TEST REPORT

Applicant:	Dongguan haoguan photoelectric technology co.,LTD
Address of Applicant:	Room 401, Shenguan Zhizao Industrial Park, No.6 Qingfeng West Road，Sijia Village Dongguan
Manufacturer/Factory:	Dongguan haoguan photoelectric technology co.,LTD
Address of Manufacturer	Room 401, Shenguan Zhizao Industrial Park, No.6 Qingfeng West Road，Sijia Village Dongguan
Product Name:	WATERPROOF TVS
Model No.:	HG22REK,HG220BM,HG156BM,HG270BM,HG320BM,HG430BM, HG190BM,HG550BM,HG22REK,HG32REK,LE220KM,LE32OKM, LEOSMDKR-32,LEOSMJMG-215,LEOSMJMG-800,LEOSMJMG-800MC
Trade Mark:	N/A
FCC ID:	2BDO2-HG22REK
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of Test:	Nov.09, 2023-Nov.21, 2023
Date of report issued:	Nov.29, 2023
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Remark:

The results shown in this test report refer only to the sample(s) tested , this test report cannot be reproduced, except in full without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

Prepared By

Shenzhen ETR Standard Technology Co., Ltd.

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Report Revision History		
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Contents

Page

1. TEST SUMMARY 4

2. GENERAL INFORMATION 5

2.1 GENERAL DESCRIPTION OF EUT 5
2.2 TEST MODE 7
2.3 DESCRIPTION OF SUPPORT UNITS 7
2.4 DEVIATION FROM STANDARDS 7
2.5 ABNORMALITIES FROM STANDARD CONDITIONS 7
2.6 TEST FACILITY 7
2.7 TEST LOCATION 7
2.8 ADDITIONAL INSTRUCTIONS 7

3. TEST INSTRUMENTS LIST 8

4. TEST RESULTS AND MEASUREMENT DATA 9

4.1 ANTENNA REQUIREMENT 9
4.2 CONDUCTED EMISSIONS 10
4.3 DUTY CYCLE 13
4.4 CONDUCTED OUTPUT POWER 16
4.5 6DB BANDWIDTH & 99% CHANNEL BANDWIDTH 17
4.6 POWER SPECTRAL DENSITY 22
4.7 BAND EDGES 25
Conducted Emission Method 25
Radiated Emission Method 28
4.8 SPURIOUS EMISSION 33
Conducted Emission Method 33
Radiated Emission Method 38

5. TEST SETUP PHOTO 55

6. EUT CONSTRUCTIONAL DETAILS 55

1. Test Summary

Test Item	Section	Result	Test by
Antenna requirement	FCC part 15.203/15.247 (c)	Pass	/
AC Power Line Conducted Emission	FCC part 15.207	Pass	Qiao Li
Conducted Peak Output Power	FCC part 15.247 (b)(3)	Pass	Yvan Fan
6dB Bandwidth	FCC part 15.247 (a)(2)	Pass	Yvan Fan
Power Spectral Density	FCC part 15.247 (e)	Pass	Yvan Fan
Band Edge	FCC part 15.247(d)	Pass	Yvan Fan
Spurious Emission	FCC part 15.205/15.209	Pass	Qiao Li

Remark: Test according to ANSI C63.10:2013

Pass: The EUT complies with the essential requirements in the standard.

Measurement Uncertainty

Test Item	Uncertainty Criterion	Measurement Uncertainty	Notes
Occupied Channel Bandwidth	±5%	±0.55%	(1)
RF output power, conducted	±1.5dB	±0.99dB	(1)
Power Spectral Density, conducted	±3dB	±0.61dB	(1)
Unwanted Emissions, conducted	±3dB	±0.64dB	(1)
AC Power Line Conducted Emission	±6dB	± 3.02 dB	(1)
Radiated emissions Below 1GHz	±6dB	±4.30 dB	(1)
Radiated emissions Above 1GHz	±6dB	±4.35 dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

2. General Information

2.1 General Description of EUT

Product Name:	WATERPROOF TVS
Model No.:	HG22REK,HG220BM,HG156BM,HG270BM,HG320BM,HG430BM, HG190BM,HG550BM,HG22REK,HG32REK,LE220KM,LE32OKM, LEOSMDKR-32,LEOSMJMG-215,LEOSMJMG-800,LEOSMJMG-800MC
Test Model:	HG22REK
Difference of model(s)	All the model are the same circuit and RF module, except the model names and colors
Hardware version:	N/A
Software version:	N/A
Sample(s) Status	Engineer sample
Channel numbers:	802.11b/802.11g /802.11n(HT20): 11 802.11n(HT40):7
Channel separation:	5MHz
Modulation technology:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/802.11n(H20)/802.11n(HT40): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	External antenna
Antenna gain:	3.66 dBi(Declare by applicant) Note: Antenna information is provided by applicant, Testing lab is not responsible for the accuracy of the information.
Battery:	N/A
Adapter Model:	Model: AK65WG-1200500W1 Input:100-240v 50/60Hz 1.5A Output: DC 12V 5A
Power supply:	DC 12V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	**Frequency (MHz)**	
	802.11b/802.11g/802.11n(HT20)	802.11n(HT40)
Lowest channel	2412MHz	2422MHz
Middle channel	2437MHz	2437MHz
Highest channel	2462MHz	2452MHz

2.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data..	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
Data rate	1Mbps	6Mbps	6.5Mbps	13Mbps

2.3 Description of Support Units

None.

2.4 Deviation from Standards

None.

2.5 Abnormalities from Standard Conditions

None.

2.6 Test Facility

Test laboratory:	Shenzhen ETR Standard Technology Co., Ltd.
CNAS Registration Number:	L11864
A2LA Certificate Number:	6640.01
FCC Designation Number:	CN1326
FCC Test Firm Registration:	183064

2.7 Test Location

All tests were performed at:

Laboratory location:	No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	+86 755 85259392
Fax:	+86 755 27219460

2.8 Additional Instructions

Test Software	COM Port Command
Power level setup	Default

3. Test Instruments list

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100605	2023.3.02	2024.3.01
2	EMI Test Receiver	Rohde&schwarz	ESCI3	102696	2023.3.02	2024.3.01
3	Loop Antenna	schwarabeck	FMZB 1519 B	FMZB 1519 B	2022.3.11	2024.3.10
4	Broadband antenna	schwarabeck	VULB9168	1064	2022.3.11	2024.3.10
5	Horn antenna	schwarabeck	BBHA9120D	9120D-1145	2022.3.11	2024.3.10
6	amplifier	EMtrace	RP01A	50117	2023.3.02	2024.3.01
7	Artificial power network	schwarabeck	NSLK8127	8127483	2023.3.02	2024.3.01
8	Artificial power network	ETS	3186/2NM	1132	2023.3.02	2024.3.01
9	10dB attenuator	HUBER+SUHNER	10dB	/	2023.3.02	2024.3.01
10	amplifier	Space-Dtronics	EWLAN0118G-P40	19113001	2023.3.02	2024.3.01
11	Filter	Xingbo	XBLBQ-GTA19	210410-3-1	2023.3.06	2024.3.05
12	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2023.3.02	2024.3.01
13	Power detector box	MWRFtest	MW100-PSB	MW201020JYT	2023.10.18	2024.10.17
14	Power meter	Rohde&Schwarz	NRP-Z11	1138.3004.02-117725-vh	2023.03.30	2024.3.29
15	amplifier	SKET	LNPA_1840-50 (18-40GHz)	SK2019040302	2023.8.16	2024.8.15
16	Horn antenna	schwarabeck	BBHA 9170	946	2022.3.11	2024.3.10
17	Spectrum analyzer	Rohde&schwarz	FSU40	1166.1660K43	2023.8.16	2024.8.15

Note: the calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).

Software Name	Manufacturer	Model	Version
RF test software	MWRFtest	MTS 8310	V2.0.0.0
Conducted test software	EZ-EMC	Farad	Ver.EMC-CON 3A1.1
Radiated test software	EZ-EMC	Farad	Ver.FA-03A2 RE

4. Test results and Measurement Data

4.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: 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, 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. **15.247(c) (1)(i) requirement:** (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is external antenna, the best case gain of the antenna is 3.66 dBi, reference to the appendix II for details.	

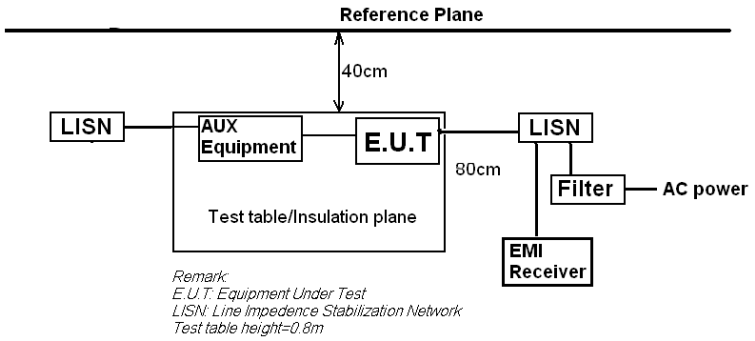
4.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test setup:



Test procedure:

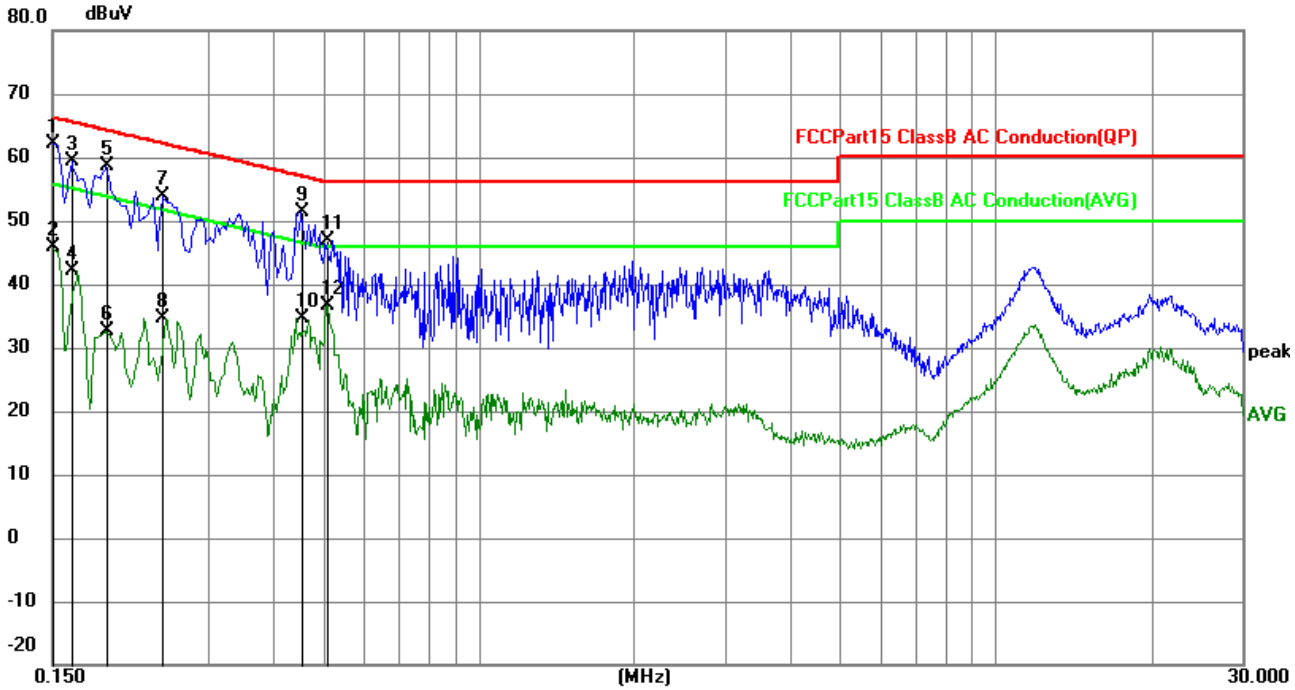
1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.

Test Instruments:	Refer to section 3.0 for details					
Test mode:	Refer to section 2.2 for details					
Test environment:	Temp.:	25.3°C	Humid.:	38%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remark:
1. Both high voltage and low voltage have been tested, and the report only shows the worst case data with AC 120V/60Hz.
2. All mode have been tested, the report only shows the worst mode (802.11g 2462MHz)

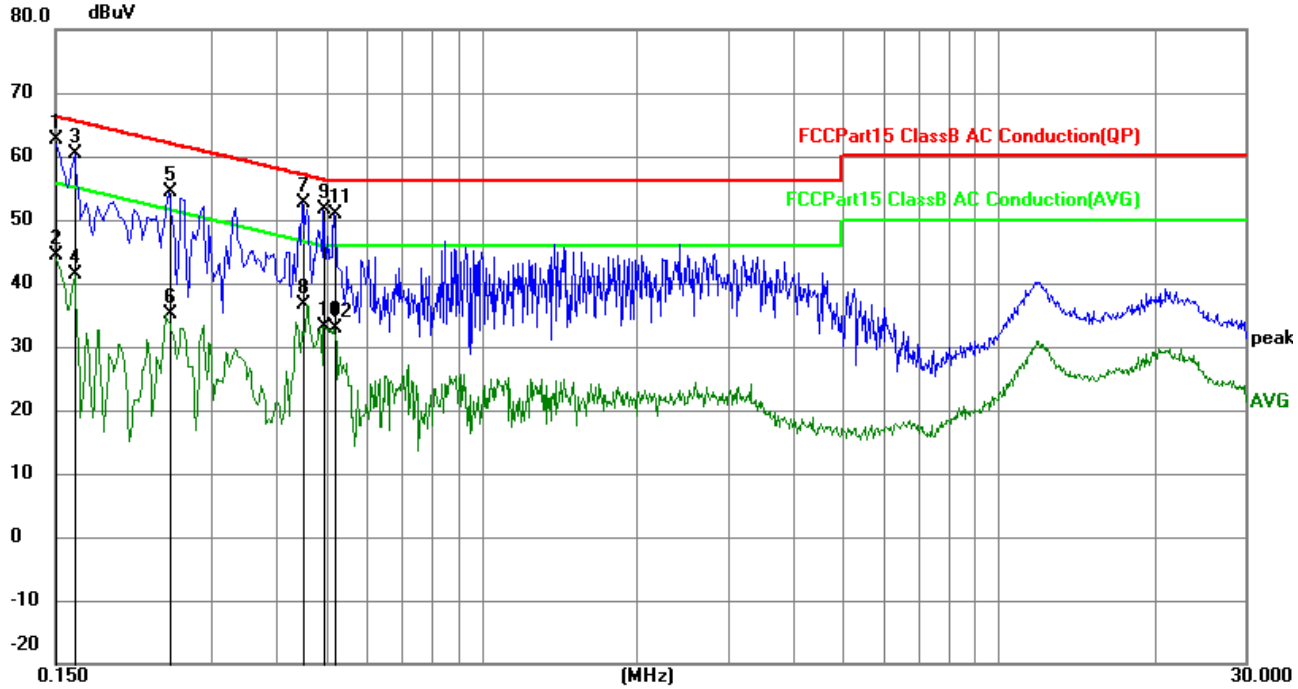
Measurement Result

Line:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	52.45	9.80	62.25	66.00	-3.75	QP
2	0.1500	35.97	9.80	45.77	56.00	-10.23	AVG
3	0.1635	49.46	9.80	59.26	65.28	-6.02	QP
4	0.1635	32.27	9.80	42.07	55.28	-13.21	AVG
5	0.1905	48.82	9.81	58.63	64.01	-5.38	QP
6	0.1905	22.87	9.81	32.68	54.01	-21.33	AVG
7	0.2445	44.01	9.82	53.83	61.94	-8.11	QP
8	0.2445	24.88	9.82	34.70	51.94	-17.24	AVG
9	0.4560	41.45	9.93	51.38	56.77	-5.39	QP
10	0.4560	24.70	9.93	34.63	46.77	-12.14	AVG
11	0.5100	37.03	9.94	46.97	56.00	-9.03	QP
12	0.5100	26.60	9.94	36.54	46.00	-9.46	AVG

