

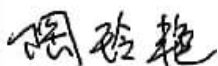
Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

FCC/IC 5GWLAN TEST REPORT

PRODUCT	Smart POS system
BRAND	SUNMI
MODEL	T6900
APPLICANT	Shanghai Sunmi Technology Co.,Ltd.
FCC ID	2AH25T6900P2
IC ID	22621-T6900P2
ISSUE DATE	January 11, 2023
STANDARD(S)	FCC Part15, RSS-247 Issue 2, RSS-Gen Issue 5

Prepared by: Tao Lingyan

Signature



Reviewed by: Yang Fan

Signature



Approved by: Zhang Min

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	15. 407(a)	RSS-Gen 6.7	Pass
Occupied 26dB 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 T6900, manufactured by Shanghai Sunmi Technology Co.,Ltd. is a new product for testing.

The following configurations were tested for radiation spurious emission:

T6900			
Main Supply:Configuration1(fingerprint &scanner&standard)			
Name	Model	Manufacturer	Spec
PCB	STM-5	SHENZHEN SUNTAK MULTILAYER PCB CO LTD	V-0 130℃
LCD	HS55ET10P63B	Huashi Opto-Electronic Co., Ltd.	720X (RGB)(H) X 1440(V) dots TFT Type 3.25mm thickness
Rear camera	HNO0458	Holitech science Technology Co., Ltd.	Sensor:Hi556 1/5" Lens:DULE DL5280 VCM:RuienPF8526-44 F.NO:2.2 FOV:>77° Connection method: BTB
Battery	P2	Guangdong Fenghua New Energy Co.,Ltd.	2480mAh/7.6V
Printer	ATP2XEP6RTWEN A	Xiamen Pinnacle Electrical Co.,Ltd	Thermal dot printing print 4.0-9.5V, 384dot, Dimension 67.3*18.25*30.0mm
Button cell	CR2032	Yichang Power Glory Technology Co.,Ltd.	Nominal Discharge current 0.2mA Nominal Voltage 3V Nominal Capacity 245(mAh)
Adapter	TPA- 23A050200UU01	SHENZHEN TIANYIN ELECTRONICS CO.,LTD.	5V 2A
Secondary Supply:Configuration2(fingerprint & standard)			
Name	Model	Manufacturer	Spec
PCB	HF01	JIANGXI ZHIBOXIN TECHNOLOGY CO LTD	V-0 130℃
LCD	JL-P055H030-05	SICHUAN JINGLONG PHOTOELECTRIC SCIENCE AND TECHNOLOGY CO.,LTD	720X (RGB)(H) X 1440(V) dots TFT Type 3.25mm thickness
Rear camera	VM25C27	Shenzhen Chengxiangtong technology Co.,Ltd.	Sensor: GC05A2 1/5" Lens: Horui TR0517B VCM: Hozel VA26F502 F.NO:2.2 FOV:>77° Connection method: BTB

Battery	P2	DongGuan Veken Battery Co.,Ltd.	2480mAh/7.6V
Printer	LTP02-245-G2	Seiko Instruments Inc.	Thermal line dot printing print 5.5-9.5V, 384dot, Dimension 67.3*18.1*30.0mm
Button cell	CR2032	SHANGHAI LONGYOUNG CORPORATION.	Nominal Discharge current 0.2mA Nominal Voltage 3V Nominal Capacity 220(mAh)
Adapter	UC13US	Jiangsu Chenyang Electron Co.,Ltd.	5V2A
Third Supply:Configuration3(Based on configuration 1) (fingerprint & standard)			
Name	Model	Manufacturer	Spec
PCB			
LCD			
Rear camera			
Battery	P2 Max	Guangdong Fenghua New Energy Co.,Ltd.	3000mAh/7.6V
Printer			
Button cell			
Adapter			

Note:

Hardware Version Id Number (HVIN):

- 1)T6900P2 - 1:Configuration1-fingerprint
- 2)T6900P2 - 2:Configuration1-scanner
- 3)T6900P2 - 3:Configuration1-standard
- 4)T6900P2 - 4:Configuration2-fingerprint
- 5)T6900P2 - 5:Configuration2-standard

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 5.3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 6 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 $\pm 2\%$.
- c. Activate simultaneous transmission in all possible configurations during the testing.

1.4 Data Provided by Applicant

No.	Item(s)	Data
-----	---------	------

1	Antenna gain of EUT	2.8 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°C~35°C
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	101kPa

2.3 Project Information

Project Manager	Gao Hongning
Test Date	October 09, 2022 to December 02, 2022

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	+86-17302160204

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	Smart POS system
Model	T6900
Date of Receipt	S13aa/S03aa/ S06aa/ S08aa / S16aa: September 26,2022 S21aa : November 3,2022 S26aa: November 23, 2022
EUT ID*	S13aa/S03aa/S06aa/S08aa/S21aa/S26aa/S16aa
SN/IMEI	S13aa: 869325026801226 869325026801234 S03aa: 869325026812009 869325026812017 S06aa: 869325026810920 869325026810938 S08aa: 869325026801002 869325026801010 S26aa: 862318060015875 862318060015883 S16aa: 869325026800780 869325026800798
Supported Radio Technology and Bands	GSM850/GSM900/DCS1800/PCS1900 WCDMA Band I/II/IV/V/VIII LTE Band 1/2/3/4/5/7/17/28/38/41 WLAN 802.11 b/g/n WLAN 802.11 a/n BT4.2 BR/EDR, BLE NFC GPS
Hardware Version	B1691_MAIN_PCB
Software Version	SP6359A-20220922115332
FCC ID	2AH25T6900P2
IC ID	22621-T6900P2
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 UNII 2A: 5250MHz-5350MHz UNII 2C: 5470MHz-5725MHz
Occupied Channel Bandwidth	20 MHz: 802.11 a/n
WLAN type of modulation	OFDM

5. Test Configuration Information

5.1 Laboratory Environmental Conditions

Relative Humidity	Min. = 45 %, Max. = 55 %		
Atmospheric Pressure	101kPa		
Temperature	Normal	Minimum	Maximum
	25℃	0℃	45℃
Working Voltage of EUT	Normal	Minimum	Maximum
	7.6V	7.2V	8.7V

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	Starpont	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	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 Sensor	U2021XA	MY56410009	Keysight	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	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 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω
Temperature	Min. = 15 °C, Max. = 35 °C

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

Temperature	Min. = 15 °C, Max. = 35 °C
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 °C, Max. = 35 °C
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
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

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	9KHz-30MHz	95%	0.89dB
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
AC Power line Conducted Emission	0.15MHz-30MHz	95%	3.66 dB

6. Measurement Results

6.1 Maximum Output Power-Conducted

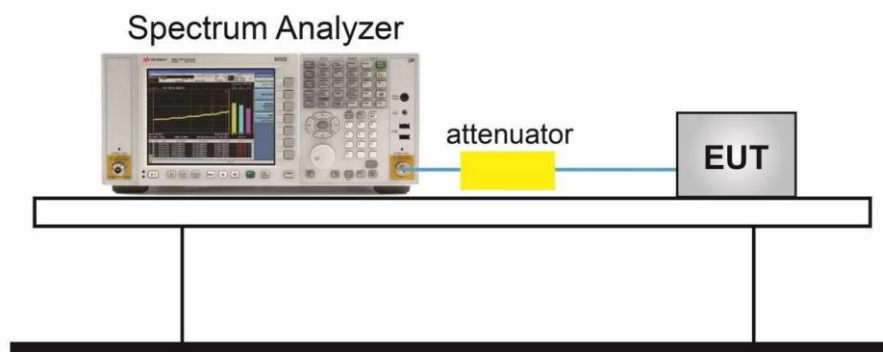
6.1.1 Measurement Limit and Method

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

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

1. Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2. Set RBW=1MHz
3. Set VBW $\geq$ 3MHz
4. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
5. Sweep time = auto.
6. Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
7. If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
8. Trace average at least 100 traces in power averaging (rms) mode.
9. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

6.1.2 Test setup



6.1.3 Measurement Results

U-NII-1

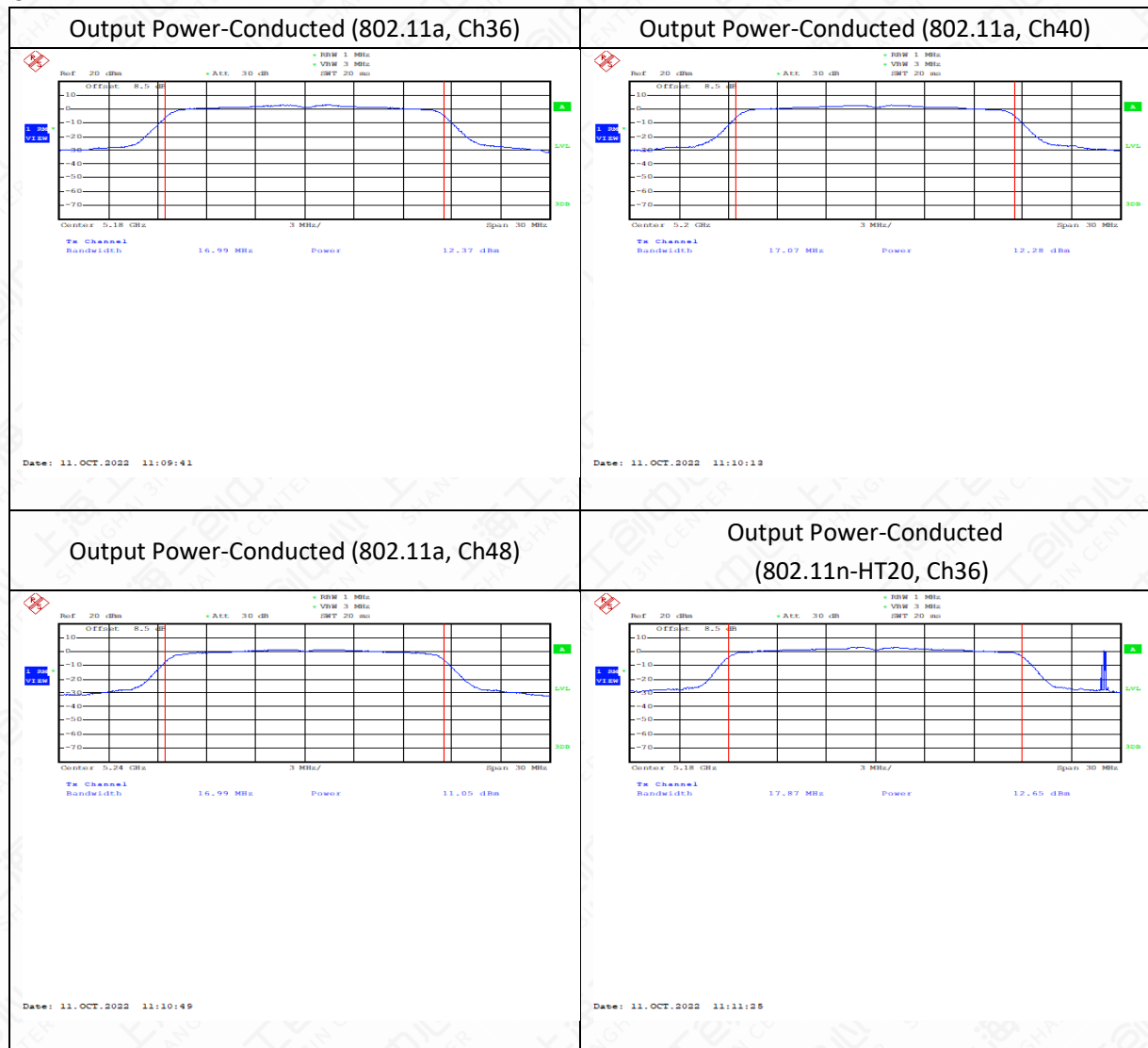
Mode	Channel	TX Power	Conducted (dBm)	E.I.R.P (dBm)
802.11a	5180	17	12.37	15.17
	5200		12.28	15.08
	5240		11.05	13.85
802.11n HT20	5180	17	12.65	15.45
	5200		12.26	15.06
	5240		11.12	13.92
802.11n HT40	5190	12	7.18	9.98
	5230		6.81	9.61

U-NII-2a

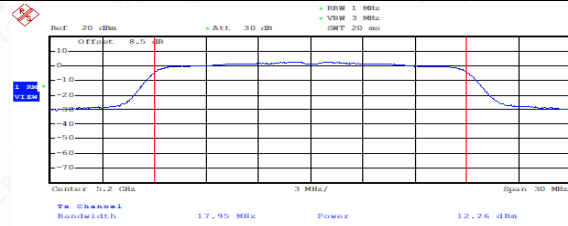
Mode	Channel	TX Power	Conducted (dBm)	E.I.R.P (dBm)
802.11a	5260	17	11.04	13.84
	5280		10.90	13.7
	5320		10.68	13.48
802.11n HT20	5260	17	10.62	13.42
	5280		10.27	13.07
	5320		10.59	13.39
802.11n HT40	5270	12	5.61	8.41
	5310		5.91	8.71

TEST PLOTS:

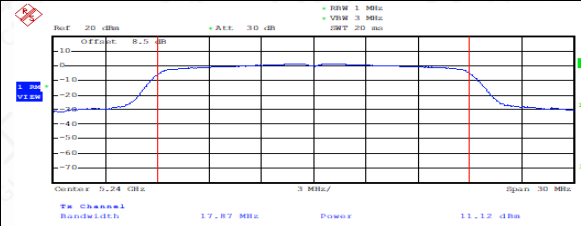
U-NII-1



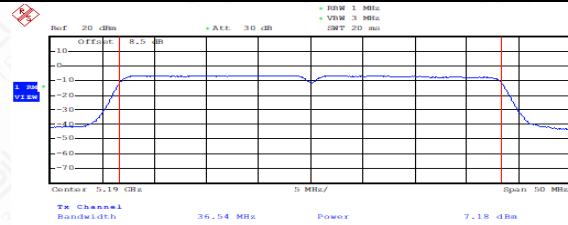
Output Power-Conducted
(802.11n-HT20, Ch40)



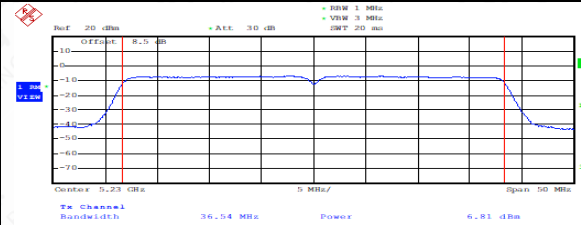
Output Power-Conducted
(802.11n-HT20, Ch48)



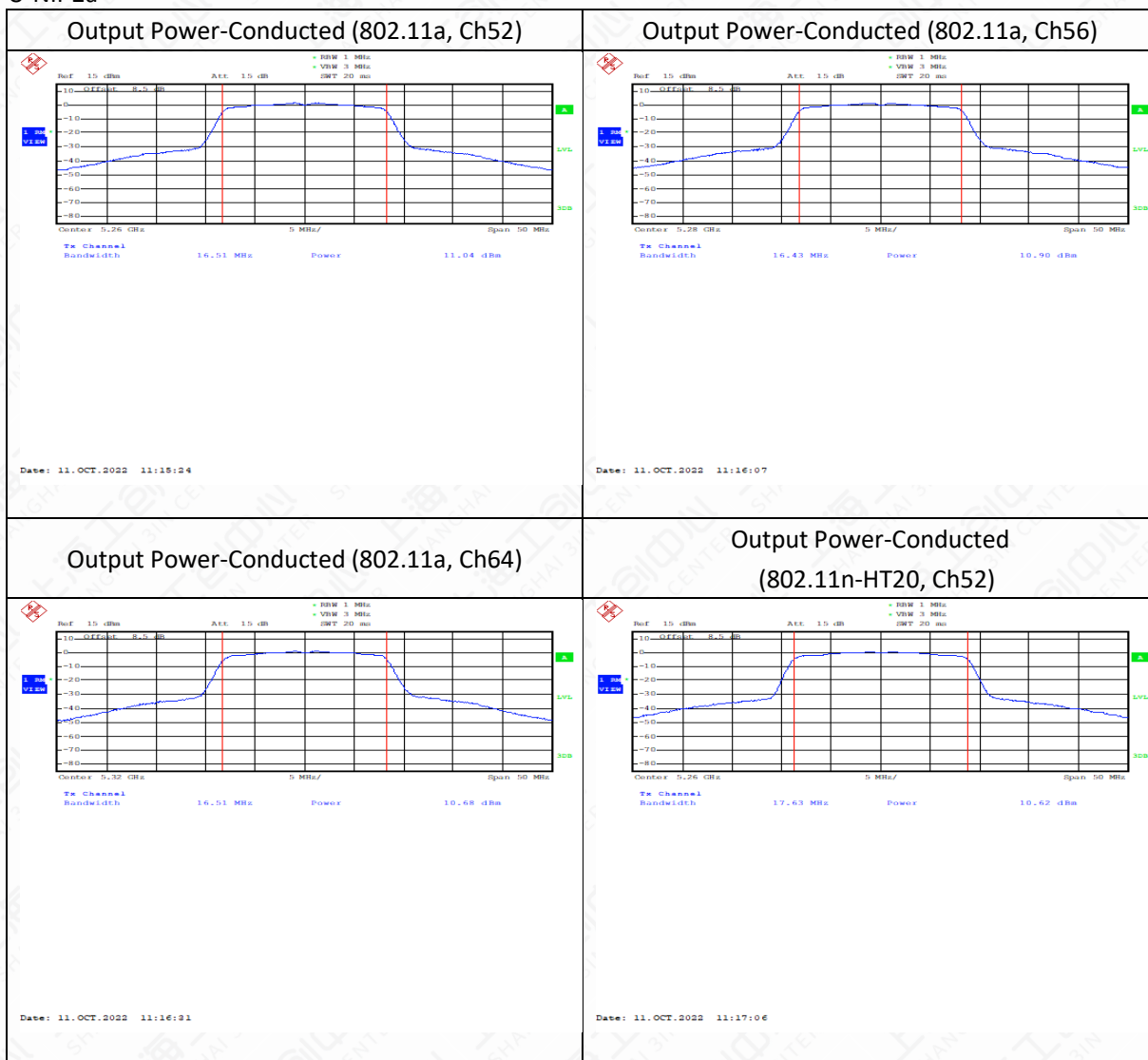
Output Power-Conducted
(802.11n-HT40, Ch38)



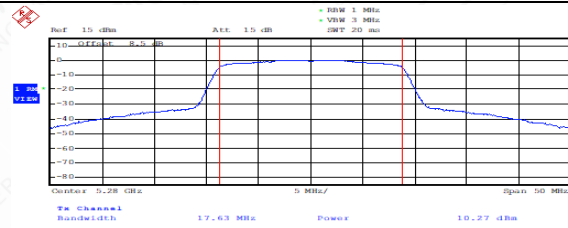
Output Power-Conducted
(802.11n-HT40, Ch46)



U-NII-2a

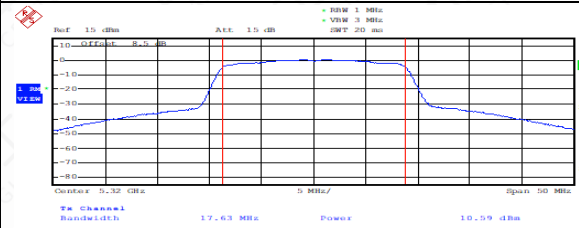


Output Power-Conducted
(802.11n-HT20, Ch56)



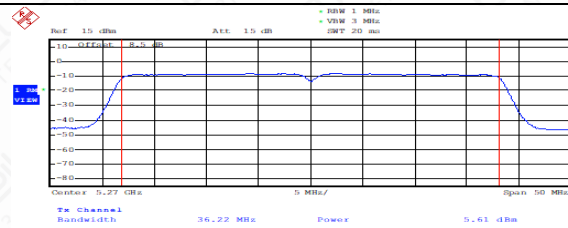
Date: 11.OCT.2022 11:17:40

Output Power-Conducted
(802.11n-HT20, Ch64)



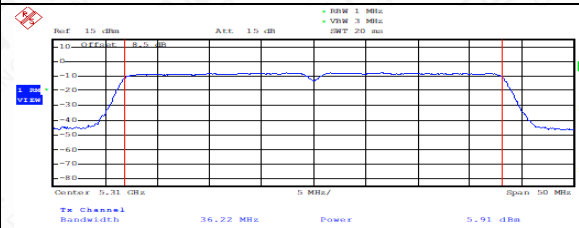
Date: 11.OCT.2022 11:18:24

Output Power-Conducted
(802.11n-HT40, Ch54)



Date: 17.OCT.2022 15:02:41

Output Power-Conducted
(802.11n-HT40, Ch62)



Date: 17.OCT.2022 15:03:20

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

6.2 Peak Power Spectral Density

6.2.1 Measurement Limit and Method

Standard	Limit (dBm/MHz)	EIRP Limit (dBm/MHz)
FCC 47 CFR Part 15.407(a)(1)(iv)	≤ 11	≤ 11
RSS-247 6.2.1.1	U-NII-1: ≤ 6.7 U-NII-2a: ≤ 11	≤ 10

The measurement method is made according to KDB 789033 F

- Create an average power spectrum for the EUT operating mode being tested by following the instructions in II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...." (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
- Use the peak search function on the instrument to find the peak of the spectrum and record its value.
- Make the following adjustments to the peak value of the spectrum, if applicable:
 - If Method SA-2 or SA-2 Alternative was used, add $10 \log (1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- The result is the Maximum PSD over 1 MHz reference bandwidth.
- For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
 - Set $RBW \geq 1/T$, where T is defined in II.B.I.a).
 - Set $VBW \geq 3$ RBW.
 - If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500$

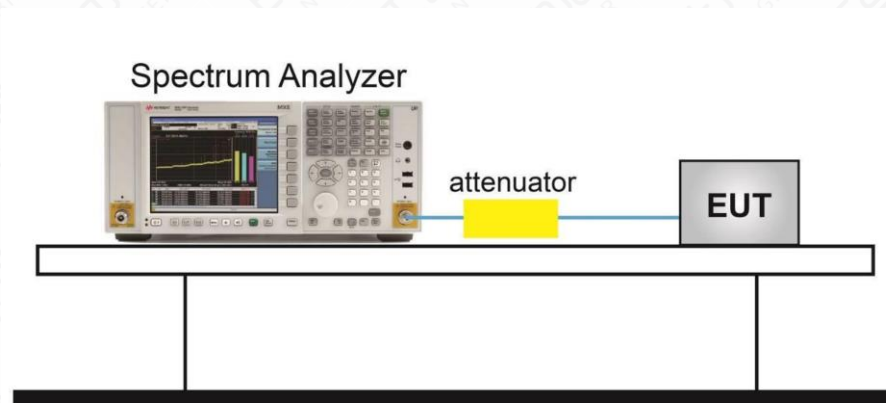
kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for steps 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

