Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

FCC/IC 5GWLAN TEST REPORT

PRODUCT	POS System
BRAND	SUNMI
MODEL	L1584,L1585,L1586,L1591, L1592, L1593,L3571,L3572,L3573
APPLICANT	Shanghai Sunmi Technology Co.,Ltd.
FCC ID	2AH25D2S2ND
IC	22621-D2S2ND
ISSUE DATE	January 16, 2023
STANDARD(S)	FCC Part15, RSS-247 Issue 2, RSS-Gen Issue 5

Prepared by: ***Tao Lingyan***	**Reviewed by:** ***Yang Fan***	**Approved by:** ***Zhang Min***
Signature	***Signature***	***Signature***

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1. Summary of Test Report

1.1 Test Standard(s)

No.	Test Standard(s)	Title	Version
1	FCC Part15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	2020
2	RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices	2017
3	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus	2021

1.2 Reference Documents

No.	Reference	Title	Version
1	ANSI 63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
2	KDB 789033	Information Infrastructure (U-NII) Devices - Part 15, Subpart E	2017
3	KDB 905462	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION	2016

1.3 Summary of Test Results

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Output Power	15.407(a)	RSS-247 6.2	Pass
Power Spectral Density	15.407(a)	RSS-247 6.2	Pass
99% Occupied Bandwidth	N/A	RSS-Gen 6.7	Pass
-26dB Occupied Bandwidth	15. 407(a)	RSS-247 6.2	Pass
Band edge compliance	15.407(b)	RSS-247 6.2	Pass
Transmitter spurious emissions radiated	15.407(b)	RSS-247 6.2	Pass
Spurious emissions radiated < 30 MHz	15.209 & 15.407(b)	RSS-247 6.2 RSS-Gen 8.9,8.10	Pass
Spurious emissions conducted < 30 MHz	15.407(b)	RSS-247 6.2	Pass
Frequency Stability	15.407(g)	RSS-Gen 8.11	Pass
Transmit Power Control	15.407(h)	RSS-247 6.2	N/A
AC Powerline Conducted Emission	15.207	RSS-Gen 8.8	Pass
NOTE: The L1584,L1585,L1586,L1591, L1592, L1593,L3571,L3572,L3573 manufactured by Shanghai Sunmi			

Technology Co.,Ltd. is a new products for testing. Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3. Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 1 of this test report.

a. All the test data for each data were verified, but only the worst case was reported.

b.The DC and low frequency voltages' measurement uncertainty is ±2%.

1.4 Data Provided by Applicant

No.	Item(s)	Data
1	Antenna gain of EUT	0.36 dBi
Note: The data of 1.4 is provided by the customer may affect the validity of the test results in this report, and the impact and consequences of this shall be undertaken by the customer.		

2. General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4，No. 766，Jingang Road，Pudong，Shanghai，China
Telephone	021-68866880
FCC Registration No.	958356
FCC Designation No.	CN1177

2.2 Laboratory Environmental Requirements

Temperature	15℃~35℃
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	101kPa

2.3 Project Information

Project Manager	Gao Hongning
Test Date	June 8, 2022 to January 16, 2023

3. General Information of The Customer

3.1 Applicant

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505,No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

3.2 Manufacturer

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505,No.388,Song Hu Road,Yang Pu District,Shanghai,China

4. General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product Name	POS System
Model name	L1584,L1585,L1586,L1591, L1592, L1593,L3571,L3572,L3573
Date of Receipt	N01: May 29,2022 N06: June 09,2022
EUT ID*	N01/N06
SN/IMEI	DD23D05N40036/ DD19D25U40089
Supported Radio Technology and Bands	BT 4.2 BR/ EDR, BLE WLAN 802.11 b,g,n WLAN 802.11 a,n,ac
Hardware Version	RK3568_MB_V2.0
Software Version	3.0.0
FCC ID	2AH25D2S2ND
IC ID	22621-D2S2ND
NOTE：EUT ID is the internal identification code of the laboratory.	

4.2 Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
AE1	RF Cable	N/A	N/A

4.3 Additional Information

WLAN Frequency	UNII 1: 5150MHz-5250MHz
Occupied Channel Bandwidth	20 MHz: 802.11 a/n/ac 40 MHz: 802.11 n/ac 20 MHz: 802.11 n/ac
WLAN type of modulation	OFDM

5. Test Configuration Information

5.1 Laboratory Environmental Conditions

5.1.1 Permanent Facilities

Relative Humidity	Min. = 45 %, Max. = 55 %		
Atmospheric Pressure	101kPa		
Temperature	Normal	Minimum	Maximum
	25℃	-10℃	55℃
Working Voltage of EUT	Normal	Minimum	Maximum
	24V	22.8V	25.2V

5.2 Test Equipments Utilized

5.2.1 Conducted Test System

No.	Name	Model	S/N	Manufacturer	Cal. Date	Cal. Interval
1	Programmable Power Supply	Keithley 2303	4039070	Starpoint	May 10, 2021	1.5years
					July 12, 2022	1 Year
2	Vector Signal Generator	SMBV100A	257904	R&S	February 21, 2022	1 year
3	Temperature box	B-TF-107C	BTF107C-201804107	Boyi	May 10, 2021	1.5 years
					June 30, 2022	1 Year
4	Spectrum Analyzer	FSQ40	200063	R&S	November 02, 2021	1 year
					October 19,2022	1 year
5	USB Wideband Power Senser	U2021XA	MY56410009	KEYSGHT	February 21, 2022	1 year
6	Simultaneous Sampling DQA	U2531A	TW56183514	Agilent	March 02, 2022	1 year
7	Vector Signal Generator	SMU200A	104684	R&S	May 10, 2021	1.5 years
8	Wireless communication comprehensive tester	CMW270	100919	R&S	May 10, 2021	1.5 years
					August 22, 2022	1 Year

9	Eagle Test Software	Eagle V3.3	N/A	ECIT	N/A	N/A
10	Talent Microwave Band Rejection Filter	Filter	191016001	N/A	N/A	N/A

5.2.2 Radiated Emission Test System

No.	Name	Model	S/N	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	October 17,2022	1Year
					May 10,2021	1.5Years
2	Universal Radio Communication Tester	CMW500	104178	R&S	October 17,2022	1Year
					May 10,2021	1.5Years
3	EMI Test Receiver	ESU40	100307	R&S	February 23, 2022	1 Year
4	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	March 11, 2022	1 Year
5	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	March 9, 2022	2 Years
6	2-Line V-Network	ENV216	101380	R&S	February 21, 2022	1 Year
7	EMI Test Software	EMC32 V9.15.00	N/A	R&S	N/A	N/A

5.2.3 Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω
Temperature	Min. = 15 ℃, Max. = 35 ℃

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ

Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (9.8 meters×6.7 meters×6.7 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz

5.3 Measurement Uncertainty

Item(s)	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2402MHz-2480MHz	95%	0.544dB
Peak Power Spectral Density	2402MHz-2480MHz	95%	0.544dB
6dB Bandwidth	2402MHz-2480MHz	95%	62.04Hz
Frequency Band Edges-Conducted	2390MHz-2488.5MHz	95%	0.544dB
Conducted Emission	30MHz-2GHz	95%	0.90dB
Conducted Emission	2GHz-3.6GHz	95%	0.88dB
Conducted Emission	3.6GHz-8GHz	95%	0.96dB
Conducted Emission	8GHz-20GHz	95%	0.94dB
Conducted Emission	20GHz-22GHz	95%	0.88dB
Conducted Emission	22GHz-26GHz	95%	0.86dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	5.20dB

Item(s)	Range	Confidence Level	Calculated Uncertainty
AC Power line Conducted Emission	0.15MHz-30MHz	95%	3.66 dB

6. Measurement Results

6.1. Maximum Output Power-Conducted

6.1.1. Measurement Limit and Method

Standard	Limit (dBm)	Limit EIRP(dBm)
FCC 47 CFR Part 15.407(a)(1)(iv)	23 or 10+10 log10B	<26.99
RSS-247 6.2.1.1	23 or 10+10 log10B	<26.99

6.1.2. Test Procedure

The measurement method SA-1 is made according to KDB 789033

Set the spectrum analyzer in the following:

Detector: RMS.

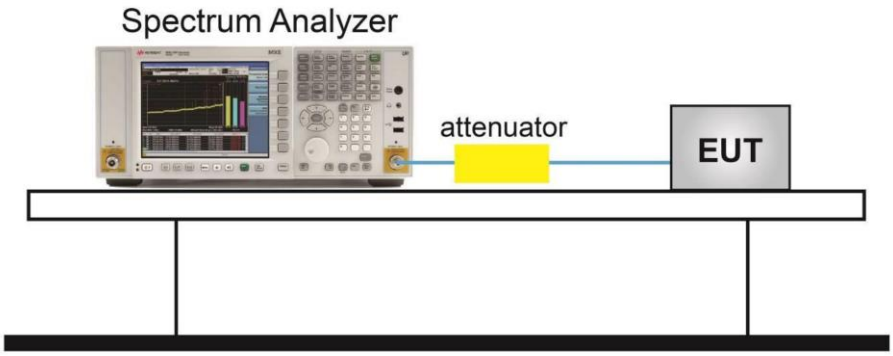
RBW=1MHz.

VBW=3MHz.

Sweep time = AUTO.

Span: 30MHz (for 20MHz); 60MHz (for 40MHz)； 120MHz (for 80MHz).

6.1.3. Test setup



Measurement Results

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Mode	Channel	index	Conducted (dBm)	E.I.R.P (dBm)	Duty cycle factor (dB)
802.11a	5180	53	11.85	12.21	0.24
	5200	53	12.00	12.36	0.24
	5240	53	12.05	12.41	0.24
802.11n(20MHz)	5180	53	11.85	12.21	0.32
	5200	53	12.03	12.39	0.32
	5240	53	12.09	12.45	0.32
802.11n(40MHz)	5190	44	12.31	12.67	0.41
	5230	53	11.22	11.58	0.41
802.11ac	5180	53	11.31	11.67	0.22
	5200	53	11.54	11.9	0.22
	5240	53	11.63	11.99	0.22
802.11ac(40)	5190	44	12.18	12.54	0.57
	5230	53	12.18	12.54	0.57
802.11ac(80)	5210	41	12.91	13.27	1.06

TEST PLOTS:

