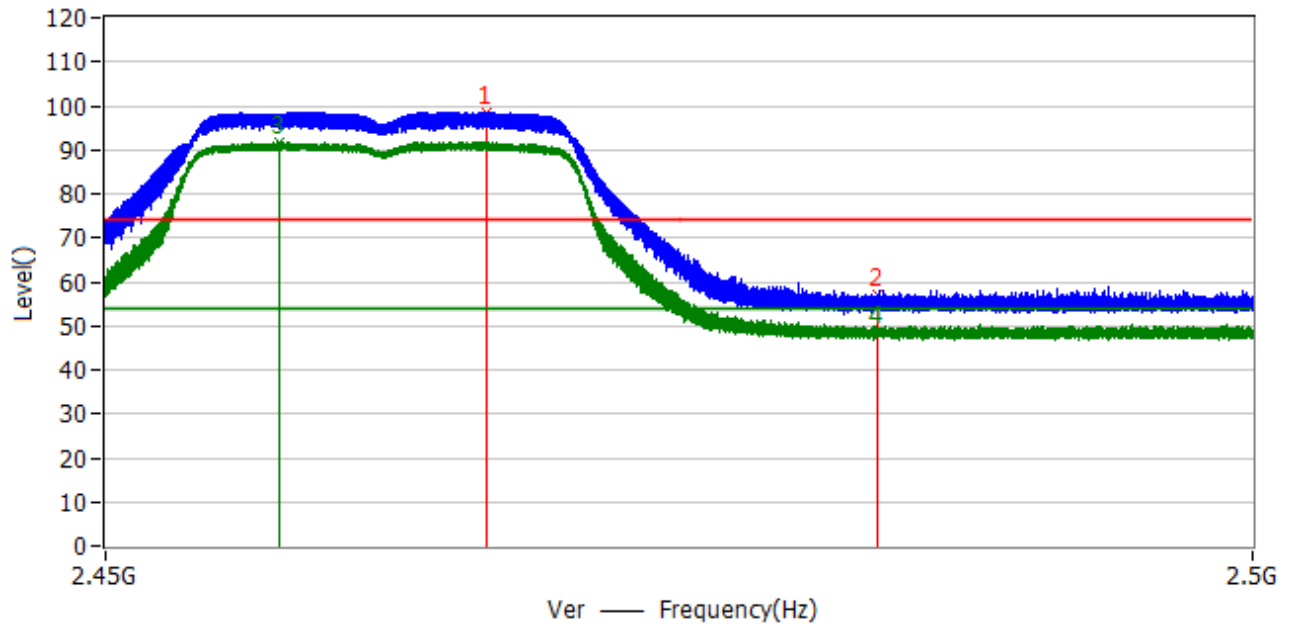


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.458	N/A	98.4	N/A	30.4	PK	Hor
2	2.4835	74.0	54.0	-20.0	30.5	PK	Hor
3	2.458	N/A	91.8	N/A	30.4	AV	Hor
4	2.4835	54.0	48.2	-5.8	30.5	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	High Frequency	: 2462MHz