Neutral:

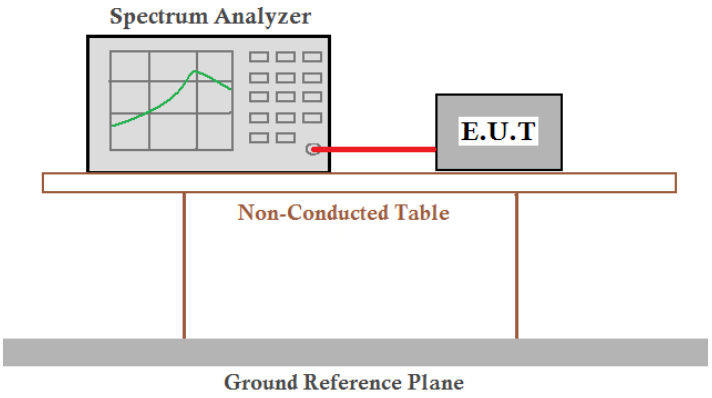


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	52.71	9.80	62.51	66.00	-3.49	QP
2	0.1500	34.49	9.80	44.29	56.00	-11.71	AVG
3	0.1635	50.54	9.80	60.34	65.28	-4.94	QP
4	0.1635	31.59	9.80	41.39	55.28	-13.89	AVG
5	0.2490	44.43	9.83	54.26	61.79	-7.53	QP
6	0.2490	25.33	9.83	35.16	51.79	-16.63	AVG
7	0.4515	42.62	9.92	52.54	56.85	-4.31	QP
8	0.4515	26.83	9.92	36.75	46.85	-10.10	AVG
9	0.4965	41.69	9.94	51.63	56.06	-4.43	QP
10	0.4965	23.26	9.94	33.20	46.06	-12.86	AVG
11	0.5190	41.01	9.94	50.95	56.00	-5.05	QP
12	0.5190	23.02	9.94	32.96	46.00	-13.04	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

4.3 Duty cycle

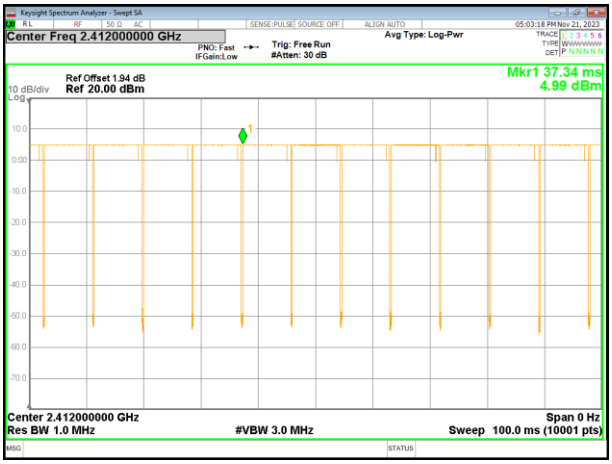
Test Method :	ANSI C63.10:2013	
Limit:	/	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

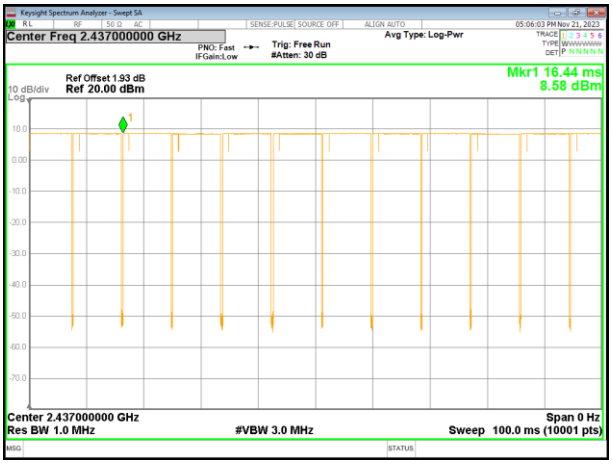
Measurement Result

Test CH	Duty cycle (%)			
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
Lowest	97.00	82.37	96.31	90.47
Middle	96.85	81.67	87.59	87.59
Highest	96.88	84.21	90.77	82.95

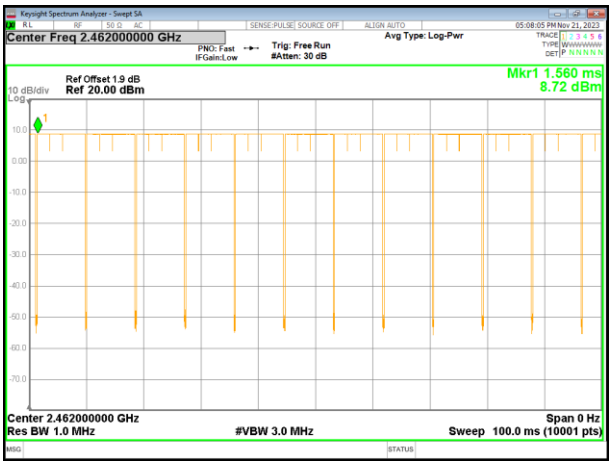
Test plot as follows:

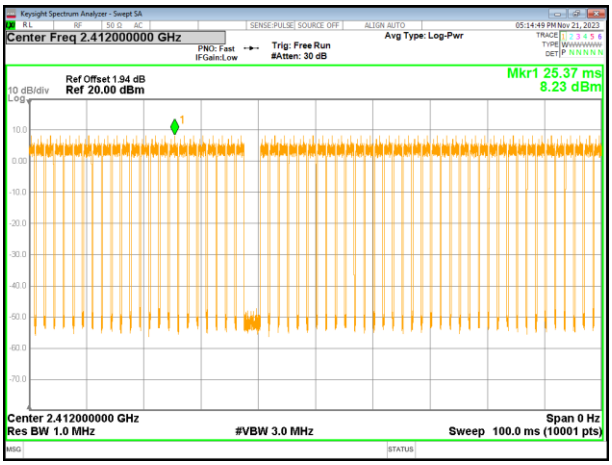
802.11b	Lowest channel	802.11b	Middle channel



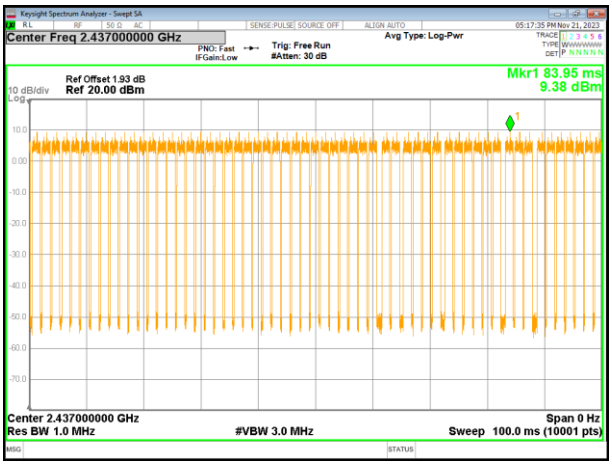


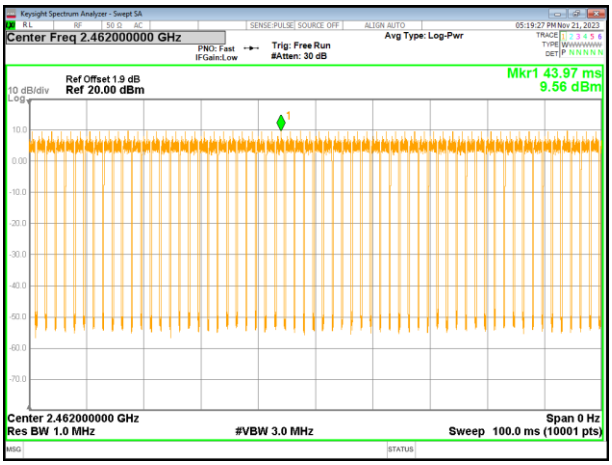
802.11b	Highest channel	802.11g	Lowest channel



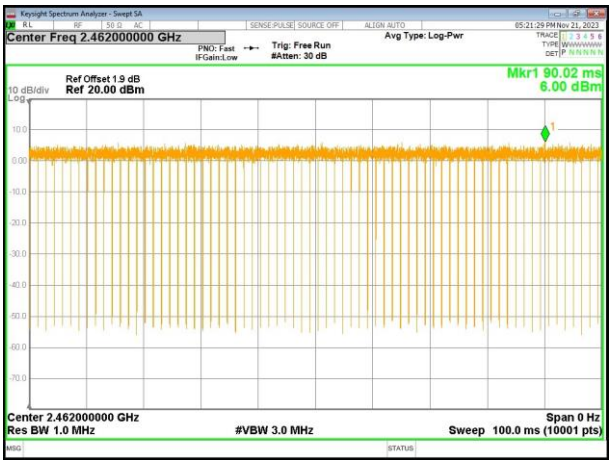


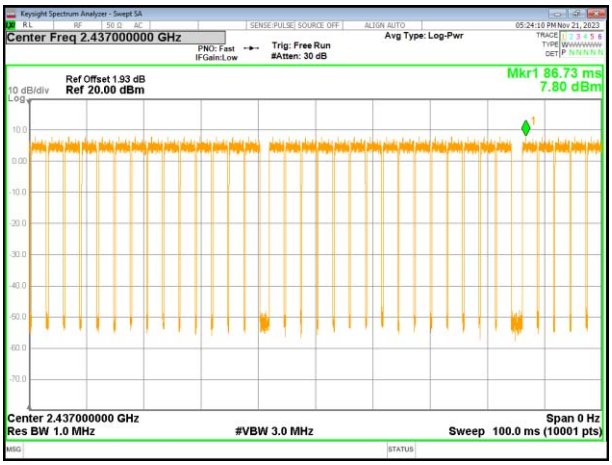
802.11g	Middle channel	802.11g	Highest channel



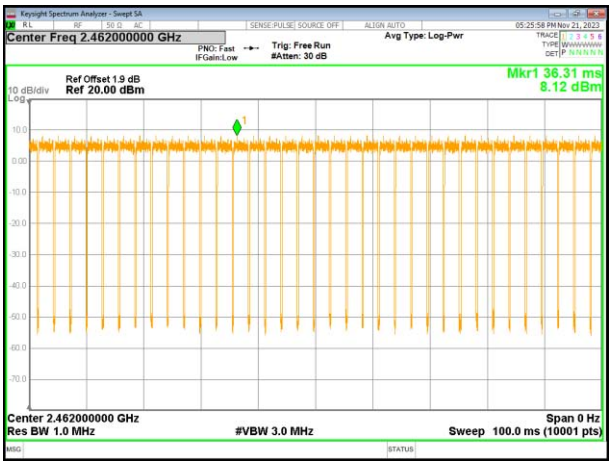


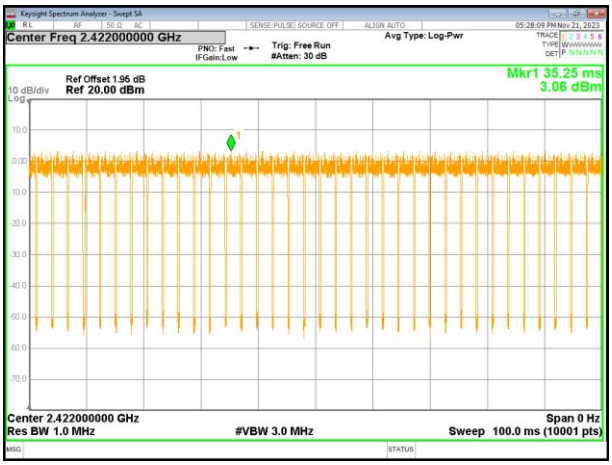
802.11n20	Lowest channel	802.1120	Middle channel



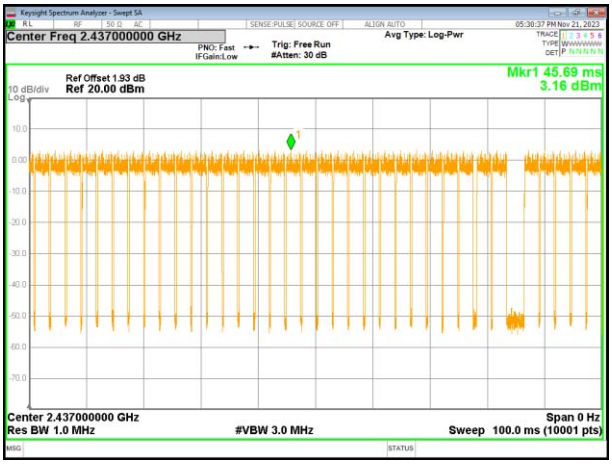


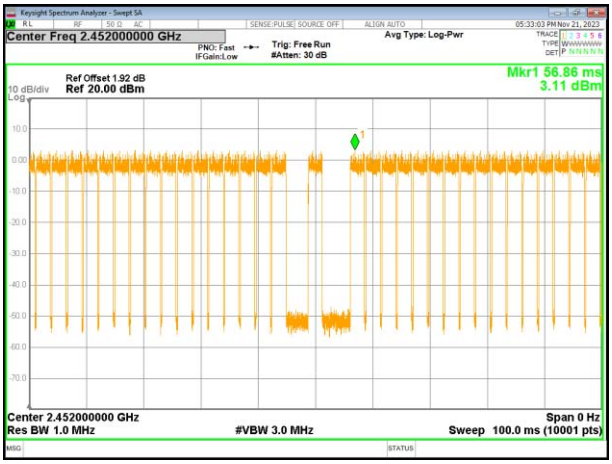
802.11n20	Highest channel	802.11n40	Lowest channel



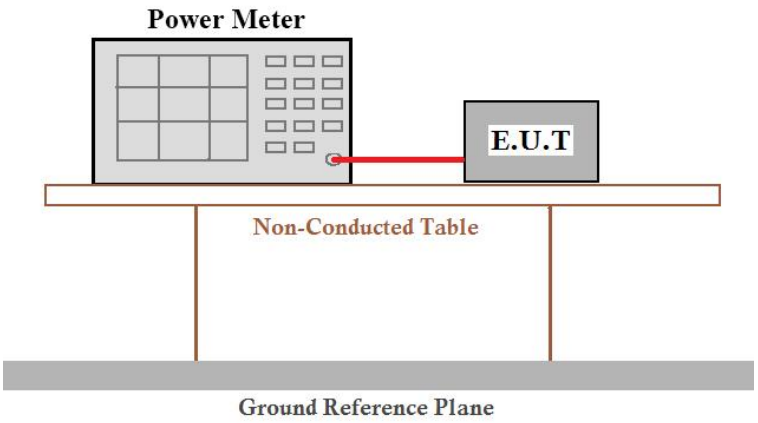


802.11n40	Middle channel	802.11n40	Highest channel





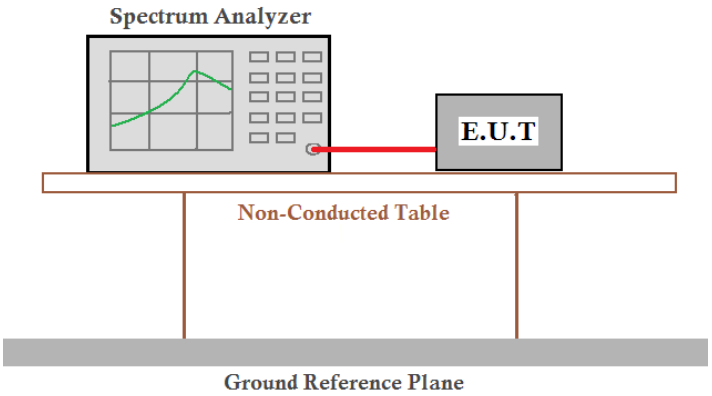
4.4 Conducted Output Power

Test Requirement :	FCC Part15 C Section 15.247 (b)(3)	
Test Method :	KDB 558074 D01 15.247 Meas Guidance v05r02	
Limit:	30dBm	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