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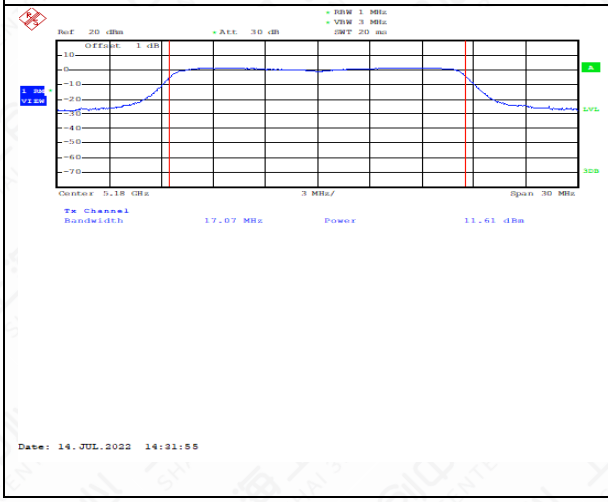
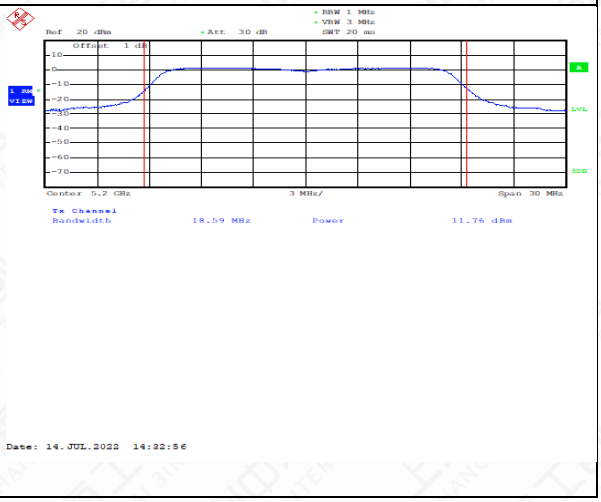
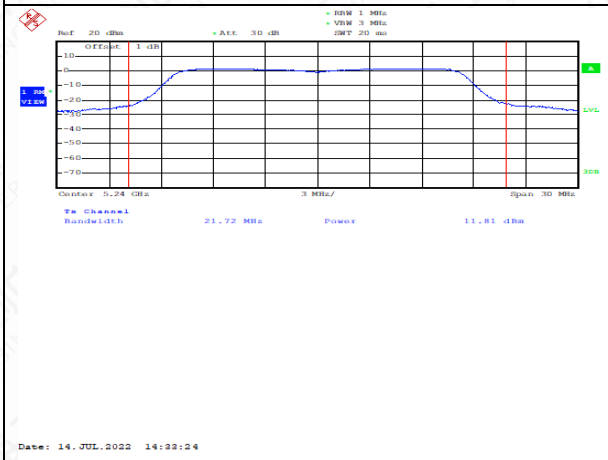
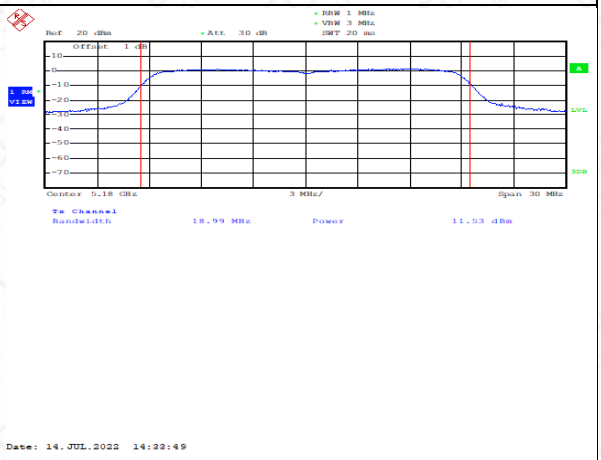
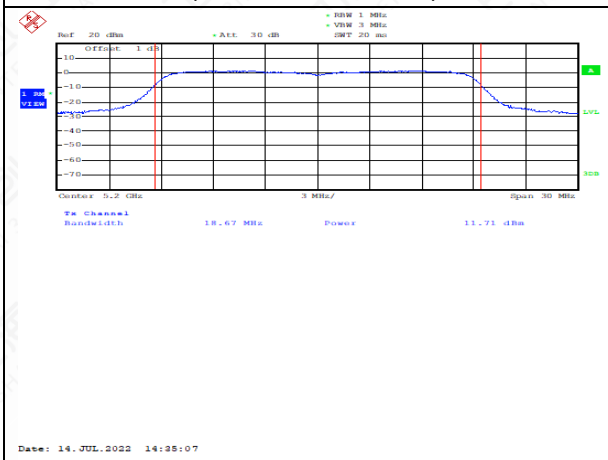
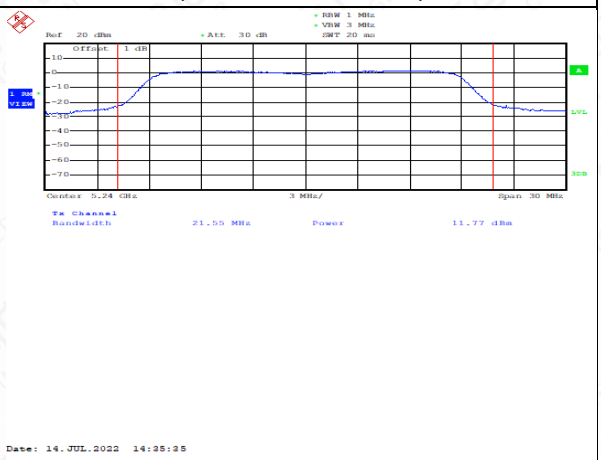
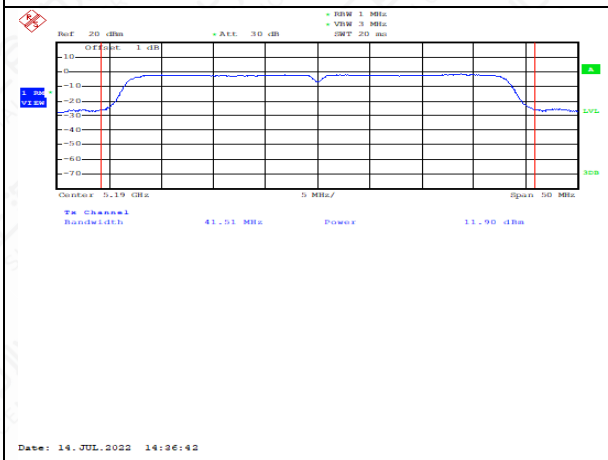
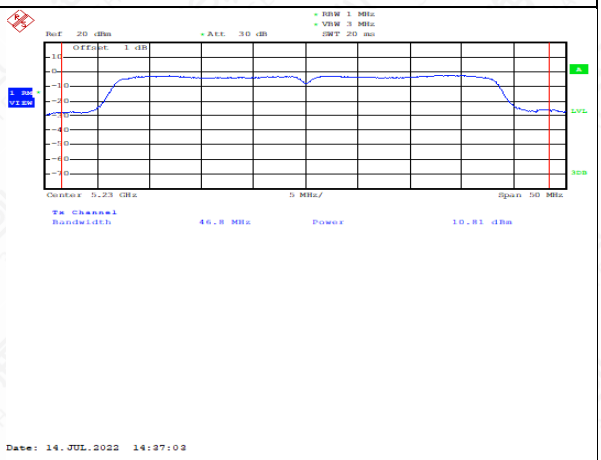
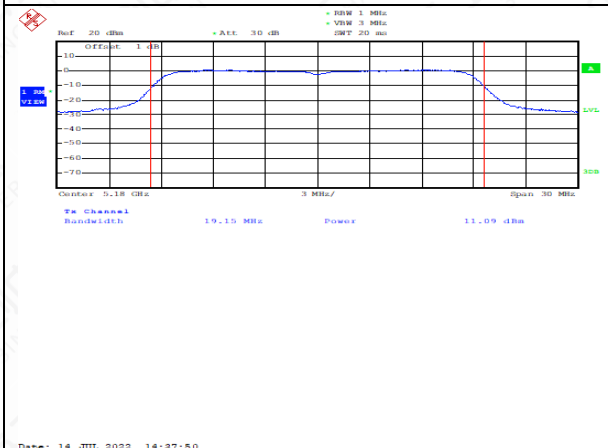
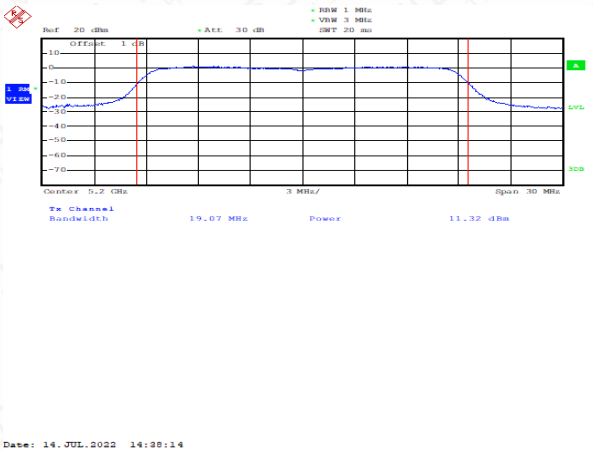
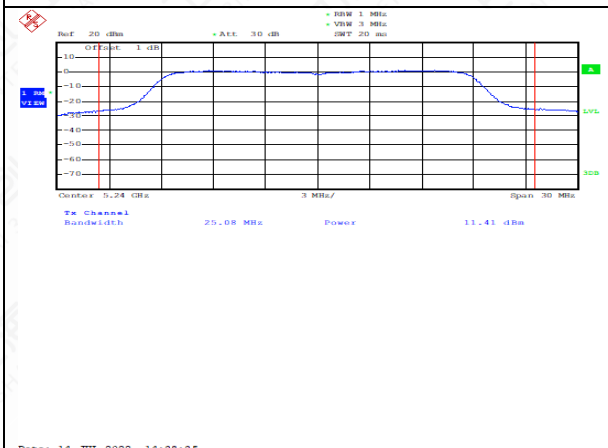
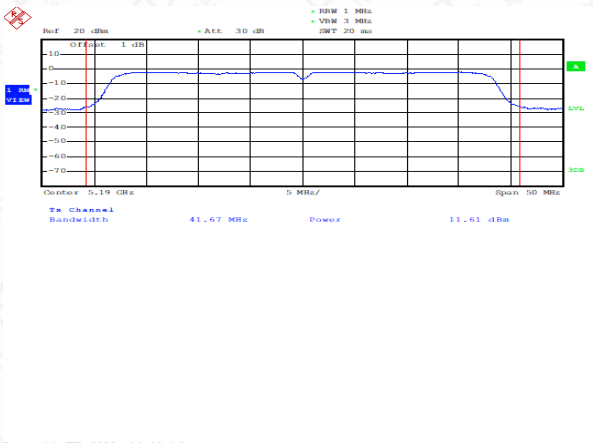
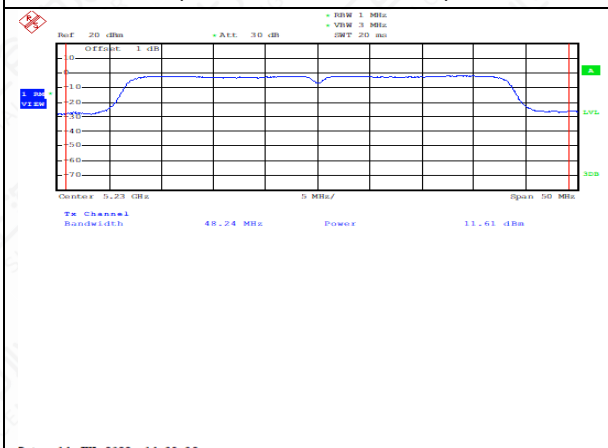
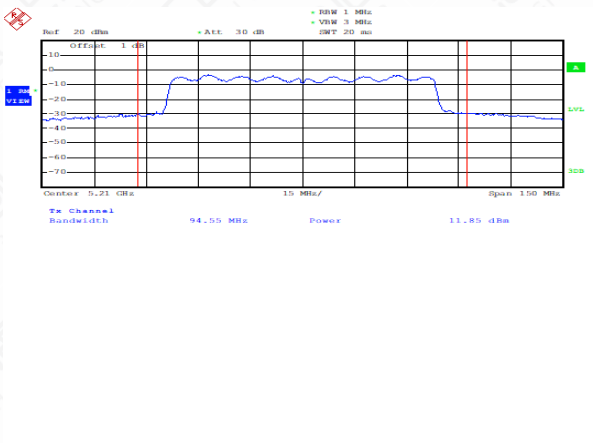
Output Power-Conducted (802.11a, Ch36)	Output Power-Conducted (802.11ac-VHT80, ch42)
	

Output Power-Conducted (802.11a, Ch48)	Output Power-Conducted (802.11n-HT20, Ch36)
	
Output Power-Conducted (802.11n-HT20, Ch40)	Output Power-Conducted (802.11n-HT20, Ch48)
	
Output Power-Conducted (802.11n-HT40, Ch38)	Output Power-Conducted (802.11n-HT40, Ch46)
	

Output Power-Conducted (802.11ac-VHT20, Ch36)	Output Power-Conducted (802.11ac-VHT20, Ch40)
	
Output Power-Conducted (802.11ac-VHT20, Ch48)	Output Power-Conducted (802.11ac-VHT40, Ch38)
	
Output Power-Conducted (802.11ac-VHT40, Ch46)	Output Power-Conducted (802.11ac-VHT80, Ch42)
	

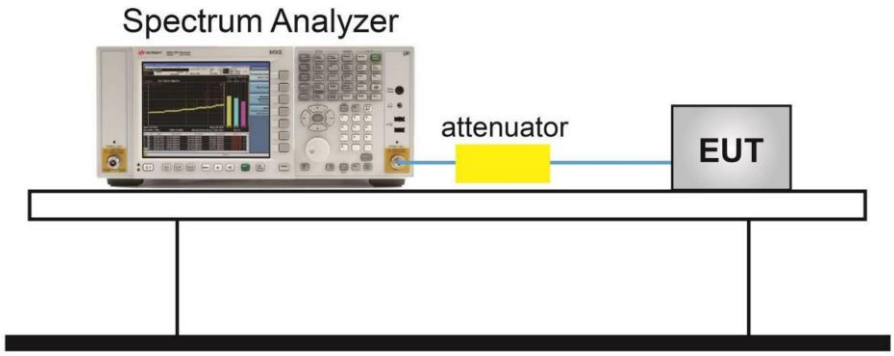
Note: Using the ADB platform software set by default by the customer.