6.2.2 Test setup



6.2.3 Measurement Results

U-NII-1

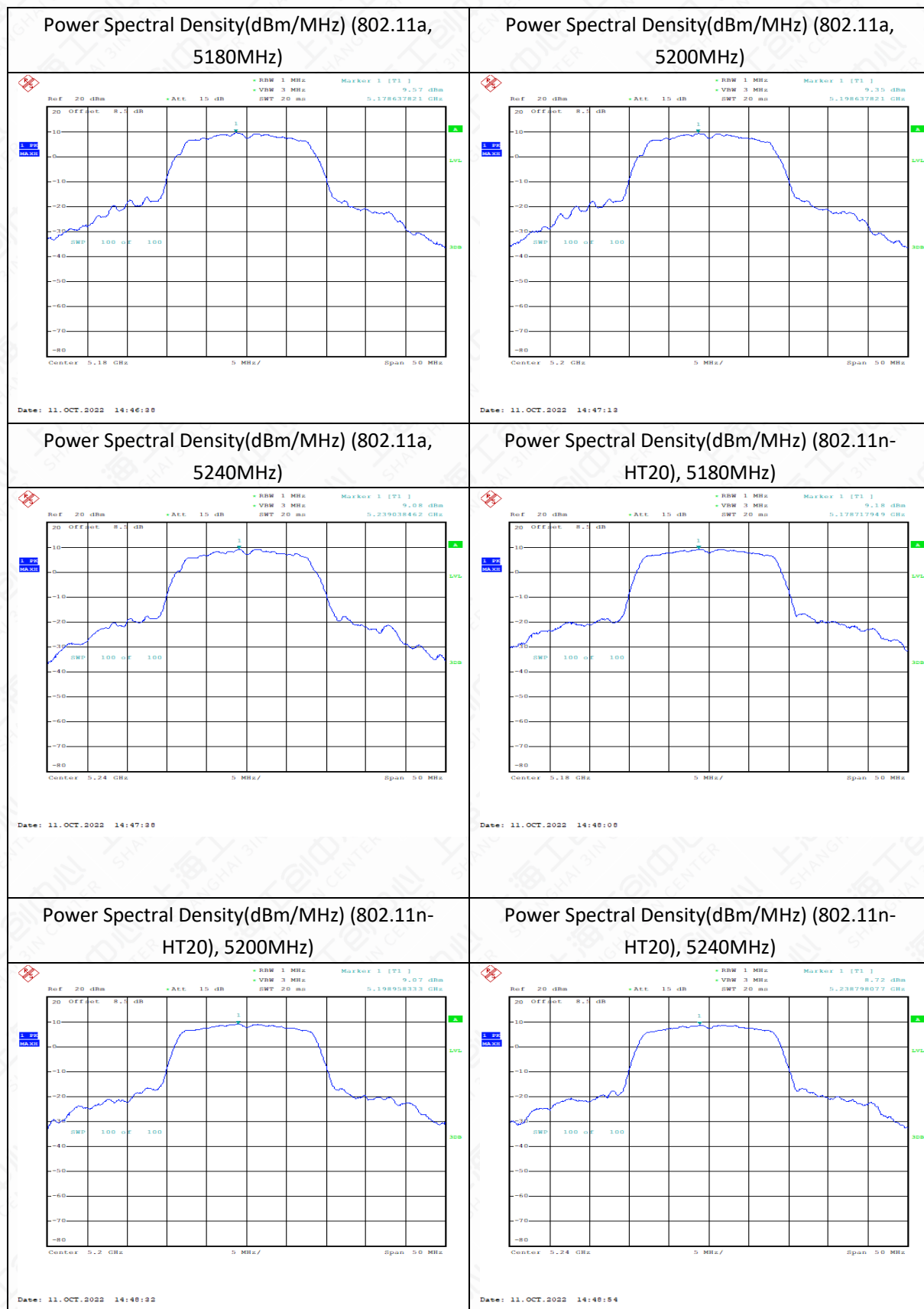
Mode	Channel	Power Spectral Density (dBm/MHz)	PSD EIRP	Conclusion
802.11a	5180	9.57	12.37	P
	5200	9.35	12.15	P
	5240	9.08	11.88	P
802.11n HT20	5180	9.18	11.98	P
	5200	9.07	11.87	P
	5240	8.72	11.52	P
802.11n HT40	5190	1.09	3.89	P
	5230	0.26	3.06	P

U-NII-2a

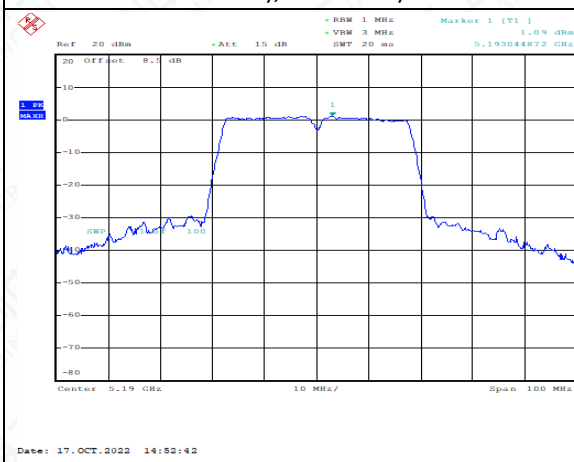
Mode	Channel	Power Spectral Density (dBm/MHz)	PSD EIRP	Conclusion
802.11a	5260	0.93	3.73	P
	5280	0.61	3.41	P
	5320	0.93	3.73	P
802.11n HT20	5260	0.59	3.39	P
	5280	0.36	3.16	P
	5320	0.83	3.63	P
802.11n	5270	-17.99	-15.19	P
HT40	5310	-17.90	-15.1	P

Test graphs as below:

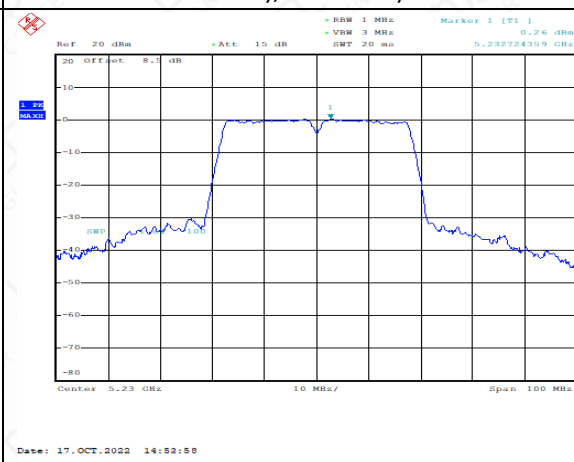
U-NII-1



Power Spectral Density(dBm/MHz) (802.11n-HT40), 5190MHz)

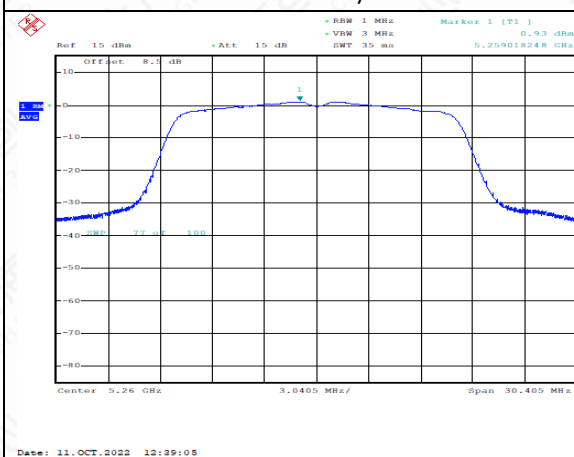


Power Spectral Density(dBm/MHz) (802.11n-HT40), 5230MHz)

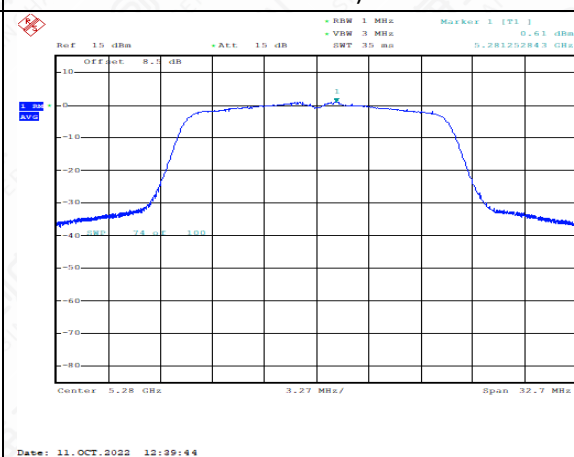


U-NII-2a

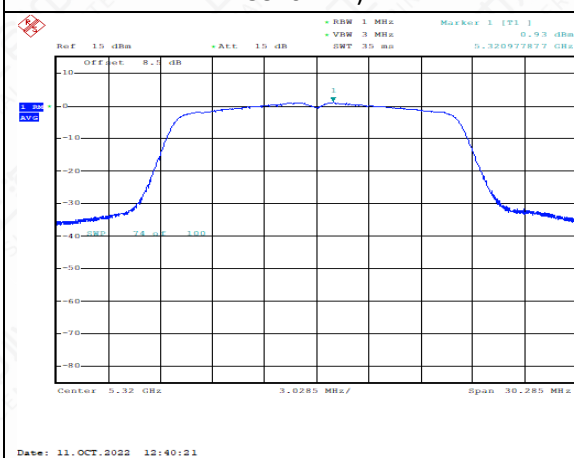
Power Spectral Density(dBm/MHz) (802.11a, 5260MHz)



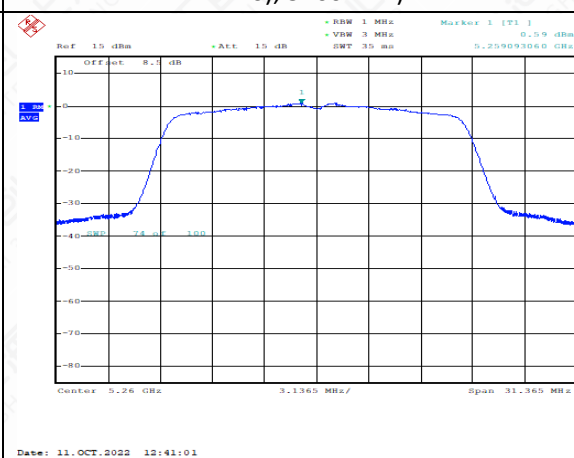
Power Spectral Density(dBm/MHz) (802.11a, 5280MHz)



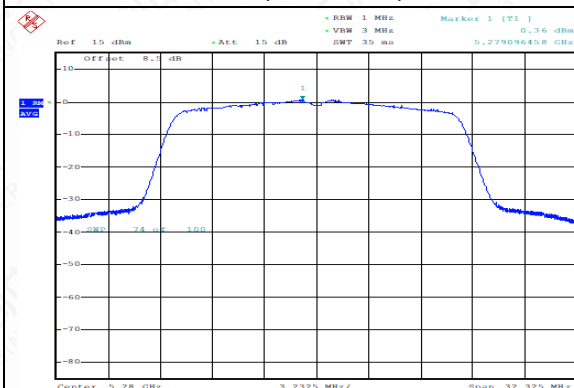
Power Spectral Density(dBm/MHz) (802.11a, 5320MHz)



Power Spectral Density(dBm/MHz) (802.11n-HT20), 5260MHz)

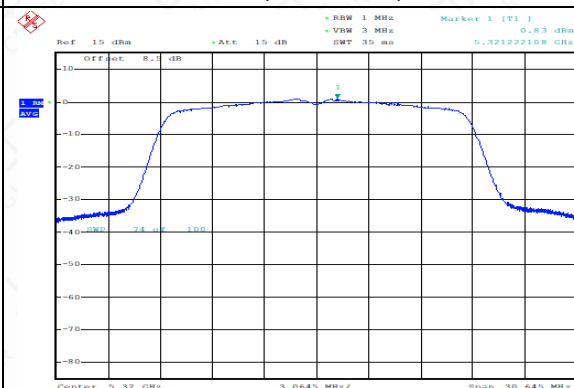


Power Spectral Density(dBm/MHz) (802.11n-HT20), 5280MHz)



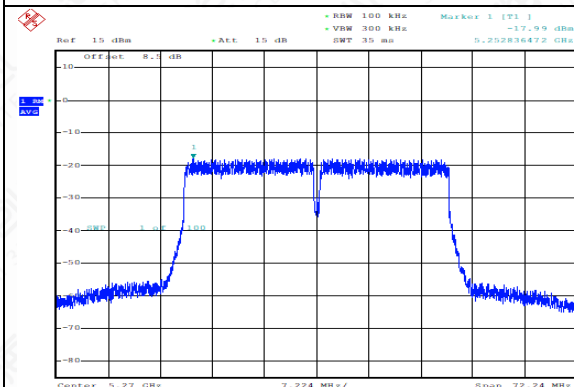
Date: 11.OCT.2022 12:41:28

Power Spectral Density(dBm/MHz) (802.11n-HT20), 5320MHz)



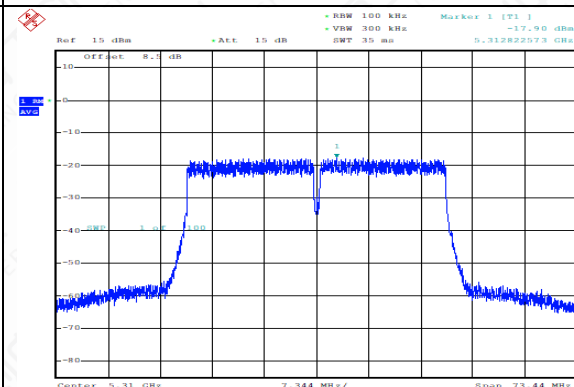
Date: 11.OCT.2022 12:41:52

Power Spectral Density(dBm/MHz) (802.11n-HT40), 5270MHz)



Date: 17.OCT.2022 15:06:22

Power Spectral Density(dBm/MHz) (802.11n-HT40), 5310MHz)



Date: 17.OCT.2022 15:06:25

6.3 Occupied 26dB Bandwidth(conducted)

6.3.1 Measurement Limit and Method

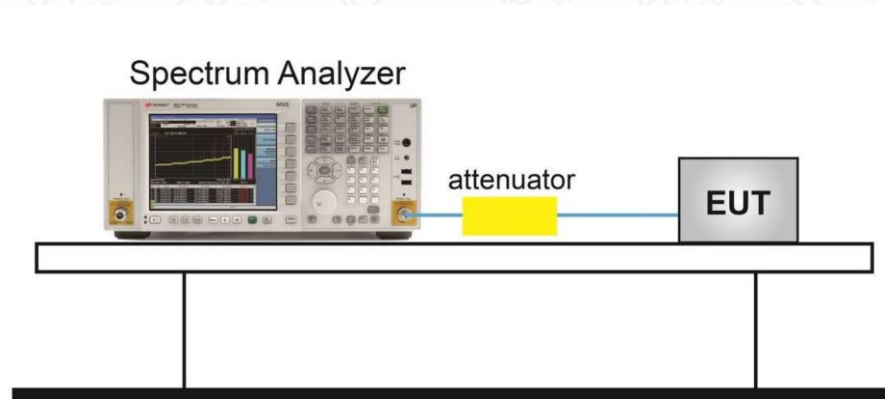
Standard	Limit(MHz)
FCC 47 CFR Part 15.407(a)	N/A
RSS-247 6.2	N/A

The measurement method is made according to KDB 789033 C

1. Set RBW = approximately 1% of the emission bandwidth
2. Set the VBW > RBW
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.

Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6.3.2 Test Setup



The measurement is made according to KDB 789033

6.3.3 Measurement Results

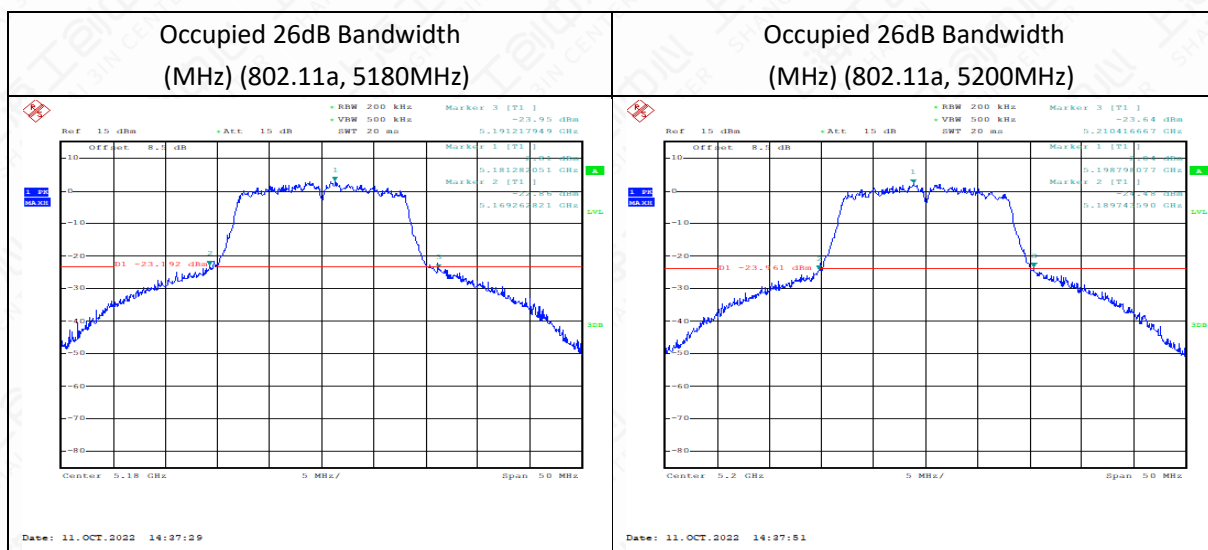
U-NII-1:

Mode	Channel	Occupied 26dB Bandwidth (MHz)	Conclusion
802.11a	5180 MHz	21.96	P
	5200 MHz	20.67	P
	5240 MHz	20.19	P
802.11n	5180 MHz	21.72	P
HT20	5200 MHz	20.83	P

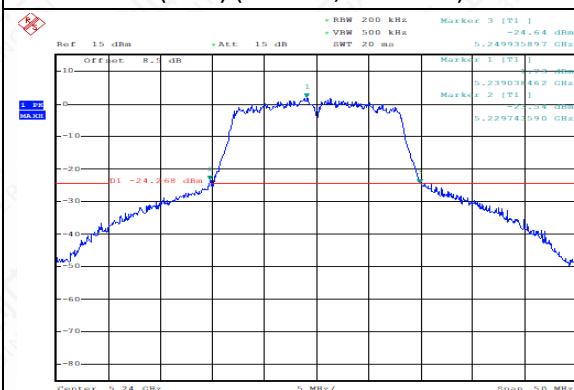
	5240 MHz	20.11	P
802.11n	5270 MHz	48.64	P
HT40	5310 MHz	49.60	P

U-NII-2a

Mode	Channel	Occupied 26dB Bandwidth (MHz)	Conclusion
802.11a	5260 MHz	20.27	P
	5280 MHz	21.80	P
	5320 MHz	20.19	P
802.11n HT20	5260 MHz	20.91	P
	5280 MHz	21.55	P
	5320 MHz	20.43	P
802.11n	5270 MHz	48.16	P
HT40	5310 MHz	48.96	P

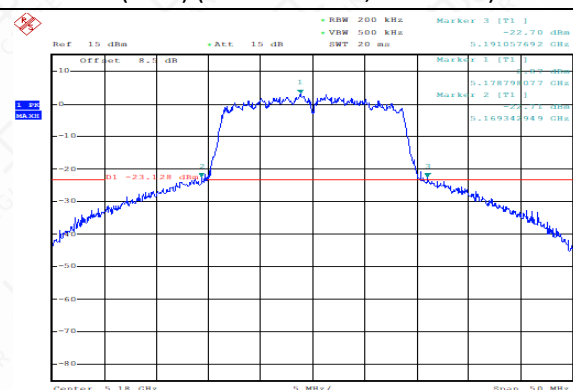
U-NII-1:


Occupied 26dB Bandwidth
(MHz) (802.11a, 5240MHz)



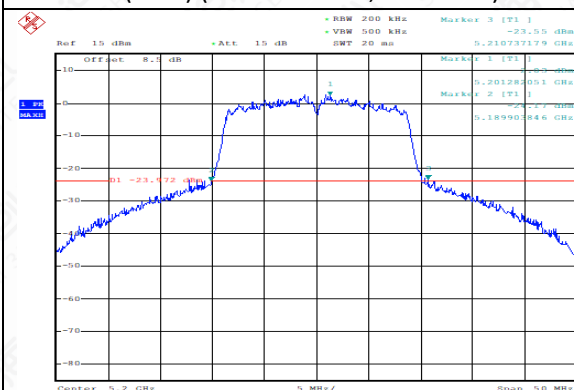
Date: 11.OCT.2022 14:38:16

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



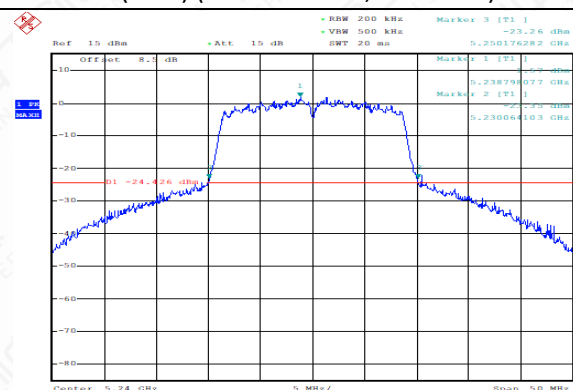
Date: 11.OCT.2022 14:39:06

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



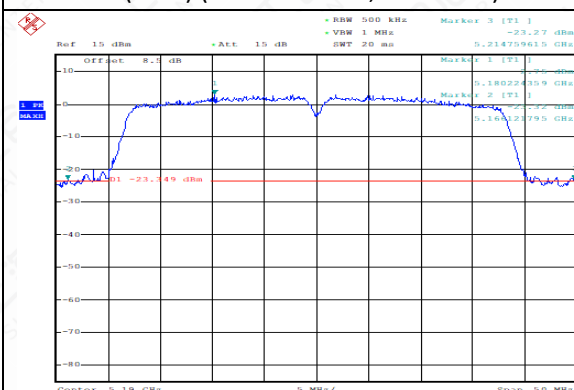
Date: 11.OCT.2022 14:39:28

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



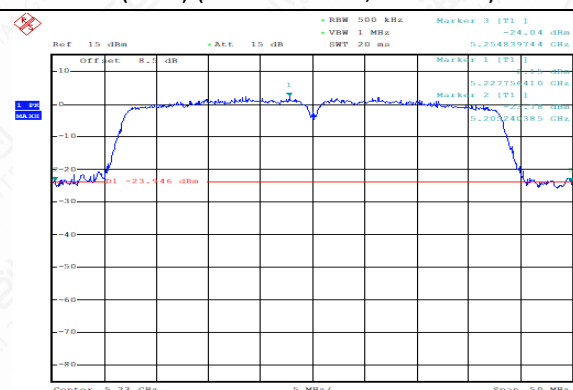
Date: 11.OCT.2022 14:39:49

Occupied 26dB Bandwidth
(MHz) (802.11n-HT40, 5190MHz)



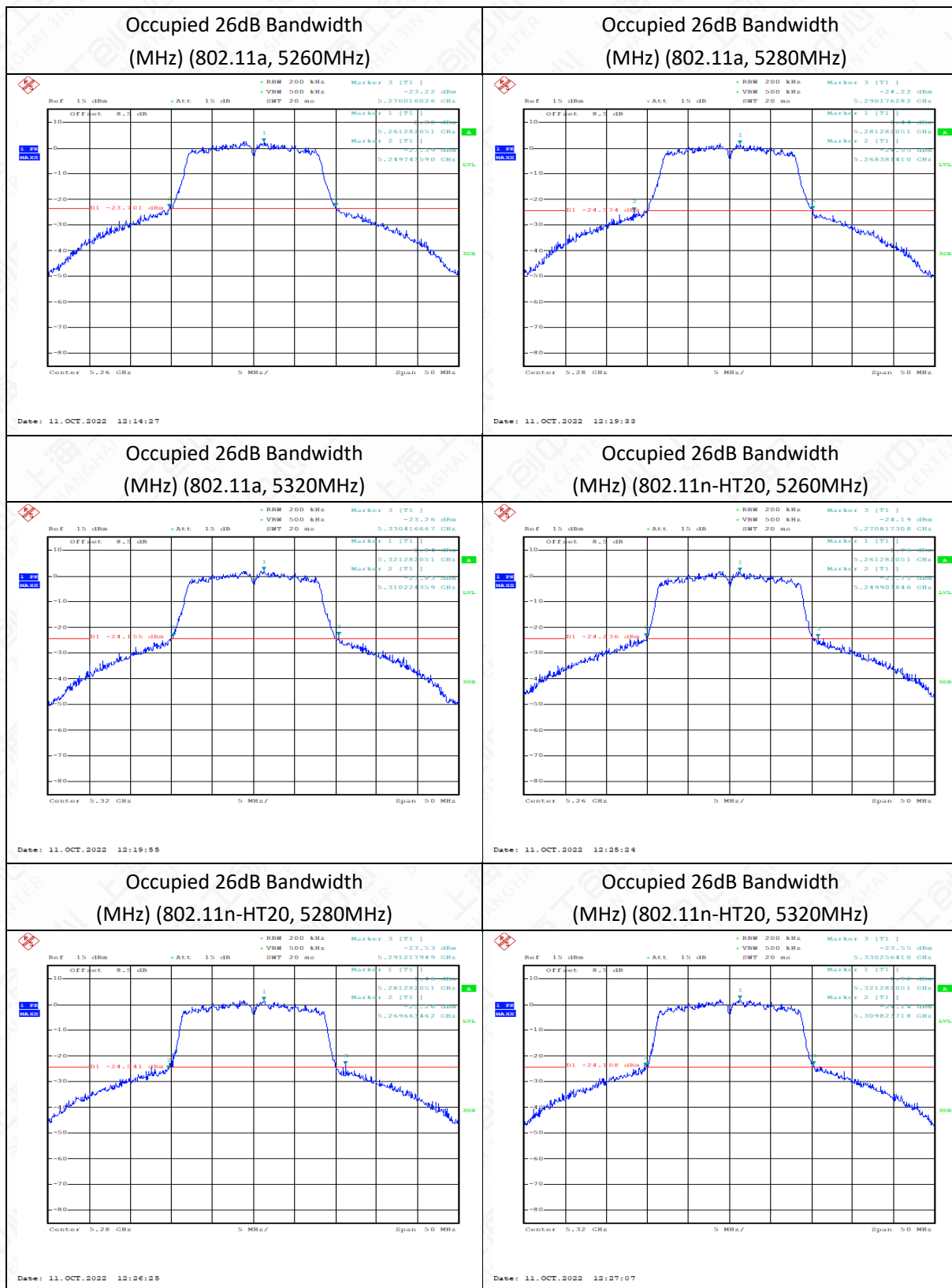
Date: 11.OCT.2022 14:40:16

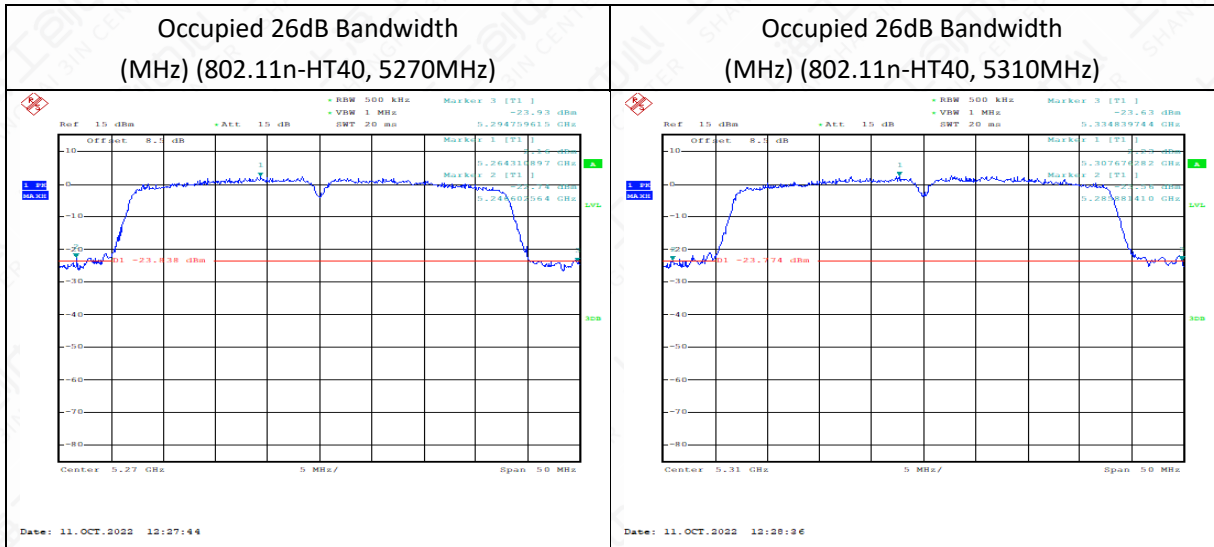
Occupied 26dB Bandwidth
(MHz) (802.11n-HT40, 5230MHz)