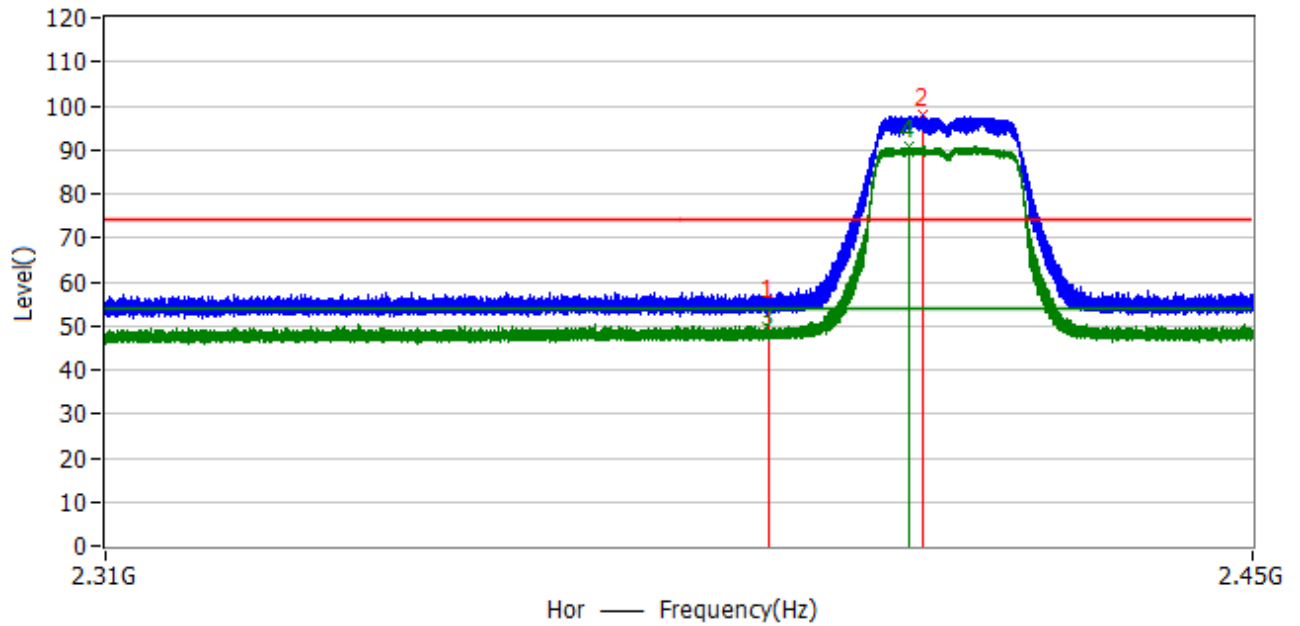


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.459	N/A	98.4	N/A	30.5	PK	Ver
2	2.4835	74.0	57.3	-16.7	30.5	PK	Ver
3	2.464	N/A	91.9	N/A	30.4	AV	Ver
4	2.4835	54.0	48.4	-5.6	30.5	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 3 Transmitting by 802.11n20	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	Low Frequency	: 2412MHz