6.2. Peak Power Spectral Density

6.2.1. Measurement Limit

Standard	Limit (dBm)	EIRP Limit (dBm/MHz)
FCC 47 CFR Part 15.407(a)(1)(iv)	≤11	≤11
RSS-247 6.2.1.1	≤11	≤10

6.2.2. Test setup



The output power measurement method SA-1 is made according to KDB 789033

6.2.3. Measurement Results

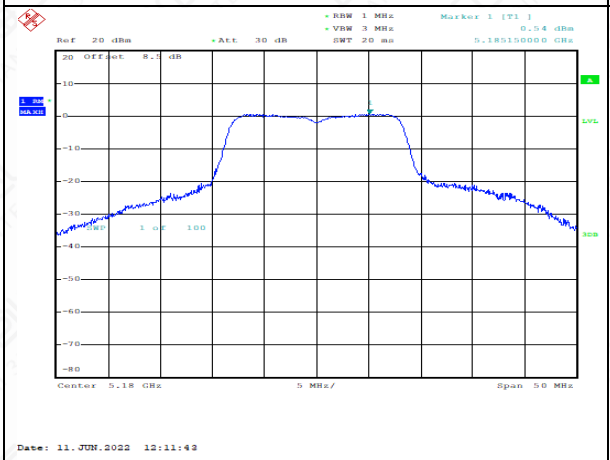
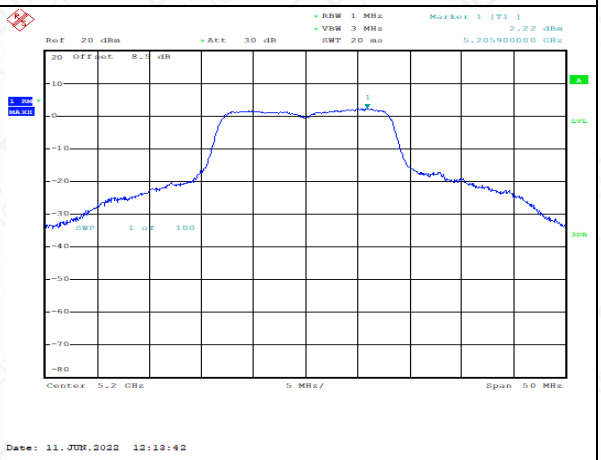
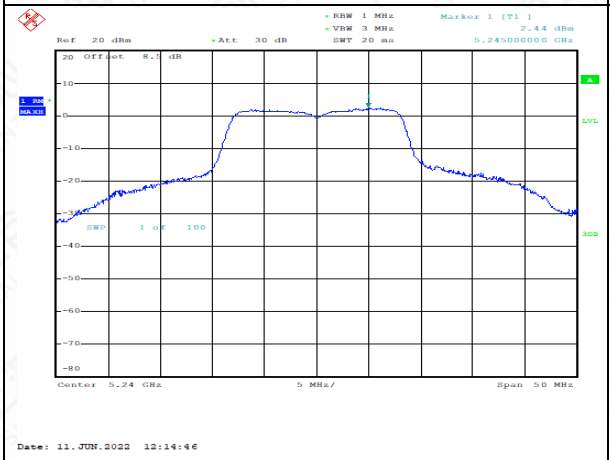
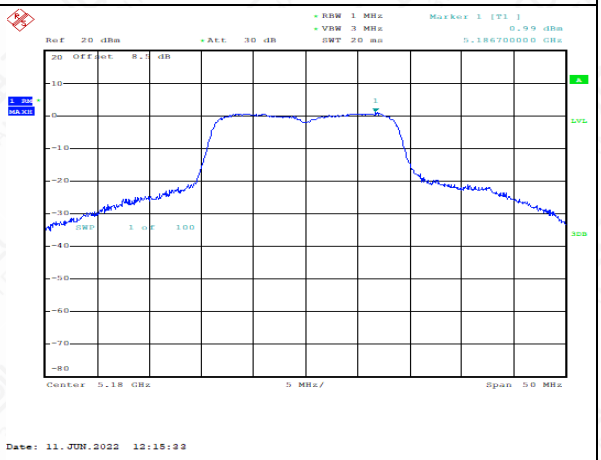
U-NII-1

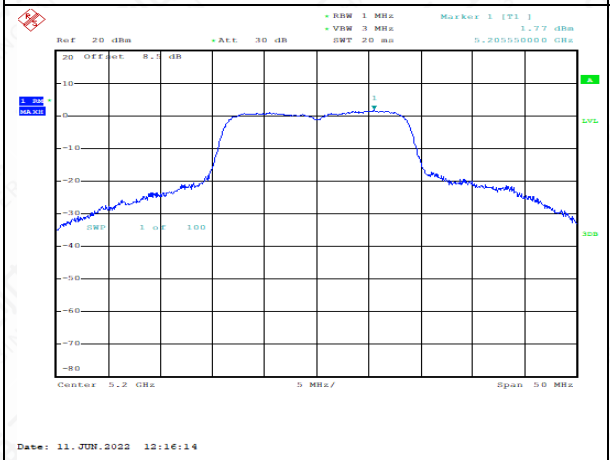
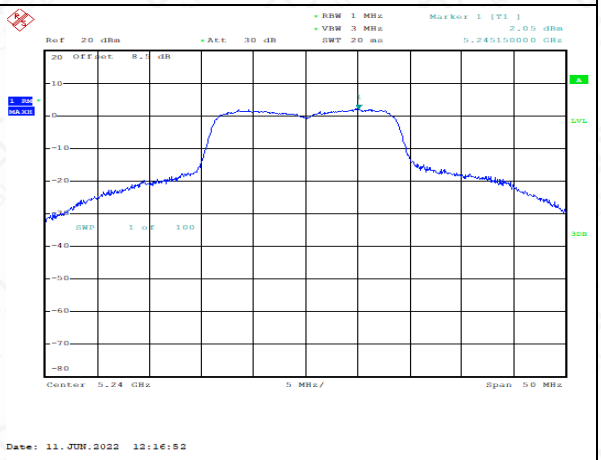
Mode	Channel	Duty Cycle Factor (dB)	Power Spectral Density (dBm/MHz)	E.I.R.P (dBm)	Conclusion
802.11a	5180	0.12	0.885	1.245	P
	5200	0.12	2.565	2.925	P
	5240	0.12	2.784	3.144	P
802.11n HT20	5180	0.14	1.172	1.532	P
	5200	0.14	1.949	2.309	P
	5240	0.14	2.226	2.586	P
802.11n HT40	5190	0.26	-5.121	-4.761	P
	5230	0.26	-4.821	-4.461	P
802.11ac VHT20	5180	0.14	0.790	1.15	P
	5200	0.14	1.535	1.895	P

	5240	0.14	2.426	2.786	P
802.11ac VHT40	5190	0.26	-5.466	-5.106	P
	5230	0.26	-5.424	-5.064	P
802.11ac VHT80	5210	0.56	-7.044	-6.684	P

Note: EIRP= Power Spectral Density(dBm/MHz)+Antenna gain(dBi)

U-NII-1:

Power Spectral Density(dBm/MHz) (802.11a, 5180MHz)	Power Spectral Density(dBm/MHz) (802.11a, 5200MHz)
	
Power Spectral Density(dBm/MHz) (802.11a, 5240MHz)	Power Spectral Density(dBm/MHz) (802.11n-HT20), 5180MHz)
	

Power Spectral Density(dBm/MHz) (802.11n-HT20), 5200MHz)	Power Spectral Density(dBm/MHz) (802.11n-HT20), 5240MHz)
	
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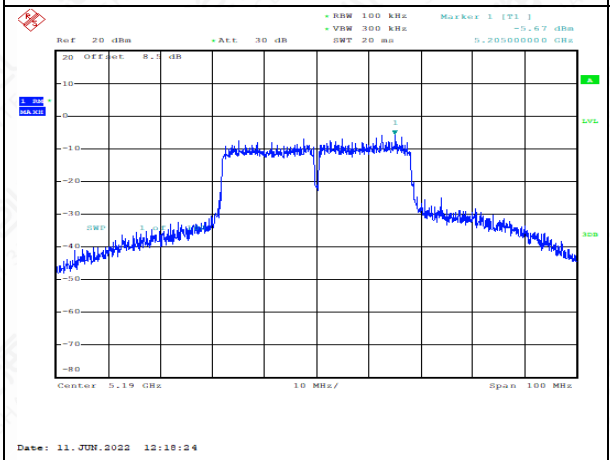
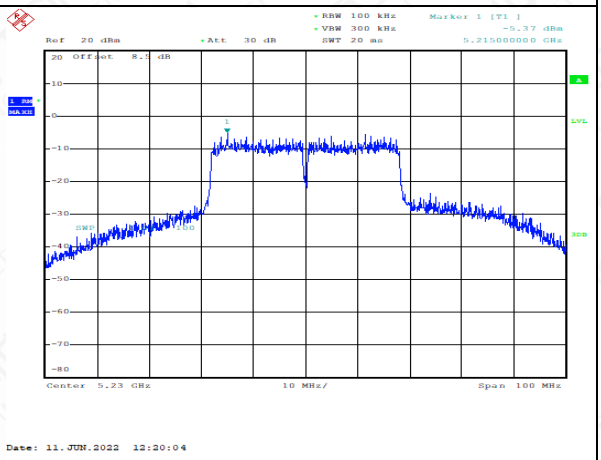
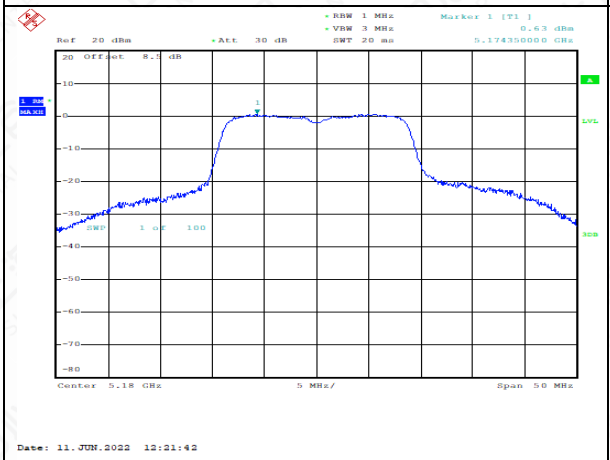
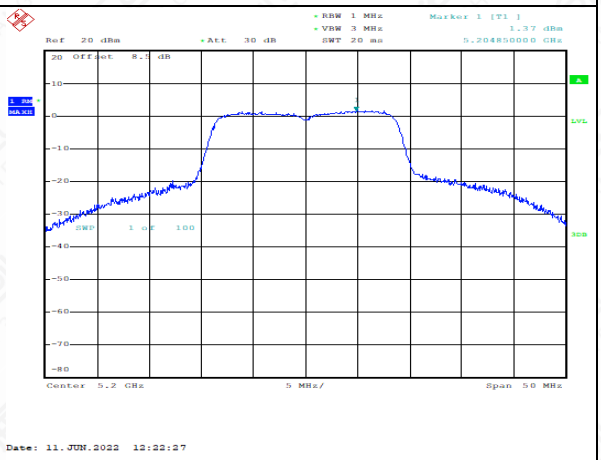
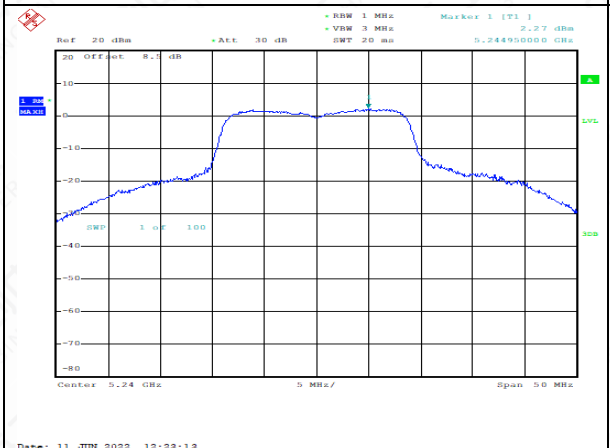
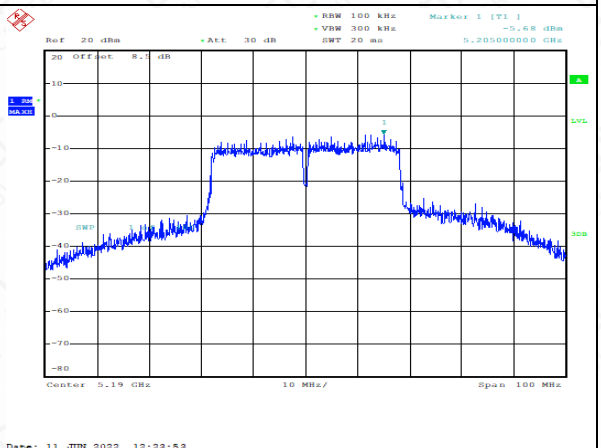
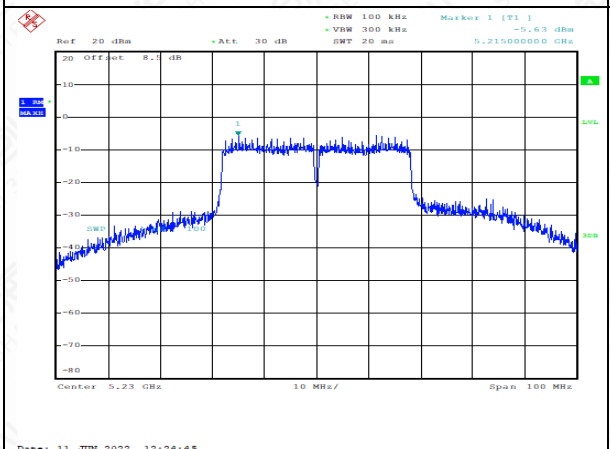
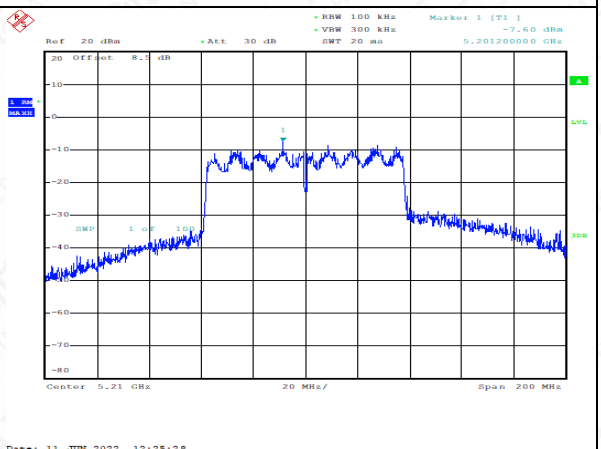
	