Date: 11.OCT.2022 14:40:41

U-NII-2a:





6.4 99% Occupied Bandwidth(conducted)

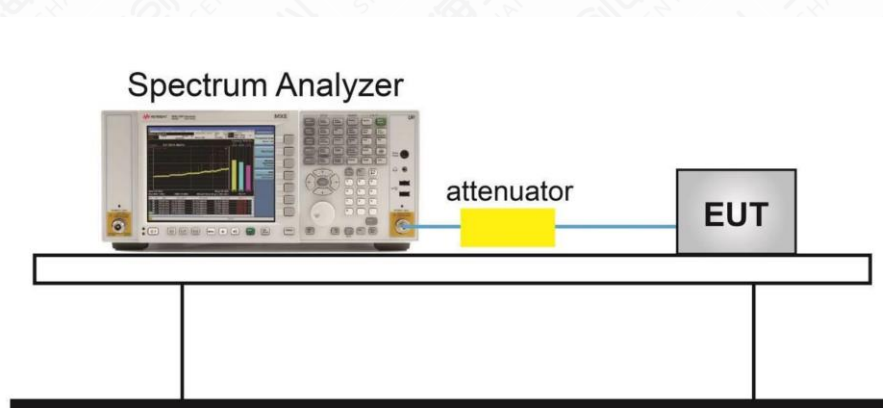
6.4.1 Measurement Limit and Method

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

The measurement method is made according to KDB 789033 D

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot$ RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

6.4.2 Test Setup



The measurement is made according to KDB 789033

6.4.3 Measurement Results

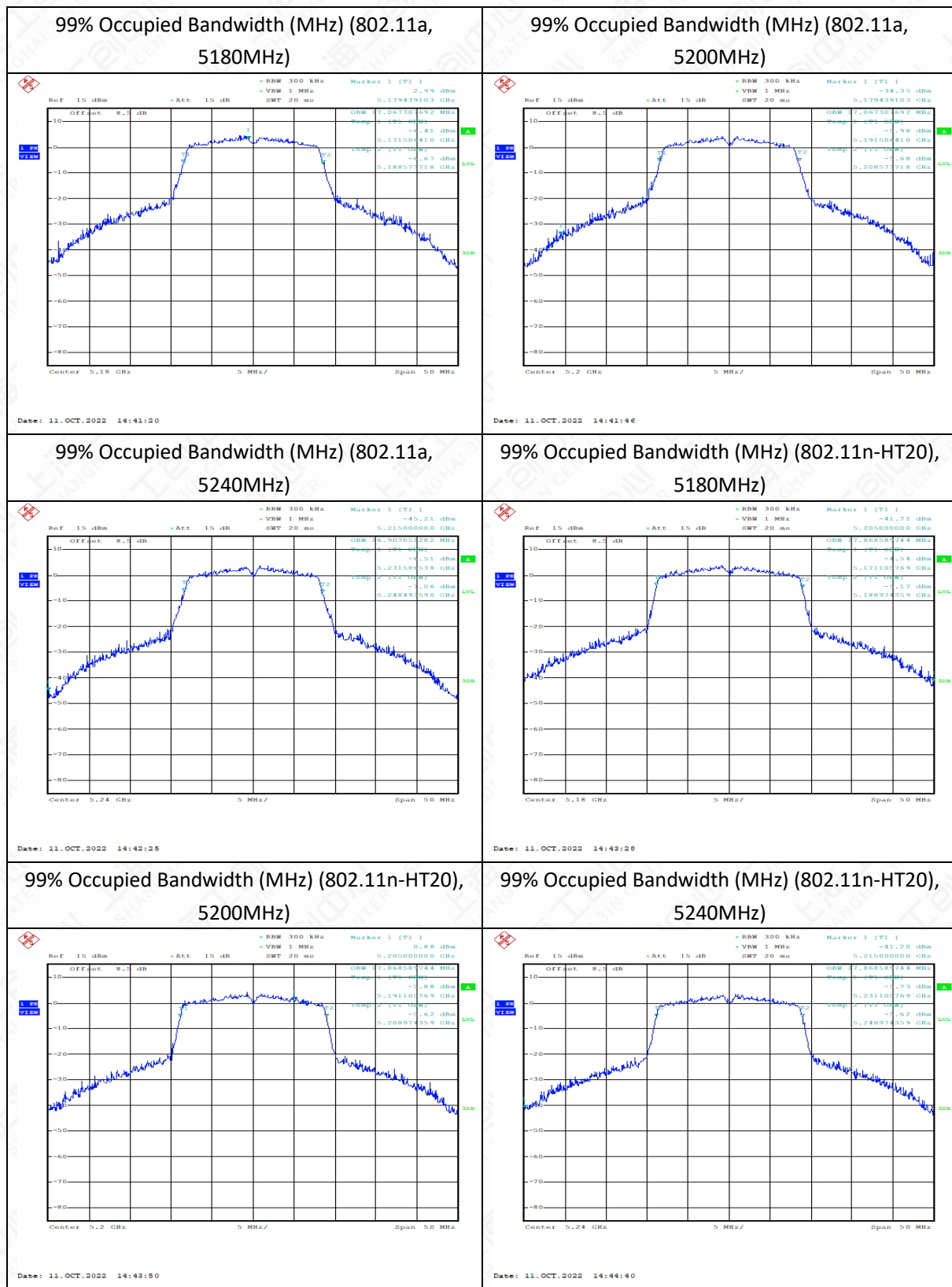
U-NII-1:

Mode	Channel	99% Occupied Bandwidth (MHz)	Conclusion
802.11a	5180 MHz	17.067	P
	5200 MHz	17.067	P
	5240 MHz	16.907	P
802.11n HT20	5180 MHz	17.869	P
	5200 MHz	17.869	P
	5240 MHz	17.869	P
802.11n HT40	5190 MHz	36.538	P
	5230 MHz	36.538	P

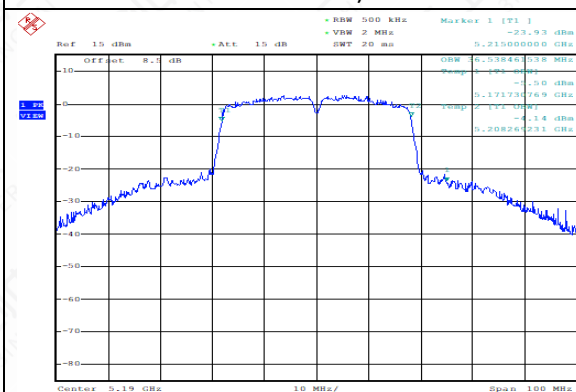
U-NII-2a

Mode	Channel	99% Occupied Bandwidth (MHz)	Conclusion
802.11a	5260 MHz	16.426	P
	5280 MHz	16.506	P
	5320 MHz	16.426	P
802.11n HT20	5260 MHz	17.628	P
	5280 MHz	17.628	P
	5320 MHz	17.628	P
802.11n HT40	5270 MHz	36.218	P
	5310 MHz	36.218	P

U-NII-1:

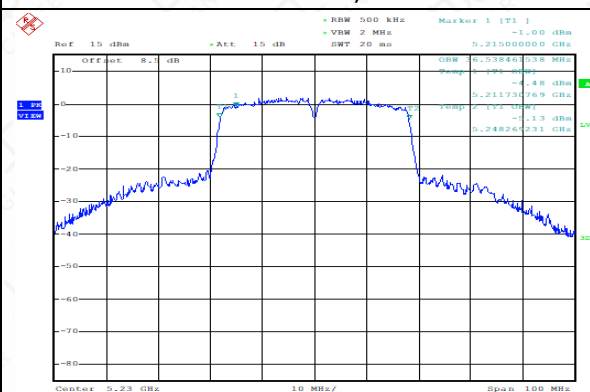


99% Occupied Bandwidth (MHz) (802.11n-HT40),
5190MHz)



Date: 11.OCT.2022 14:45:24

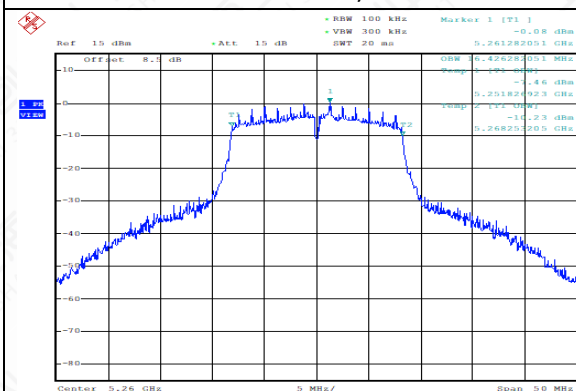
99% Occupied Bandwidth (MHz) (802.11n-HT40),
5230MHz)



Date: 11.OCT.2022 14:45:48

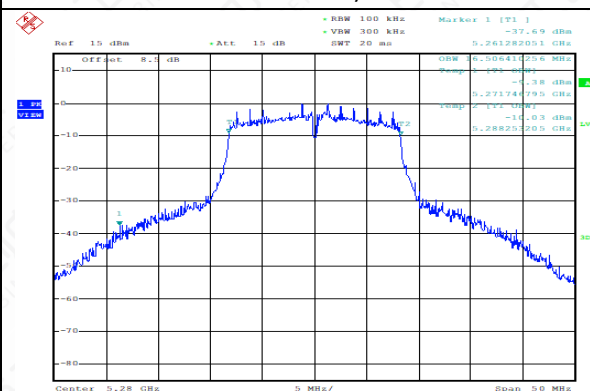
U-NII-2a:

99% Occupied Bandwidth (MHz) (802.11a,
5260MHz)



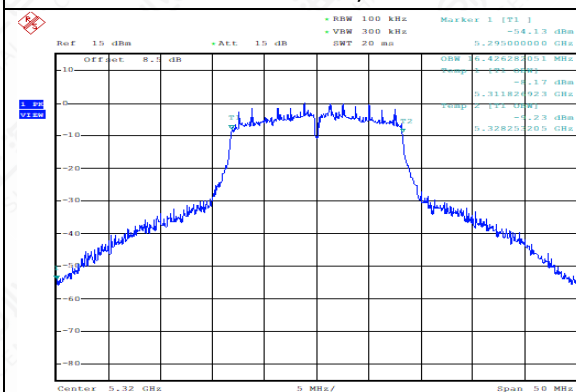
Date: 11.OCT.2022 12:30:12

99% Occupied Bandwidth (MHz) (802.11a,
5280MHz)



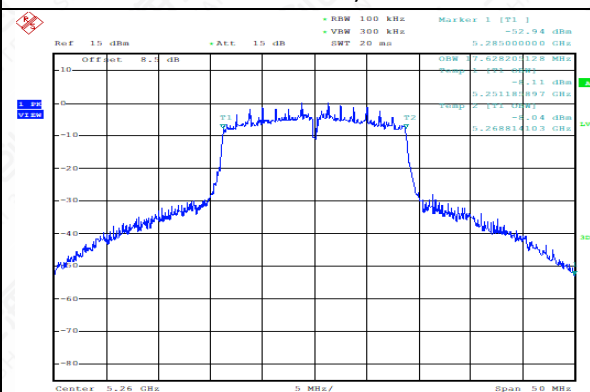
Date: 11.OCT.2022 12:30:44

99% Occupied Bandwidth (MHz) (802.11a,
5320MHz)



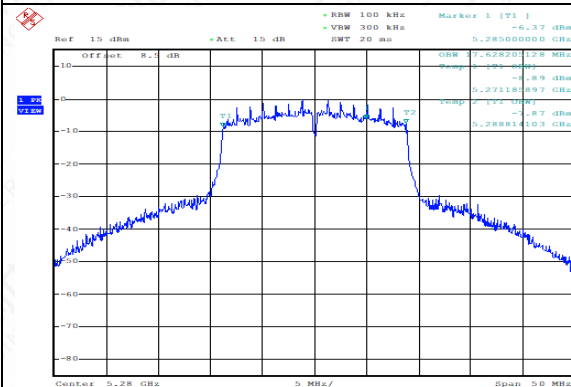
Date: 11.OCT.2022 12:32:18

99% Occupied Bandwidth (MHz) (802.11n-HT20),
5260MHz)



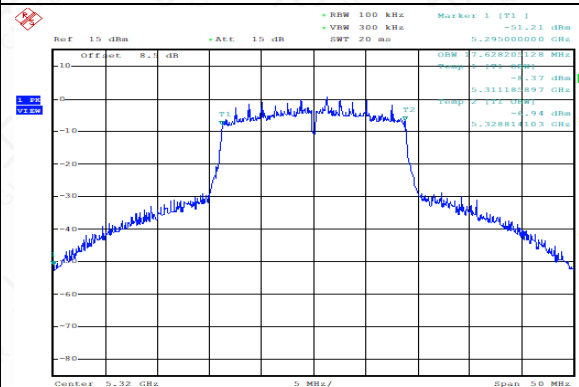
Date: 11.OCT.2022 12:33:12

99% Occupied Bandwidth (MHz) (802.11n-HT20),
5280MHz)



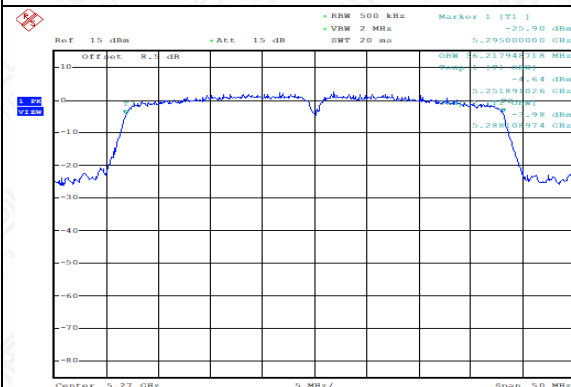
Date: 11.OCT.2022 12:32:34

99% Occupied Bandwidth (MHz) (802.11n-HT20), 5320MHz)



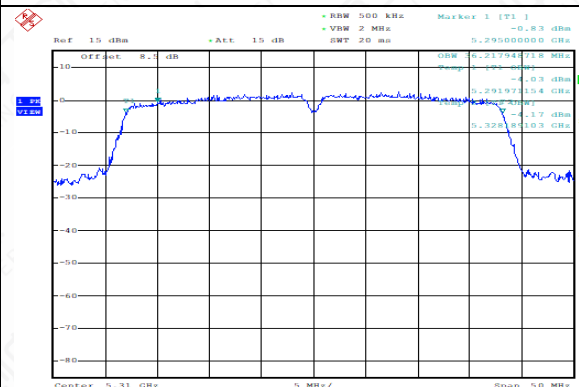
Date: 11.OCT.2022 12:34:21

99% Occupied Bandwidth (MHz) (802.11n-HT40),
5270MHz)



Date: 11.OCT.2022 12:35:18

99% Occupied Bandwidth (MHz) (802.11n-HT40), 5310MHz)



Date: 11.OCT.2022 12:35:45

6.5 Band Edges Compliance

6.5.1 Band Edges – conducted

Measurement Limit and Method:

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.

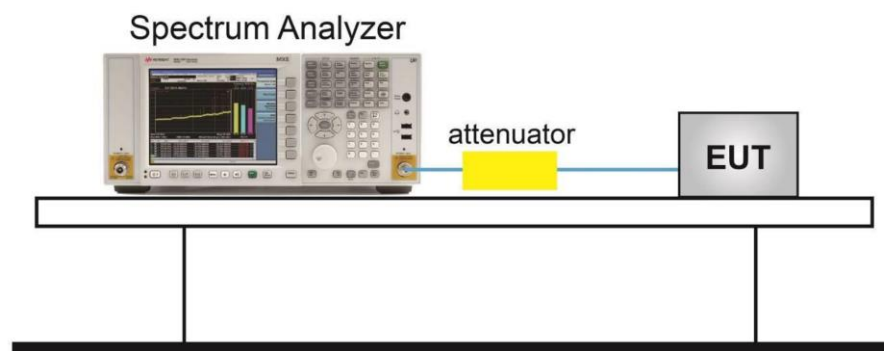
The measurement method is made according to KDB 789033 G(2)

- For all measurements, follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."
- At frequencies below 1000 MHz, use the procedure described in II.G.4. "Procedure for Unwanted Emissions Measurements Below 1000 MHz."
- At frequencies above 1000 MHz, use the procedure for maximum emissions described in II.G.5., "Procedure for Unwanted Emissions Measurements Above 1000 MHz."

(i) Sections 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.

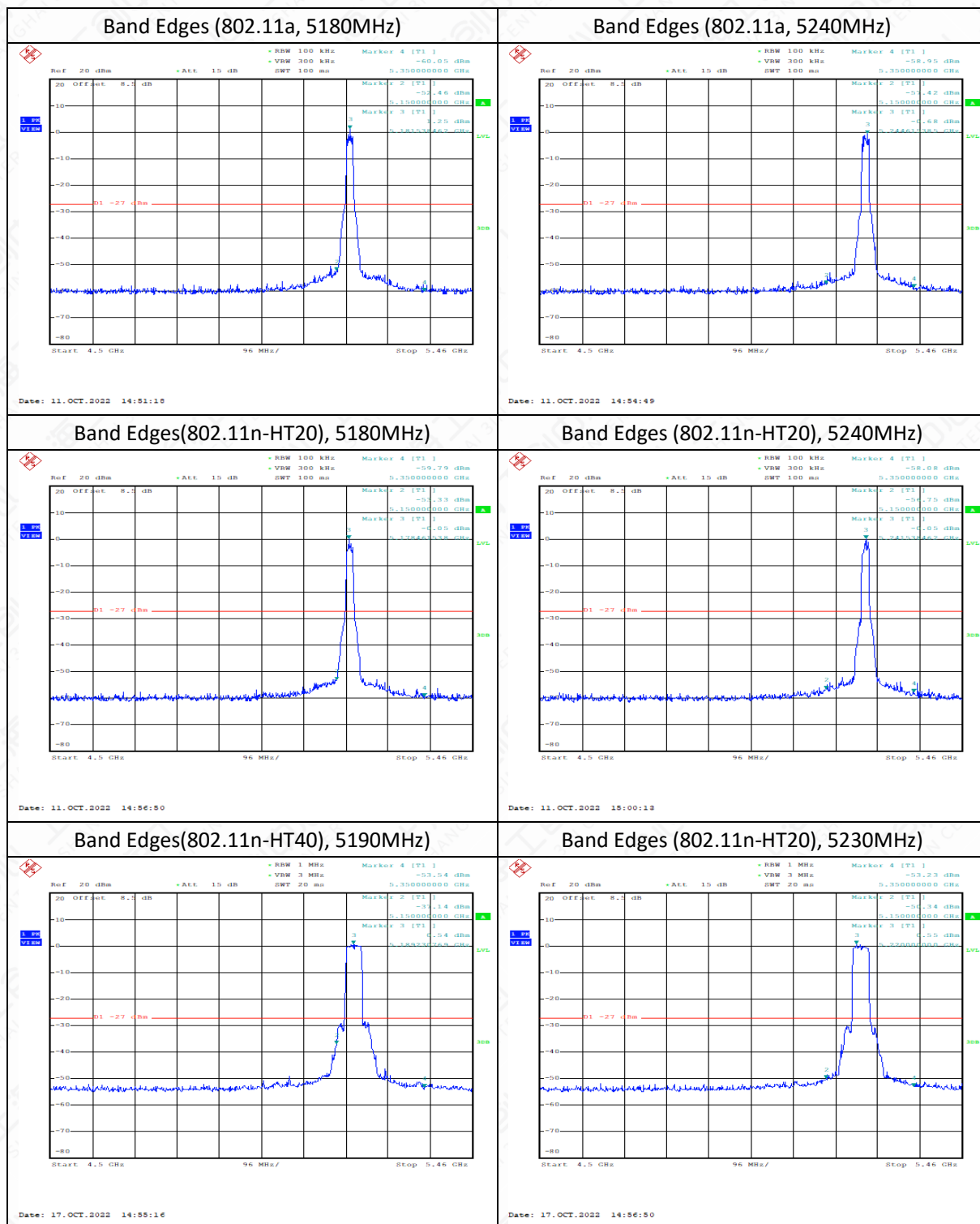
(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.

6.5.1.1 Test Setup

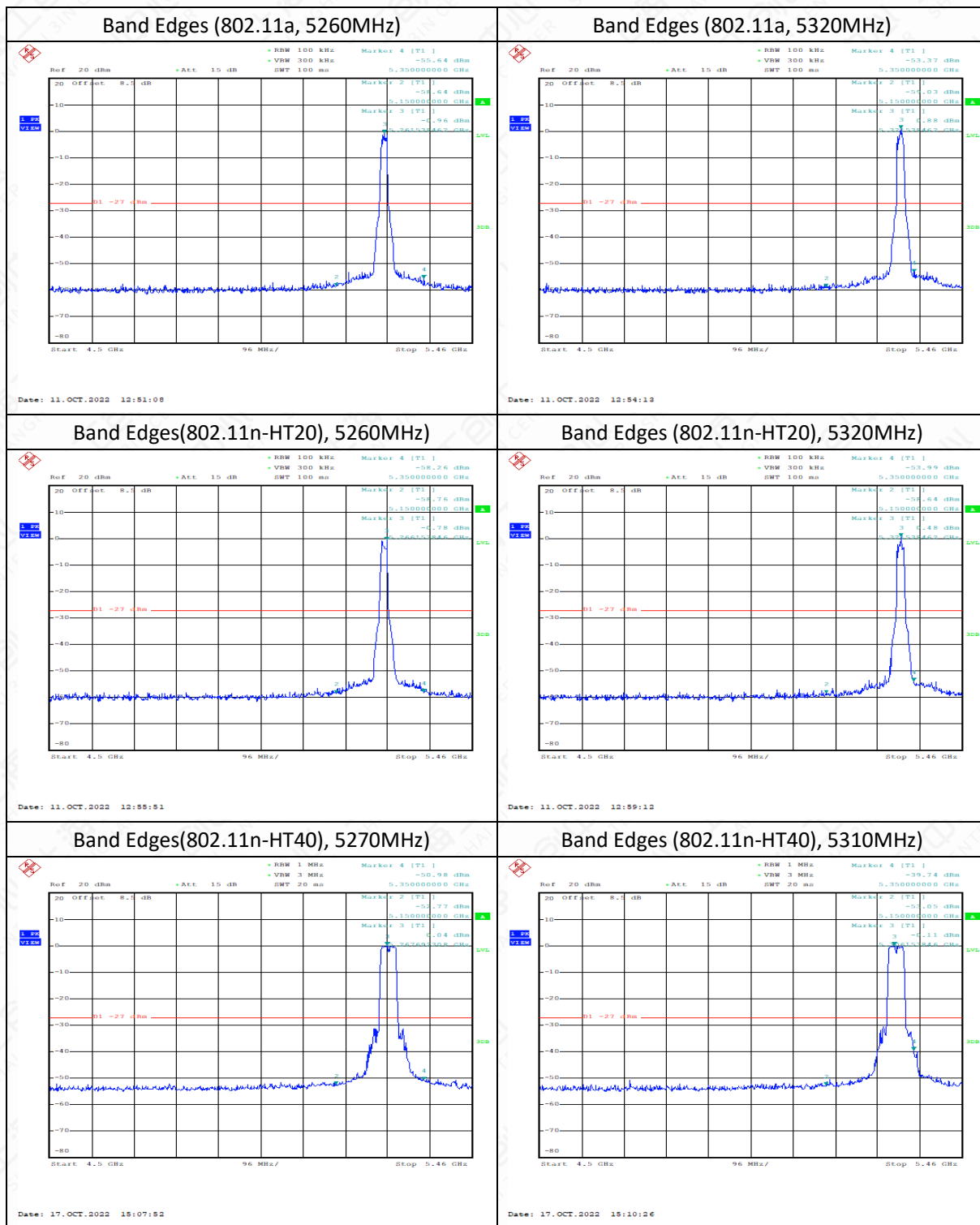


6.5.1.2 6.5.1.2 Measurement Result

U-NII-1:



U-NII-2a:



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

The measurement is made according to KDB 789033.