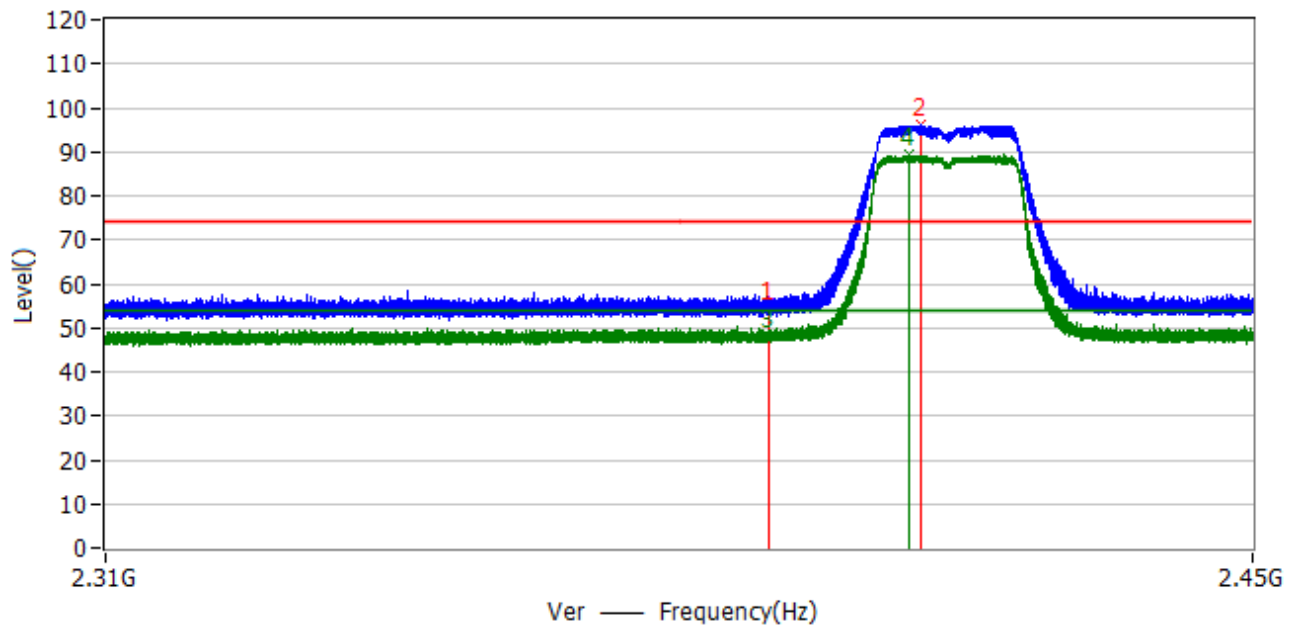


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	54.5	-19.5	30.2	PK	Hor
2	2.409	N/A	97.8	N/A	30.3	PK	Hor
3	2.390	54.0	48.0	-6.0	30.2	AV	Hor
4	2.413	N/A	90.8	N/A	30.3	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 3 Transmitting by 802.11n20	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	Low Frequency	: 2412MHz

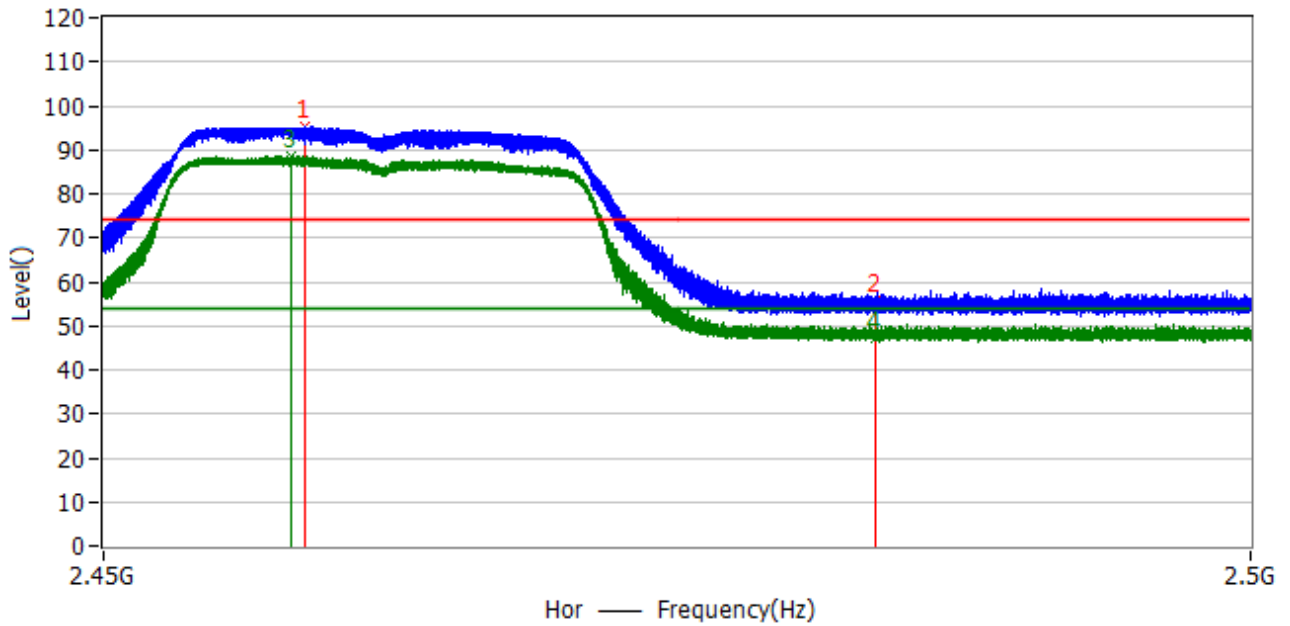


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.390	74.0	54.5	-19.5	30.2	PK	Ver
2	2.409	N/A	96.0	N/A	30.3	PK	Ver
3	2.390	54.0	48.1	-5.9	30.2	AV	Ver
4	2.407	N/A	89.5	N/A	30.3	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 3 Transmitting by 802.11n20	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Horizontal	High Frequency	: 2462MHz