Power Spectral Density(dBm/MHz) (802.11ac-VHT20), 5180MHz)	Power Spectral Density(dBm/MHz) (802.11ac-VHT20), 5200MHz)
	

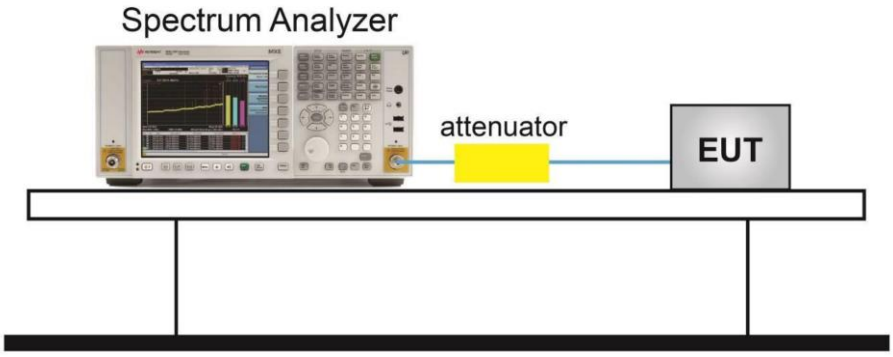
Power Spectral Density(dBm/MHz) (802.11ac-VHT20), 5240MHz)	Power Spectral Density(dBm/MHz) (802.11ac-VHT40), 5190MHz)
	
Power Spectral Density(dBm/MHz) (802.11ac-VHT40), 5230MHz)	Power Spectral Density(dBm/MHz) (802.11ac-VHT80), 5210MHz)
	

6.3. Occupied 26dB Bandwidth(conducted)

6.3.1 Measurement Limt

Standard	Limit(MHz)
FCC 47 CFR Part 15.407(a)	N/A
RSS-247 6.2	N/A

6.3.2 Test Setup



The measurement is made according to KDB 789033

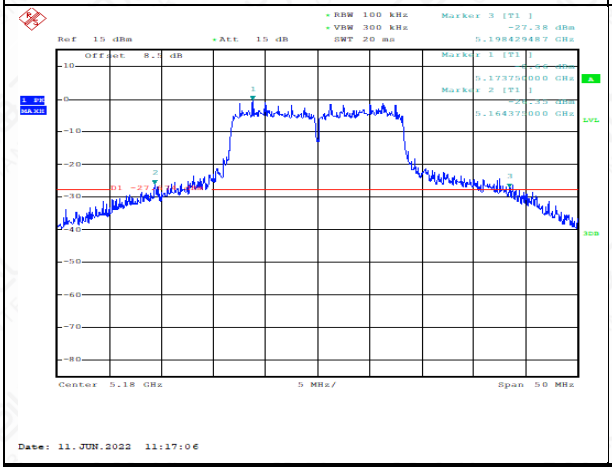
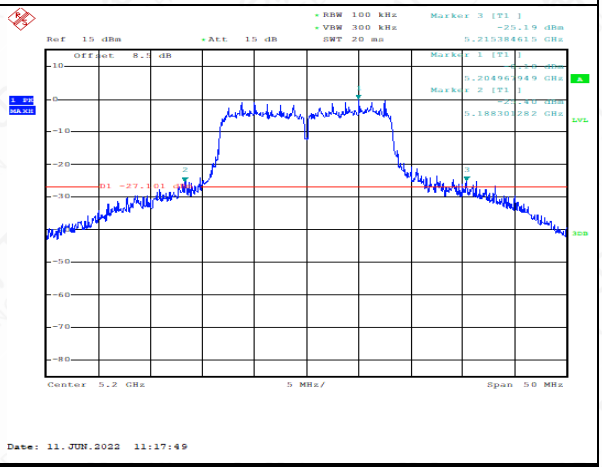
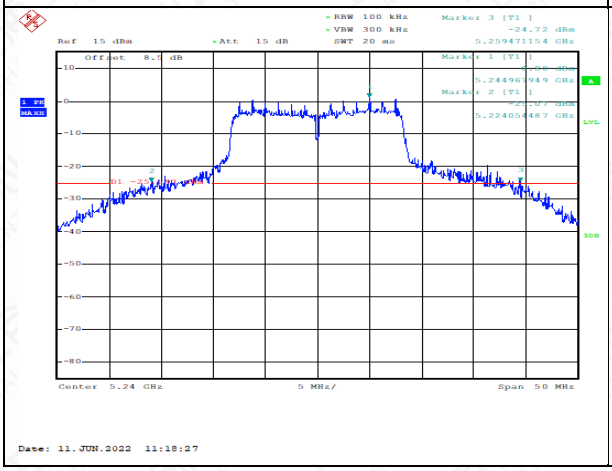
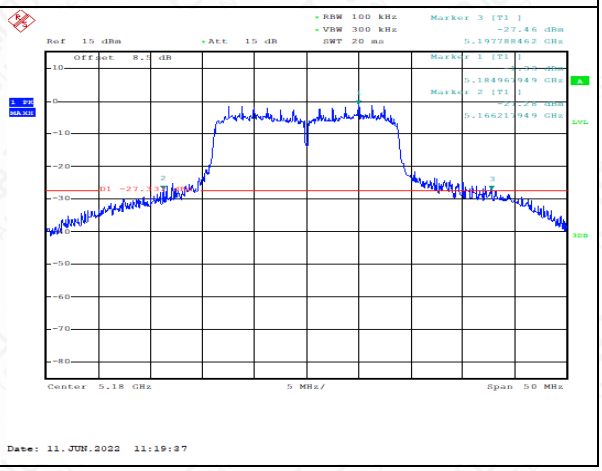
6.3.3 Measurement Results

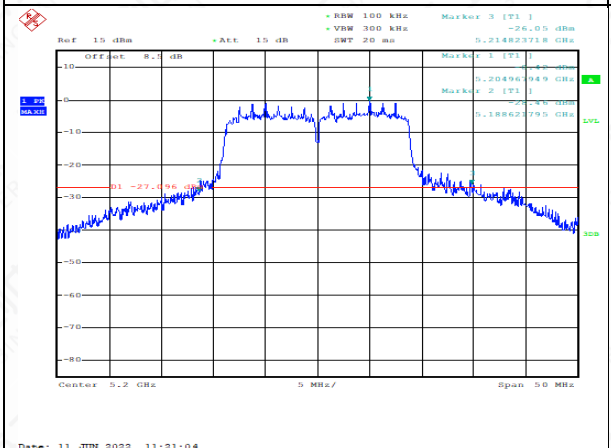
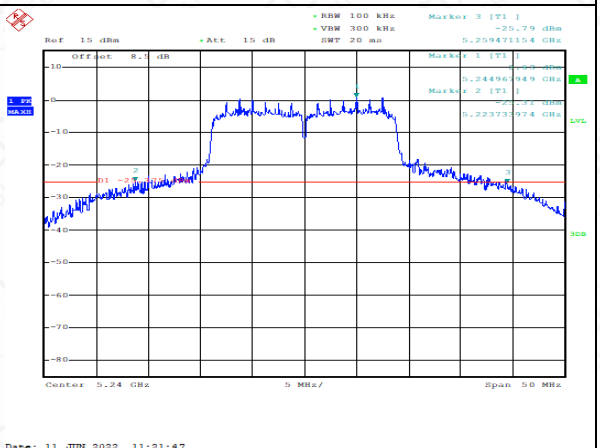
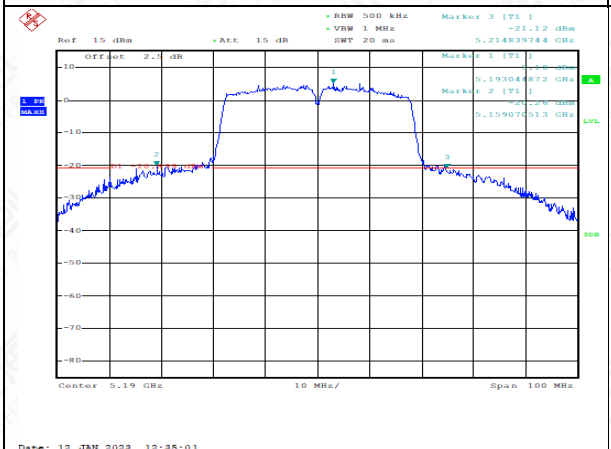
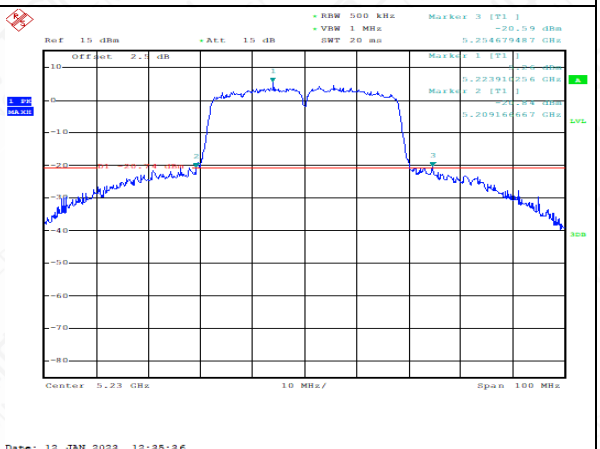
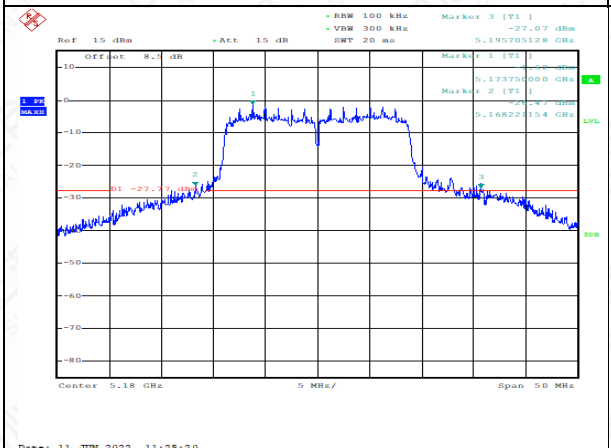
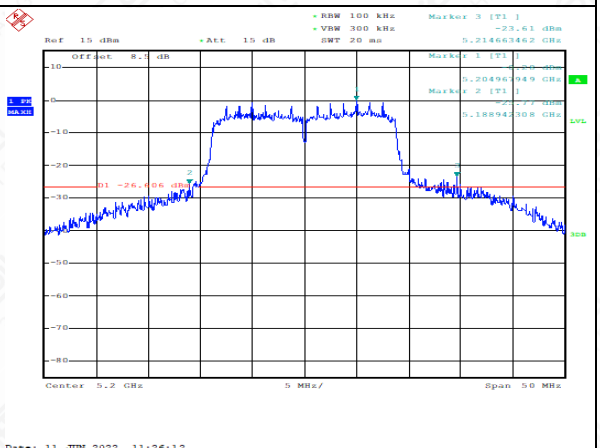
U-NII-1:

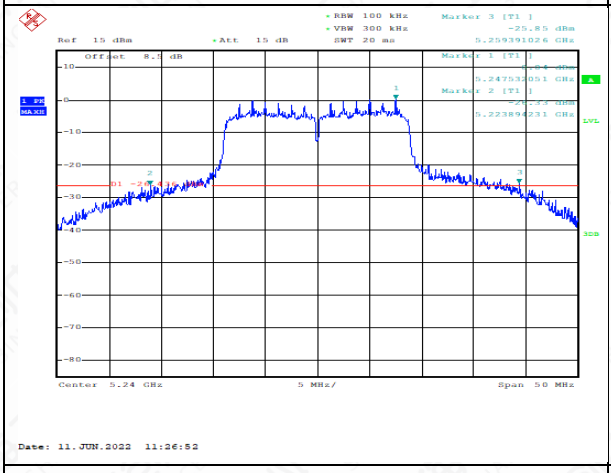
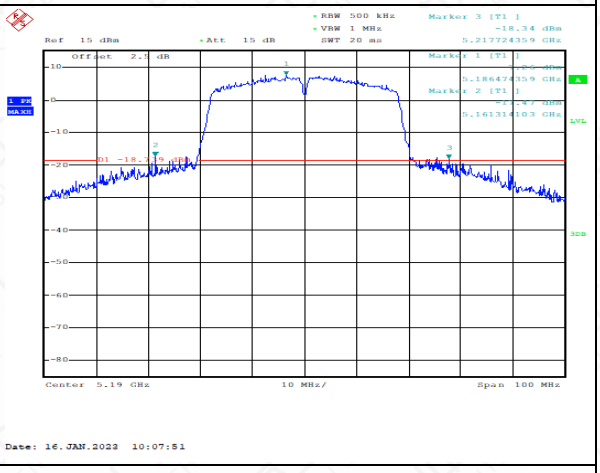
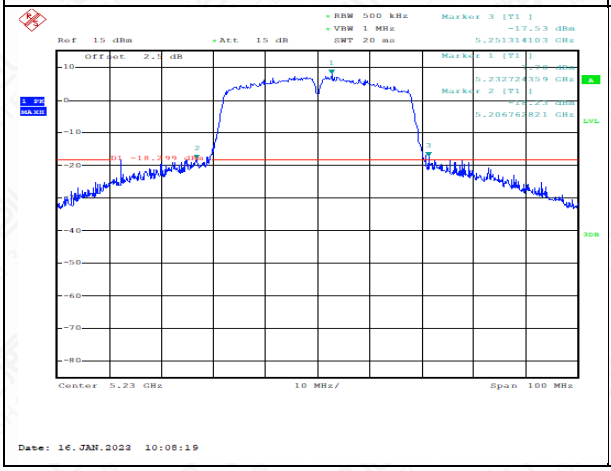
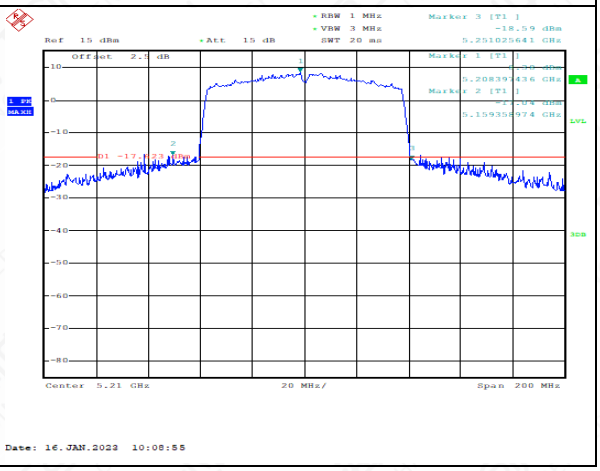
Mode	Channel	Occupied 26dB Bandwidth (MHz)	Conclusion
802.11a	5180 MHz	34.05	P
	5200 MHz	27.08	P
	5240 MHz	35.42	P
802.11n HT20	5180 MHz	31.57	P
	5200 MHz	26.20	P
	5240 MHz	35.74	P
802.11n HT40	5190 MHz	44.87	P
	5230 MHz	49.36	P
802.11ac HT20	5180 MHz	27.48	P
	5200 MHz	25.72	P
	5240MHZ	35.50	P

802.11ac HT40	5190 MHz	56.41	P
	5230 MHz	44.55	P
802.11ac HT80	5210 MHz	91.67	P

U-NII-1:

Occupied 26dB Bandwidth (MHz) (802.11a, 5180MHz)	Occupied 26dB Bandwidth (MHz) (802.11a, 5200MHz)
	
Occupied 26dB Bandwidth (MHz) (802.11a, 5240MHz)	Occupied 26dB Bandwidth (MHz) (802.11n-HT20, 5180MHz)
	

Occupied 26dB Bandwidth (MHz) (802.11n-HT20, 5200MHz)	Occupied 26dB Bandwidth (MHz) (802.11n-HT20, 5240MHz)
	
Occupied 26dB Bandwidth (MHz) (802.11n-HT40, 5190MHz)	Occupied 26dB Bandwidth (MHz) (802.11n-HT40, 5230MHz)
	
Occupied 26dB Bandwidth (MHz) (802.11ac-VHT20, 5180MHz)	Occupied 26dB Bandwidth (MHz) (802.11ac-VHT20, 5200MHz)
	

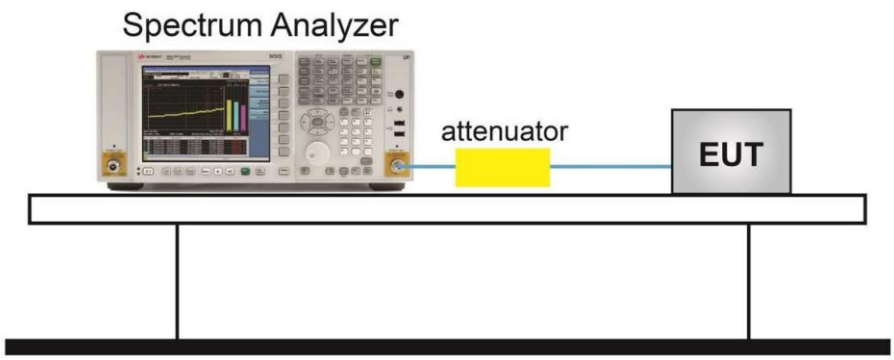
Occupied 26dB Bandwidth (MHz) (802.11ac-VHT20, 5240MHz)	Occupied 26dB Bandwidth (MHz) (802.11ac-VHT40, 5190MHz)
	
Occupied 26dB Bandwidth (MHz) (802.11ac-VHT40, 5230MHz)	Occupied 26dB Bandwidth (MHz) (802.11ac-VHT80, 5210MHz)
	

6.4. 99% Occupied Bandwidth(conducted)

6.4.1 Measurement Limit

Standard	Limit(MHz)
RSS-Gen 6.7	N/A

6.4.2 Test Setup

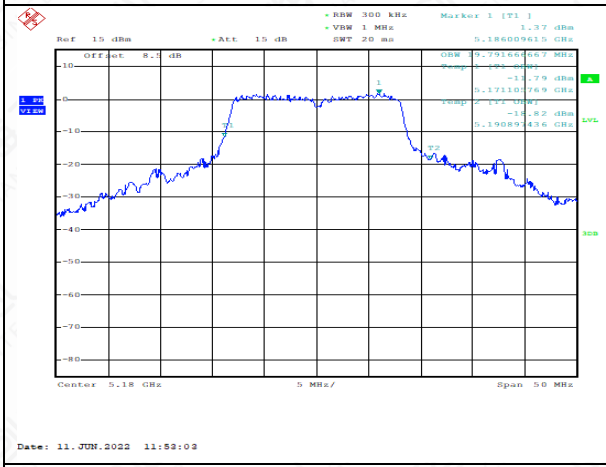
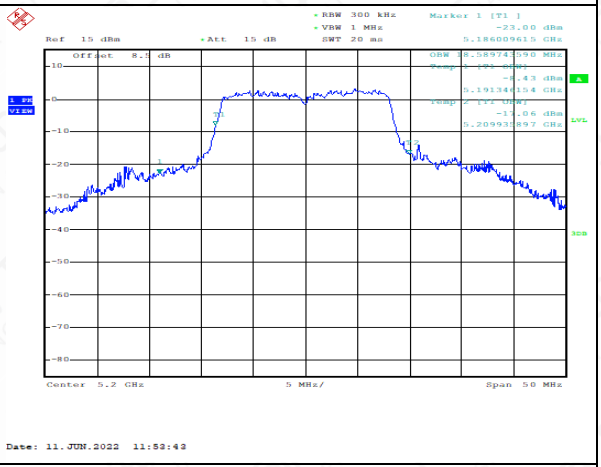
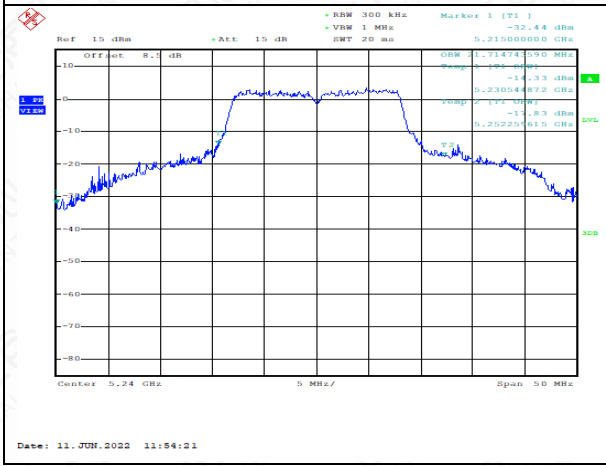
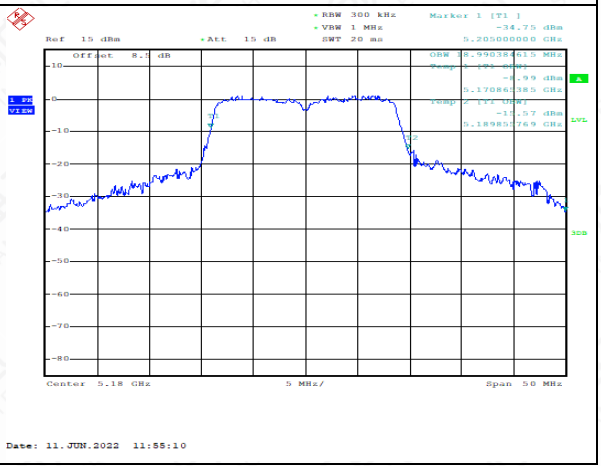