For maximum emissions measurements, follow the procedures described in II.G.5., “Procedures for Unwanted Maximum Emissions Measurements above 1000 MHz,” except for the following changes:

1. Set RBW = 100 kHz
2. Set VBW $\geq 3 \times$ RBW
3. Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured. CAUTION: You must ensure that the spectrum analyzer or EMI receiver is set for peak-detection and max-hold for this measurement.

For average emissions measurements, follow the procedures described in II.G.6., “Procedures for Average Unwanted Emissions Measurements above 1000 MHz,” except for the following changes:

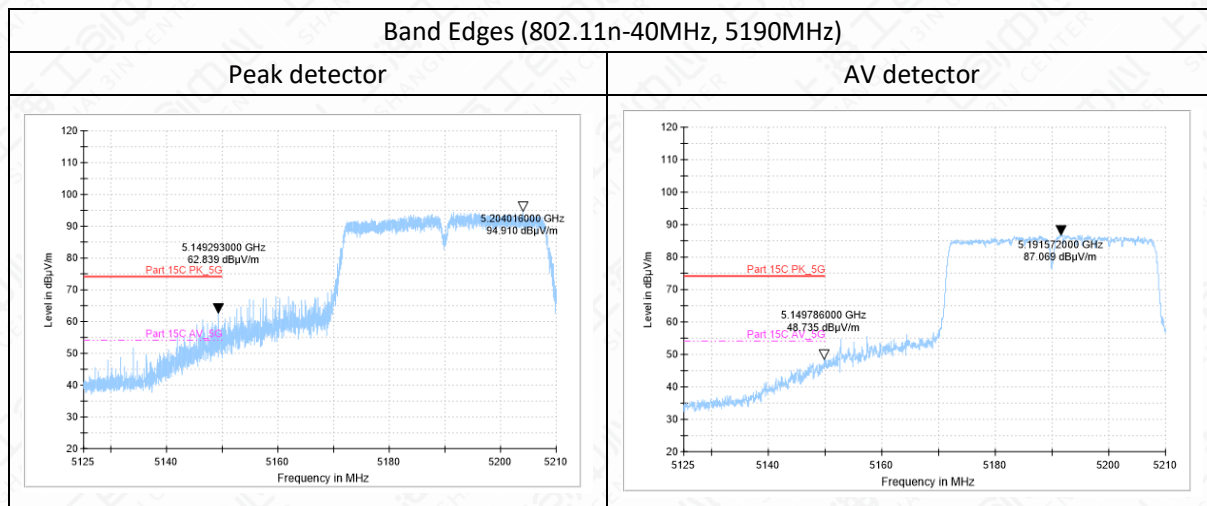
1. Set RBW = 100 kHz
2. Set VBW $\geq 3 \times$ RBW
3. Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.

6.5.2.2 Measurement Result

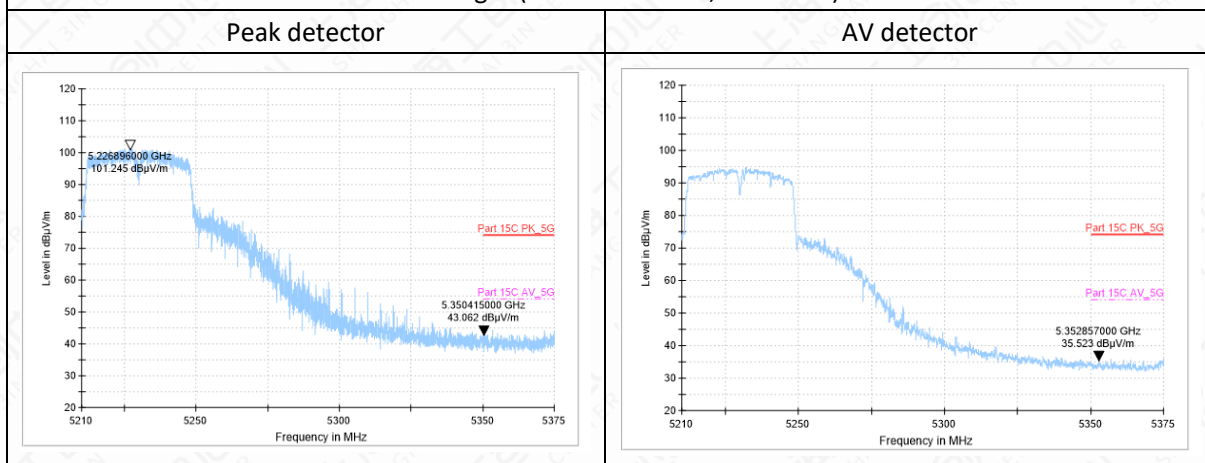
Standard version

Main Supply

U-NII-1 :

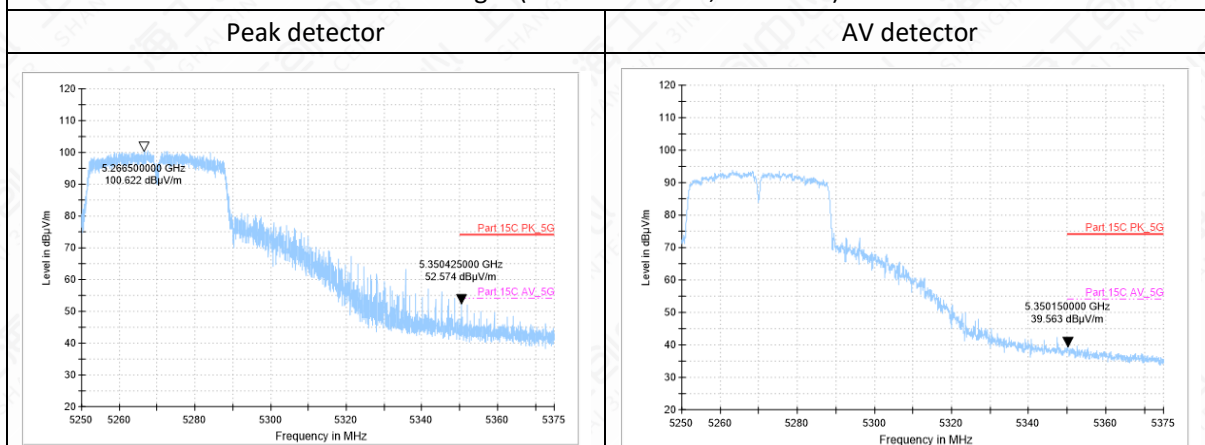


Band Edges (802.11n-40MHz, 5230MHz)

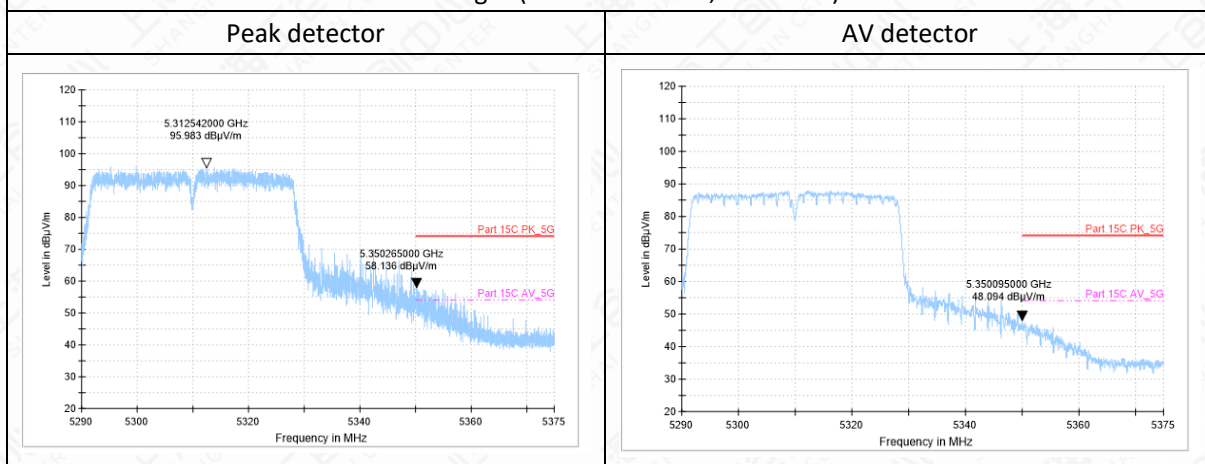


U-NII-2a :

Band Edges (802.11n-40MHz, 5270MHz)

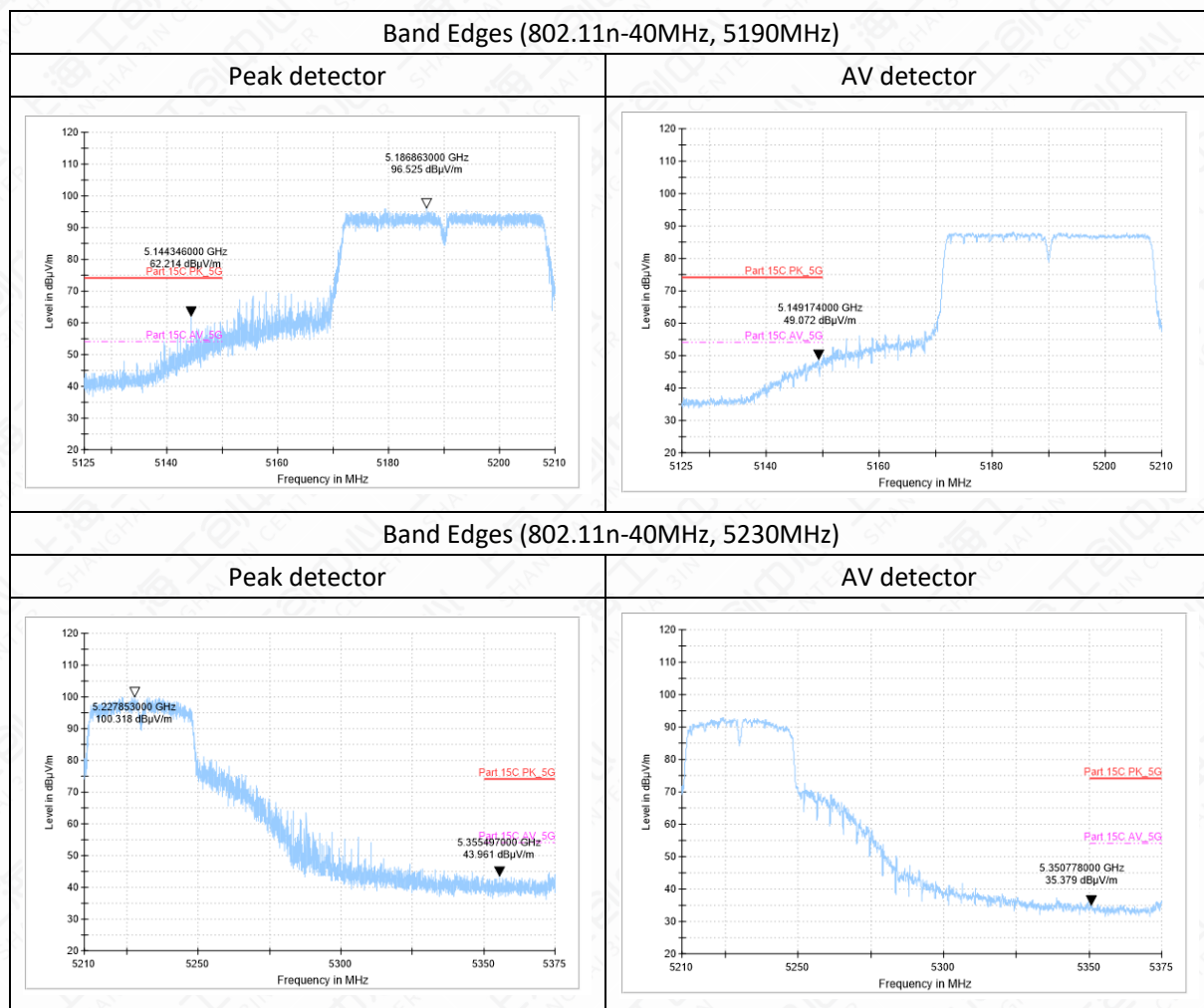


Band Edges (802.11n-40MHz, 5310MHz)

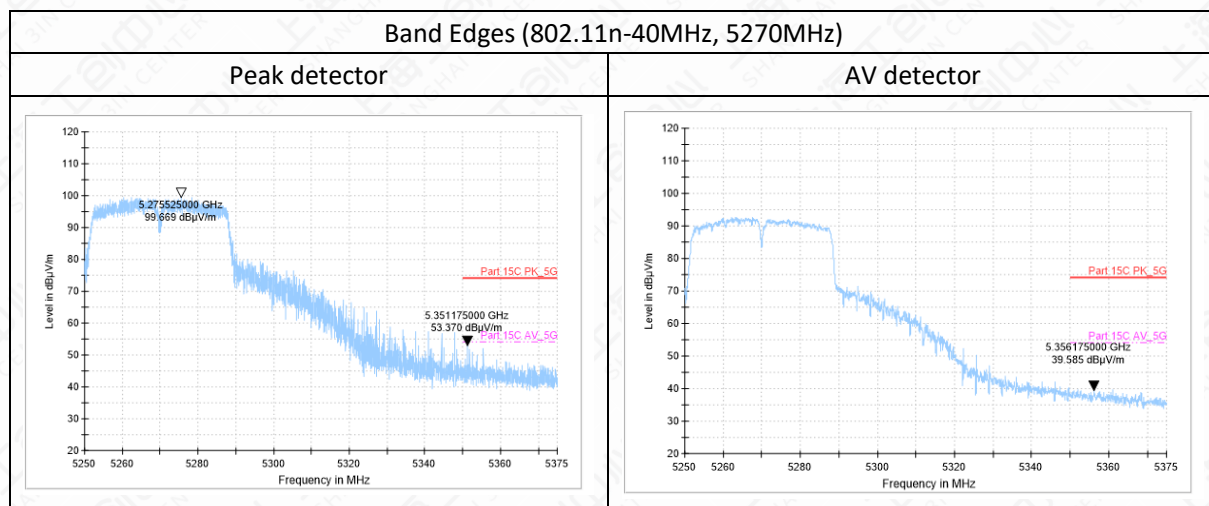


Secondary Supply

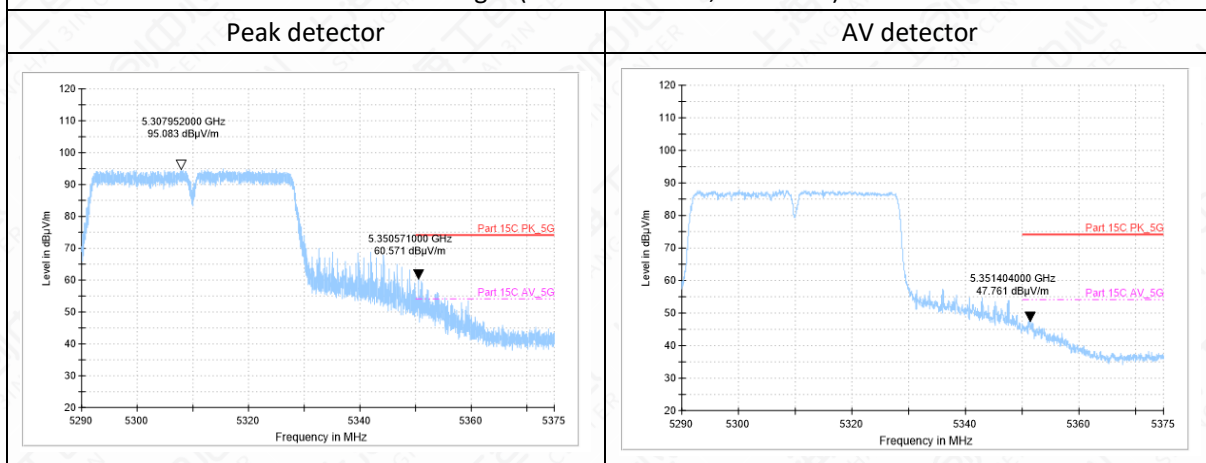
U-NII-1 :



U-NII-2a :



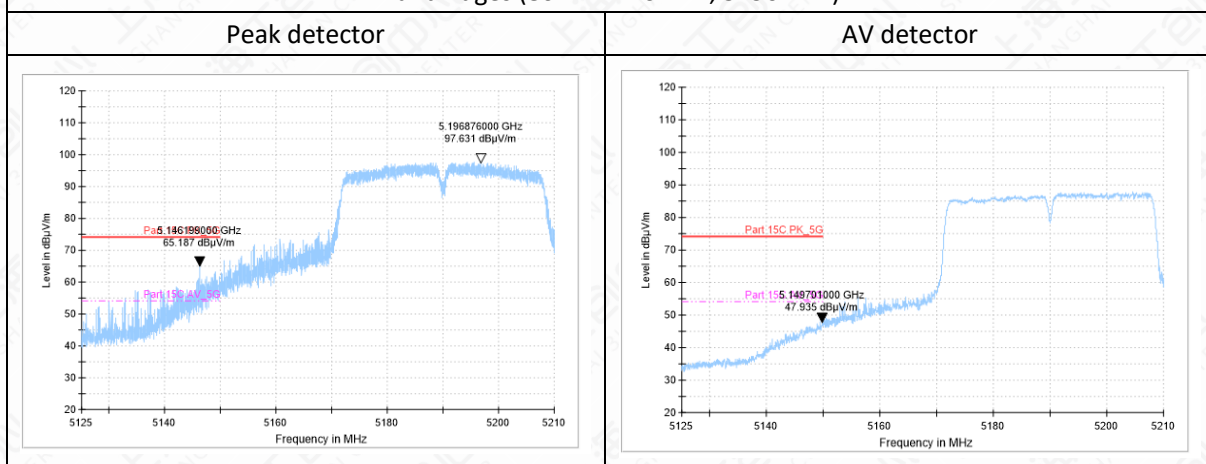
Band Edges (802.11n-40MHz, 5310MHz)



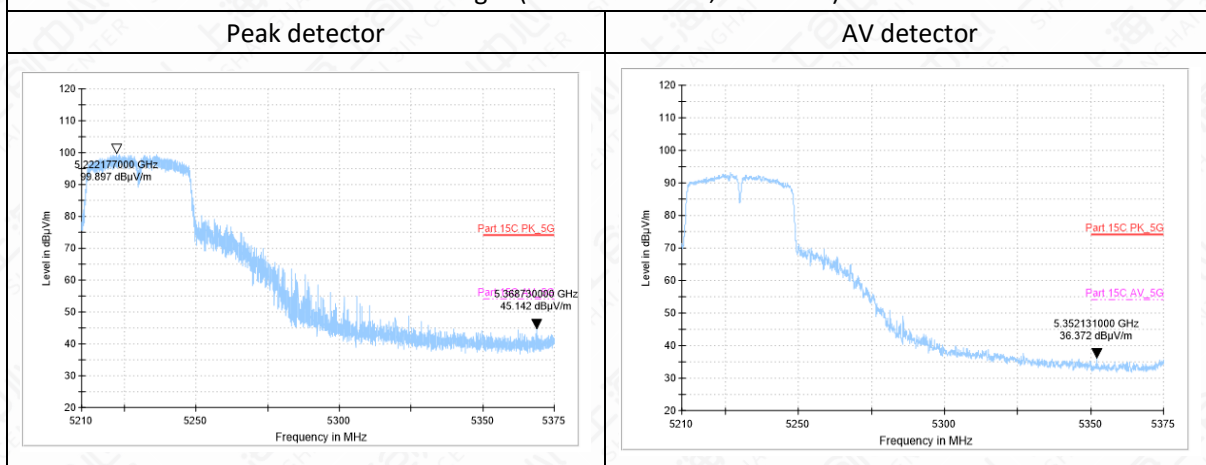
Third Supply

U-NII-1 :

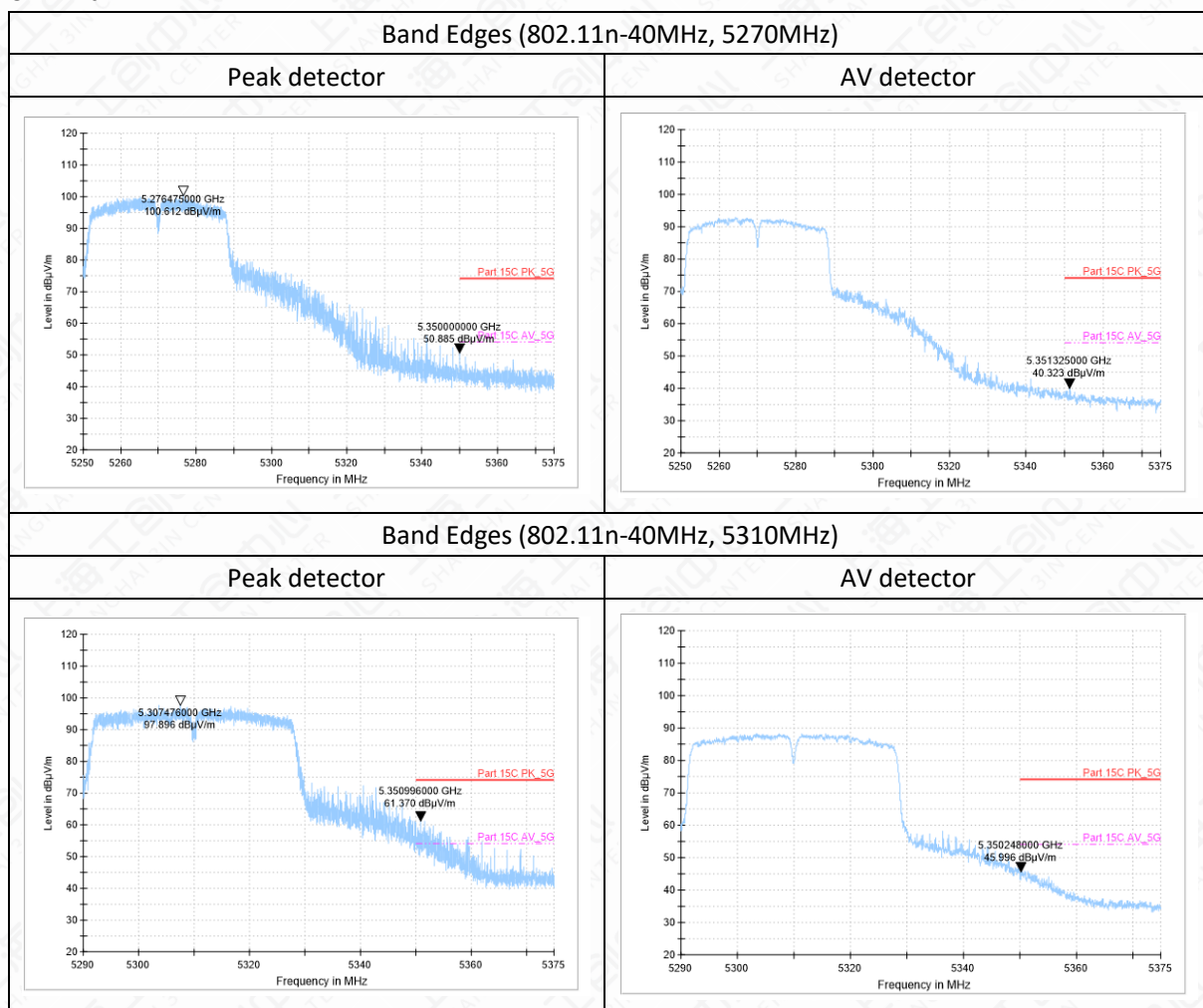
Band Edges (802.11n-40MHz, 5190MHz)