Measurement Result

Test CH	Output Power (dBm)				Limit(dBm)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	13.69	16.24	16.13	14.99	30.00	Pass
Middle	15.34	17.26	17.17	14.31		
Highest	15.51	17.55	17.44	14.06		

4.5 6dB Bandwidth & 99% Channel Bandwidth

Test Requirement :	FCC Part15 C Section 15.247 (a)(2)	
Test Method :	KDB 558074 D01 15.247 Meas Guidance v05r02	
Limit:	>500KHz	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

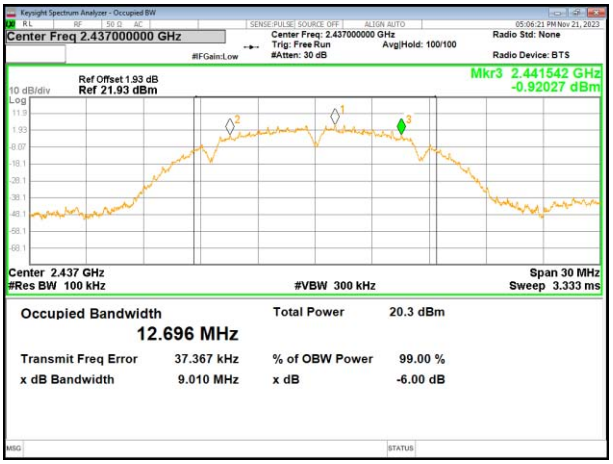
Measurement Result

Test CH	6dB Bandwidth (MHz)				Limit(KHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	9.000	16.366	17.332	36.278	>500	Pass
Middle	9.010	16.432	17.615	36.329		
Highest	8.506	16.337	17.595	36.074		

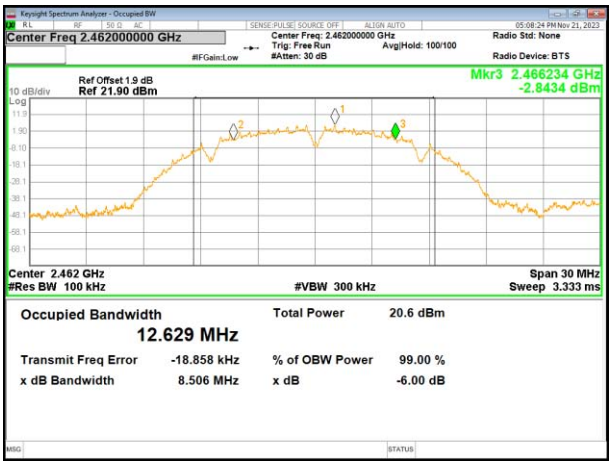
Test CH	99% Bandwidth (MHz)				Limit	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	12.599	16.637	17.673	36.233	/	Pass
Middle	12.789	16.585	17.664	36.268		
Highest	12.703	16.591	17.678	36.255		

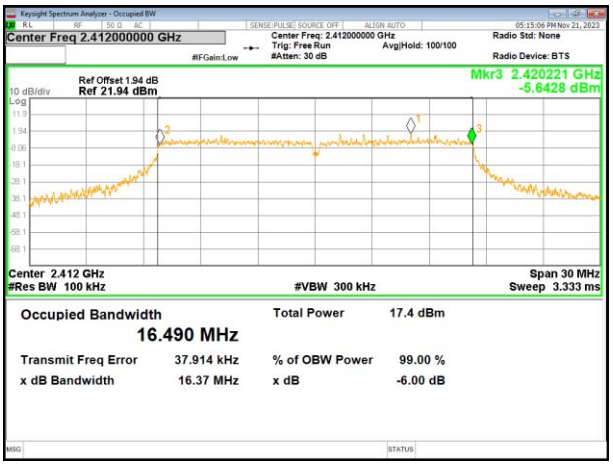
Test plot as follows: -6 Bandwidth dB Test plot as follows

802.11b	Lowest channel	802.11b	Middle channel

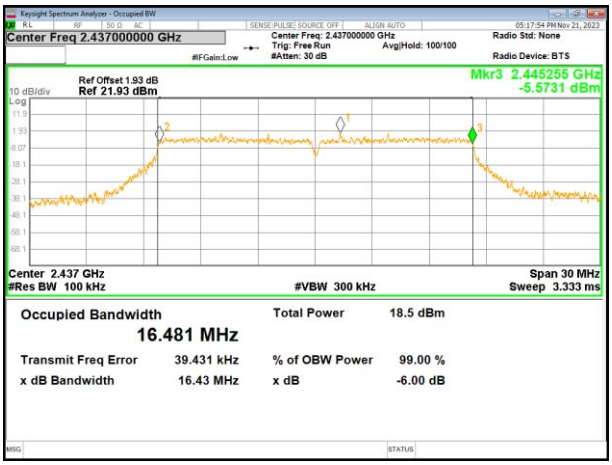


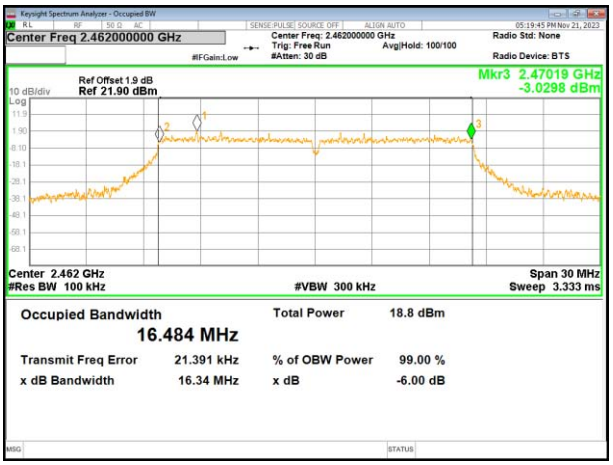
802.11b	Highest channel	802.11g	Lowest channel



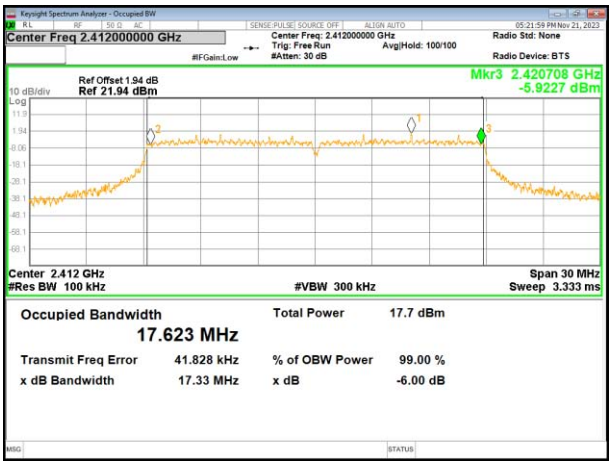


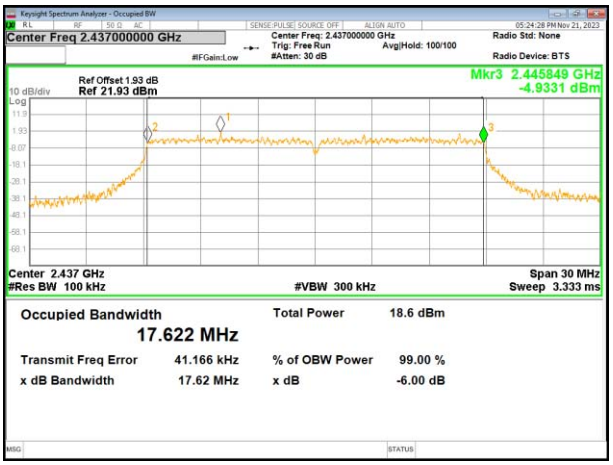
802.11g	Middle channel	802.11g	Highest channel



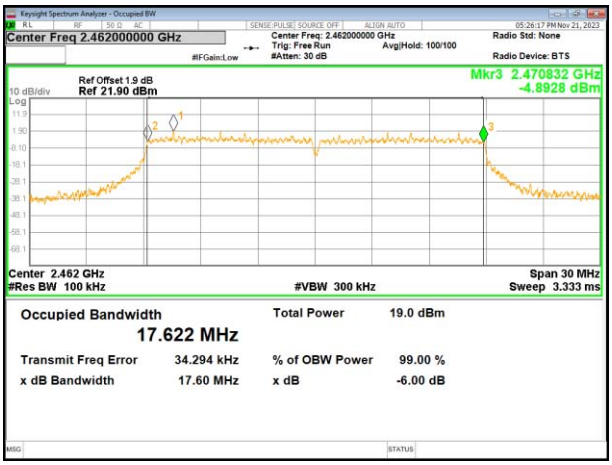


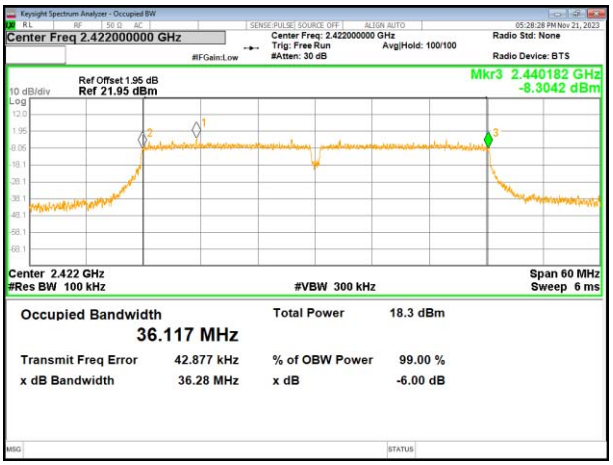
802.11n20	Lowest channel	802.1120	Middle channel



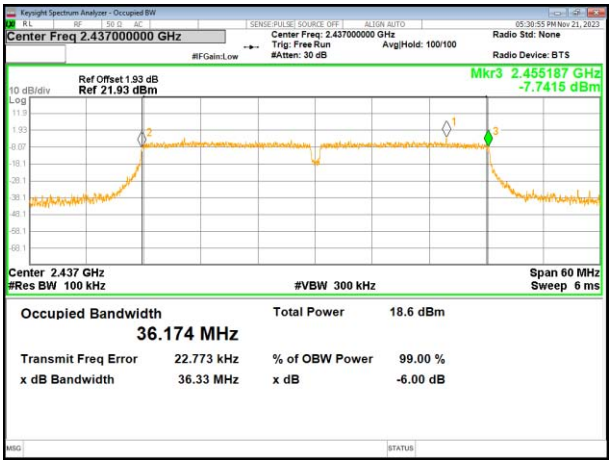


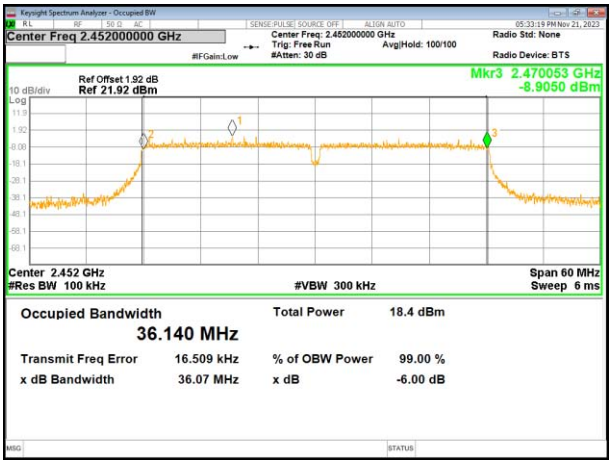
802.11n20	Highest channel	802.11n40	Lowest channel





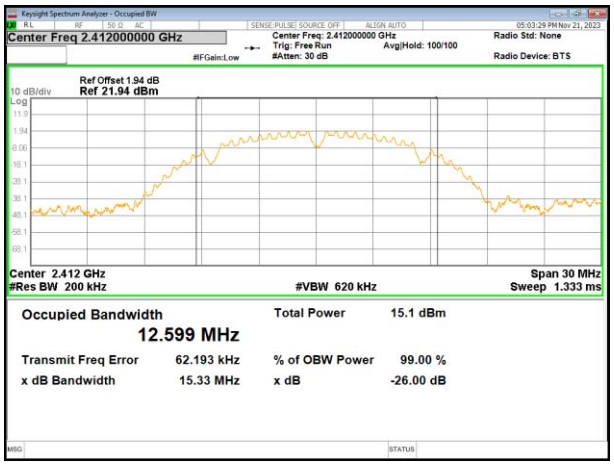
802.11n40	Middle channel	802.11n40	Highest channel

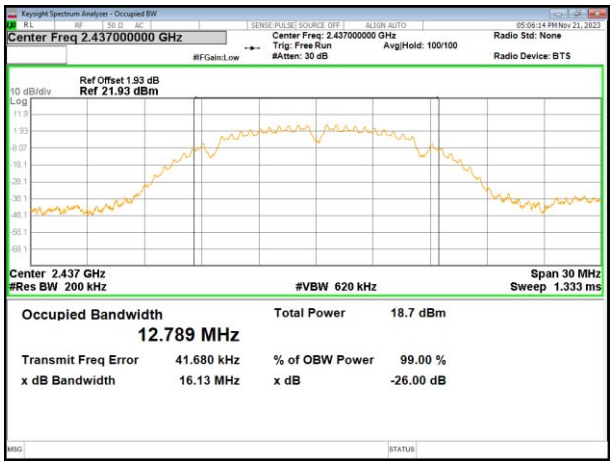




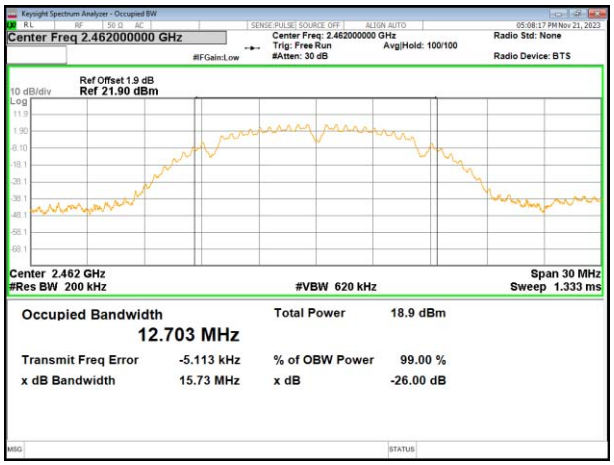
Test plot as follows: 99% Bandwidth Test plot as follows

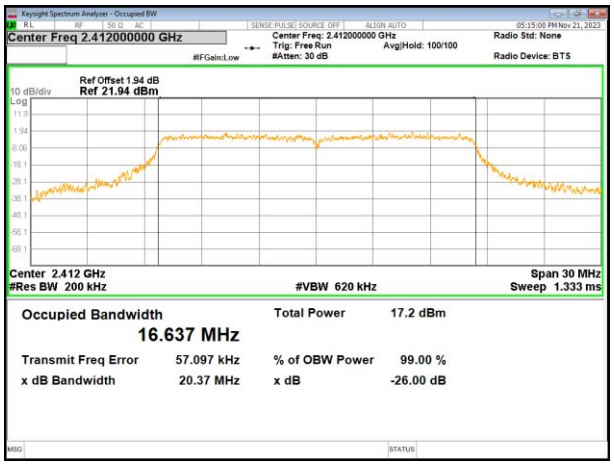
802.11b	Lowest channel	802.11b	Middle channel