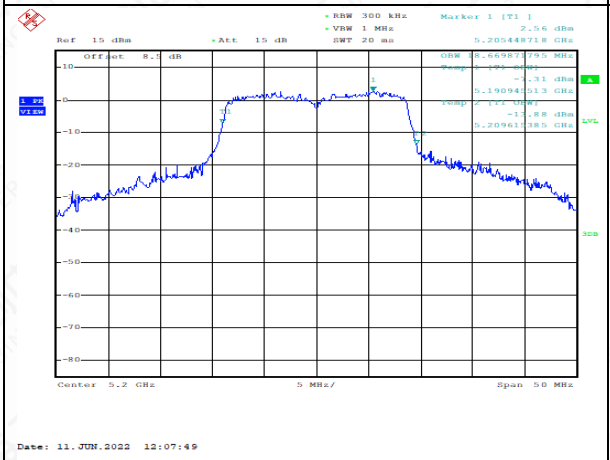
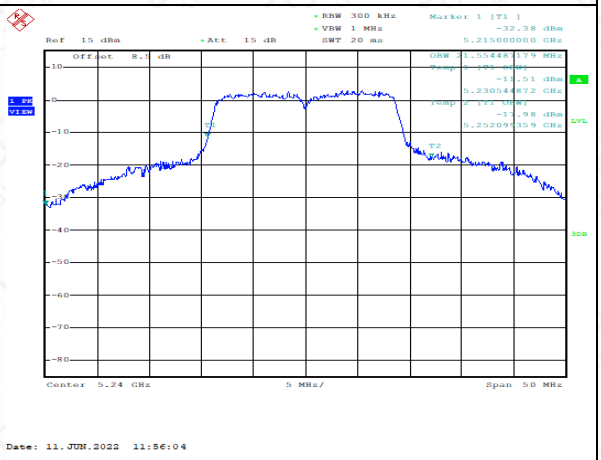
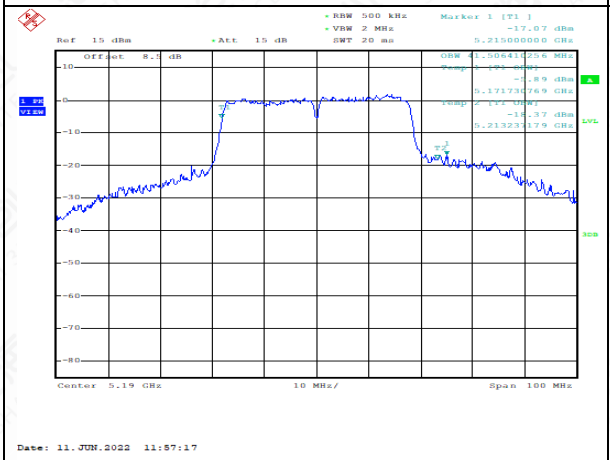
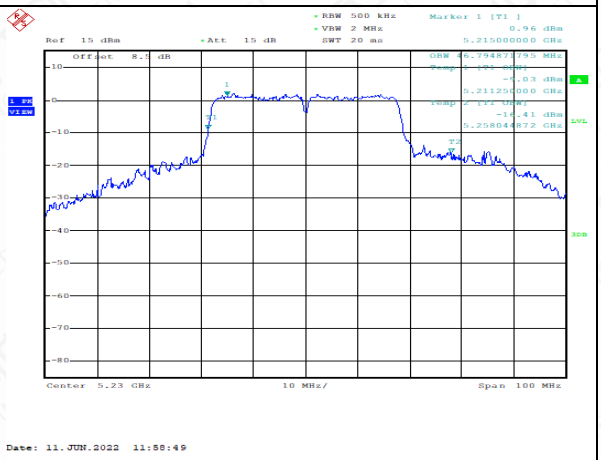
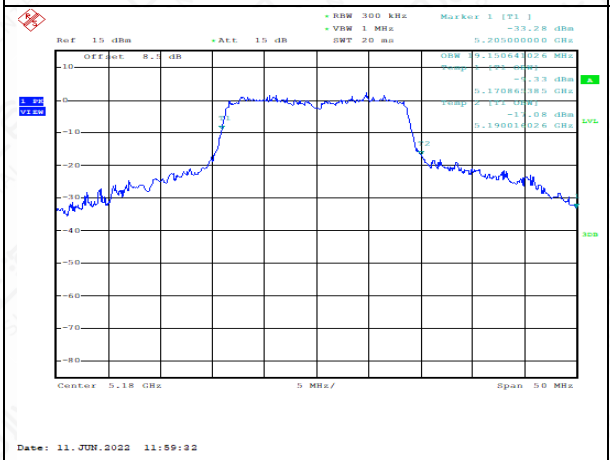
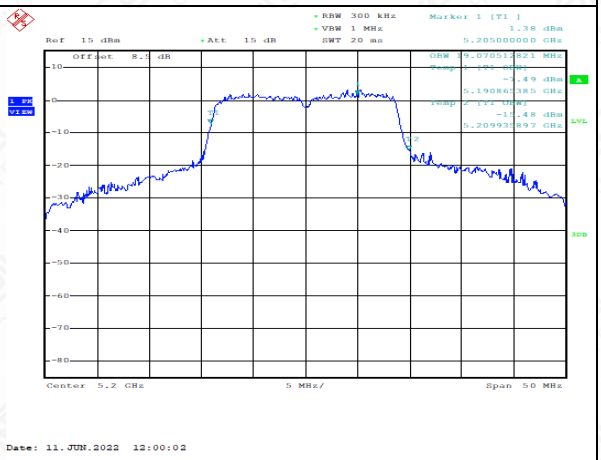
6.4.3 The measurement is made according to KDB 789033

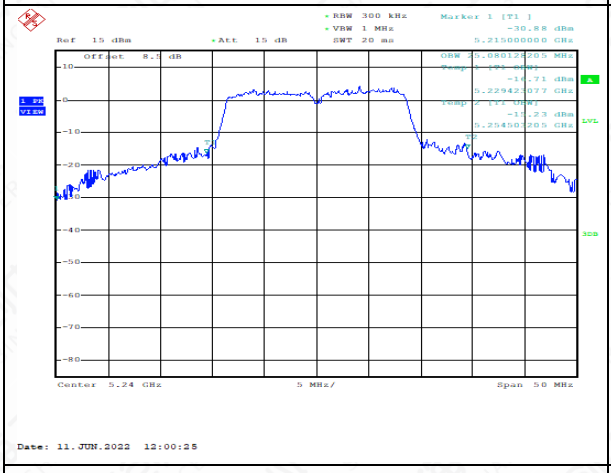
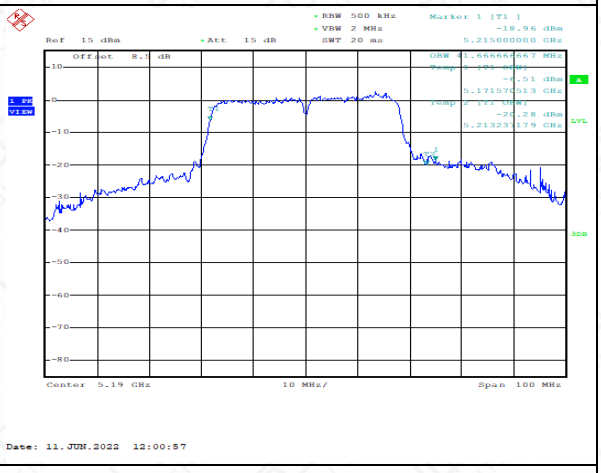
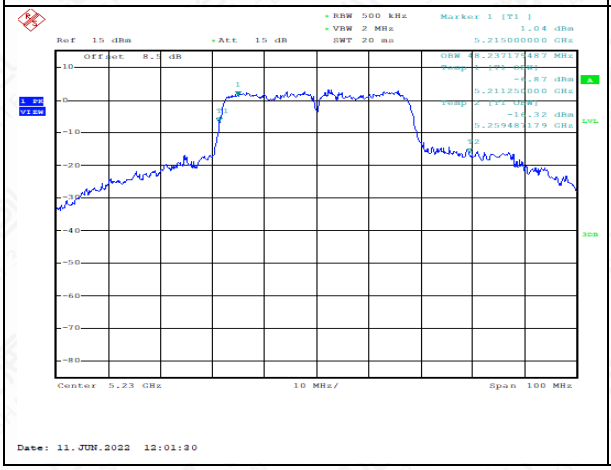
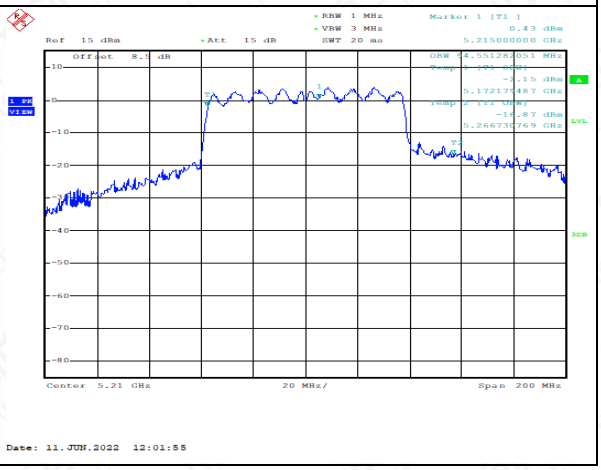
U-NII-1:

Mode	Channel	99% Occupied Bandwidth (MHz)	Conclusion
802.11a	5180 MHz	19.792	P
	5200 MHz	18.590	P
	5240 MHz	21.715	P
802.11n HT20	5180 MHz	18.990	P
	5200 MHz	18.670	P
	5240 MHz	21.554	P
802.11n HT40	5190 MHz	41.506	P
	5230 MHz	46.795	P
802.11ac HT20	5180 MHz	19.151	P
	5200 MHz	19.071	P
	5240MHZ	25.080	P

802.11ac HT40	5190 MHz	41.667	P
	5230 MHz	48.237	P
802.11ac HT80	5210 MHz	94.551	P

99% Occupied Bandwidth (MHz) (802.11a, 5180MHz)	99% Occupied Bandwidth (MHz) (802.11a, 5200MHz)
	
99% Occupied Bandwidth (MHz) (802.11a, 5240MHz)	99% Occupied Bandwidth (MHz) (802.11n-HT20), 5180MHz)
	

99% Occupied Bandwidth (MHz) (802.11n-HT20), 5200MHz)	99% Occupied Bandwidth (MHz) (802.11n-HT20), 5240MHz)
	
99% Occupied Bandwidth (MHz) (802.11n-HT40), 5190MHz)	99% Occupied Bandwidth (MHz) (802.11n-HT40), 5230MHz)
	
99% Occupied Bandwidth (MHz) (802.11ac-VHT20), 5180MHz)	99% Occupied Bandwidth (MHz) (802.11ac-VHT20), 5200MHz)
	

99% Occupied Bandwidth (MHz) (802.11ac-VHT20), 5240MHz)	99% Occupied Bandwidth (MHz) (802.11ac-VHT40), 5190MHz)
	
99% Occupied Bandwidth (MHz) (802.11ac-VHT40), 5230MHz)	99% Occupied Bandwidth (MHz) (802.11ac-VHT80), 5210MHz)
	

6.5. Band Edges Compliance

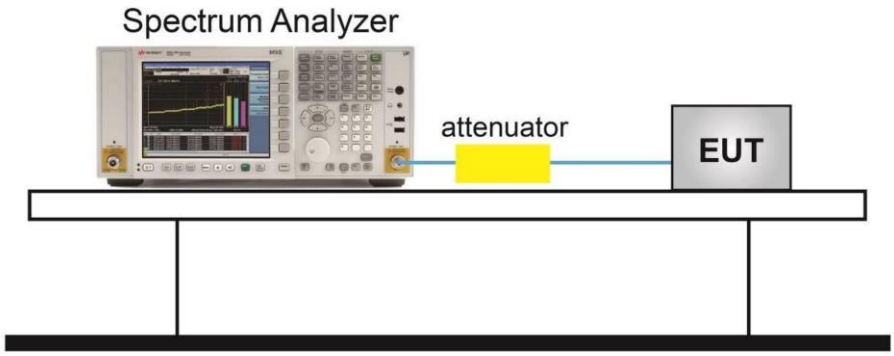
6.5.1 Band Edges – conducted

Measurement Limit:

Standard	Limit(dBm/MHz)
FCC 47 CFR Part 15.407(b)(1)	< -27
RSS-247 6.2.1.2	< -27

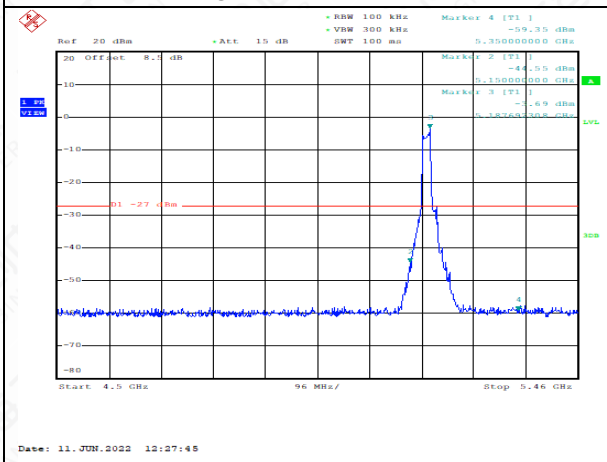
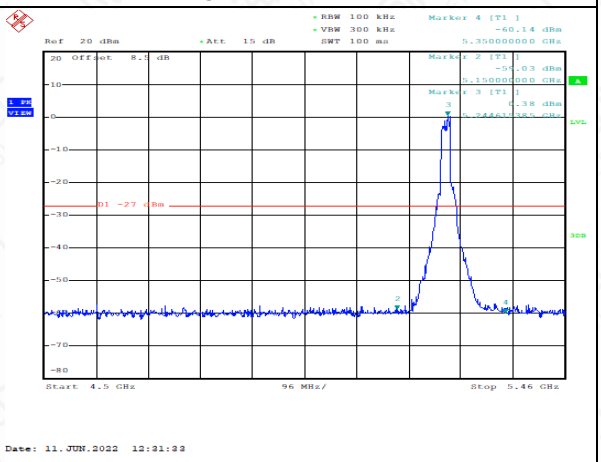
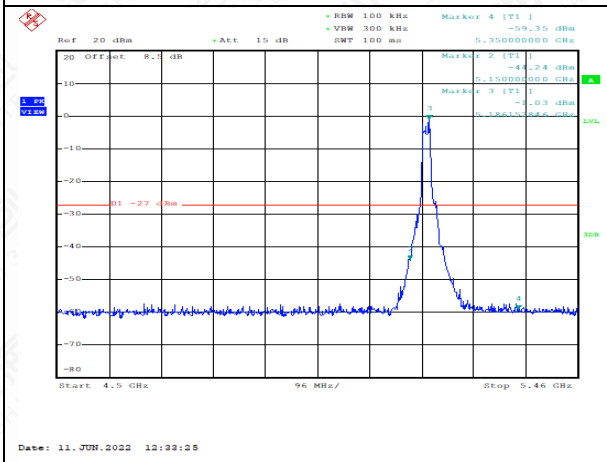
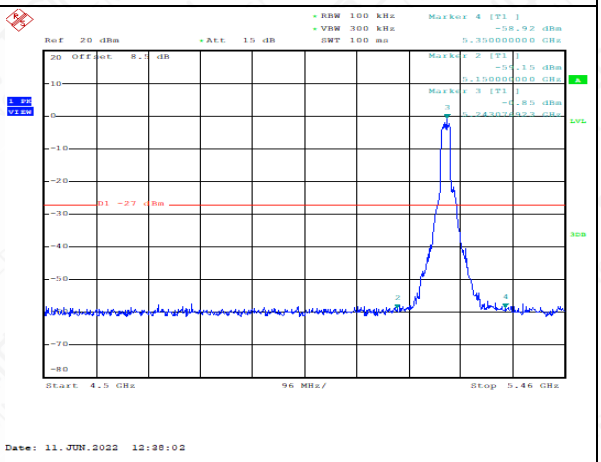
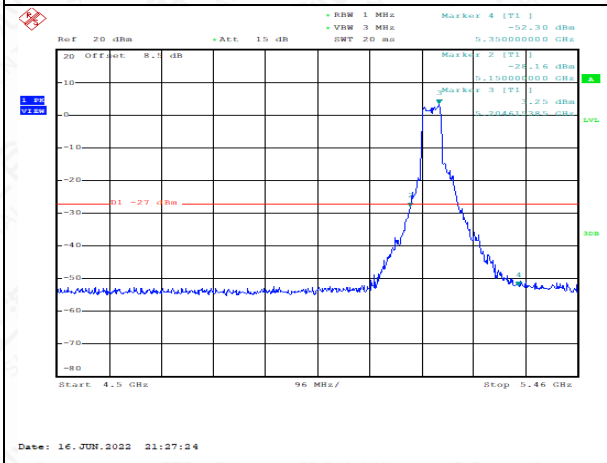
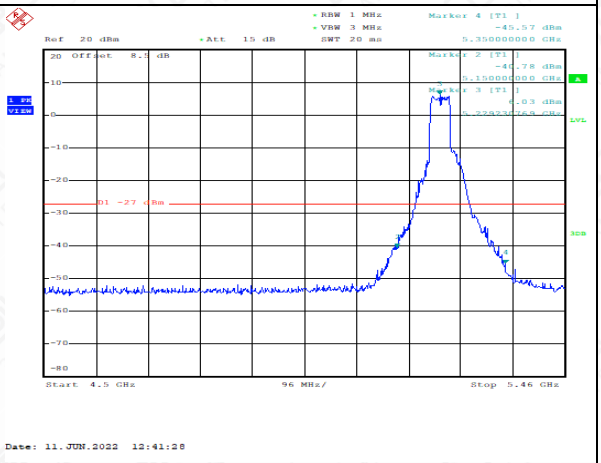
Note:The test doesn't add the antenna gain to the test plots.

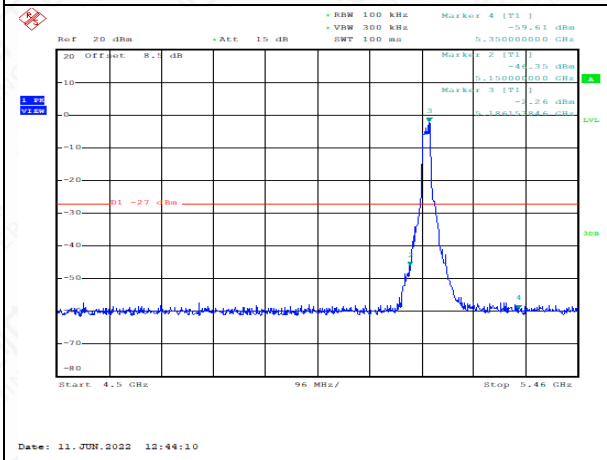
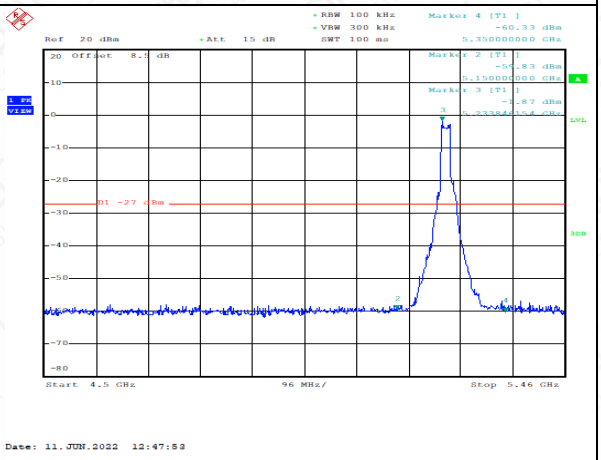
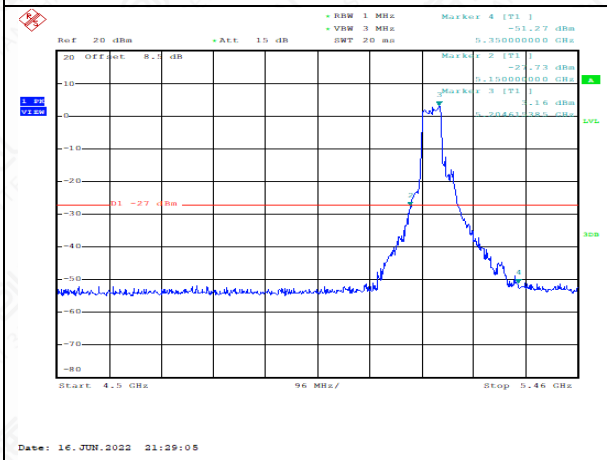
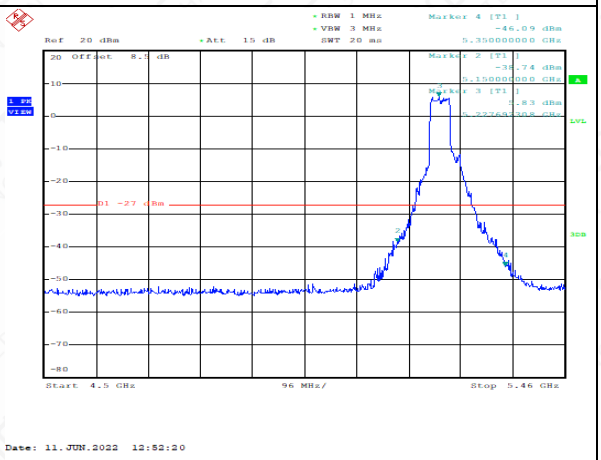
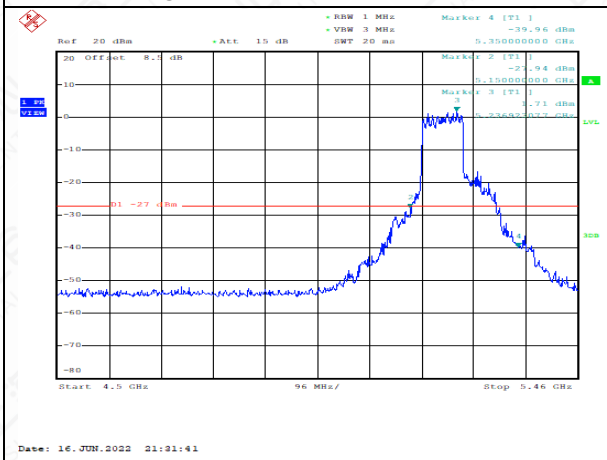
6.5.1.1 Test Setup



Measurement Result

U-NII-1:

Band Edges (802.11a, 5180MHz)	Band Edges (802.11a, 5240MHz)
	
Band Edges(802.11n-HT20), 5180MHz)	Band Edges (802.11n-HT20), 5240MHz)
	
Band Edges(802.11n-HT40), 5190MHz)	Band Edges (802.11n-HT40), 5230MHz)
	

Band Edges (802.11ac-VHT20), 5180MHz)	Band Edges (802.11ac-VHT20), 5240MHz)
	
Band Edges (802.11ac-VHT40), 5190MHz)	Band Edges (802.11ac-VHT40), 5230MHz)
	
Band Edges (802.11ac-VHT80), 5210MHz)	/
	/

6.5.2 Band Edges - Radiated

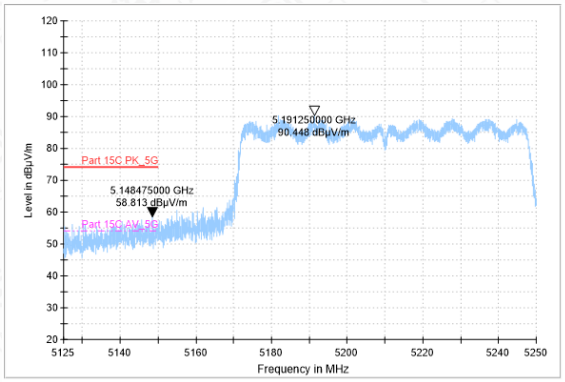
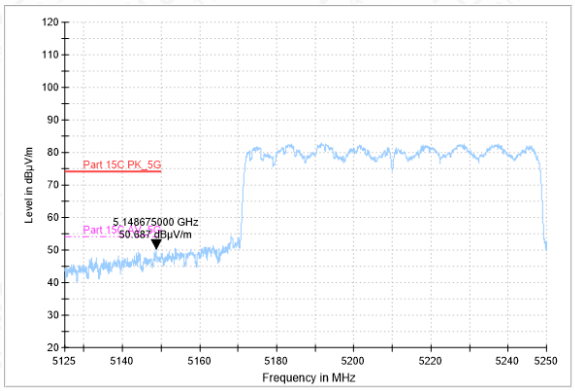
6.5.2.1 Measurement Limit:

Standard	Limit (dBμV/m)	
FCC 47 CFR Part 15.209 & 15.407(b)(9),(10)	Peak	74
	Average	54
RSS-Gen 8.9,8.10 RSS-247 6.2.1.2	Peak	74
	Average	54

The measurement is made according to KDB 789033.

6.5.2.2 Measurement Result

U-NII-1 :

Band Edges (802.11ac-VHT80, 5210MHz)	
Peak detector	AV detector
	

6.6. Transmitter Spurious Emission

6.6.1 Measurement Limit

Standard	Limit(dBμV/m)	
FCC 47 CFR Part 15.209 & 15.407(b)(9),(10)	Peak	74
	Average	54
RSS-Gen 8.9,8.10 RSS-247 6.2.1.2	Peak	74
	Average	54

6.6.2 The measurement is made according to KDB 789033

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz (detector: Peak):

(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep= AUTO

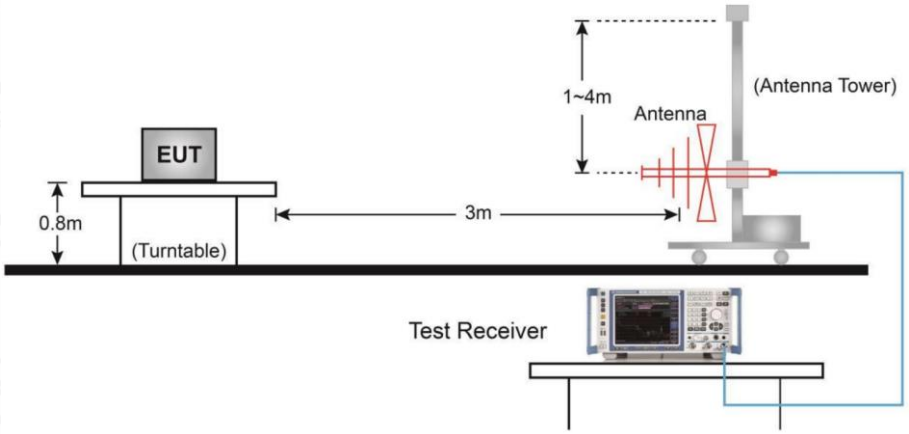
Limit in restricted band:

Frequency of emission (MHz)	Field strength(dBμV/m)	Measurement distance(m)
0.009-0.490	129-94	3
0.490-1.705	74-63	3
1.705-30	70	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

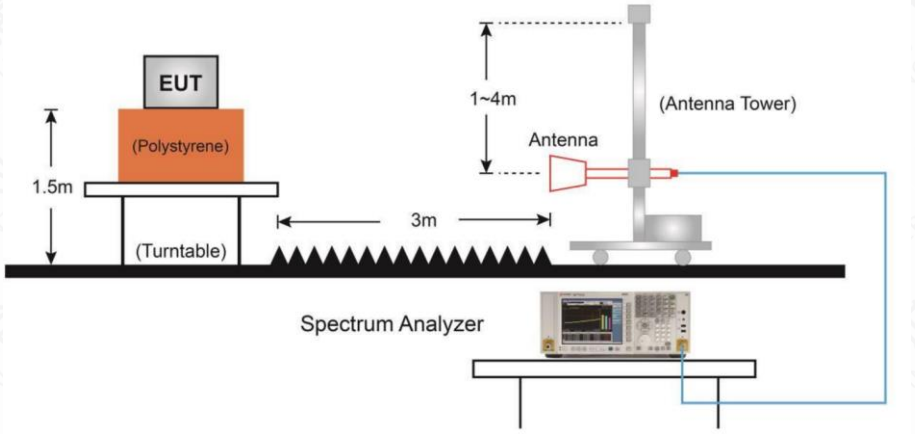
Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m

6.6.3 Test Setup

Below 1GHz Test Setup



Above 1GHz Test Setup



Test procedures

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turntable rotated 360 degrees to determine the position of the maximum emission level.