Band Edges (802.11n-40MHz, 5230MHz)



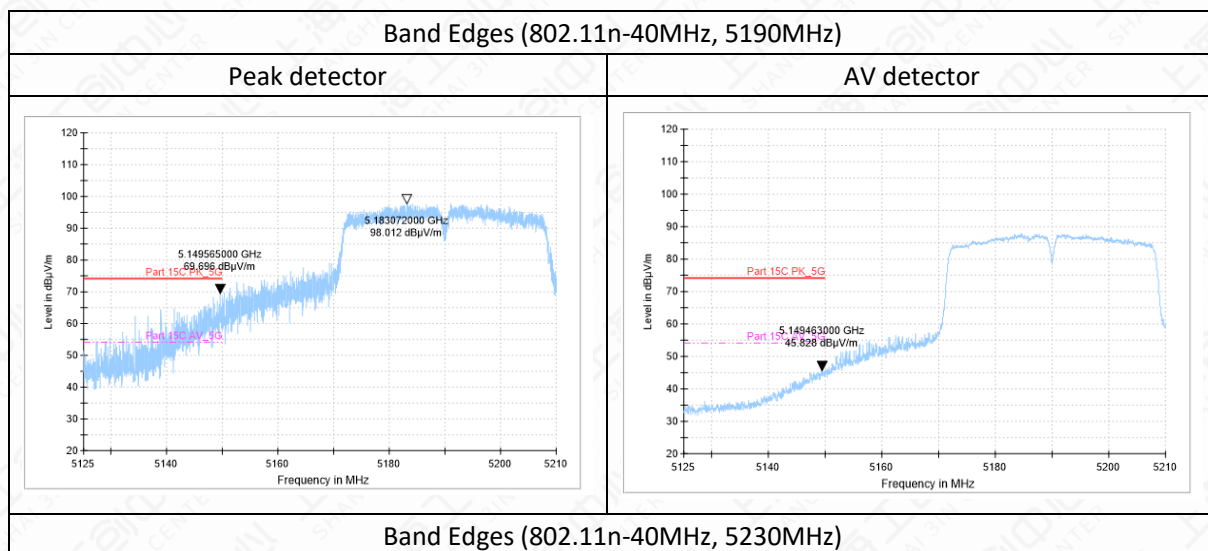
U-NII-2a :

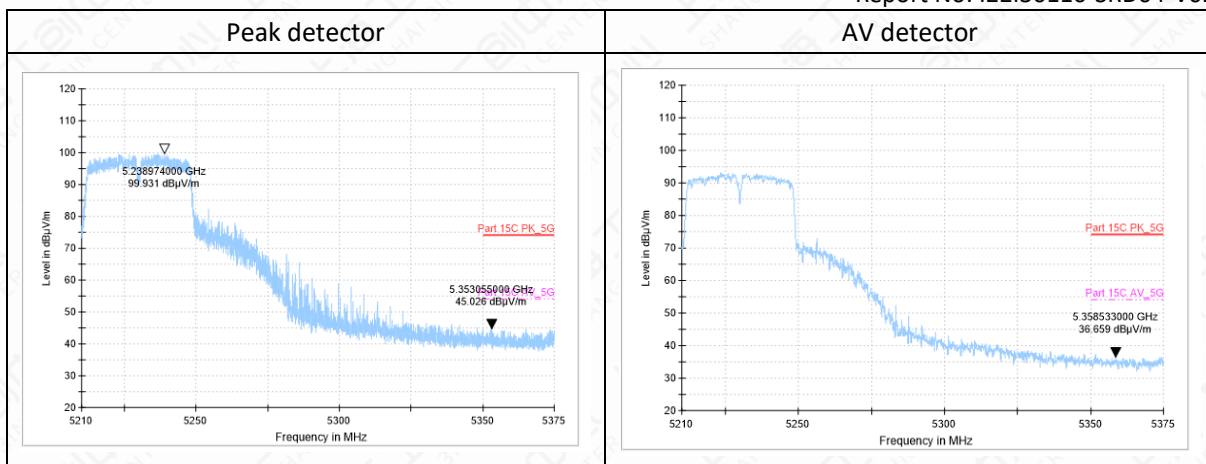


Scan code version

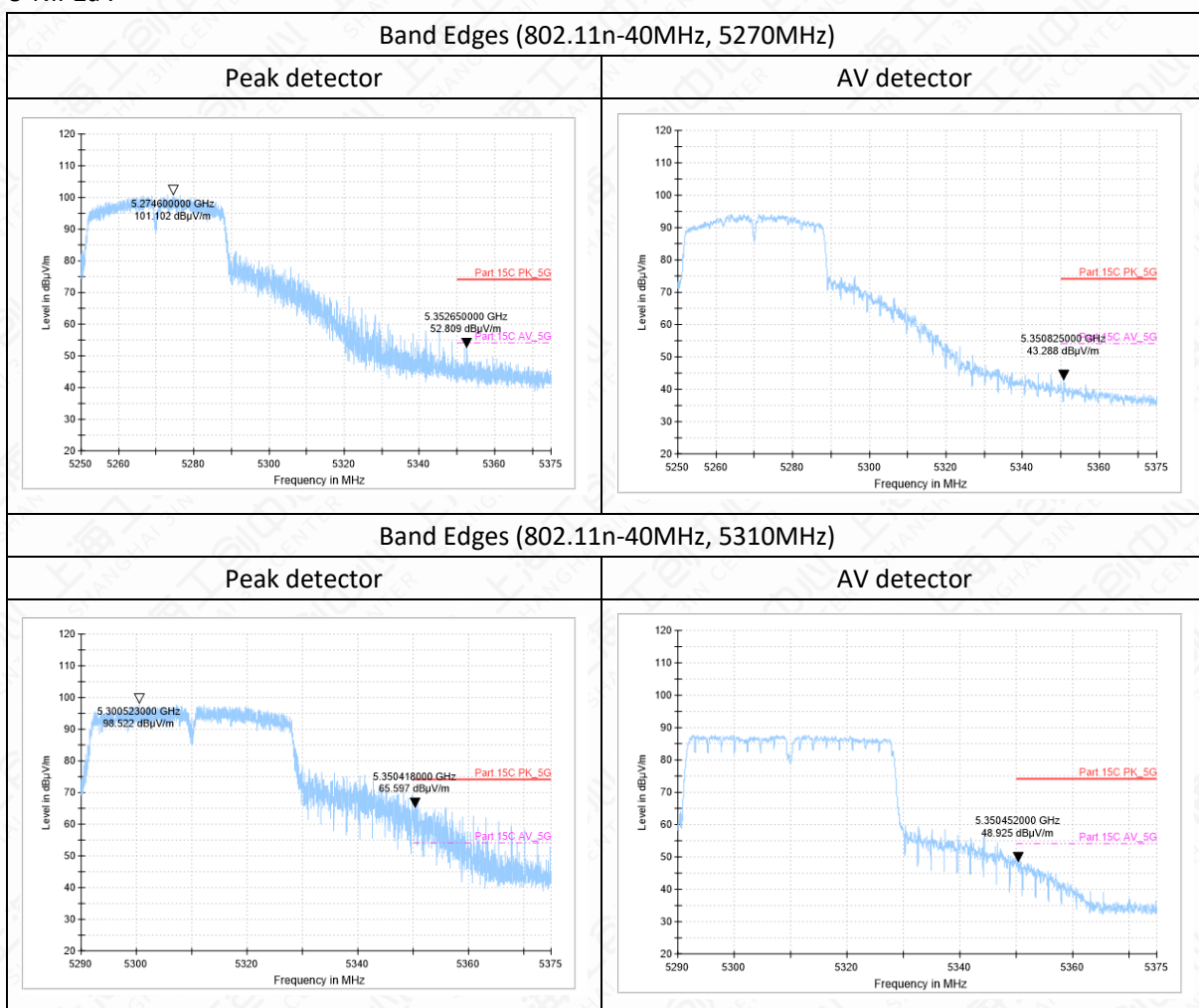
Main Supply

U-NII-1 :





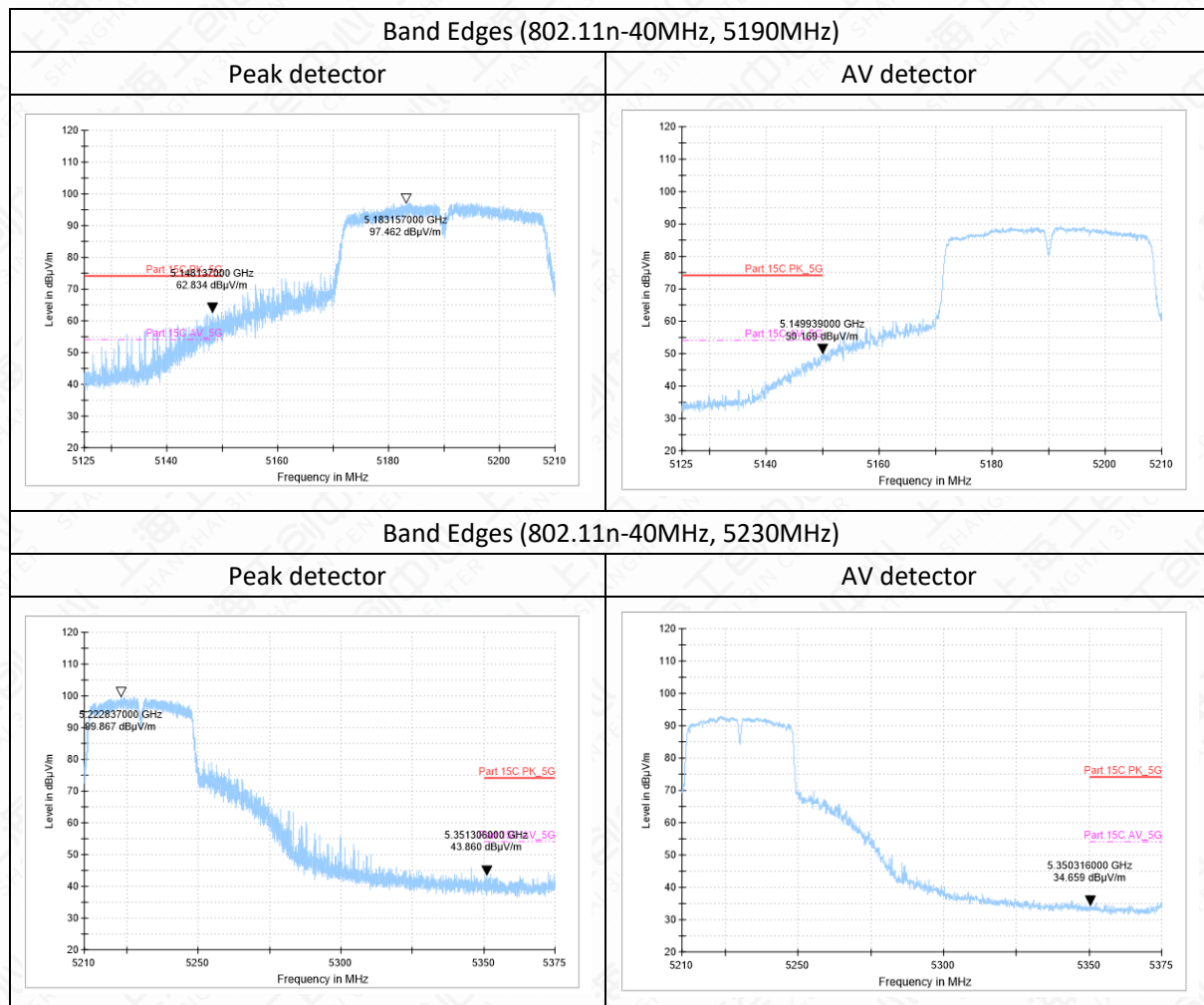
U-NII-2a :



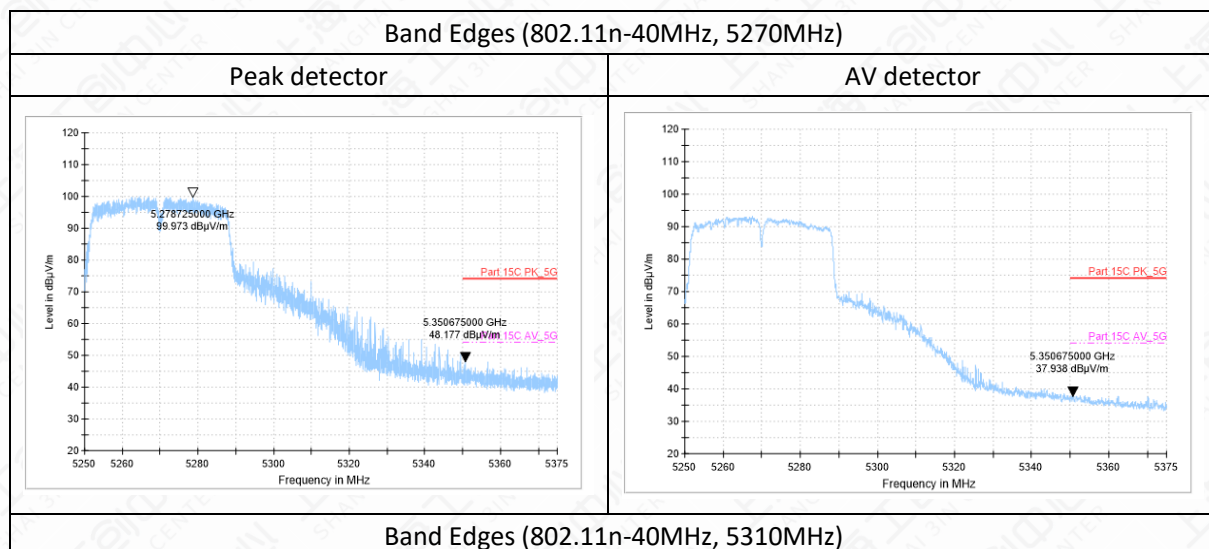
Fingerprint version

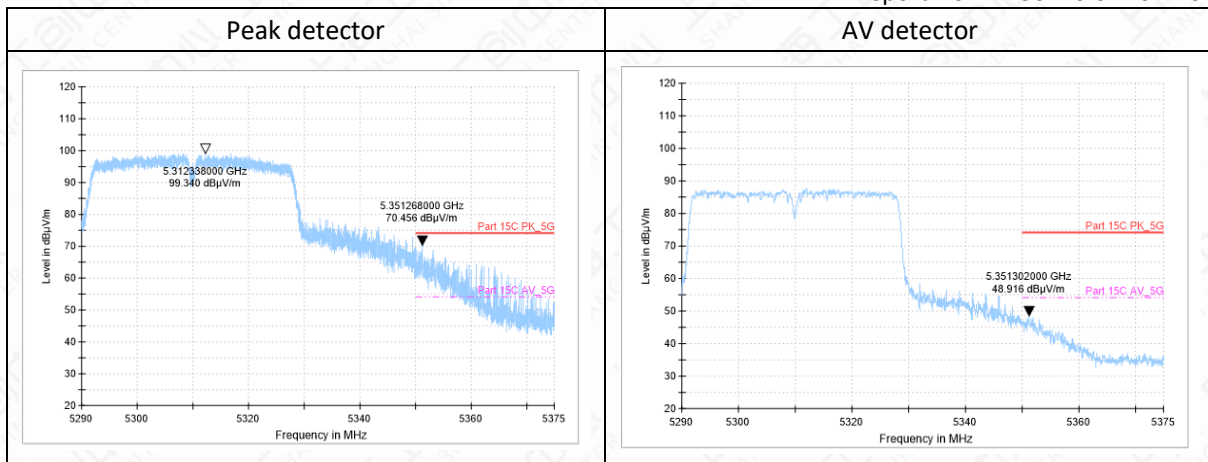
Main Supply

U-NII-1 :



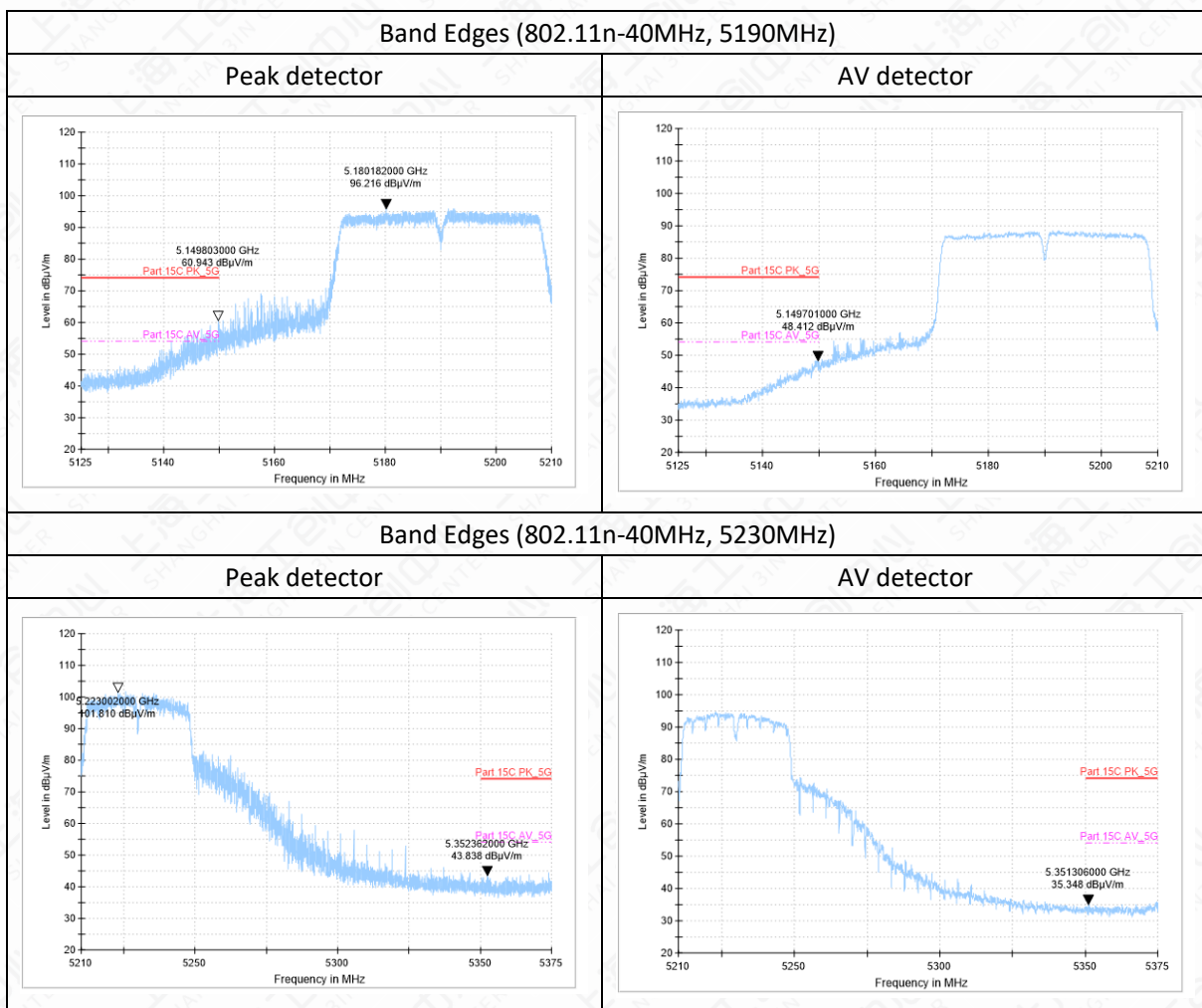
U-NII-2a :



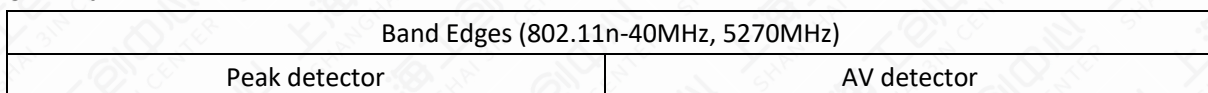


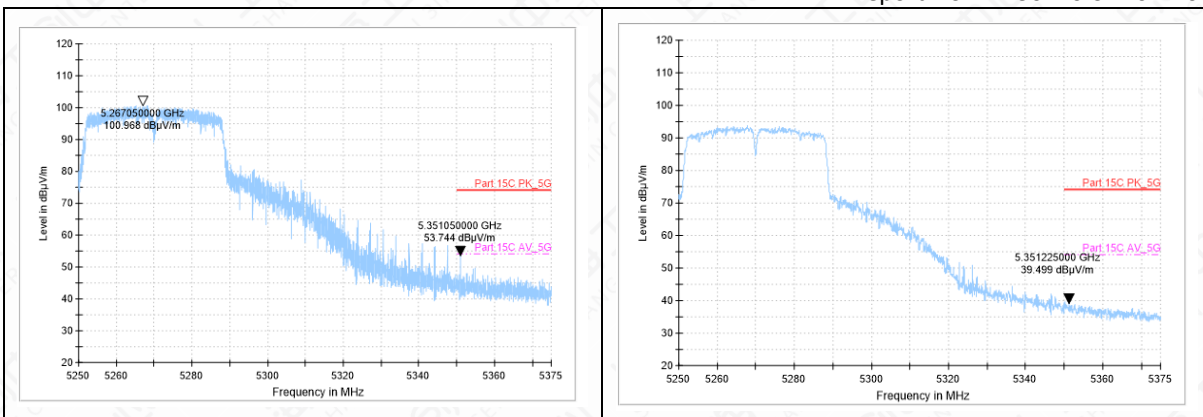
Secondary Supply

U-NII-1 :

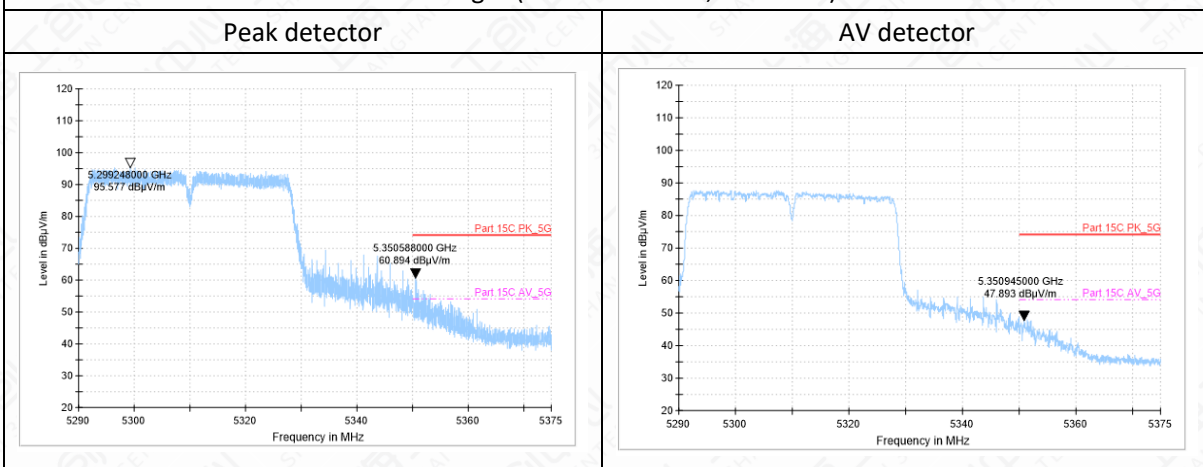


U-NII-2a :