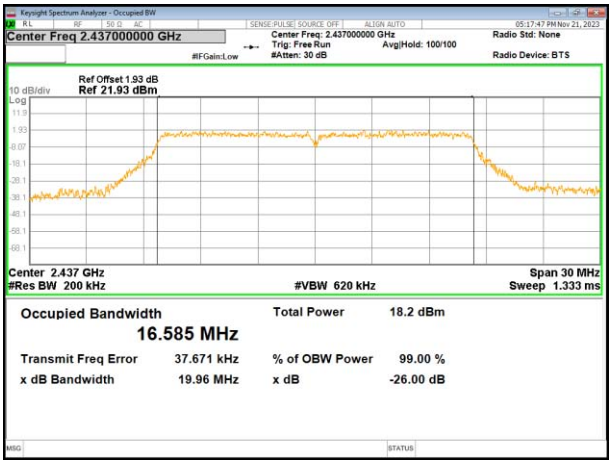


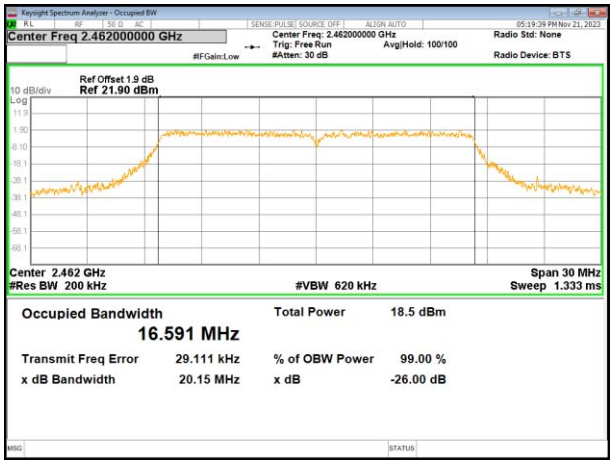
802.11b	Highest channel	802.11g	Lowest channel



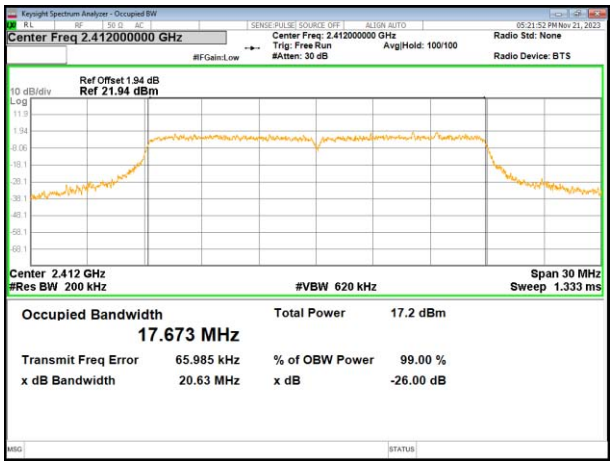


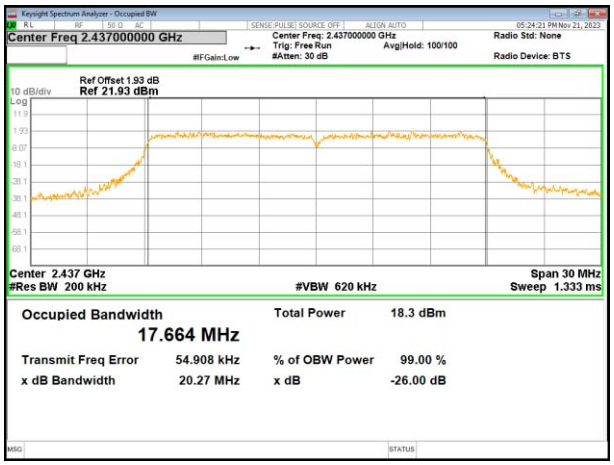
802.11g	Middle channel	802.11g	Highest channel



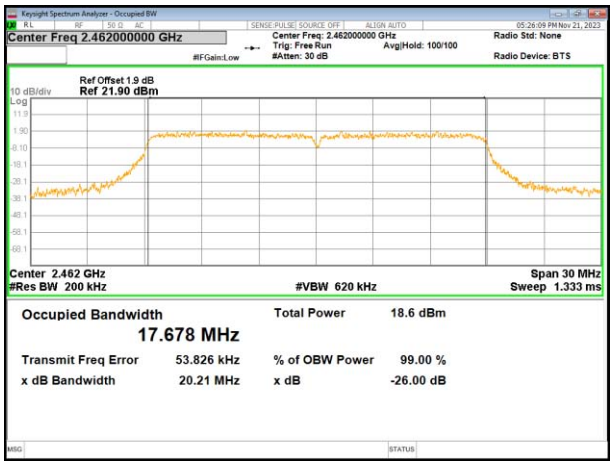


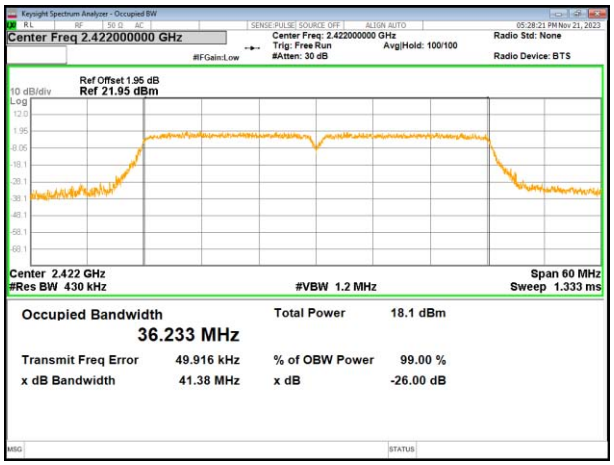
802.11n20	Lowest channel	802.1120	Middle channel



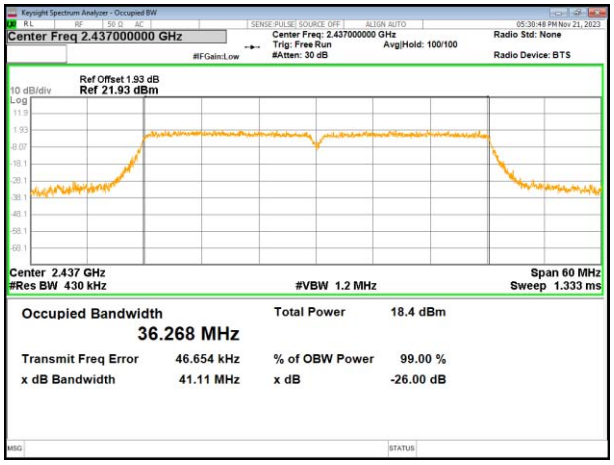


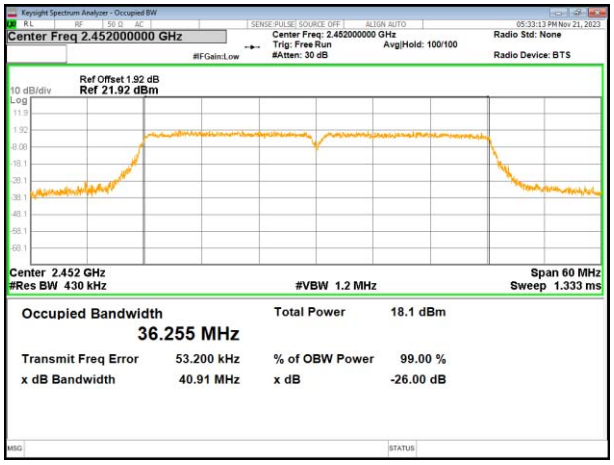
802.11n20	Highest channel	802.11n40	Lowest channel



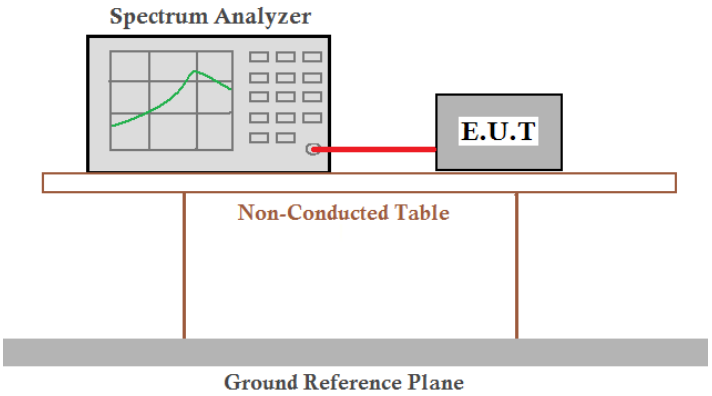


802.11n40	Middle channel	802.11n40	Highest channel





4.6 Power Spectral Density

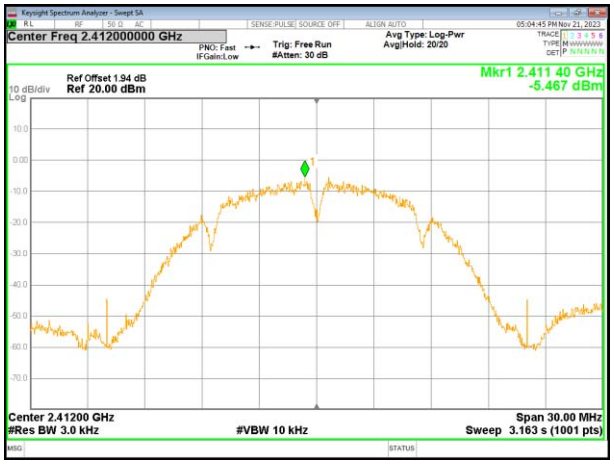
Test Requirement:	FCC Part15 C Section 15.247 (e)	
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02	
Limit:	8dBm/3kHz	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

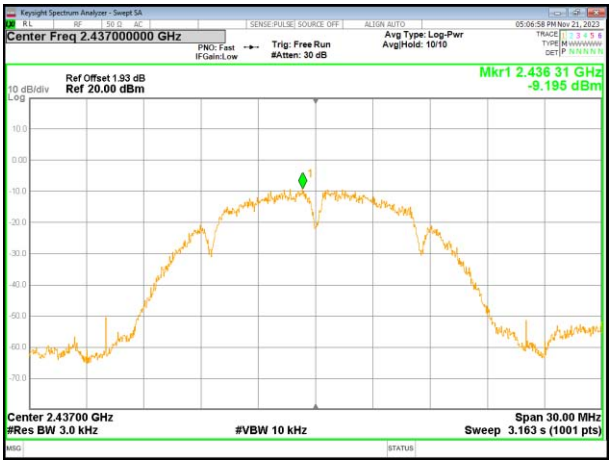
Measurement Result

Test CH	Power Spectral Density (dBm/3kHz)				Limit (dBm/3kHz)	Result
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)		
Lowest	-5.467	-12.557	-13.683	-15.44	8.00	Pass
Middle	-9.195	-12.323	-12.644	-15.088		
Highest	-7.885	-11.771	-12.405	-15.297		

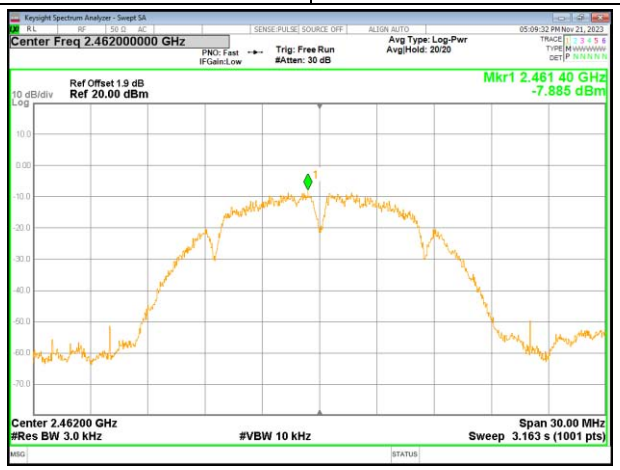
Test plot as follows:

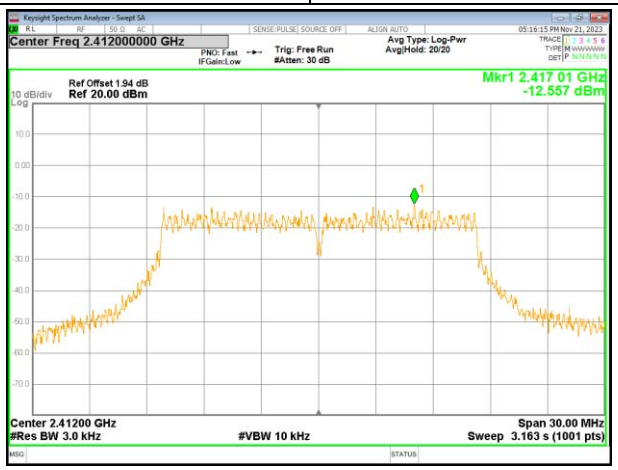
802.11b	Lowest channel	802.11b	Middle channel



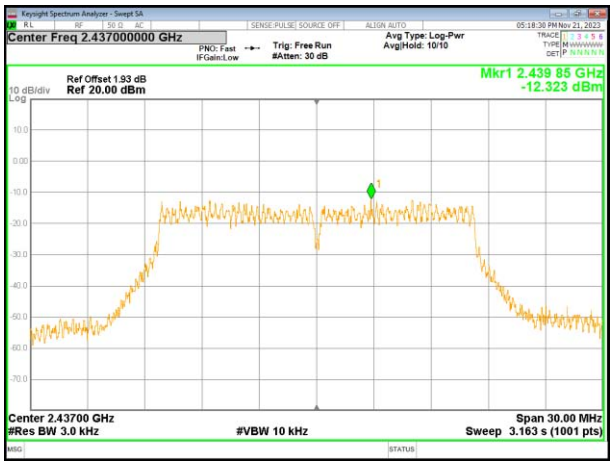


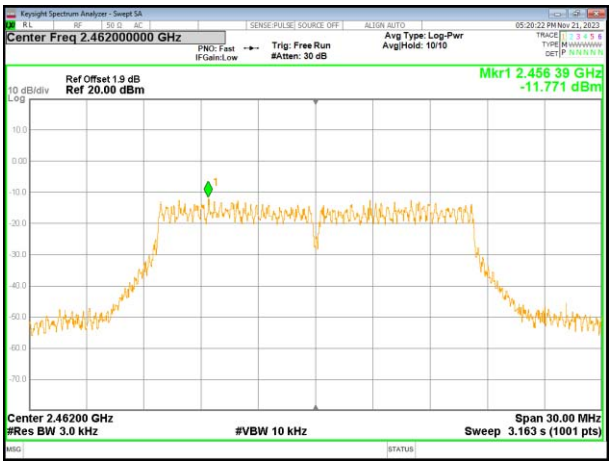
802.11b	Highest channel	802.11g	Lowest channel



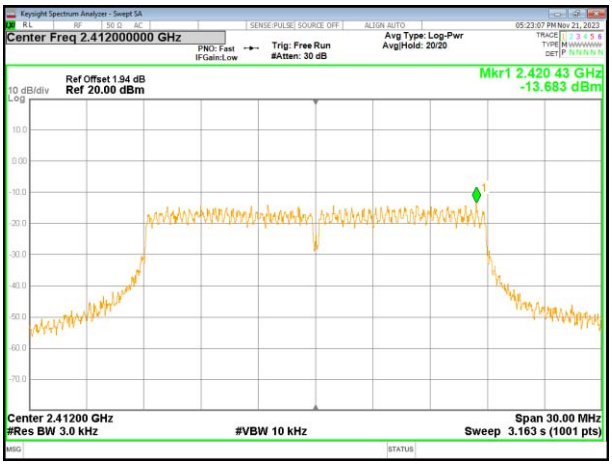


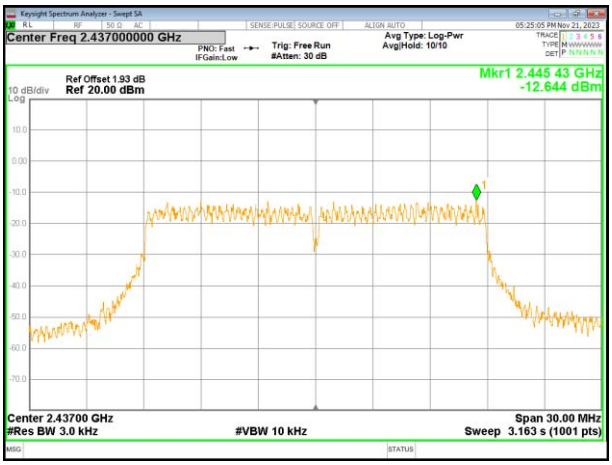
802.11g	Middle channel	802.11g	Highest channel