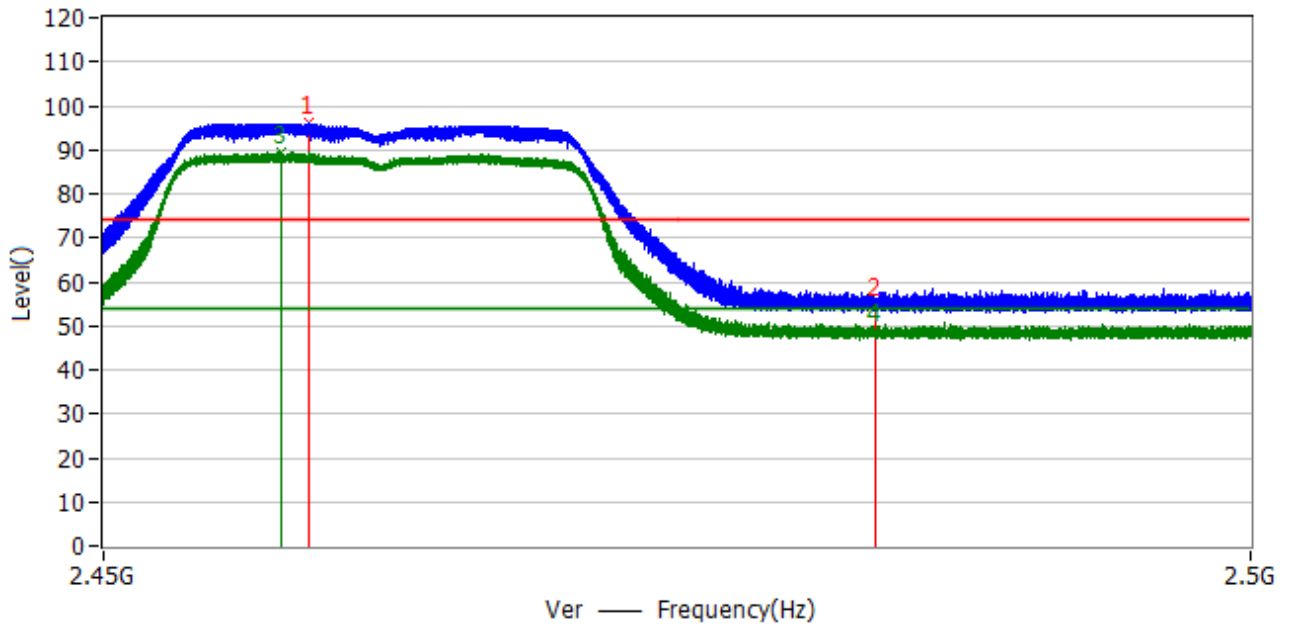


No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.458	N/A	95.4	N/A	30.4	PK	Hor
2	2.4835	74.0	55.7	-18.3	30.5	PK	Hor
3	2.458	N/A	88.6	N/A	30.4	AV	Hor
4	2.4835	54.0	47.2	-6.8	30.5	AV	Hor

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

Product Name	: Wireless Module	Power	: DC 3.3V
Test Mode	: Mode 2 Transmitting by 802.11g	Test Site	: Chamber
Test Date	: 2021.01.25	Test Engineer	: Heaven
Polarization	: Vertical	High Frequency	: 2462MHz



No.	Frequency (GHz)	Limit (dB μ V/m)	Level (dB μ V/m)	Delta dB	Factor dB	Detector	Polar
1	2.459	N/A	96.2	N/A	30.4	PK	Ver
2	2.4835	74.0	54.9	-19.1	30.5	PK	Ver
3	2.464	N/A	89.5	N/A	30.4	AV	Ver
4	2.4835	54.0	48.8	-5.2	30.5	AV	Ver

Note: Level = Reading Level + Factor

Factor = Antenna factor + Cable Loss

10. Antenna Requirement

10.1. Limit

Antenna Requirement Limit	
<p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p>	

10.2. Antenna Connector Construction

Antenna Connector Construction	
<input type="checkbox"/>	The use of a permanently attached antenna
<input type="checkbox"/>	The antenna use of a unique coupling to the intentional radiator
<input checked="" type="checkbox"/>	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document "Internal Photograph" to show the antenna connector.	

_____ The End _____