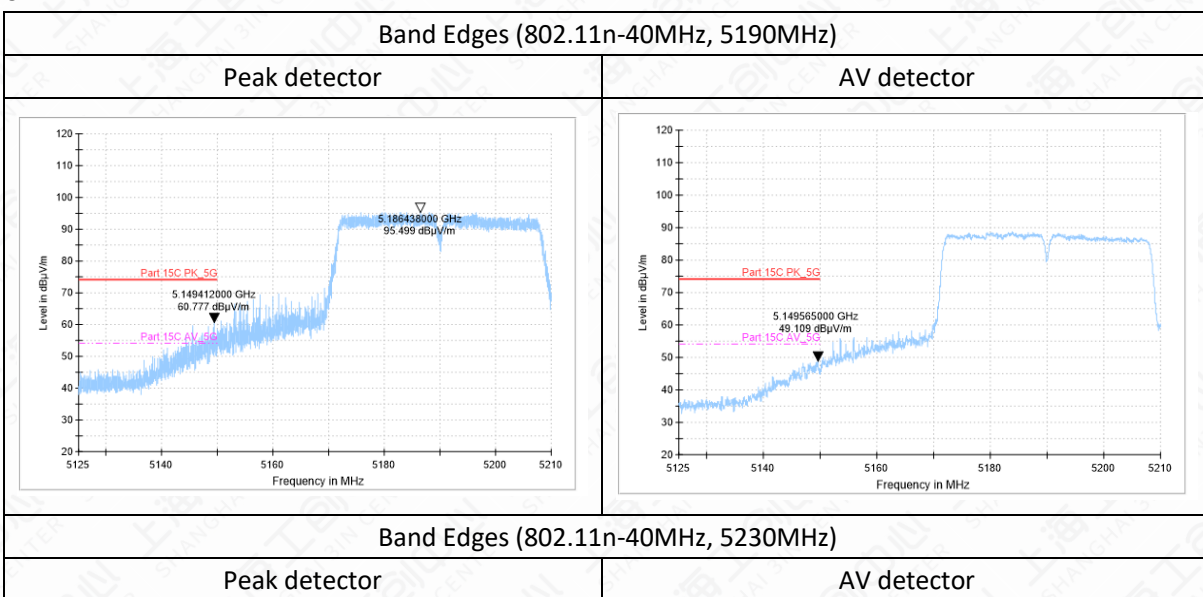


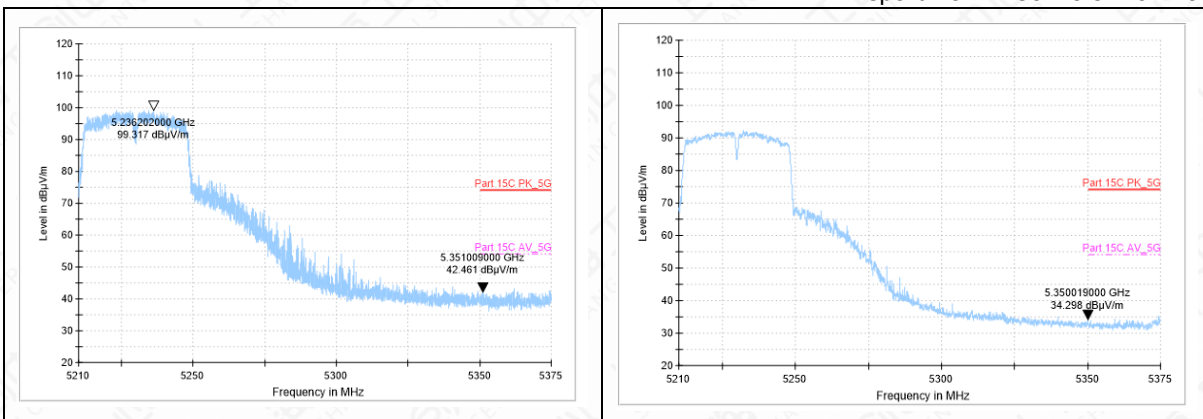
Band Edges (802.11n-40MHz, 5310MHz)



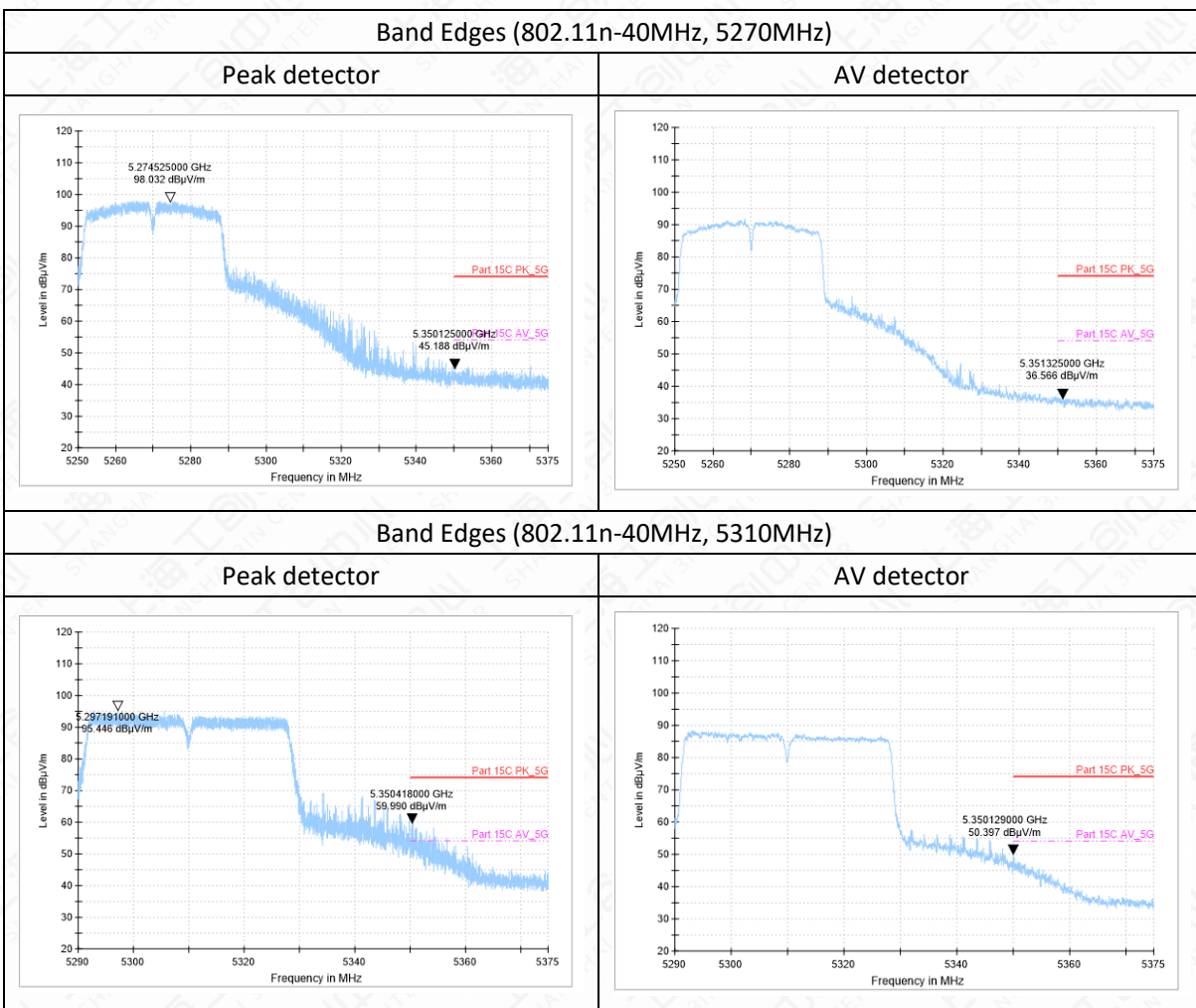
Third Supply

U-NII-1 :





U-NII-2a :



6.6 Transmitter Spurious Emission

6.6.1 Measurement Limit and Method

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

Set the spectrum analyzer in the following:

Below 1GHz:

- Follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."
- Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

Detector: Peak and Quasi-Peak

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

Above 1GHz (detector: Peak):

- Follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."
- Maximum emission levels are measured by setting the analyzer as follows:
 - RBW = 1 MHz.
 - VBW ≥ 3 MHz.
 - Detector = Peak.
 - Sweep time = auto.
 - Trace mode = max hold.
 - Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous,

the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

Limit in restricted band:

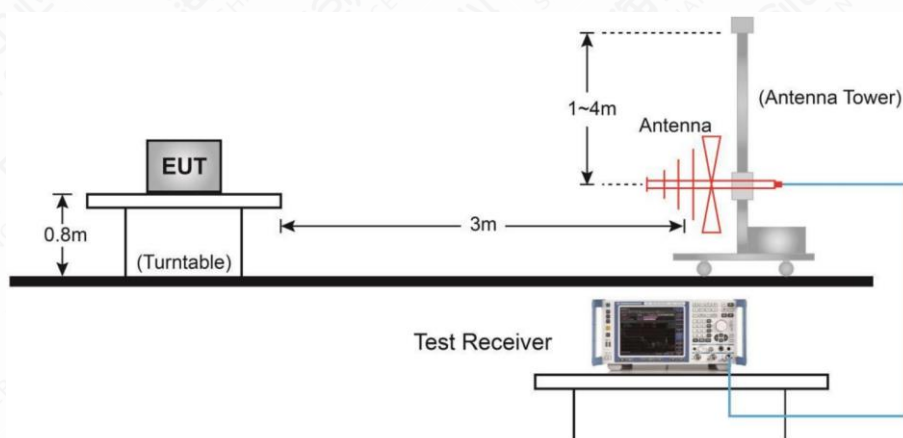
Frequency of emission (MHz)	Field strength(dBμV/m)	Measurement distance(m)
0.009-0.490	129-94	3
0.490-1.705	74-63	3
1.705-30	70	3

30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

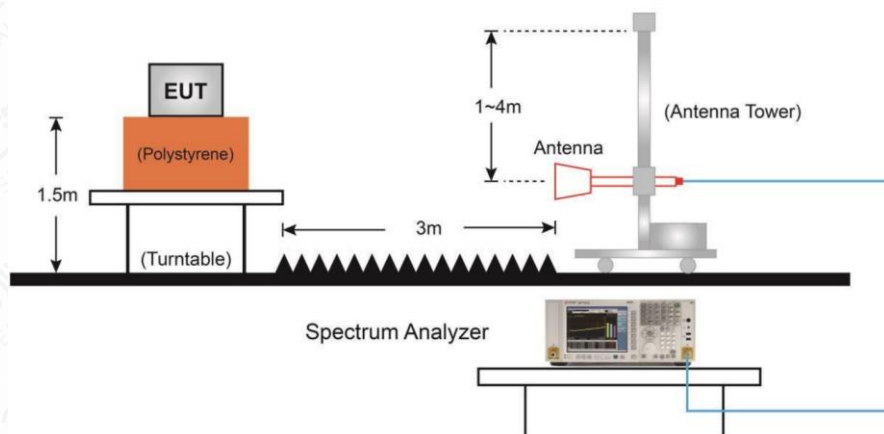
Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m

6.6.2 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

The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

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

U-NII-1:

Mode	Data rate	Channel
802.11n-HT40	MCS0	38(5190MHz)
802.11n-HT40	MCS0	46(5230MHz)

U-NII-2a:

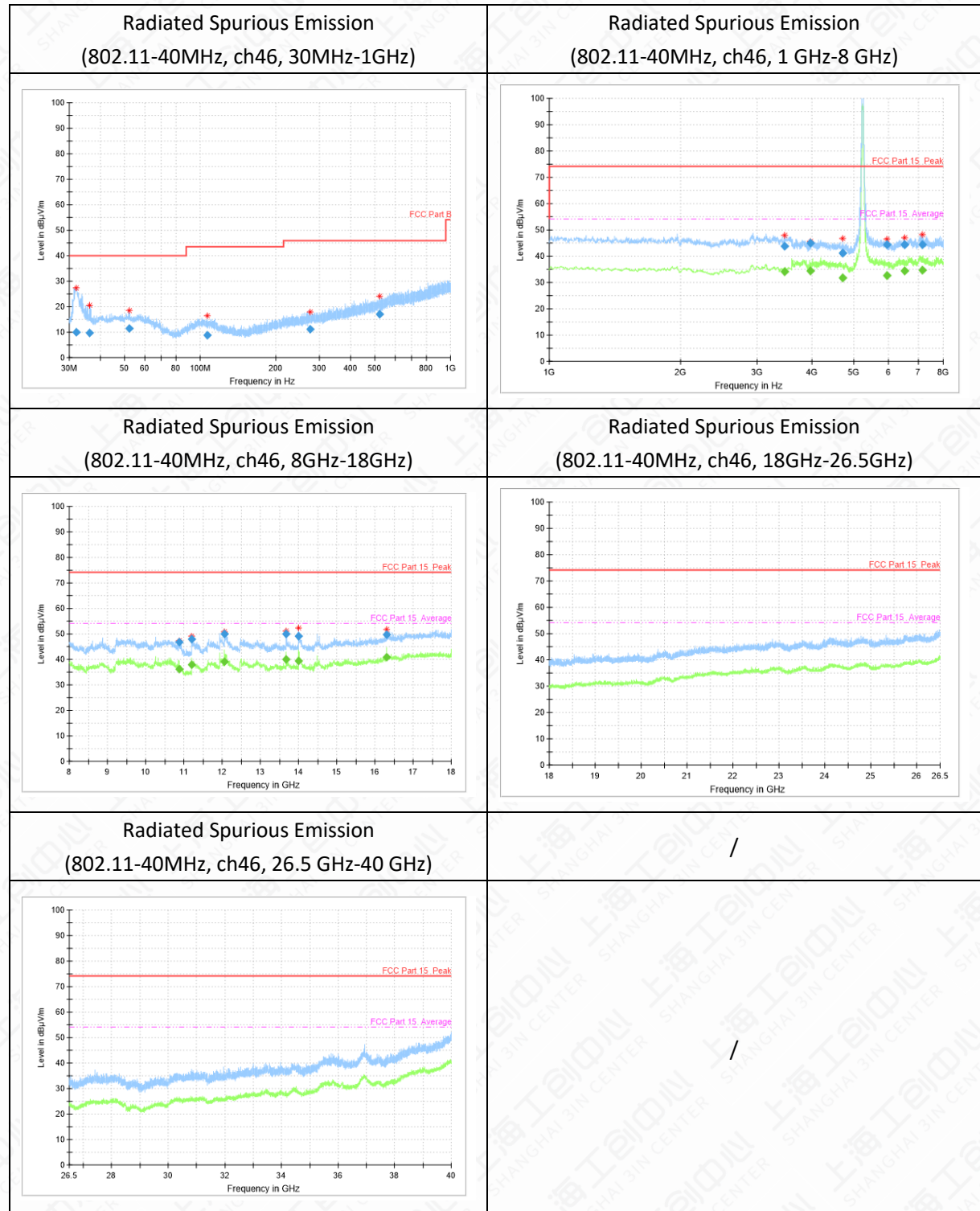
Mode	Data rate	Channel
802.11n-HT40	MCS0	54(5270MHz)
802.11n-HT40	MCS0	62(5310MHz)

6.6.3 Measurement Results

Standard version

Main Supply

U-NII-1



802.11-40MHz

Channel 46(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.0	10.03	-14.3	24.33	H
36.2	9.8	-13.7	23.5	H
51.9	11.46	-12	23.46	H
106.5	8.72	-13.2	21.92	H
274.4	11.14	-11	22.14	H
521.9	17.16	-5.6	22.76	H

Channel 46(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3467.2	43.8	1.3	42.5	H
3974.0	44.94	1.2	43.74	V
4709.4	41.21	1	40.21	V
5952.0	44.34	2.2	42.14	H
6511.4	44.33	3	41.33	H
7149.8	44.49	4.1	40.39	H

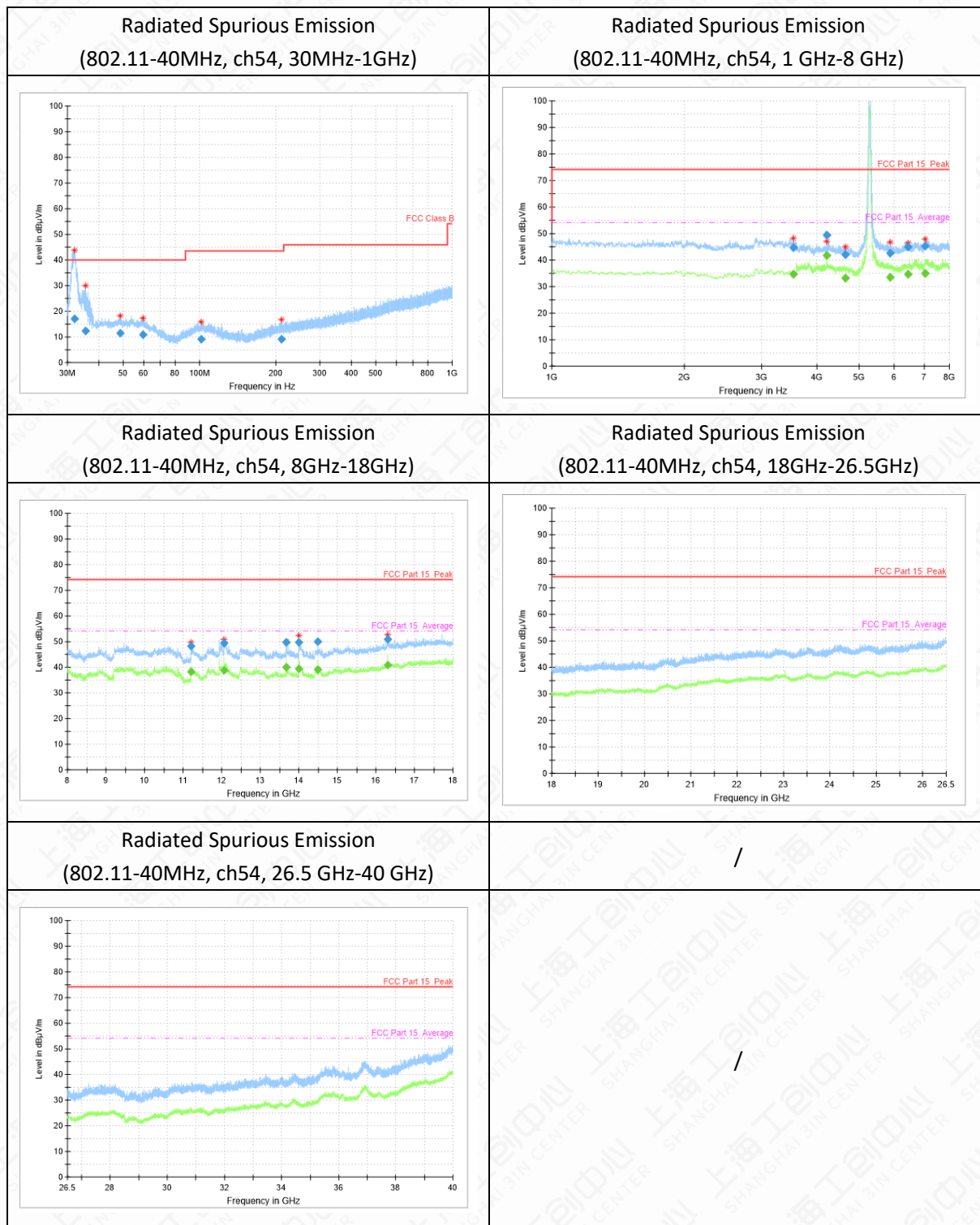
Channel 46(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
10870.0	46.77	7	39.77	V
11203.0	48.05	8	40.05	H
12054.0	50.02	10.2	39.82	H
13675.8	50.01	11.6	38.41	V
14006.4	49.1	12.4	36.7	H
16301.6	49.8	16.1	33.7	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a



802.11-40MHz

Channel 54(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
31.9	16.94	-14.4	31.34	V
35.3	12.35	-14	26.35	V
48.5	11.4	-12.2	23.6	H
59.7	10.85	-12.3	23.15	H
101.5	9.19	-13.3	22.49	V
211.0	9.12	-13.4	22.52	H

Channel 54(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3535.0	44.69	1.2	43.49	V
4216.0	49.43	1.2	48.23	H
4634.8	42.19	1.3	40.89	H
5869.0	42.73	2.3	40.43	V
6438.4	44.9	2.9	42	H
7030.6	45.37	4.5	40.87	V

Channel 54(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11201.0	48.16	7.9	40.26	V
12056.0	49.36	10.2	39.16	V
13677.2	49.56	11.6	37.96	V
14002.0	49.68	12.4	37.28	H
14485.4	50.08	12.5	37.58	V
16301.2	50.79	16.1	34.69	V

Channel 54(8GHz ~ 18GHz)(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15781.0	47.92	14.8	33.12	V

Note:

- The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Secondary Supply

U-NII-1

Radiated Spurious Emission (802.11-40MHz, ch38, 30MHz-1GHz)	Radiated Spurious Emission (802.11-40MHz, ch38, 1 GHz-8 GHz)
Radiated Spurious Emission (802.11-40MHz, ch38, 8GHz-18GHz)	Radiated Spurious Emission (802.11-40MHz, ch38, 18GHz-26.5GHz)
Radiated Spurious Emission (802.11-40MHz, ch38, 26.5 GHz-40 GHz)	/

802.11-40MHz

Channel 38(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.0	11.26	-14.4	25.66	V
35.3	13.24	-14	27.24	V
56.3	10.01	-12.3	22.31	V
122.7	13.35	-15.8	29.15	V
236.5	9.97	-12.7	22.67	H
439.3	16.28	-7.8	24.08	H

Channel 38 (1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5498.0	45.85	2.3	43.55	H
5800.4	44.03	2.1	41.93	H
6366.2	46.03	2.8	43.23	V
6734.8	46.43	3.7	42.73	H
7177.8	44.92	4	40.92	H
7739.4	44.51	3.9	40.61	H

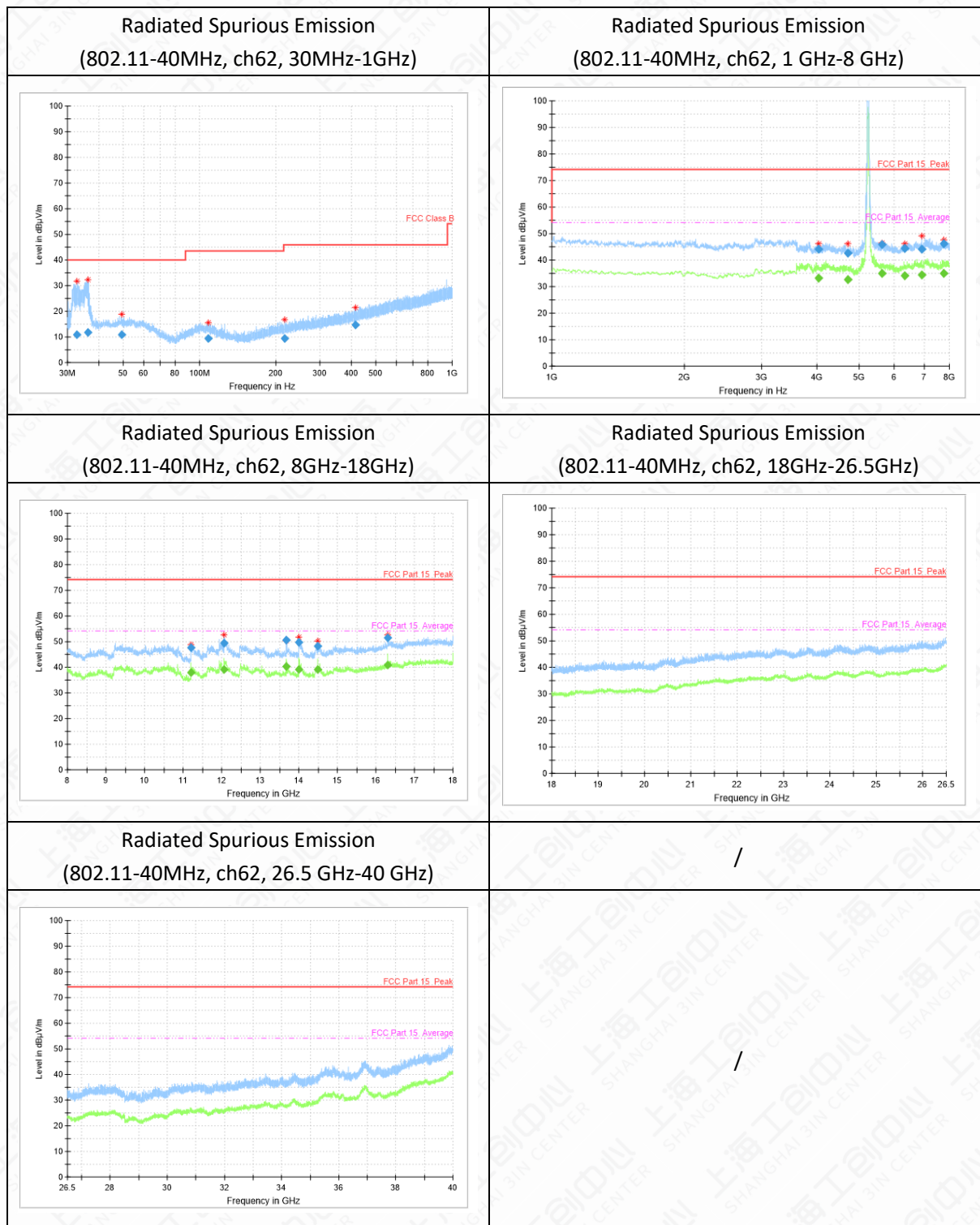
Channel 38(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11217.0	48.43	8	40.43	H
12490.2	50.4	10.3	40.1	H
13676.8	49.8	11.6	38.2	V
14499.0	50.87	12.6	38.27	H
15492.4	49.27	14.2	35.07	H
16306.4	51.27	16.1	35.17	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a



802.11-40MHz

Channel 62(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.8	10.94	-14.3	25.24	V
36.2	11.78	-13.7	25.48	V
49.3	10.84	-12.2	23.04	H
108.2	9.29	-13.4	22.69	V
216.9	9.33	-13.3	22.63	V
414.3	14.63	-8.1	22.73	H