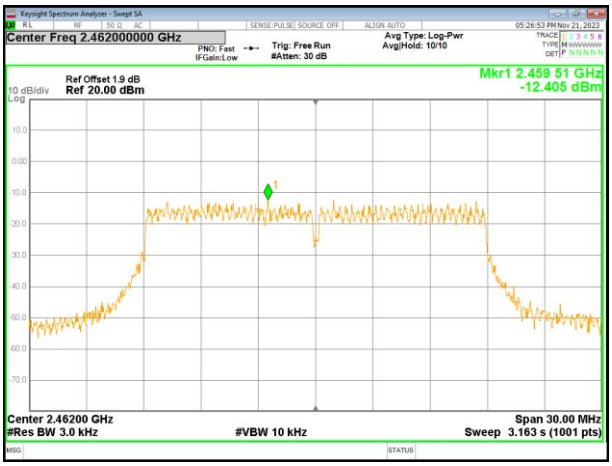


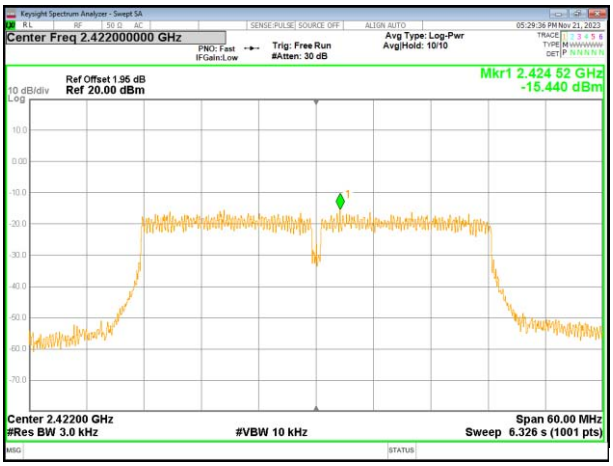
802.11n20	Lowest channel	802.11n20	Middle channel



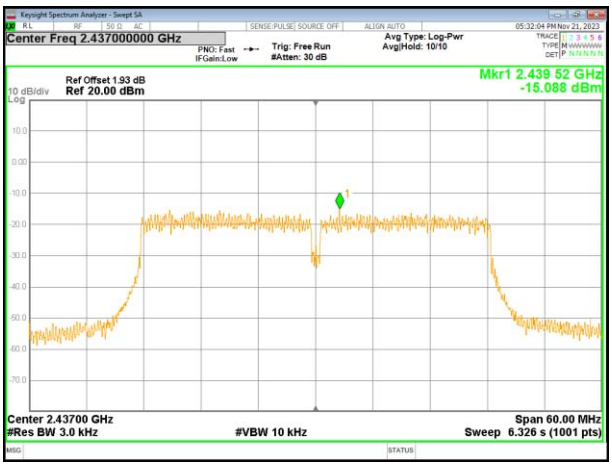


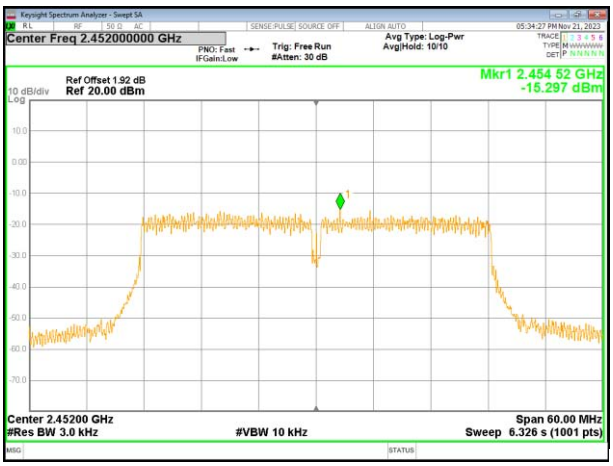
802.11n20	Highest channel	802.11n40	Lowest channel





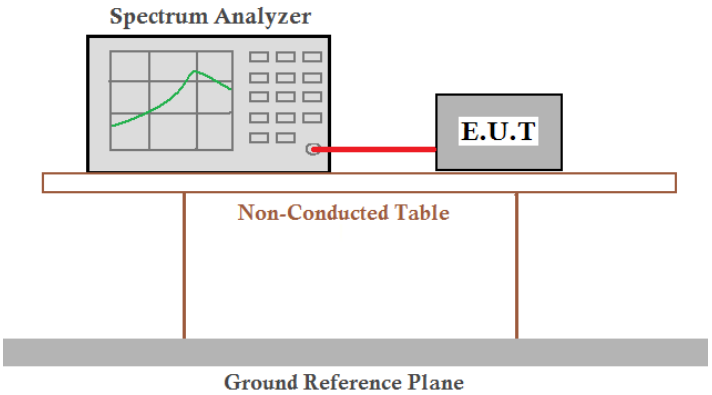
802.11n40	Middle channel	802.11n40	Highest channel





4.7 Band edges

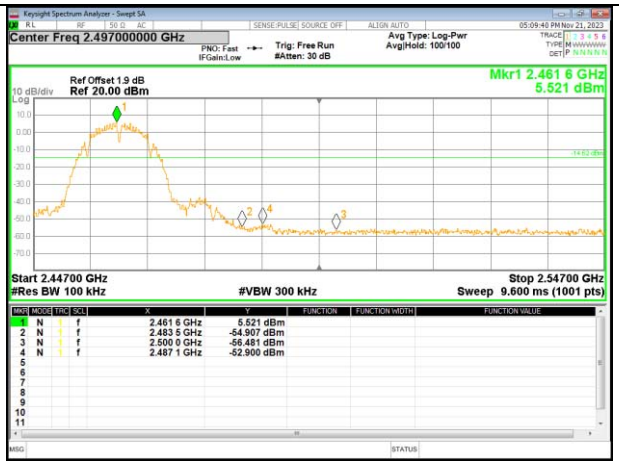
Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d), RSS-247 §5.2.b	
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02	
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

Test plot as follows:

Test mode:	802.11b

Lowest channel



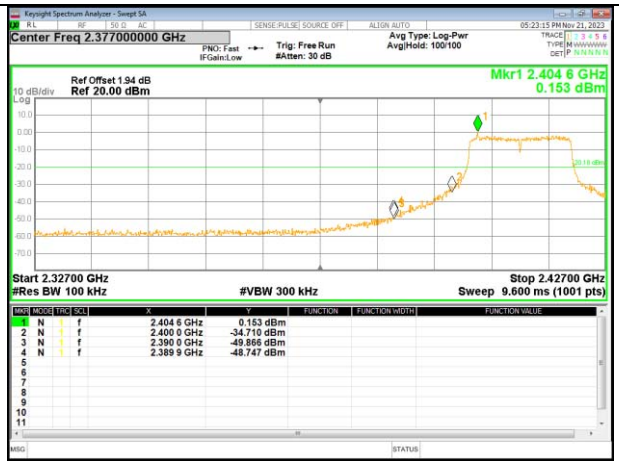
Highest channel

Test mode:	802.11g

Lowest channel

Highest channel

Test mode:	802.11n20



Lowest channel

Highest channel

Test mode:	802.11n40

Lowest channel

Highest channel

Radiated Emission Method

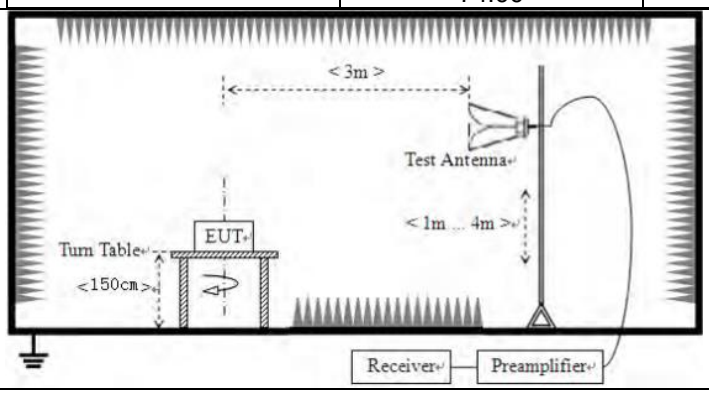
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	Average	1MHz	3MHz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

Measurement data:

Test mode:	802.11b	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	59.63	27.40	3.43	45.40	45.06	74.00	-28.94	Horizontal
2390.00	62.26	27.10	3.43	45.40	47.39	74.00	-26.61	Horizontal
2310.00	60.69	27.40	3.43	45.40	46.12	74.00	-27.88	Vertical
2390.00	63.82	27.10	3.43	45.40	48.95	74.00	-25.05	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	49.12	27.40	3.43	45.40	34.55	54.00	-19.45	Horizontal
2390.00	52.05	27.10	3.43	45.40	37.18	54.00	-16.83	Horizontal
2310.00	51.01	27.40	3.43	45.40	36.44	54.00	-17.56	Vertical
2390.00	53.36	27.10	3.43	45.40	38.49	54.00	-15.51	Vertical

Test mode:	802.11b	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	62.19	27.80	3.56	45.40	48.15	74.00	-25.85	Horizontal
2500.00	58.80	27.80	3.56	45.40	44.76	74.00	-29.24	Horizontal
2483.50	62.96	27.80	3.56	45.40	48.92	74.00	-25.08	Vertical
2500.00	60.51	27.80	3.56	45.40	46.47	74.00	-27.53	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	52.38	27.80	3.56	45.40	38.34	54.00	-15.66	Horizontal
2500.00	50.37	27.80	3.56	45.40	36.33	54.00	-17.67	Horizontal
2483.50	51.86	27.80	3.56	45.40	37.82	54.00	-16.18	Vertical
2500.00	49.85	27.80	3.56	45.40	35.81	54.00	-18.19	Vertical

Remarks:

1. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
2. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11g	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	60.34	27.40	3.43	45.40	45.77	74.00	-28.23	Horizontal
2390.00	63.82	27.10	3.43	45.40	48.95	74.00	-25.05	Horizontal
2310.00	59.73	27.40	3.43	45.40	45.16	74.00	-28.84	Vertical
2390.00	62.71	27.10	3.43	45.40	47.84	74.00	-26.16	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	50.51	27.40	3.43	45.40	35.94	54.00	-18.06	Horizontal
2390.00	52.91	27.10	3.43	45.40	38.04	54.00	-15.96	Horizontal
2310.00	50.22	27.40	3.43	45.40	35.65	54.00	-18.35	Vertical
2390.00	53.17	27.10	3.43	45.40	38.30	54.00	-15.70	Vertical

Test mode:	802.11g	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	62.54	27.80	3.56	45.40	48.50	74.00	-25.50	Horizontal
2500.00	59.35	27.80	3.56	45.40	45.31	74.00	-28.69	Horizontal
2483.50	62.79	27.80	3.56	45.40	48.75	74.00	-25.25	Vertical
2500.00	59.59	27.80	3.56	45.40	45.55	74.00	-28.45	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	53.75	27.80	3.56	45.40	39.71	54.00	-14.29	Horizontal
2500.00	49.92	27.80	3.56	45.40	35.88	54.00	-18.12	Horizontal
2483.50	52.51	27.80	3.56	45.40	38.47	54.00	-15.53	Vertical
2500.00	49.09	27.80	3.56	45.40	35.05	54.00	-18.95	Vertical

Remarks:

4. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
5. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
6. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	59.39	27.40	3.43	45.40	44.82	74.00	-29.18	Horizontal
2390.00	62.92	27.10	3.43	45.40	48.05	74.00	-25.95	Horizontal
2310.00	60.10	27.40	3.43	45.40	45.53	74.00	-28.47	Vertical
2390.00	63.73	27.10	3.43	45.40	48.86	74.00	-25.14	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	49.33	27.40	3.43	45.40	34.76	54.00	-19.24	Horizontal
2390.00	52.65	27.10	3.43	45.40	37.78	54.00	-16.22	Horizontal
2310.00	48.19	27.40	3.43	45.40	33.62	54.00	-20.38	Vertical
2390.00	52.83	27.10	3.43	45.40	37.96	54.00	-16.04	Vertical

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	67.73	27.80	3.56	45.40	53.69	74.00	-20.31	Horizontal
2500.00	64.05	27.80	3.56	45.40	50.01	74.00	-23.99	Horizontal
2483.50	67.87	27.80	3.56	45.40	53.83	74.00	-20.17	Vertical
2500.00	61.82	27.80	3.56	45.40	47.78	74.00	-26.22	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	51.73	27.80	3.56	45.40	37.69	54.00	-16.31	Horizontal
2500.00	50.04	27.80	3.56	45.40	36.00	54.00	-18.00	Horizontal
2483.50	51.54	27.80	3.56	45.40	37.50	54.00	-16.50	Vertical
2500.00	50.29	27.80	3.56	45.40	36.25	54.00	-17.75	Vertical

Remarks:

7. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
8. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
9. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT40)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	60.29	27.40	3.43	45.40	45.72	74.00	-28.28	Horizontal
2390.00	63.84	27.10	3.43	45.40	48.97	74.00	-25.03	Horizontal
2310.00	59.71	27.40	3.43	45.40	45.14	74.00	-28.86	Vertical
2390.00	64.68	27.10	3.43	45.40	49.81	74.00	-24.19	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	50.04	27.40	3.43	45.40	35.47	54.00	-18.53	Horizontal
2390.00	53.01	27.10	3.43	45.40	38.14	54.00	-15.86	Horizontal
2310.00	49.18	27.40	3.43	45.40	34.61	54.00	-19.39	Vertical
2390.00	52.67	27.10	3.43	45.40	37.80	54.00	-16.20	Vertical

Test mode:	802.11n(HT40)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	67.13	27.80	3.56	45.40	53.09	74.00	-20.91	Horizontal
2500.00	62.90	27.80	3.56	45.40	48.86	74.00	-25.14	Horizontal
2483.50	67.97	27.80	3.56	45.40	53.93	74.00	-20.07	Vertical
2500.00	61.51	27.80	3.56	45.40	47.47	74.00	-26.53	Vertical

Average value:

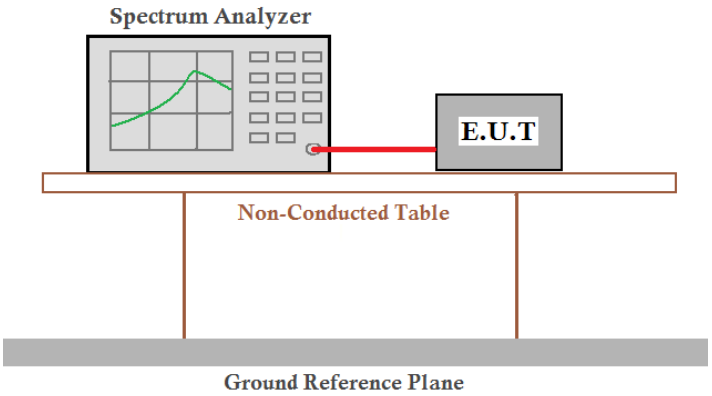
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	52.47	27.80	3.56	45.40	38.43	54.00	-15.57	Horizontal
2500.00	49.91	27.80	3.56	45.40	35.87	54.00	-18.13	Horizontal
2483.50	51.18	27.80	3.56	45.40	37.14	54.00	-16.86	Vertical
2500.00	49.32	27.80	3.56	45.40	35.28	54.00	-18.72	Vertical