The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The EUT was tested according to KDB 789033 D02: Section G.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);

RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);

RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. If the PK measured level is lower than AV limit, the AV test can be elided

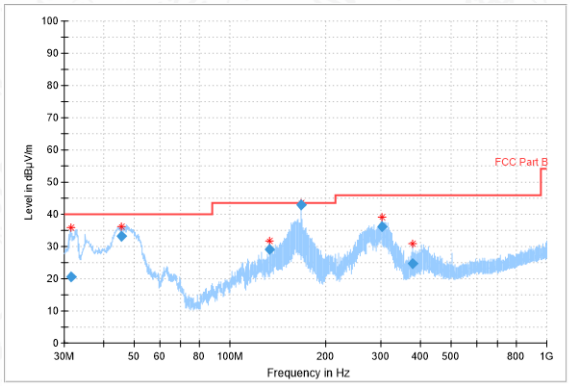
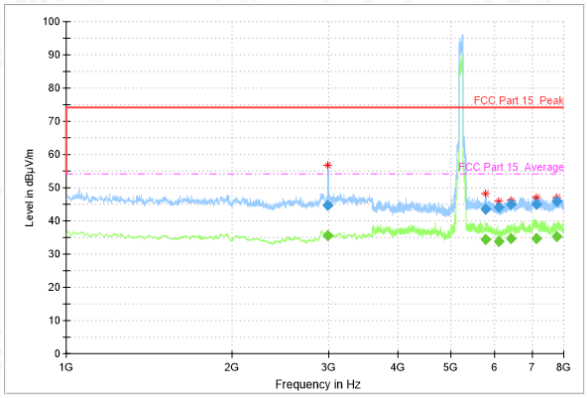
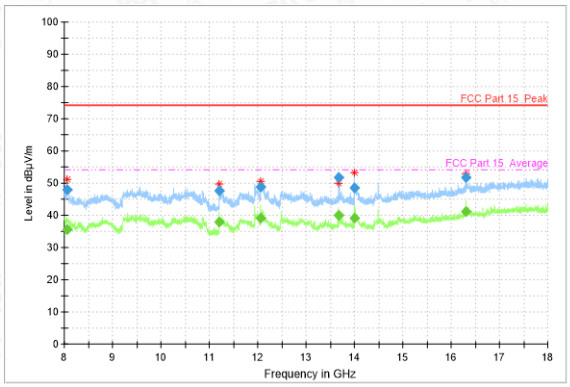
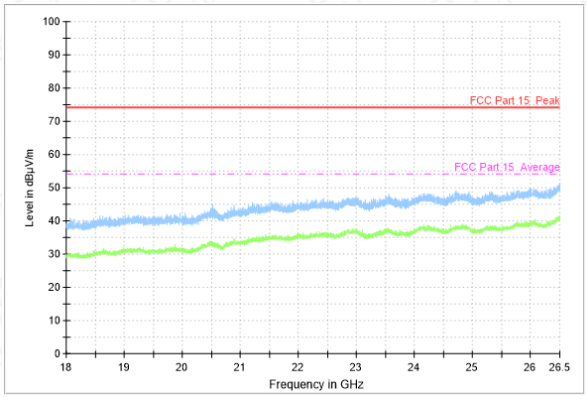
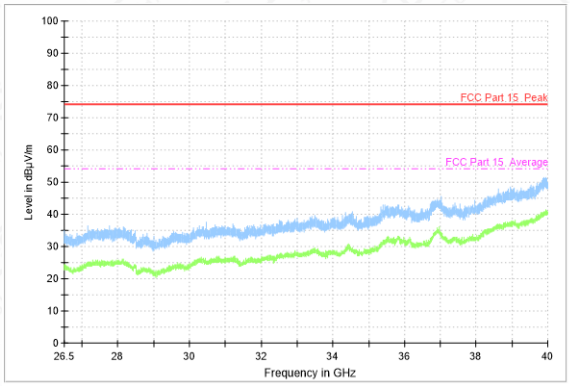
Modulation type and data rate tested (Only worst case result is given below):

U-NII-1:

Mode	Data rate	Channel
802.11a	6Mbps	36(5180MHz)
802.11n-HT20	MCS0	48(5240MHz)
802.11n-HT40	MCS0	38(5190MHz)
802.11ac-HT20	MCS0	36(5180MHz)
802.11ac-HT40	MCS0	38(5190MHz)
802.11ac-HT80	MCS0	42(5210MHz)

Measurement Results

U-NII-1

Radiated Spurious Emission (802.11ac-VHT80, ch42, 30MHz-1GHz)	Radiated Spurious Emission (802.11ac-VHT80, ch42, 1 GHz-8 GHz)
	
Radiated Spurious Emission (802.11ac-VHT80, ch42, 8GHz-18GHz)	**Radiated Spurious Emission (802.11ac-VHT80, ch42, 18GHz-26.5GHz)**
	
Radiated Spurious Emission (802.11ac-VHT80, ch42, 26.5 GHz-40 GHz)	/
	/

802.11ac-VHT80

Channel 42(30MHz ~1GHz)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
31.5	20.5	-14.3	34.8	V
45.4	33.24	-12.3	45.54	V
133.4	29.24	-16.4	45.64	H
168.0	42.89	-15.3	58.19	H
302.8	36.12	-10.8	46.92	H
377.1	24.61	-8.7	33.31	H

Channel 42(1GHz ~8GHz)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
2986.8	44.74	1.9	42.84	V
5778.0	43.66	2.2	41.46	H
6094.8	44.2	2.5	41.7	V
6421.6	45.05	2.9	42.15	V
7118.0	44.97	4.2	40.77	V
7765.6	45.93	4.1	41.83	H

Channel 42(8GHz ~18GHz)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
8064.6	48.06	4.4	43.66	H
11204.8	47.63	8	39.63	H
12056.6	48.73	10.2	38.53	V
13677.6	51.75	11.6	40.15	H
14001.8	48.67	12.4	36.27	H
16302.8	51.63	16.1	35.53	H

Note: We test all modes of the EUT, select the worst case in the report, the EUT N06 is the worst case.

6.7. Radiated Emission

Manufacturers ensured the EUT meet the requirement of frequency stability, such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.(According to15.407(g) and RSS-Gen 8.11)

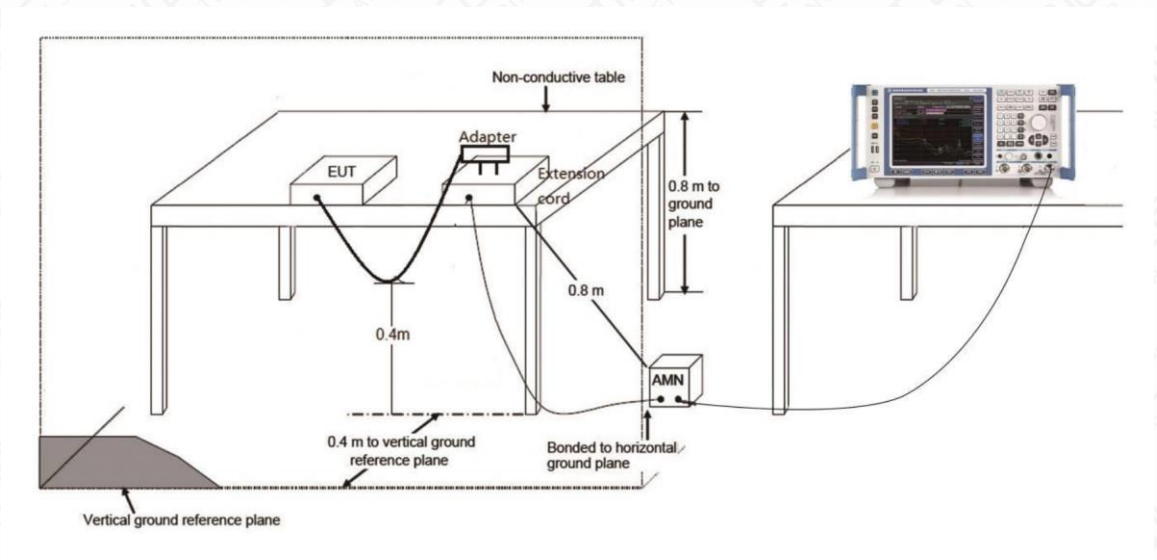
6.8. AC Powerline Conducted Emission

6.8.1. Method of Measurement: ANSI C63.10-2013-clause 6.2

1. The one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
2. If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
3. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
4. If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.36 Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

6.8.2. Test Setup



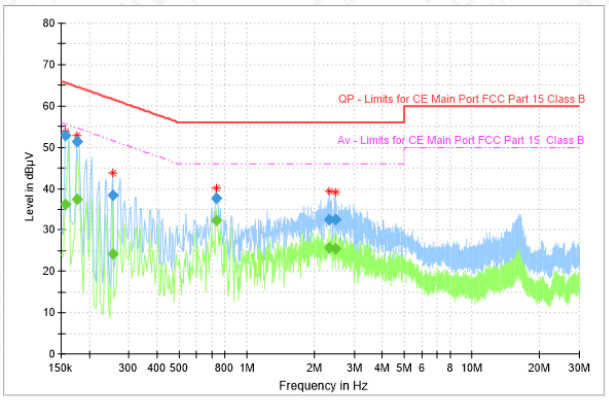
6.8.3. Test Condition

Voltage（V）	Frequency（Hz）
120	60

Measurement Result and limit

(Quasi-peak-average Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Conclusion
0.15 to 0.5	66 to 56	56 to 46	P
0.5 to 5	56	46	
5 to 30	60	50	
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.			

CA01	/
	/

CA01

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.157463	---	36.14	55.60	19.45	15000.0	9.000	L1	ON	9.6
0.157463	52.86	---	65.60	12.74	15000.0	9.000	L1	ON	9.6
0.176119	---	37.41	54.67	17.25	15000.0	9.000	L1	ON	9.6
0.176119	51.36	---	64.67	13.30	15000.0	9.000	L1	ON	9.6
0.254475	---	24.14	51.61	27.47	15000.0	9.000	L1	ON	9.6
0.254475	38.29	---	61.61	23.32	15000.0	9.000	L1	ON	9.6
0.732075	---	32.26	46.00	13.74	15000.0	9.000	L1	ON	9.6
0.732075	37.60	---	56.00	18.40	15000.0	9.000	L1	ON	9.6
2.321588	---	25.64	46.00	20.36	15000.0	9.000	L1	ON	9.7
2.321588	32.45	---	56.00	23.55	15000.0	9.000	L1	ON	9.7
2.482031	---	25.50	46.00	20.50	15000.0	9.000	L1	ON	9.7
2.482031	32.43	---	56.00	23.57	15000.0	9.000	L1	ON	9.7

Annex A: Revised History

Version	Revised Content
V00	Initial
V01	Update the equipemnts list; Add the update the test equipment and the TX Power level; Add the EIRP limit; Add the radiation spurious above 18GHz result
V02	Update the test result in section 6.3.3
V03	Update the test result in section 6.3.3

Annex B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 12th day of April 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

END OF REPORT