Channel 62(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5581.8	47.58	2.6	44.98	V
5938.0	43.75	2.3	41.45	V
6371.4	45.5	2.8	42.7	H
6691.6	44.17	4	40.17	V
7244.4	43.8	3.8	40	H
7775.6	44.31	4	40.31	H

Channel 62(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11201.2	47.76	7.9	39.86	H
12054.0	49.4	10.2	39.2	H
13675.6	50.7	11.6	39.1	V
14004.6	49.82	12.4	37.42	V
14490.4	48.12	12.5	35.62	V
16301.6	51.34	16.1	35.24	H

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Third Supply

U-NII-1

Radiated Spurious Emission (802.11-40MHz, ch46, 30MHz-1GHz)	Radiated Spurious Emission (802.11-40MHz, ch46, 1 GHz-8 GHz)
Radiated Spurious Emission (802.11-40MHz, ch46, 8GHz-18GHz)	Radiated Spurious Emission (802.11-40MHz, ch46, 18GHz-26.5GHz)
Radiated Spurious Emission (802.11-40MHz, ch46, 26.5 GHz-40 GHz)	/

802.11-40MHz

Channel 46(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.2	11.87	-14.4	26.27	V
35.3	10.69	-14	24.69	V
60.0	10.96	-12.3	23.26	V
103.8	9.21	-13.4	22.61	V
219.6	9.51	-13.2	22.71	H
435.7	15.23	-7.8	23.03	V

Channel 46(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4026.6	44.15	1.5	42.65	V
4705.4	42.61	1.1	41.51	H
5628.4	45.93	2.5	43.43	H
6344.4	44.46	2.9	41.56	V
6915.4	44.19	3.9	40.29	V
7765.4	46.03	4.1	41.93	V

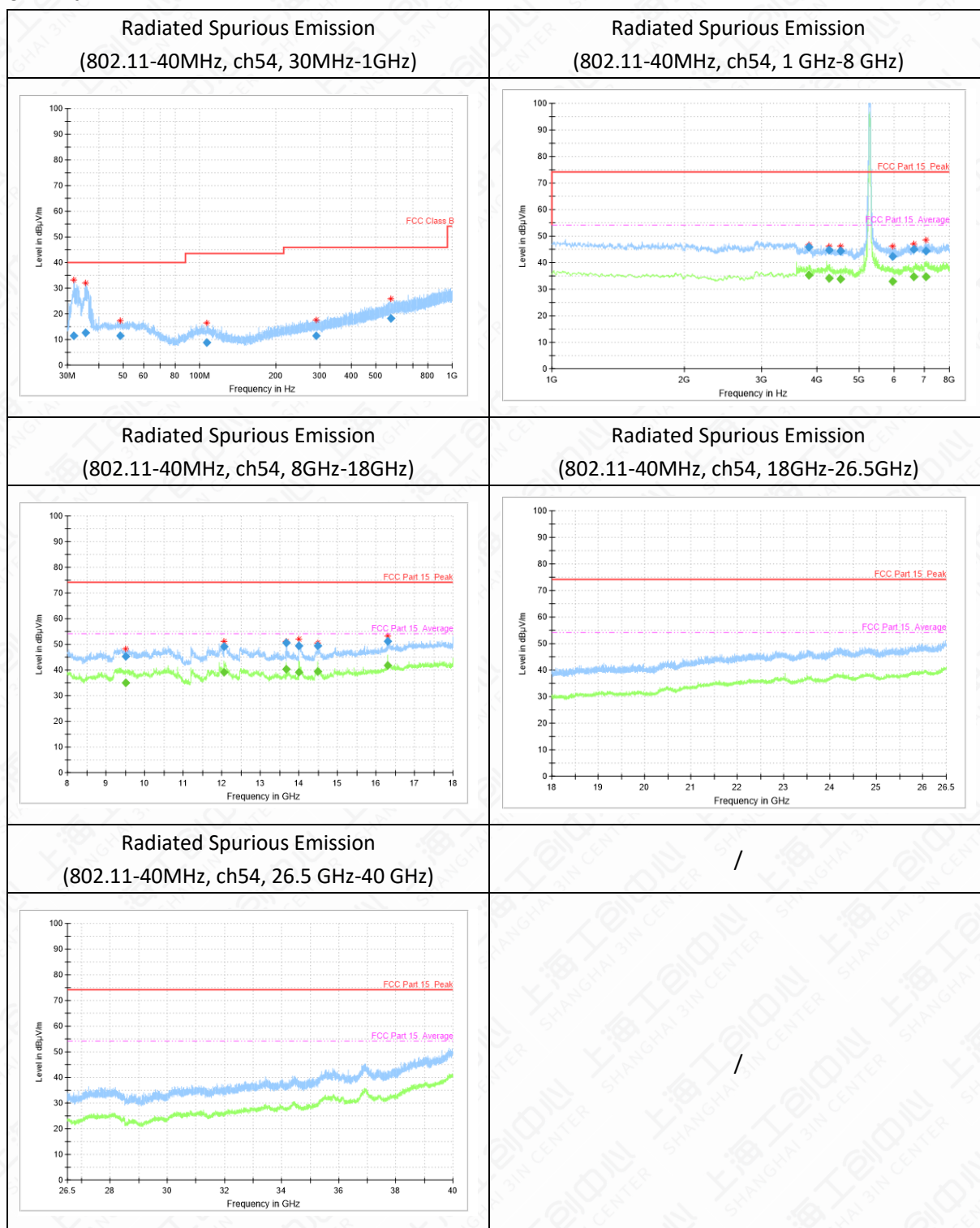
Channel 46(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9231.2	45.96	5	40.96	V
11213.2	48.76	8	40.76	V
12060.8	51.77	10.2	41.57	V
13677.0	51.14	11.6	39.54	H
14001.6	50.7	12.4	38.3	H
16301.0	51.46	16.1	35.36	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a



802.11-40MHz

Channel 54(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
31.8	11.34	-14.4	25.74	V
35.5	12.69	-13.9	26.59	V
48.5	11.41	-12.2	23.61	V
106.5	8.74	-13.3	22.04	V
288.6	11.33	-11.3	22.63	H
571.6	18.25	-4.4	22.65	H

Channel 54(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3841.0	45.98	2	43.98	V
4255.6	44.81	1.2	43.61	V
4528.8	44.28	1.3	42.98	V
5950.8	42.37	2.2	40.17	H
6641.2	45	3.5	41.5	H
7077.8	44.33	4.3	40.03	V

Channel 54(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9504.8	45.3	5.6	39.7	V
12059.0	49.22	10.2	39.02	H
13676.2	50.67	11.6	39.07	V
14005.4	49.35	12.4	36.95	H
14488.2	49.27	12.5	36.77	H
16303.0	51.32	16.1	35.22	V

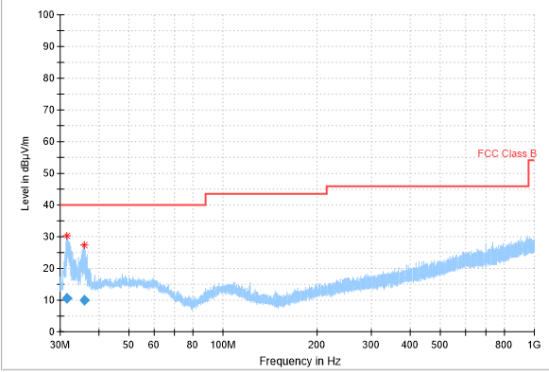
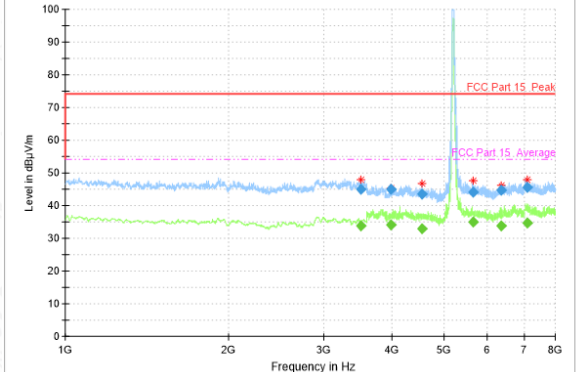
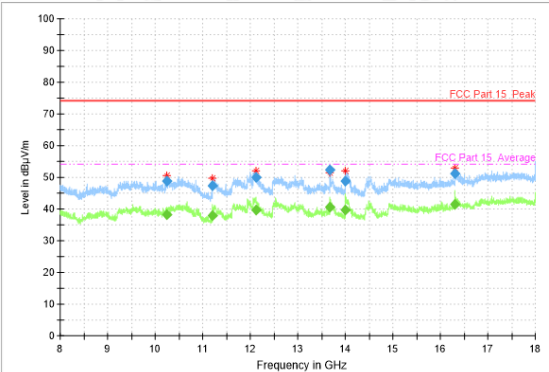
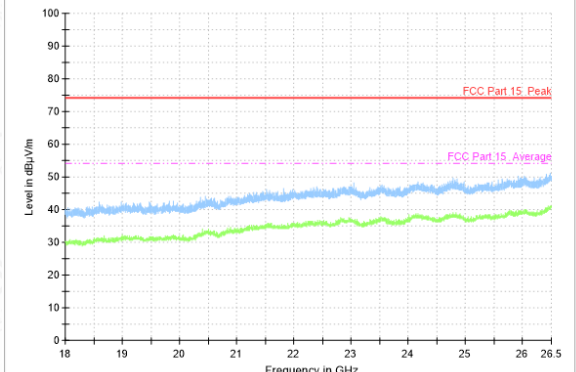
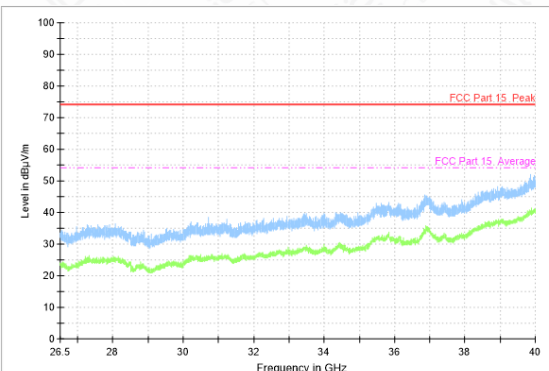
Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Scan code version

Main Supply

U-NII-1

Radiated Spurious Emission (802.11-40MHz, ch38, 30MHz-1GHz) 	Radiated Spurious Emission (802.11-40MHz, ch38, 1 GHz-8 GHz) 
Radiated Spurious Emission (802.11-40MHz, ch38, 8GHz-18GHz) 	Radiated Spurious Emission (802.11-40MHz, ch38, 18GHz-26.5GHz) 
Radiated Spurious Emission (802.11-40MHz, ch38, 26.5 GHz-40 GHz) 	/ /

802.11-40MHz
Channel 38(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
31.4	10.48	-14.5	24.98	V
35.8	10.06	-13.8	23.86	V

Channel 38 (1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3498.8	44.94	0.7	44.24	H
3978.6	44.94	1.2	43.74	H
4551.2	43.65	1.2	42.45	V
5655.0	44.25	2.3	41.95	V
6351.0	44.6	2.8	41.8	V
7090.0	45.58	4.3	41.28	H

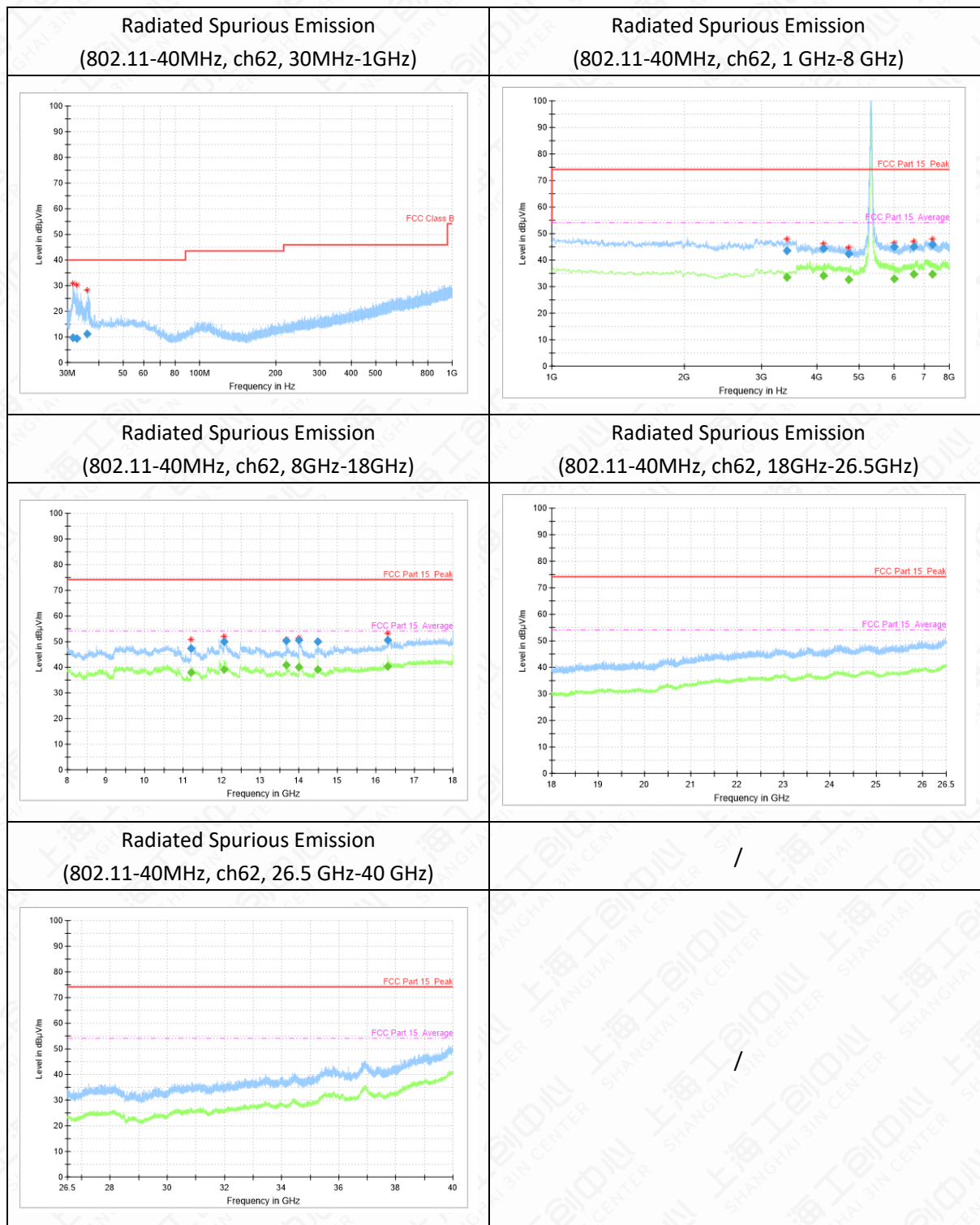
Channel 38(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
10241.8	48.68	7.4	41.28	V
11201.6	47.27	7.9	39.37	H
12117.0	49.95	10.4	39.55	H
13683.0	52.22	11.6	40.62	H
14003.8	48.77	12.4	36.37	V
16303.6	51.22	16.1	35.12	H

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a



802.11-40MHz

Channel 62(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
31.5	9.78	-14.5	24.28	V
32.7	9.47	-14.2	23.67	V
36.0	11.06	-13.7	24.76	V

Channel 62(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3420.8	43.65	0.6	43.05	H
4146.2	44.37	1.2	43.17	H
4723.6	42.38	1	41.38	H
5985.2	45.08	1.9	43.18	H
6637.0	44.93	3.4	41.53	H
7320.0	45.94	4	41.94	H

Channel 62(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11201.6	47.41	7.9	39.51	H
12059.6	49.93	10.2	39.73	V
13682.0	50.32	11.6	38.72	H
14002.0	50.5	12.4	38.1	V
14486.8	50.05	12.5	37.55	V
16301.4	50.63	16.1	34.53	V

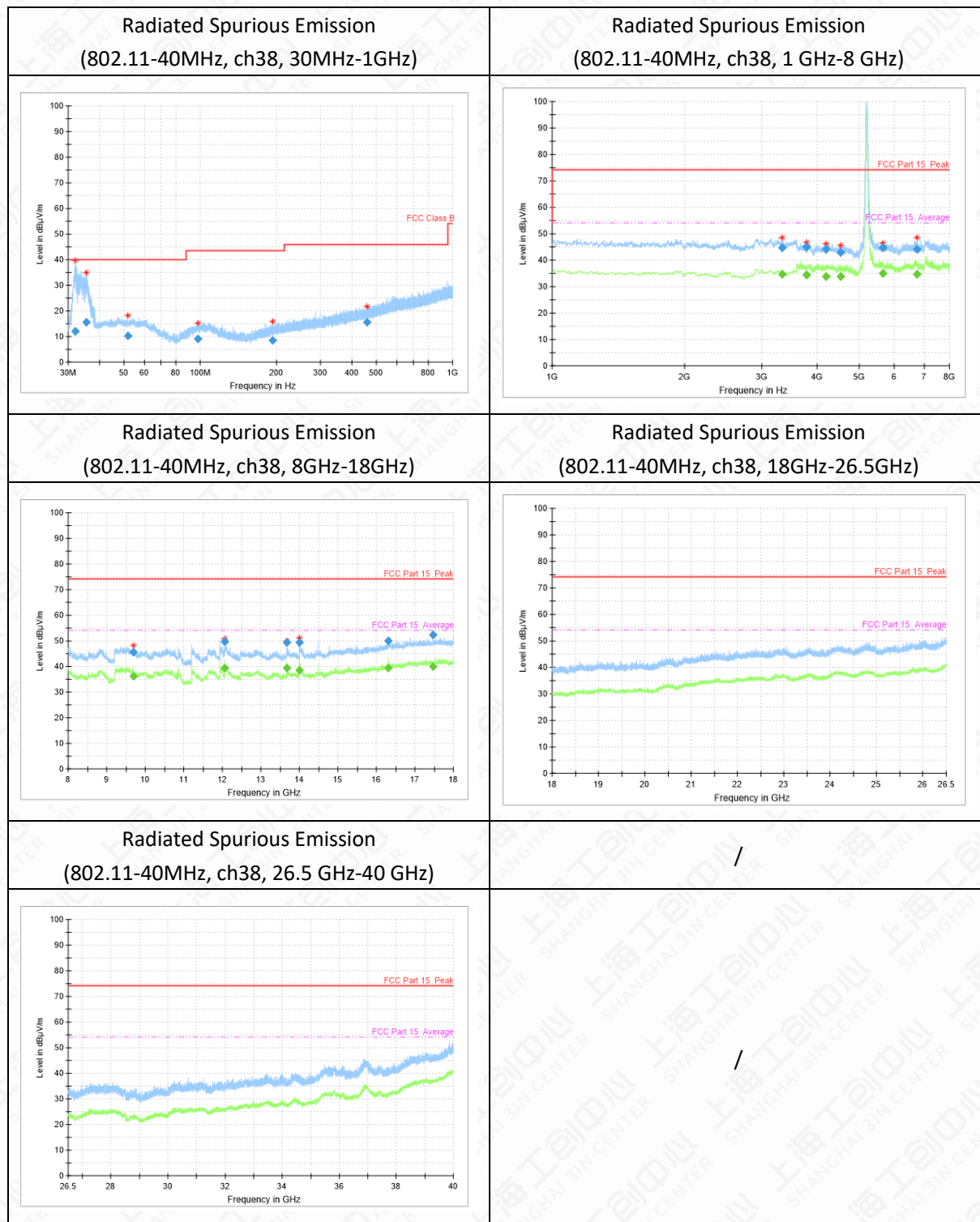
Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Fingerprint version

Main Supply

U-NII-1



802.11-40MHz

Channel 38(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.0	12.08	-14.4	26.48	V
35.3	15.73	-14	29.73	V
51.6	10.37	-12	22.37	H
97.8	8.99	-13.8	22.79	H
193.8	8.55	-14.2	22.75	H
458.8	15.6	-7.2	22.8	V

Channel 38 (1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3332.8	44.64	1.4	43.24	H
3786.6	44.9	1.2	43.7	V
4192.0	44.06	1	43.06	H
4528.8	43.05	1.3	41.75	V
5641.6	44.7	2.4	42.3	H
6751.2	44.14	3.6	40.54	V

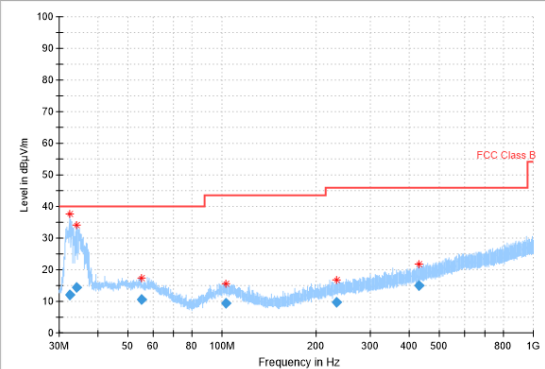
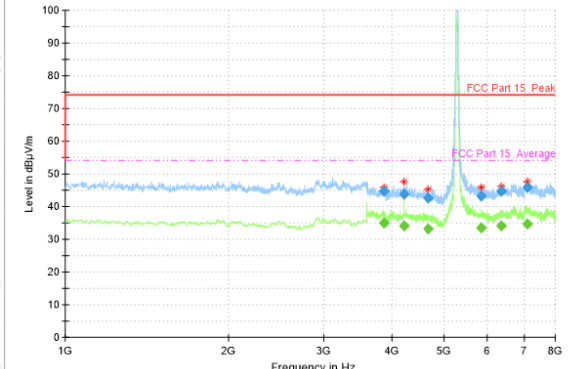
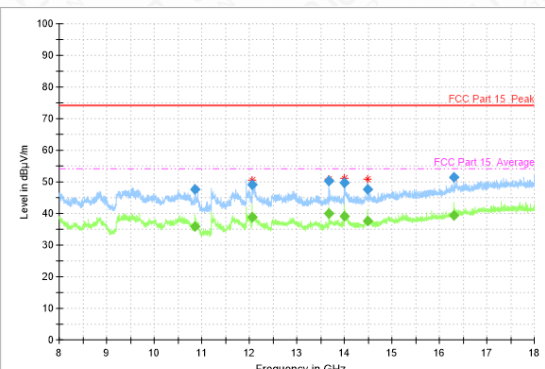
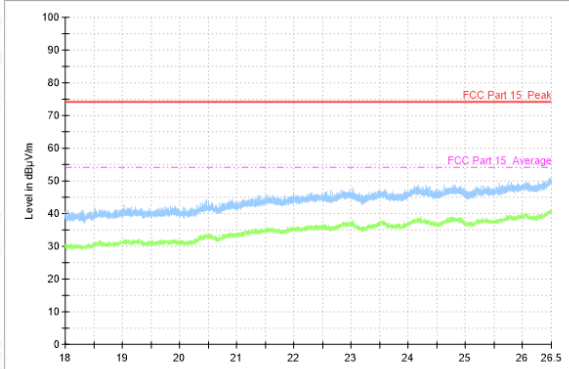
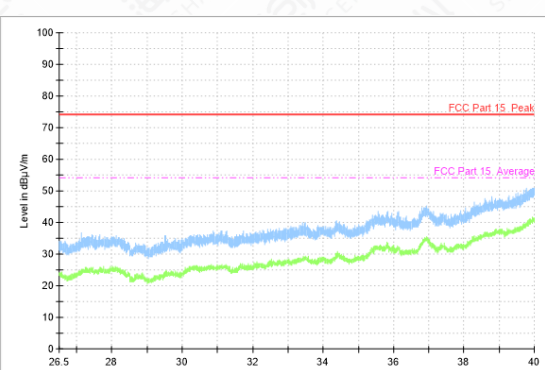
Channel 38(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9695.6	45.55	5.6	39.95	V
12055.8	49.65	10.2	39.45	H
13676.6	49.46	11.6	37.86	V
14003.8	49.46	12.4	37.06	V
16301.0	49.96	16.1	33.86	V
17476.0	52.23	17.7	34.53	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a

Radiated Spurious Emission (802.11-40MHz, ch54, 30MHz-1GHz) 	Radiated Spurious Emission (802.11-40MHz, ch54, 1 GHz-8 GHz) 
Radiated Spurious Emission (802.11-40MHz, ch54, 8GHz-18GHz) 	Radiated Spurious Emission (802.11-40MHz, ch54, 18GHz-26.5GHz) 
Radiated Spurious Emission (802.11-40MHz, ch54, 26.5 GHz-40 GHz) 	/

802.11-40MHz

Channel 54(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.4	12.05	-14.3	26.35	V
34.1	14.54	-14.3	28.84	V
55.3	10.7	-12.2	22.9	V
103.1	9.45	-13.4	22.85	V
234.0	9.77	-12.7	22.47	H
430.0	14.91	-8	22.91	V
32.4	12.05	-14.3	26.35	V