Remarks:

10. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
11. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
12. *Emissions more than 20 dB below the limit do not need to be reported.*

4.8 Spurious Emission

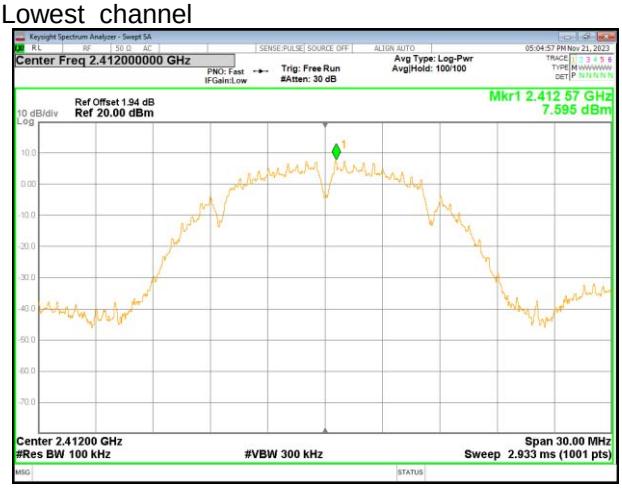
Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)	
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02	
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.	
Test setup:		
Test Instruments:	Refer to section 3.0 for details	
Test mode:	Refer to section 2.2 for details	
Test environment:	Temp.: 26.2°C	Humid.: 51%RH
Test voltage:	DC 12V	
Test results:	Pass	

Test plot as follows:

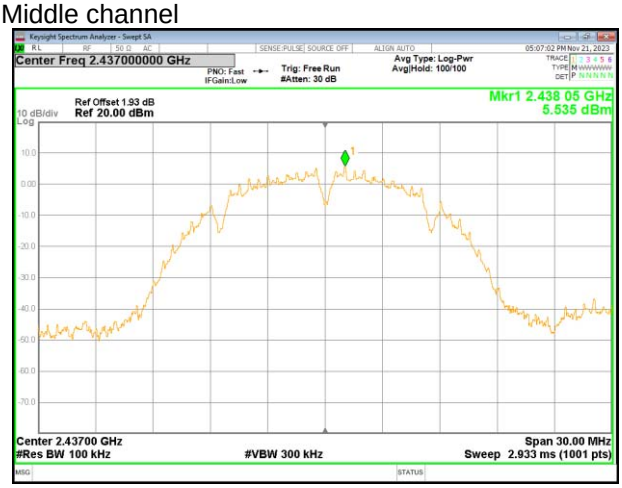
802.11b

Lowest channel



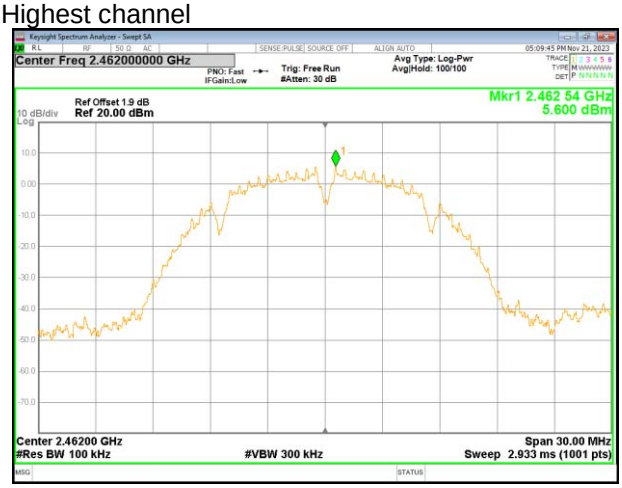
30MHz~25GHz

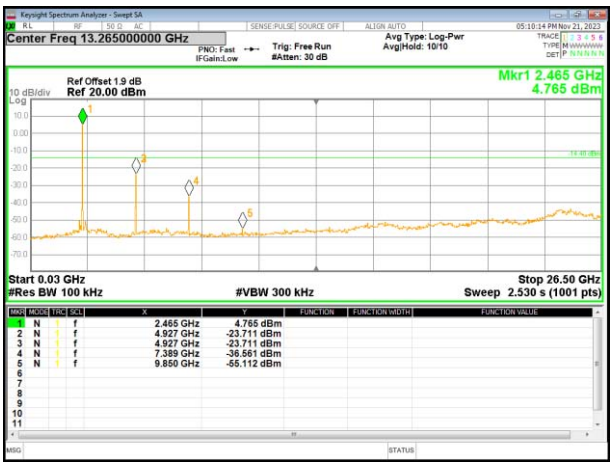
Middle channel



30MHz~25GHz

Highest channel

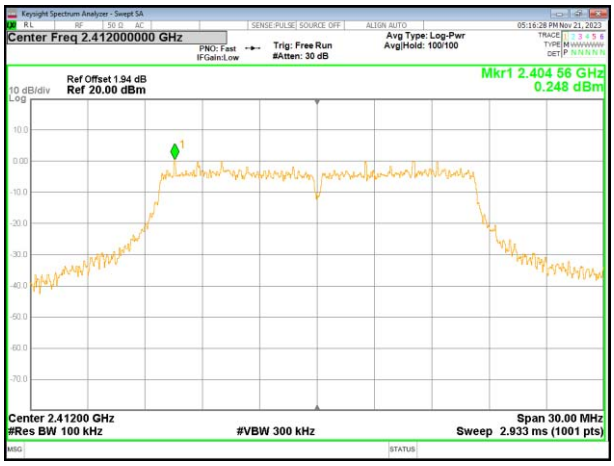




30MHz~25GHz

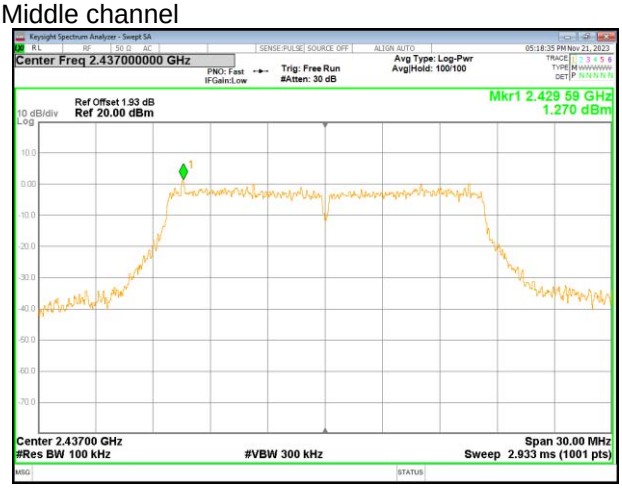
802.11g

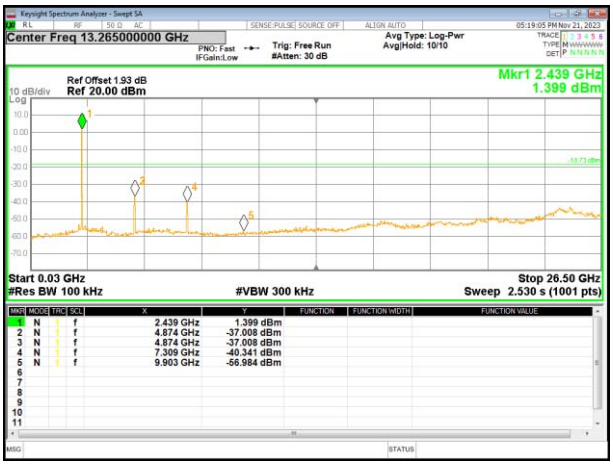
Lowest channel



30MHz~25GHz

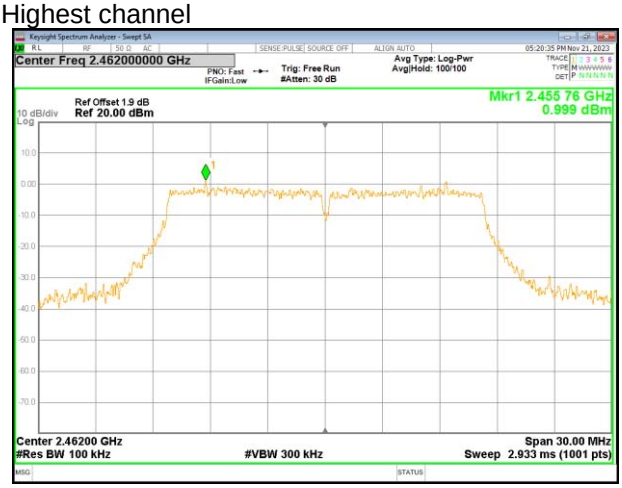
Middle channel





30MHz~25GHz

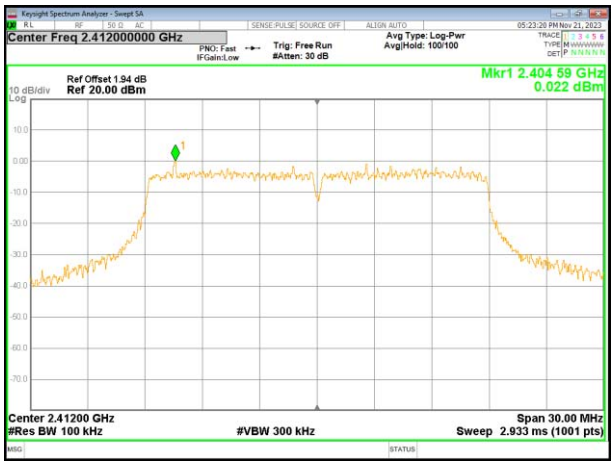
Highest channel



30MHz~25GHz

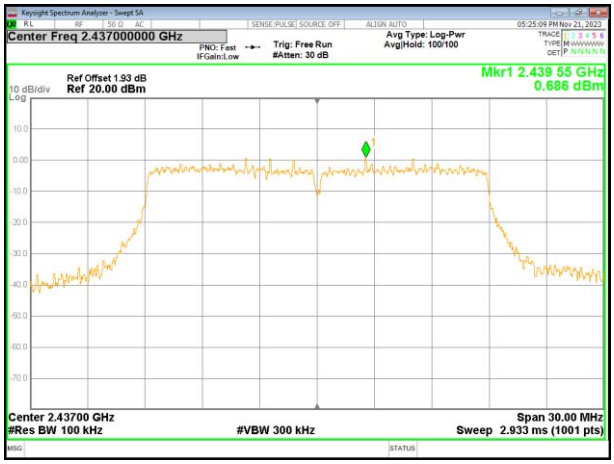
802.11n20

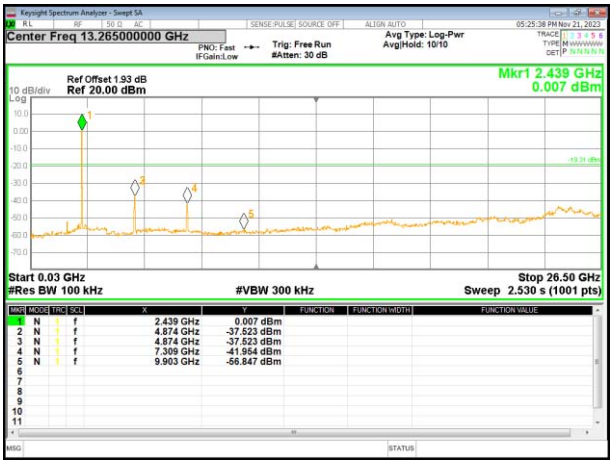
Lowest channel



30MHz~25GHz

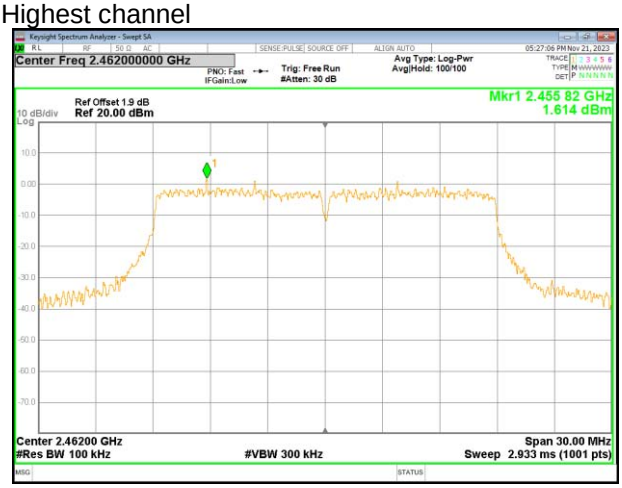
Middle channel

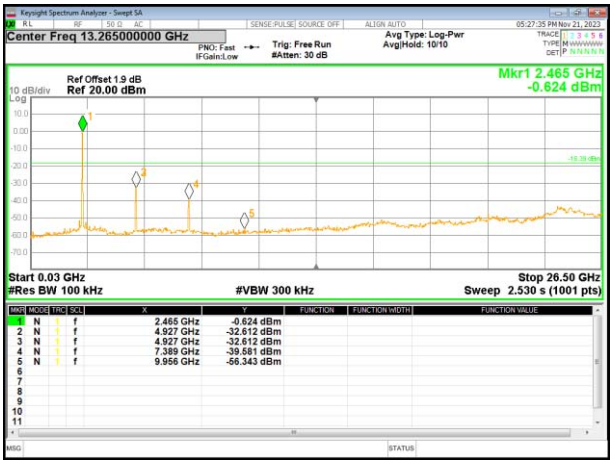




30MHz~25GHz

Highest channel

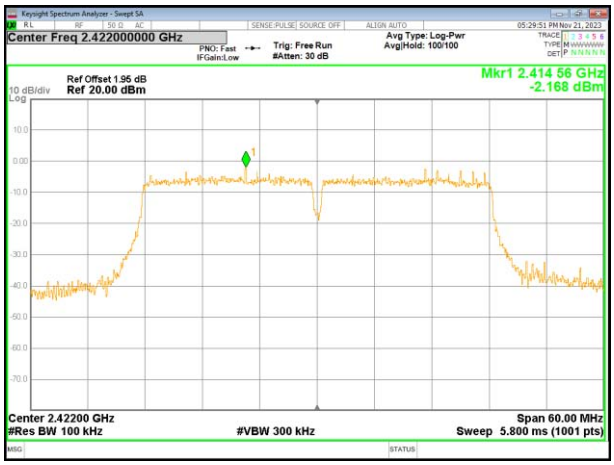


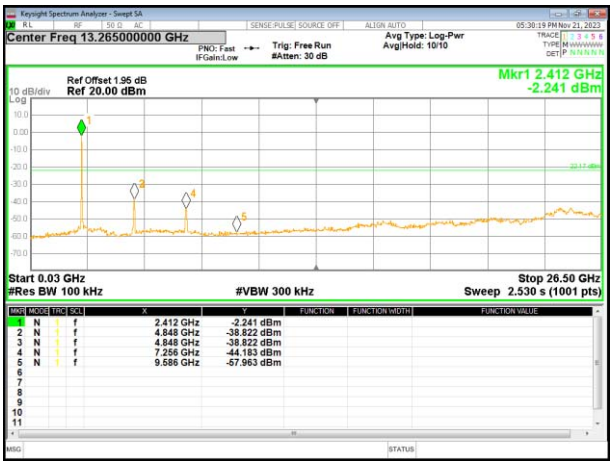


30MHz~25GHz

802.11n40

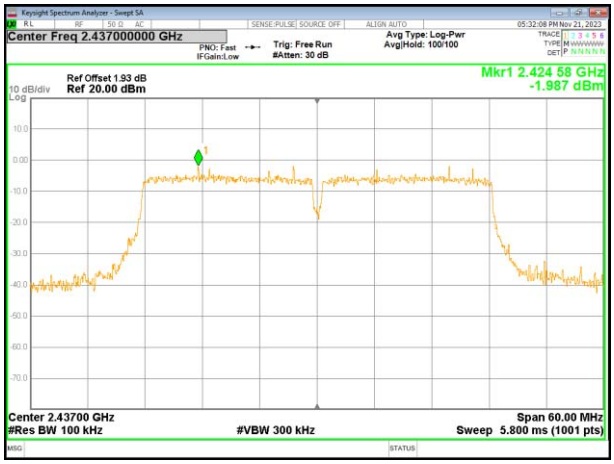
Lowest channel

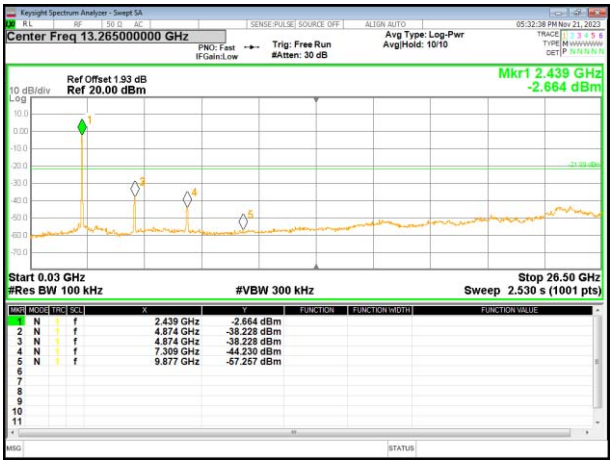




30MHz~25GHz

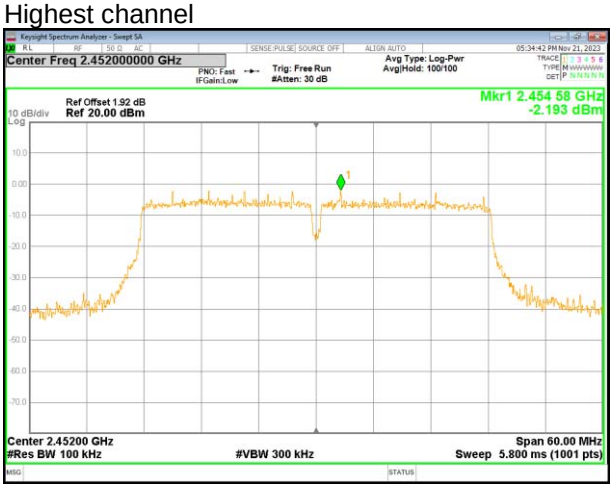
Middle channel





30MHz~25GHz

Highest channel



30MHz~25GHz

Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

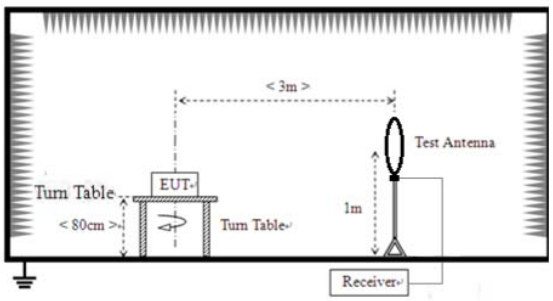
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

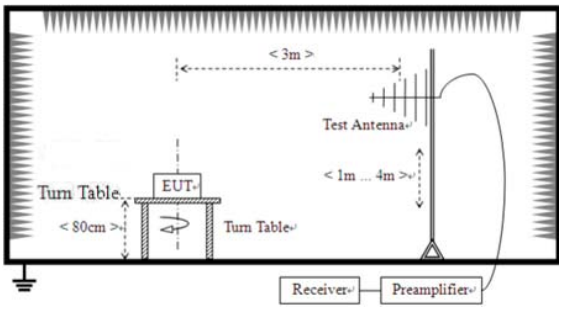
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	300m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

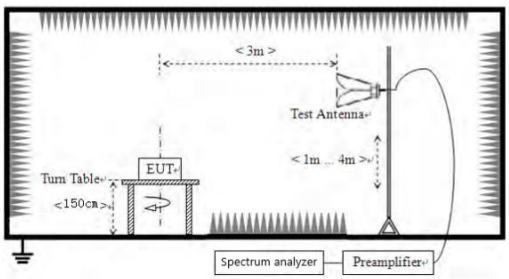
Test setup:

For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz



	For radiated emissions above 1GHz  					
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Test Instruments:	Refer to section 3.0 for details					
Test mode:	Refer to section 2.2 for details					
Test environment:	Temp.:	26.2°C	Humid.:	51%	Press.:	1012mbar
Test voltage:	DC 12V					
Test results:	Pass					

Remarks:

1. *The report only shows the worst mode.*
2. *Pre-scan all kind of the place mode (X-axis, Y-(axis, Z-axis), and found the Y-axis which it is worse case.*

Measurement data:

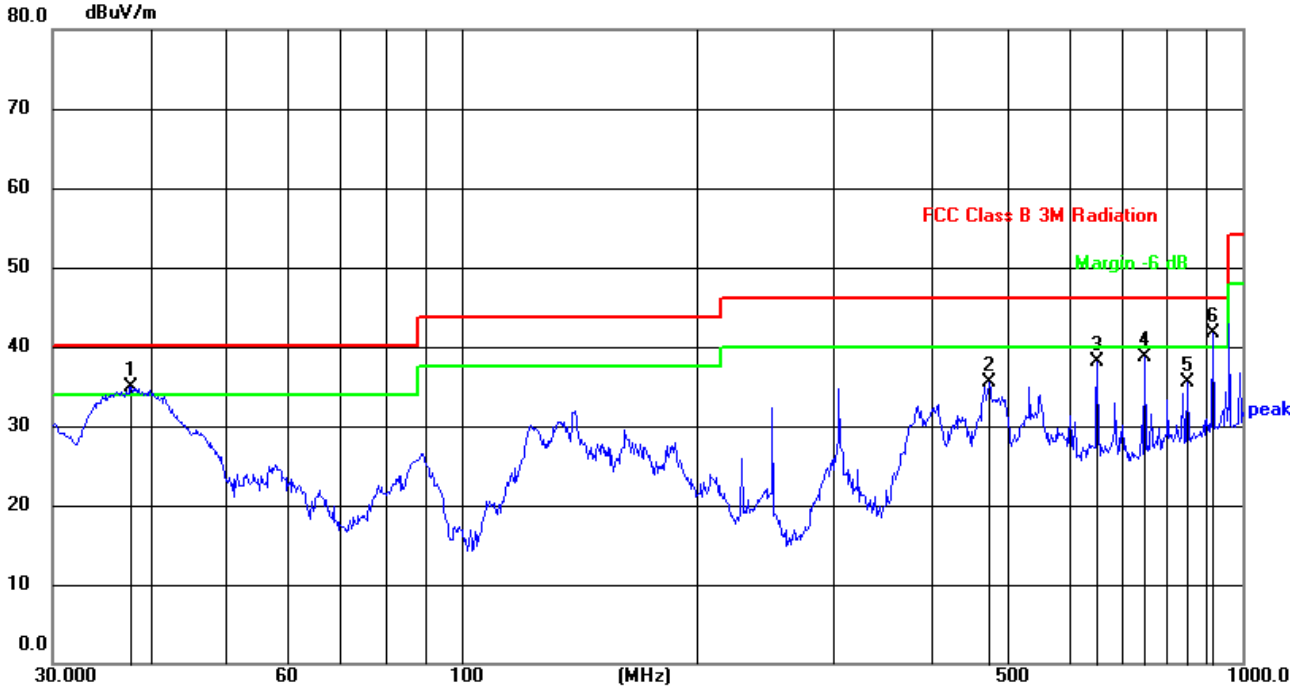
- **9kHz~30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

■ **Below 1GHz**

All mode has been tested, the report only shows the worst mode (802.11g 2462MHz).

Vertical:



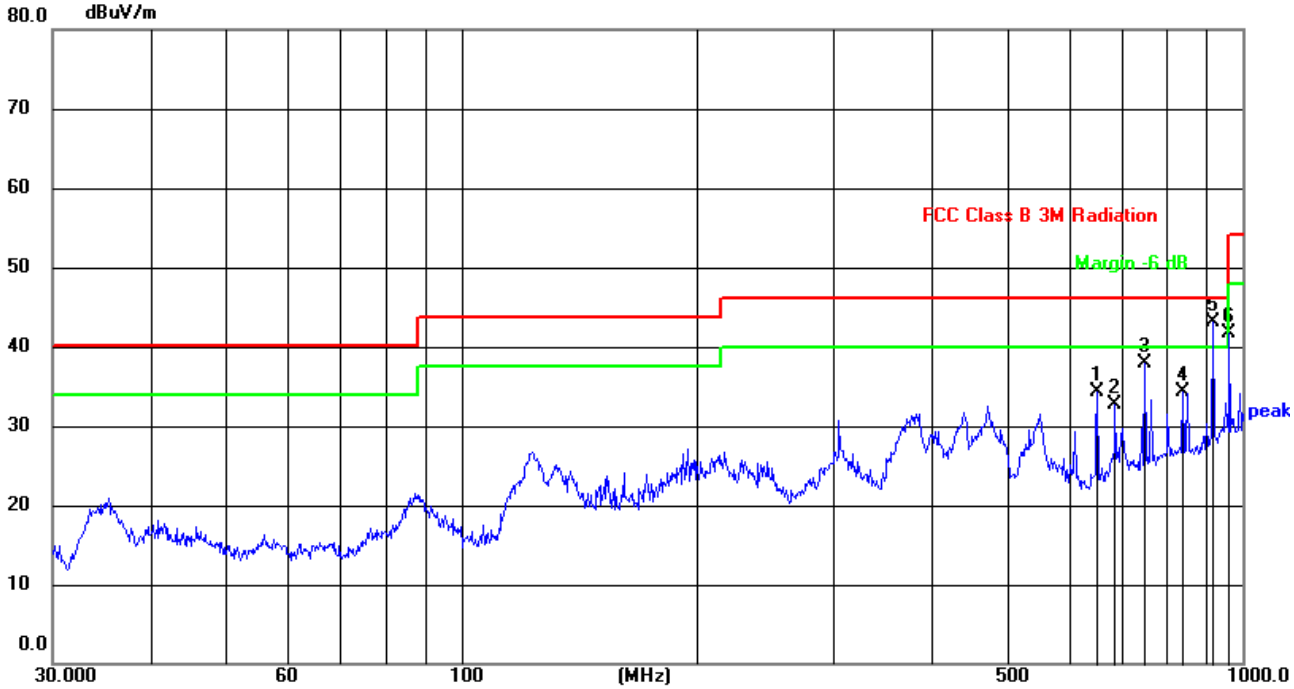
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	37.8121	56.14	-21.28	34.86	40.00	-5.14	QP
2	473.8346	51.13	-15.53	35.60	46.00	-10.40	QP
3	651.9415	48.50	-10.32	38.18	46.00	-7.82	QP
4	750.1082	46.75	-8.11	38.64	46.00	-7.36	QP
5	851.0353	41.68	-6.26	35.42	46.00	-10.58	QP
6	916.0684	46.55	-4.92	41.63	46.00	-4.37	QP

Remarks:

Level =Receiver Reading + Factor

Factor= Antenna Factor + Cable Factor – Preamplifier Factor

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	651.9415	44.55	-10.32	34.23	46.00	-11.77	QP
2	687.1506	42.32	-9.57	32.75	46.00	-13.25	QP
3	750.1082	46.07	-8.11	37.96	46.00	-8.04	QP
4	839.1816	40.60	-6.32	34.28	46.00	-11.72	QP
5	916.0683	47.92	-4.92	43.00	46.00	-3.00	QP
6	962.1621	45.34	-3.70	41.64	54.00	-12.36	QP

Remarks:

Level =Receiver Reading + Factor

Factor= Antenna Factor + Cable Factor – Preamplifier Factor

■ **Above 1GHz**

Test mode:	802.11b	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	54.75	32.80	5.96	45.70	47.81	74.00	-26.19	Vertical
7236.00	53.49	36.20	6.93	45.80	50.82	74.00	-23.18	Vertical
9648.00	52.83	38.40	8.02	46.20	53.05	74.00	-20.95	Vertical
12060.00	*					74.00		Vertical
14472.00	*					74.00		Vertical
16884.00	*					74.00		Vertical
4824.00	55.32	32.10	5.96	45.50	47.88	74.00	-26.12	Horizontal
7236.00	54.26	36.60	6.93	45.60	52.19	74.00	-21.81	Horizontal
9648.00	52.95	38.60	8.02	46.20	53.37	74.00	-20.63	Horizontal
12060.00	*					74.00		Horizontal
14472.00	*					74.00		Horizontal
16884.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	45.65	32.10	5.96	45.50	38.21	54.00	-15.79	Vertical
7236.00	44.05	36.60	6.93	45.60	41.98	54.00	-12.02	Vertical
9648.00	42.01	38.60	8.02	46.20	42.43	54.00	-11.57	Vertical
12060.00	*					54.00		Vertical
14472.00	*					54.00		Vertical
16884.00	*					54.00		Vertical
4824.00	46.23	32.10	5.96	45.50	38.79	54.00	-15.21	Horizontal
7236.00	43.94	36.60	6.93	45.60	41.87	54.00	-12.13	Horizontal
9648.00	42.07	38.60	8.02	46.20	42.49	54.00	-11.51	Horizontal
12060.00	*					54.00		Horizontal
14472.00	*					54.00		Horizontal
16884.00	*					54.00		Horizontal

Remark:

1. *Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11b	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	56.28	32.40	5.96	45.50	49.14	74.00	-24.86	Vertical
7311.00	54.09	36.60	6.93	45.60	52.02	74.00	-21.98	Vertical
9748.00	53.17	38.00	8.02	46.20	52.99	74.00	-21.01	Vertical
12185.00	*					74.00		Vertical
14622.00	*					74.00		Vertical
17059.00	*					74.00		Vertical
4874.00	55.97	32.40	5.96	45.50	48.83	74.00	-25.17	Horizontal
7311.00	55.13	36.60	6.93	45.60	53.06	74.00	-20.94	Horizontal
9748.00	52.24	38.00	8.02	46.20	52.06	74.00	-21.94	Horizontal
12185.00	*					74.00		Horizontal
14622.00	*					74.00		Horizontal
17059.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	46.12	32.40	5.96	45.50	38.98	54.00	-15.02	Vertical
7311.00	43.26	36.60	6.93	45.60	41.19	54.00	-12.81	Vertical
9748.00	42.49	38.00	8.02	46.20	42.31	54.00	-11.69	Vertical
12185.00	*					54.00		Vertical
14622.00	*					54.00		Vertical
17059.00	*					54.00		Vertical
4874.00	46.20	32.40	5.96	45.50	39.06	54.00	-14.94	Horizontal
7311.00	43.88	36.60	6.93	45.60	41.81	54.00	-12.19	Horizontal
9748.00	41.73	38.00	8.02	46.20	41.55	54.00	-12.45	Horizontal
12185.00	*					54.00		Horizontal
14622.00	*					54.00		Horizontal
17059.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11b	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	55.78	32.80	5.96	45.70	48.84	74.00	-25.16	Vertical
7386.00	53.46	36.40	6.93	45.80	50.99	74.00	-23.01	Vertical
9848.00	52.32	38.20	8.02	46.20	52.34	74.00	-21.66	Vertical
12310.00	*					74.00		Vertical
14772.00	*					74.00		Vertical
17234.00	*					74.00		Vertical
4924.00	55.14	32.80	5.96	45.70	48.20	74.00	-25.80	Horizontal
7386.00	52.67	36.40	6.93	45.80	50.20	74.00	-23.80	Horizontal
9848.00	52.54	38.20	8.02	46.20	52.56	74.00	-21.44	Horizontal
12310.00	*					74.00		Horizontal
14772.00	*					74.00		Horizontal
17234.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	45.86	32.80	5.96	45.70	38.92	54.00	-15.08	Vertical
7386.00	43.55	36.40	6.93	45.80	41.08	54.00	-12.92	Vertical
9848.00	42.42	38.20	8.02	46.20	42.44	54.00	-11.56	Vertical
12310.00	*					54.00		Vertical
14772.00	*					54.00		Vertical
17234.00	*					54.00		Vertical
4924.00	45.40	32.80	5.96	45.70	38.46	54.00	-15.54	Horizontal
7386.00	45.17	36.40	6.93	45.80	42.70	54.00	-11.30	Horizontal
9848.00	41.90	38.20	8.02	46.20	41.92	54.00	-12.08	Horizontal
12310.00	*					54.00		Horizontal
14772.00	*					54.00		Horizontal
17234.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11g	Test channel:	lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	56.82	32.10	5.96	45.50	49.38	74.00	-24.62	Vertical
7236.00	55.13	36.60	6.93	45.60	53.06	74.00	-20.94	Vertical
9648.00	53.02	38.60	8.02	46.20	53.44	74.00	-20.56	Vertical
12060.00	*					74.00		Vertical
14472.00	*					74.00		Vertical
16884.00	*					74.00		Vertical
4824.00	55.97	32.10	5.96	45.50	48.53	74.00	-25.47	Horizontal
7236.00	54.55	36.60	6.93	45.60	52.48	74.00	-21.52	Horizontal
9648.00	52.76	38.60	8.02	46.20	53.18	74.00	-20.82	Horizontal
12060.00	*					74.00		Horizontal
14472.00	*					74.00		Horizontal
16884.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	44.55	32.10	5.96	40.02	42.59	54.00	-11.41	Vertical
7236.00	41.78	36.60	6.93	42.52	42.79	54.00	-11.21	Vertical
9648.00	40.28	38.60	8.02	43.45	43.45	54.00	-10.55	Vertical
12060.00	*					54.00		Vertical
14472.00	*					54.00		Vertical
16884.00	*					54.00		Vertica
4824.00	43.82	32.10	5.96	40.02	41.86	54.00	-12.14	Horizontal
7236.00	41.17	36.60	6.93	42.52	42.18	54.00	-11.82	Horizontal
9648.00	39.88	38.60	8.02	43.45	43.05	54.00	-10.95	Horizontal
12060.00	*					54.00		Horizontal
14472.00	*					54.00		Horizontal
16884.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11g	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	56.85	32.40	5.96	45.50	49.71	74.00	-24.29	Vertical
7311.00	54.23	36.60	6.93	45.60	52.16	74.00	-21.84	Vertical
9748.00	54.03	38.00	8.02	46.20	53.85	74.00	-20.15	Vertical
12185.00	*					74.00		Vertical
14622.00	*					74.00		Vertical
17059.00	*					74.00		Vertical
4874.00	56.48	32.40	5.96	45.50	49.34	74.00	-24.66	Horizontal
7311.00	54.62	36.60	6.93	45.60	52.55	74.00	-21.45	Horizontal
9748.00	53.16	38.00	8.02	46.20	52.98	74.00	-21.02	Horizontal
12185.00	*					74.00		Horizontal
14622.00	*					74.00		Horizontal
17059.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	45.66	32.40	5.96	45.50	38.52	54.00	-15.48	Vertical
7311.00	44.24	36.60	6.93	45.60	42.17	54.00	-11.83	Vertical
9748.00	41.78	38.00	8.02	46.20	41.60	54.00	-12.40	Vertical
12185.00	*					54.00		Vertical
14622.00	*					54.00		Vertical
17059.00	*					54.00		Vertical
4874.00	47.20	32.40	5.96	45.50	40.06	54.00	-13.94	Horizontal
7311.00	42.61	36.60	6.93	45.60	40.54	54.00	-13.46	Horizontal
9748.00	42.92	38.00	8.02	46.20	42.74	54.00	-11.26	Horizontal
12185.00	*					54.00		Horizontal
14622.00	*					54.00		Horizontal
17059.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11g	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	56.43	32.80	5.96	45.70	49.49	74.00	-24.51	Vertical
7386.00	54.59	36.40	6.93	45.80	52.12	74.00	-21.88	Vertical
9848.00	52.73	38.20	8.02	46.20	52.75	74.00	-21.25	Vertical
12310.00	*					74.00		Vertical
14772.00	*					74.00		Vertical
17234.00	*					74.00		Vertical
4924.00	55.99	32.80	5.96	45.70	49.05	74.00	-24.95	Horizontal
7386.00	55.14	36.40	6.93	45.80	52.67	74.00	-21.33	Horizontal
9848.00	53.38	38.20	8.02	46.20	53.40	74.00	-20.60	Horizontal
12310.00	*					74.00		Horizontal
14772.00	*					74.00		Horizontal
17234.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	46.31	32.80	5.96	45.70	39.37	54.00	-14.63	Vertical
7386.00	43.58	36.40	6.93	45.80	41.11	54.00	-12.89	Vertical
9848.00	42.83	38.20	8.02	46.20	42.85	54.00	-11.15	Vertical
12310.00	*					54.00		Vertical
14772.00	*					54.00		Vertical
17234.00	*					54.00		Vertical
4924.00	48.73	32.80	5.96	45.70	41.79	54.00	-12.21	Horizontal
7386.00	43.24	36.40	6.93	45.80	40.77	54.00	-13.23	Horizontal
9848.00	43.65	38.20	8.02	46.20	43.67	54.00	-10.34	Horizontal
12310.00	*					54.00		Horizontal
14772.00	*					54.00		Horizontal
17234.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT20)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	56.48	32.10	5.96	45.50	49.04	74.00	-24.96	Vertical
7236.00	53.50	36.60	6.93	45.60	51.43	74.00	-22.57	Vertical
9648.00	52.36	38.60	8.02	46.20	52.78	74.00	-21.22	Vertical
12060.00	*					74.00		Vertical
14472.00	*					74.00		Vertical
16884.00	*					74.00		Vertical
4824.00	56.74	32.10	5.96	45.50	49.30	74.00	-24.70	Horizontal
7236.00	53.56	36.60	6.93	45.60	51.49	74.00	-22.51	Horizontal
9648.00	52.99	38.60	8.02	46.20	53.41	74.00	-20.59	Horizontal
12060.00	*					74.00		Horizontal
14472.00	*					74.00		Horizontal
16884.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4824.00	46.83	32.10	5.96	45.50	39.39	54.00	-14.61	Vertical
7236.00	44.90	36.60	6.93	45.60	42.83	54.00	-11.17	Vertical
9648.00	43.63	38.60	8.02	46.20	44.05	54.00	-9.95	Vertical
12060.00	*					54.00		Vertical
14472.00	*					54.00		Vertical
16884.00	*					54.00		Vertical
4824.00	47.60	32.10	5.96	45.50	40.16	54.00	-13.84	Horizontal
7236.00	44.01	36.60	6.93	45.60	41.94	54.00	-12.06	Horizontal
9648.00	40.77	38.60	8.02	46.20	41.19	54.00	-12.81	Horizontal
12060.00	*					54.00		Horizontal
14472.00	*					54.00		Horizontal
16884.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT20)	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	56.71	32.10	5.96	45.50	49.27	74.00	-24.73	Vertical
7311.00	53.82	36.60	6.93	45.60	51.75	74.00	-22.25	Vertical
9748.00	50.81	38.60	8.02	46.20	51.23	74.00	-22.77	Vertical
12185.00	*					74.00		Vertical
14622.00	*					74.00		Vertical
17059.00	*					74.00		Vertical
4874.00	55.90	32.10	5.96	45.50	48.46	74.00	-25.54	Horizontal
7311.00	53.54	36.60	6.93	45.60	51.47	74.00	-22.53	Horizontal
9748.00	50.87	38.60	8.02	46.20	51.29	74.00	-22.71	Horizontal
12185.00	*					74.00		Horizontal
14622.00	*					74.00		Horizontal
17059.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	45.87	32.10	5.96	45.50	38.43	54.00	-15.57	Vertical
7311.00	42.15	36.60	6.93	45.60	40.08	54.00	-13.92	Vertical
9748.00	39.67	38.60	8.02	46.20	40.09	54.00	-13.91	Vertical
12185.00	*					54.00		Vertical
14622.00	*					54.00		Vertical
17059.00	*					54.00		Vertical
4874.00	46.41	32.10	5.96	45.50	38.97	54.00	-15.03	Horizontal
7311.00	43.03	36.60	6.93	45.60	40.96	54.00	-13.04	Horizontal
9748.00	40.21	38.60	8.02	46.20	40.63	54.00	-13.37	Horizontal
12185.00	*					54.00		Horizontal
14622.00	*					54.00		Horizontal
17059.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT20)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	55.86	32.10	5.96	45.50	48.42	74.00	-25.58	Vertical
7386.00	53.23	36.60	6.93	45.60	51.16	74.00	-22.84	Vertical
9848.00	52.42	38.60	8.02	46.20	52.84	74.00	-21.16	Vertical
12310.00	*					74.00		Vertical
14772.00	*					74.00		Vertical
17234.00	*					74.00		Vertical
4924.00	55.51	32.80	5.96	45.70	48.57	74.00	-25.43	Horizontal
7386.00	52.30	36.40	6.93	45.80	49.83	74.00	-24.17	Horizontal
9848.00	50.42	38.20	8.02	46.20	50.44	74.00	-23.56	Horizontal
12310.00	*					74.00		Horizontal
14772.00	*					74.00		Horizontal
17234.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4924.00	45.63	32.80	5.96	45.70	38.69	54.00	-15.31	Vertical
7386.00	42.01	36.40	6.93	45.80	39.54	54.00	-14.46	Vertical
9848.00	40.24	38.20	8.02	46.20	40.26	54.00	-13.74	Vertical
12310.00	*					54.00		Vertical
14772.00	*					54.00		Vertical
17234.00	*					54.00		Vertical
4924.00	45.21	32.80	5.96	45.70	38.27	54.00	-15.73	Horizontal
7386.00	42.60	36.40	6.93	45.80	40.13	54.00	-13.87	Horizontal
9848.00	39.97	38.20	8.02	46.20	39.99	54.00	-14.01	Horizontal
12310.00	*					54.00		Horizontal
14772.00	*					54.00		Horizontal
17234.00	*					54.00		Horizontal

Remark:

1 Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2 "", means this data is the too weak instrument of signal is unable to test.*

3. Emissions more than 20 dB below the limit do not need to be reported.

Test mode:	802.11n(HT40)	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4844.00	55.32	32.10	5.96	45.50	47.88	74.00	-26.12	Vertical
7266.00	52.08	36.80	6.93	45.60	50.21	74.00	-23.79	Vertical
9688.00	54.29	38.10	8.02	46.20	54.21	74.00	-19.79	Vertical
12060.00	*					74.00		Vertical
14472.00	*					74.00		Vertical
16884.00	*					74.00		Vertical
4844.00	55.76	32.10	5.96	45.50	48.32	74.00	-25.68	Horizontal
7266.00	51.67	36.80	6.93	45.60	49.80	74.00	-24.20	Horizontal
9688.00	50.97	38.10	8.02	46.20	50.89	74.00	-23.11	Horizontal
12060.00	*					74.00		Horizontal
14472.00	*					74.00		Horizontal
16884.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4844.00	45.95	32.10	5.96	45.50	38.51	54.00	-15.49	Vertical
7266.00	42.77	36.80	6.93	45.60	40.90	54.00	-13.10	Vertical
9688.00	43.26	38.10	8.02	46.20	43.18	54.00	-10.82	Vertical
12060.00	*					54.00		Vertical
14472.00	*					54.00		Vertical
16884.00	*					54.00		Vertical
4844.00	46.45	32.10	5.96	45.50	39.01	54.00	-14.99	Horizontal
7266.00	45.31	36.80	6.93	45.60	43.44	54.00	-10.56	Horizontal
9688.00	40.13	38.10	8.02	46.20	40.05	54.00	-13.95	Horizontal
12060.00	*					54.00		Horizontal
14472.00	*					54.00		Horizontal
16884.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT40)	Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	55.74	32.10	5.96	45.50	48.30	74.00	-25.70	Vertical
7311.00	54.84	36.60	6.93	45.60	52.77	74.00	-21.23	Vertical
9748.00	53.47	38.60	8.02	46.20	53.89	74.00	-20.11	Vertical
12185.00	*					74.00		Vertical
14622.00	*					74.00		Vertical
17059.00	*					74.00		Vertical
4874.00	55.30	32.10	5.96	45.50	47.86	74.00	-26.14	Horizontal
7311.00	51.70	36.60	6.93	45.60	49.63	74.00	-24.37	Horizontal
9748.00	52.62	38.60	8.02	46.20	53.04	74.00	-20.96	Horizontal
12185.00	*					74.00		Horizontal
14622.00	*					74.00		Horizontal
17059.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4874.00	45.86	32.10	5.96	45.50	38.42	54.00	-15.58	Vertical
7311.00	44.89	36.60	6.93	45.60	42.82	54.00	-11.18	Vertical
9748.00	40.55	38.60	8.02	46.20	40.97	54.00	-13.03	Vertical
12185.00	*					54.00		Vertical
14622.00	*					54.00		Vertical
17059.00	*					54.00		Vertical
4874.00	44.91	32.10	5.96	45.50	37.47	54.00	-16.53	Horizontal
7311.00	43.93	36.60	6.93	45.60	41.86	54.00	-12.14	Horizontal
9748.00	39.89	38.60	8.02	46.20	40.31	54.00	-13.69	Horizontal
12185.00	*					54.00		Horizontal
14622.00	*					54.00		Horizontal
17059.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Emissions more than 20 dB below the limit do not need to be reported.*

Test mode:	802.11n(HT40)	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4904.00	54.83	32.80	5.96	45.70	47.89	74.00	-26.11	Vertical
7356.00	55.61	36.20	6.93	45.80	52.94	74.00	-21.06	Vertical
9808.00	50.52	38.40	8.02	46.20	50.74	74.00	-23.26	Vertical
12310.00	*					74.00		Vertical
14772.00	*					74.00		Vertical
17234.00	*					74.00		Vertical
4904.00	54.07	32.80	5.96	45.70	47.13	74.00	-26.87	Horizontal
7356.00	53.29	36.20	6.93	45.80	50.62	74.00	-23.38	Horizontal
9808.00	50.05	38.40	8.02	46.20	50.27	74.00	-23.73	Horizontal
12310.00	*					74.00		Horizontal
14772.00	*					74.00		Horizontal
17234.00	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4904.00	45.92	32.80	5.96	45.70	38.98	54.00	-15.02	Vertical
7356.00	43.46	36.20	6.93	45.80	40.79	54.00	-13.21	Vertical
9808.00	41.82	38.40	8.02	46.20	42.04	54.00	-11.96	Vertical
12310.00	*					54.00		Vertical
14772.00	*					54.00		Vertical
17234.00	*					54.00		Vertical
4904.00	44.89	32.80	5.96	45.70	37.95	54.00	-16.05	Horizontal
7356.00	43.73	36.20	6.93	45.80	41.06	54.00	-12.94	Horizontal
9808.00	41.88	38.40	8.02	46.20	42.10	54.00	-11.90	Horizontal
12310.00	*					54.00		Horizontal
14772.00	*					54.00		Horizontal
17234.00	*					54.00		Horizontal

Remark:

1 Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2 "", means this data is the too weak instrument of signal is unable to test.*

3. Emissions more than 20 dB below the limit do not need to be reported.

5. Test Setup Photo

Reference to the **appendix I** for details.

6. EUT Constructional Details

Reference to the **appendix II** for details.

------End------