Channel 54(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3862.0	44.7	1.8	42.9	H
4215.6	43.86	1.2	42.66	H
4654.8	42.67	1.3	41.37	H
5833.4	43.22	2.1	41.12	H
6352.2	44.73	2.8	41.93	V
7094.6	45.93	4.2	41.73	H

Channel 54(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
10862.6	47.57	7	40.57	V
12055.0	49.11	10.2	38.91	H
13675.6	50.16	11.6	38.56	V
14006.6	49.71	12.4	37.31	H
14484.6	47.79	12.5	35.29	H
16307.0	51.38	16.1	35.28	H

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Secondary Supply

U-NII-1

Radiated Spurious Emission (802.11-40MHz, ch38, 30MHz-1GHz)	Radiated Spurious Emission (802.11-40MHz, ch38, 1 GHz-8 GHz)
Radiated Spurious Emission (802.11-40MHz, ch38, 8GHz-18GHz)	Radiated Spurious Emission (802.11-40MHz, ch38, 18GHz-26.5GHz)
Radiated Spurious Emission (802.11-40MHz, ch38, 26.5 GHz-40 GHz)	/

802.11-40MHz

Channel 38(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.1	23.19	-14.3	37.49	V
43.0	33.13	-12.6	45.73	V
69.1	25.01	-15.7	40.71	V
143.6	23.25	-17.1	40.35	H
215.6	21.19	-13.3	34.49	V
428.3	15.4	-8	23.4	H

Channel 38 (1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5505.6	45.82	2.3	43.52	H
5888.8	42.68	2.4	40.28	H
6365.2	44.28	2.8	41.48	H
6712.4	45.53	3.8	41.73	V
7150.4	44.37	4.1	40.27	H
7790.8	44.97	4	40.97	V

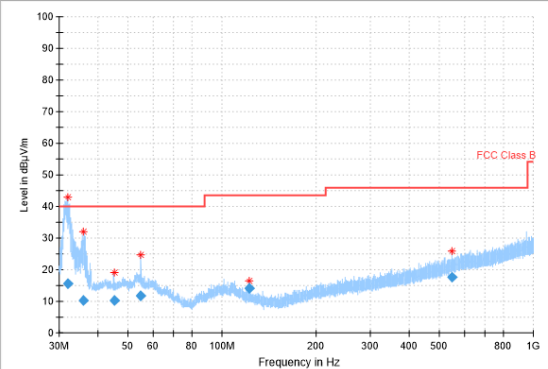
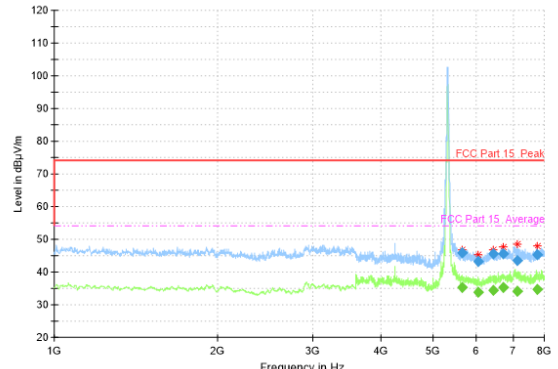
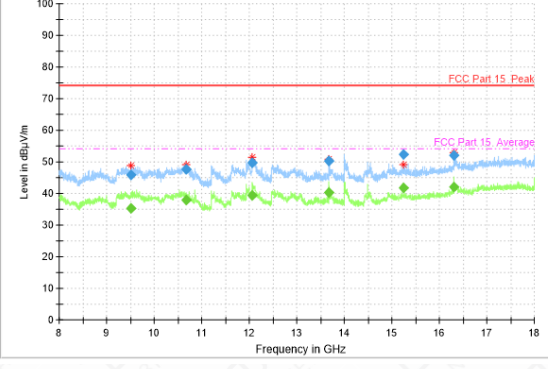
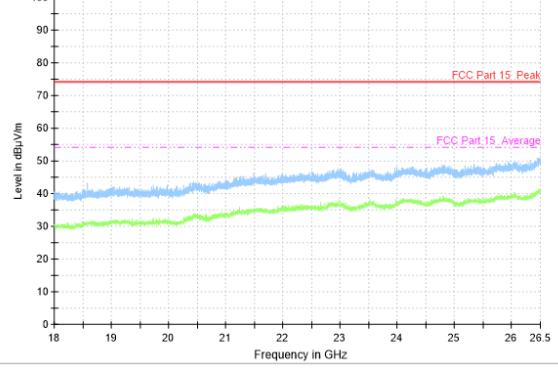
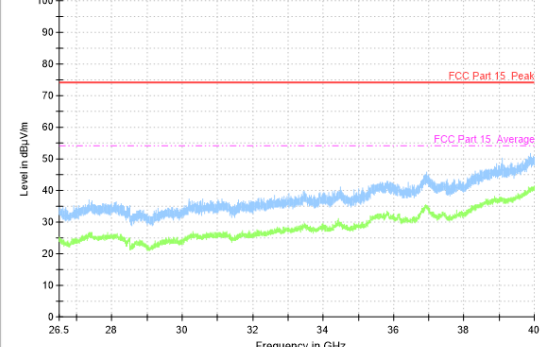
Channel 38(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9515.0	44.74	5.7	39.04	V
10613.0	48.93	7.6	41.33	V
12076.4	49.53	10.3	39.23	H
13675.8	49.87	11.6	38.27	H
15199.4	49.8	14	35.8	V
16302.8	52.38	16.1	36.28	V

Note:

- The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a

Radiated Spurious Emission (802.11-40MHz, ch62, 30MHz-1GHz) 	Radiated Spurious Emission (802.11-40MHz, ch62, 1 GHz-8 GHz) 
Radiated Spurious Emission (802.11-40MHz, ch62, 8GHz-18GHz) 	Radiated Spurious Emission (802.11-40MHz, ch62, 18GHz-26.5GHz) 
Radiated Spurious Emission (802.11-40MHz, ch62, 26.5 GHz-40 GHz) 	/

802.11-40MHz

Channel 62(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.0	15.64	-14.3	29.94	V
36.0	10.23	-13.7	23.93	V
45.1	10.39	-12.4	22.79	H
54.8	11.65	-12.2	23.85	H
122.7	13.99	-15.8	29.79	V
549.1	17.56	-5.2	22.76	H

Channel 62(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5642.4	45.9	2.4	43.5	V
6048.0	43.28	2.3	40.98	H
6435.8	45.51	2.9	42.61	V
6716.8	45.69	3.8	41.89	V
7124.4	43.45	4.2	39.25	V
7751.8	45.41	4	41.41	V

Channel 62(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9518.6	46.02	5.7	40.32	H
10682.2	47.76	7.6	40.16	V
12064.6	49.8	10.3	39.5	H
13677.0	50.22	11.6	38.62	H
15239.0	52.23	14.2	38.03	H
16303.8	52	16.1	35.9	V

Note:

- The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

Third supply

U-NII-1

Radiated Spurious Emission (802.11-40MHz, ch46, 30MHz-1GHz)	Radiated Spurious Emission (802.11-40MHz, ch46, 1 GHz-8 GHz)
Radiated Spurious Emission (802.11-40MHz, ch46, 8GHz-18GHz)	Radiated Spurious Emission (802.11-40MHz, ch46, 18GHz-26.5GHz)
Radiated Spurious Emission (802.11-40MHz, ch46, 26.5 GHz-40 GHz)	/

802.11-40MHz

Channel 46(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
31.7	11.09	-14.4	25.49	H
35.5	10.39	-13.9	24.29	V
55.2	10.79	-12.2	22.99	V
98.2	9.67	-13.7	23.37	V
248.4	10.36	-12.2	22.56	V
466.4	15.79	-7.2	22.99	V

Channel 46(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3840.6	45.49	2	43.49	H
4237.2	45.45	1.3	44.15	H
4751.6	43.16	1.3	41.86	H
5799.8	43.7	2.1	41.6	V
6388.2	45.55	2.8	42.75	H
7074.4	45.12	4.3	40.82	H

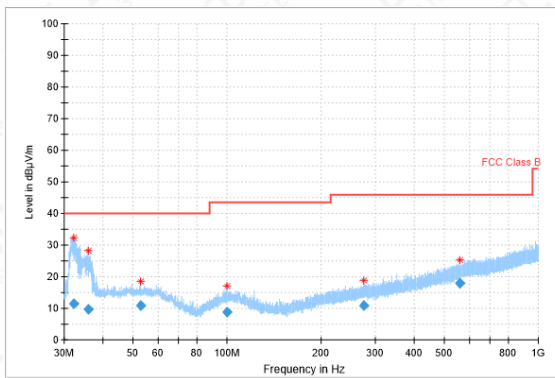
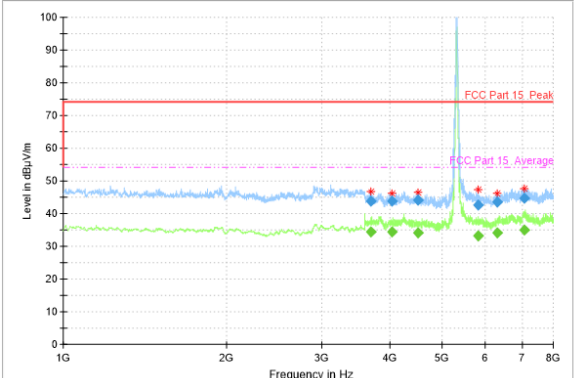
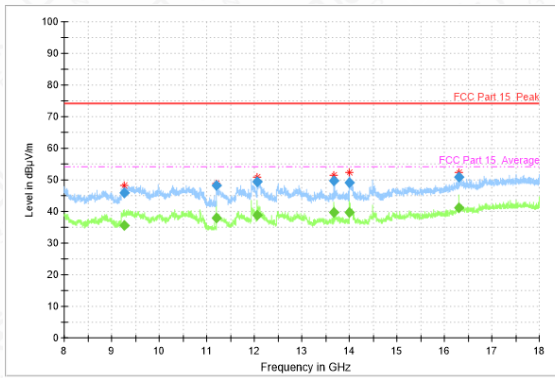
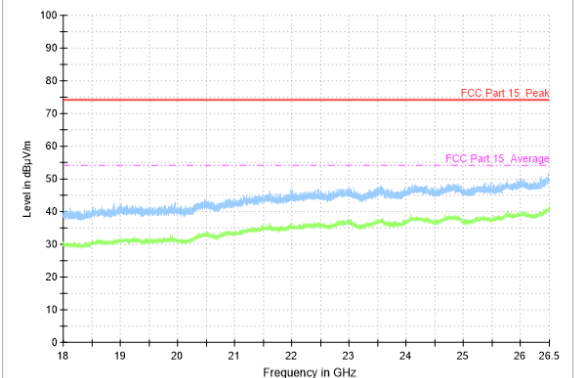
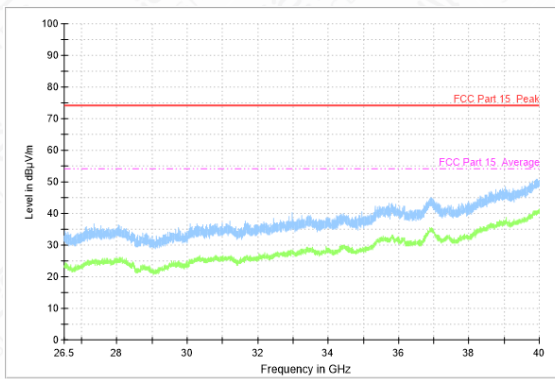
Channel 46(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9291.4	46.62	5.2	41.42	V
11203.0	48.95	8	40.95	H
11936.2	47.89	9.6	38.29	V
13675.0	51.02	11.6	39.42	V
14487.0	50.47	12.5	37.97	H
16303.4	51.49	16.1	35.39	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

U-NII-2a

Radiated Spurious Emission (802.11-40MHz, ch62, 30MHz-1GHz) 	Radiated Spurious Emission (802.11-40MHz, ch62, 1 GHz-8 GHz) 
Radiated Spurious Emission (802.11-40MHz, ch62, 8GHz-18GHz) 	Radiated Spurious Emission (802.11-40MHz, ch62, 18GHz-26.5GHz) 
Radiated Spurious Emission (802.11-40MHz, ch62, 26.5 GHz-40 GHz) 	/

802.11-40MHz

Channel 62(30MHz ~1GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.1	11.41	-14.4	25.81	H
35.8	9.8	-13.8	23.6	V
52.9	10.87	-12.1	22.97	V
99.8	8.76	-13.3	22.06	H
275.9	10.92	-11.4	22.32	V
561.2	17.82	-4.7	22.52	V

Channel 62(1GHz ~ 8GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3682.0	43.83	1.3	42.53	V
4031.8	43.92	1.5	42.42	H
4510.4	44.03	1.3	42.73	V
5814.0	42.69	2.1	40.59	H
6311.2	43.54	3	40.54	H
7057.4	44.82	4.4	40.42	V

Channel 62(8GHz ~ 18GHz)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9271.2	45.86	5.2	40.66	V
11202.0	48.2	7.9	40.3	V
12058.4	49.4	10.2	39.2	H
13680.6	49.66	11.6	38.06	V
14005.6	49.18	12.4	36.78	H
16303.0	50.98	16.1	34.88	V

Note:

1. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.

6.7 Frequency Stability

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 to 15.407(g)).

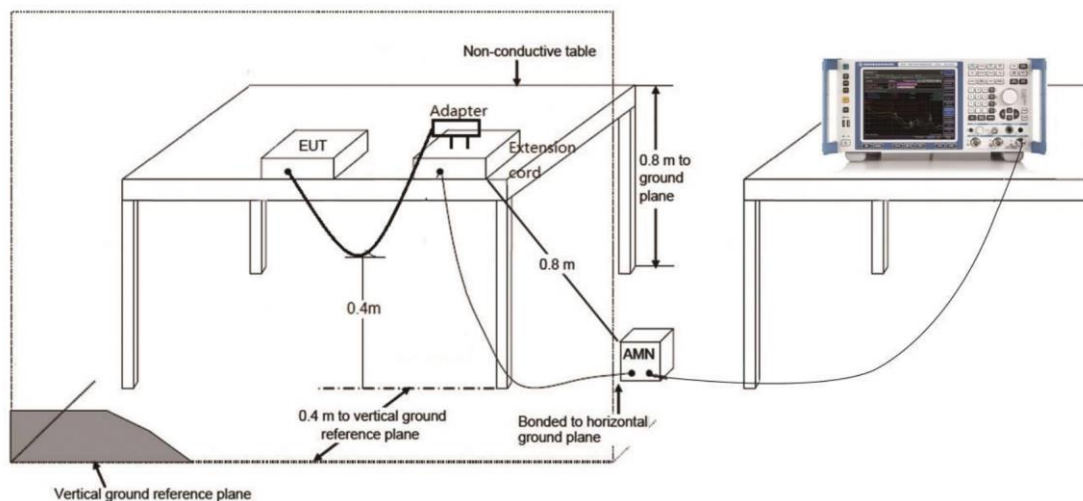
6.8 AC Powerline Conducted Emission

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:

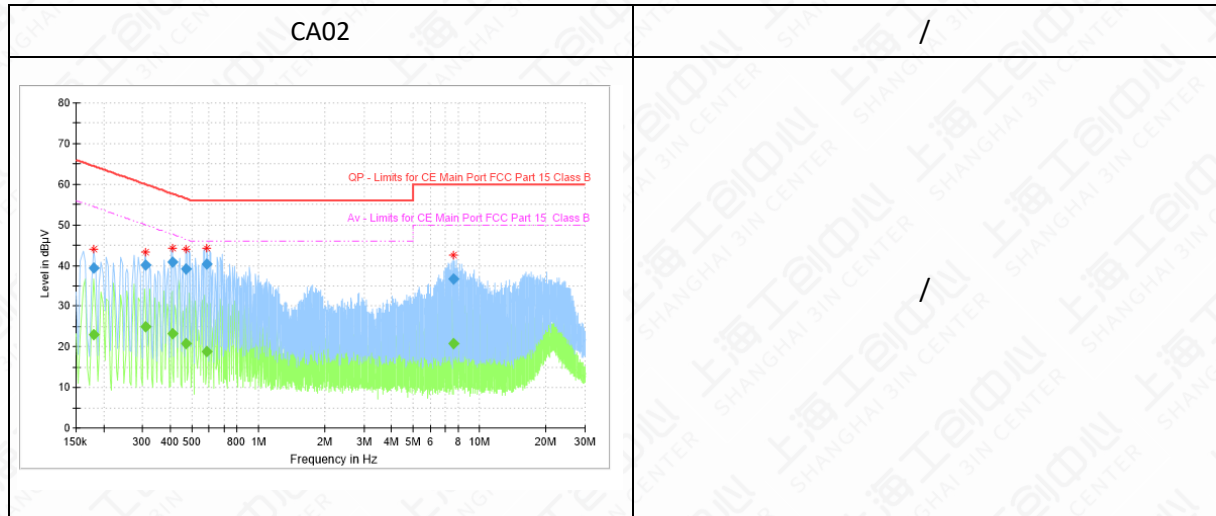
(Quasi-peak-average Limit)

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.

Standard version

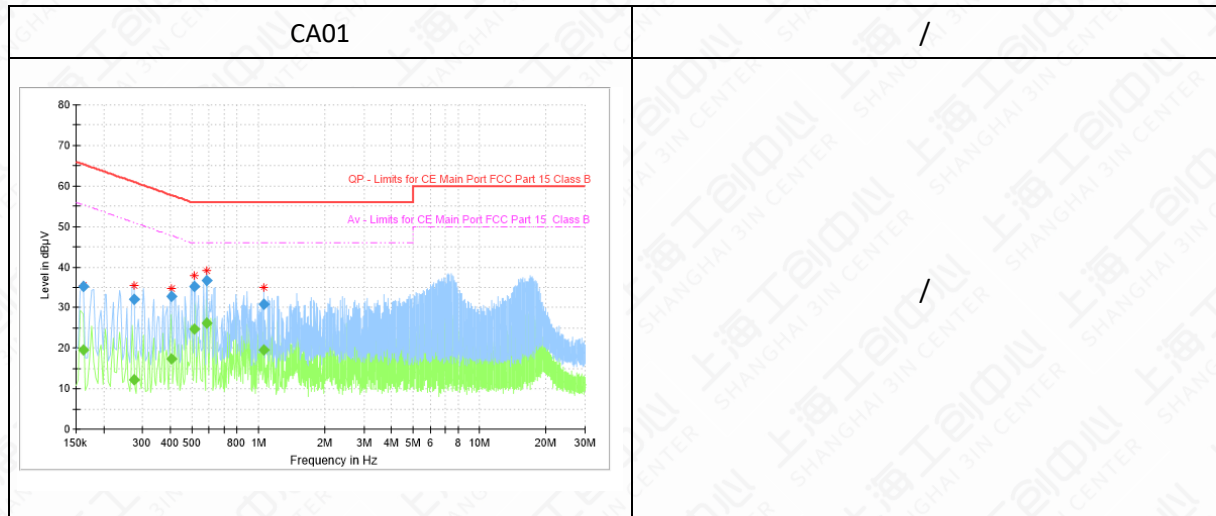
Main Supply



Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.179850	---	23.08	54.49	31.42	15000.0	9.000	L1	ON	9.6
0.179850	39.33	---	64.49	25.16	15000.0	9.000	L1	ON	9.6
0.310444	---	24.84	49.96	25.12	15000.0	9.000	L1	ON	9.6
0.310444	40.10	---	59.96	19.86	15000.0	9.000	L1	ON	9.6
0.407456	---	23.31	47.70	24.39	15000.0	9.000	L1	ON	9.6
0.407456	40.96	---	57.70	16.74	15000.0	9.000	L1	ON	9.6
0.470888	---	20.72	46.50	25.78	15000.0	9.000	L1	ON	9.6
0.470888	39.05	---	56.50	17.45	15000.0	9.000	L1	ON	9.6
0.586556	40.44	---	56.00	15.56	15000.0	9.000	N	ON	9.6
0.586556	---	18.78	46.00	27.22	15000.0	9.000	N	ON	9.6
7.638619	36.76	---	60.00	23.24	15000.0	9.000	L1	ON	9.9
7.638619	---	20.67	50.00	29.33	15000.0	9.000	L1	ON	9.9

Scan code version

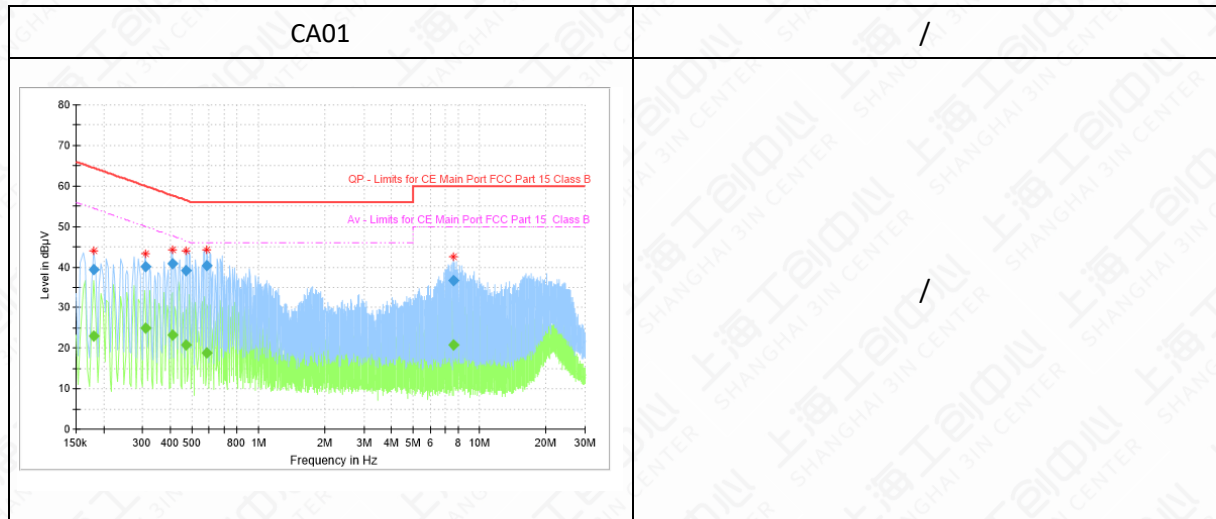
Main Supply



Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.161194	---	19.65	55.40	35.75	15000.0	9.000	L1	ON	9.6
0.161194	35.30	---	65.40	30.11	15000.0	9.000	L1	ON	9.6
0.273131	---	12.29	51.02	38.73	15000.0	9.000	L1	ON	9.6
0.273131	32.00	---	61.02	29.02	15000.0	9.000	L1	ON	9.6
0.403725	---	17.44	47.78	30.34	15000.0	9.000	L1	ON	9.6
0.403725	32.69	---	57.78	25.09	15000.0	9.000	L1	ON	9.6
0.515663	---	24.75	46.00	21.25	15000.0	9.000	N	ON	9.6
0.515663	35.14	---	56.00	20.86	15000.0	9.000	N	ON	9.6
0.582825	---	26.25	46.00	19.75	15000.0	9.000	N	ON	9.6
0.582825	36.61	---	56.00	19.39	15000.0	9.000	N	ON	9.6
1.056694	---	19.52	46.00	26.48	15000.0	9.000	N	ON	9.6
1.056694	30.73	---	56.00	25.27	15000.0	9.000	N	ON	9.6

Fingerprint version

Main Supply



Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.235819	---	20.55	52.24	31.69	15000.0	9.000	L1	ON	9.6
0.235819	37.63	---	62.24	24.61	15000.0	9.000	L1	ON	9.6
0.534319	---	21.73	46.00	24.27	15000.0	9.000	L1	ON	9.6
0.534319	40.43	---	56.00	15.57	15000.0	9.000	L1	ON	9.6
0.571631	---	22.90	46.00	23.10	15000.0	9.000	L1	ON	9.6
0.571631	42.34	---	56.00	13.66	15000.0	9.000	L1	ON	9.6
0.631331	---	23.02	46.00	22.98	15000.0	9.000	L1	ON	9.6
0.631331	40.79	---	56.00	15.22	15000.0	9.000	L1	ON	9.6
1.064156	---	25.15	46.00	20.85	15000.0	9.000	N	ON	9.6
1.064156	39.09	---	56.00	16.91	15000.0	9.000	N	ON	9.6
6.500588	---	23.34	50.00	26.66	15000.0	9.000	N	ON	9.8
6.500588	36.48	---	60.00	23.52	15000.0	9.000	N	ON	9.8

Annex A: Revised History

Version	Revised Content
V00	Initial
V01	update the equipemnts list; add the EIRP limit; add the TX Power level
V02	update the equipemnts Cal. Interval

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