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Report Template Version: V05

Report Template Revision Date: 2018-07-06

Test Report

Report No.: CQASZ20250801864E-02
Applicant: Shen Zhen laikeweier Technology Co.,Ltd.
Address of Applicant: 303. A2, HC Park,159 Hangcheng Avenue, Sanwei community. Hangcheng street,Bao'an District, Shenzhen, China
Equipment Under Test (EUT):
Product: Wireless Carplay/Android Auto Adapter
Model No.: C0051,C0053, C0051-H01, C0051-H02, C0051-H30, C0051-H31, C0051-H32, C0051-H33 C0053-H01, C0053-H02, C0053-H30, C0053-H31, C0053-H32, C0053-H33
Teat Model No.: C0051,C0053
Brand Name: N/A
FCC ID: 2BLLO-C0051
Standards: 47 CFR Part 15, Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
Date of Receipt: 2025-08-12
Date of Test: 2025-08-12 to 2025-08-29
Date of Issue: 2025-9-2
Test Result: **PASS***

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

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Timo Lei
(Timo Lei)

Approved By: Jack Ai
(Jack Ai)



Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20250801864E-02	Rev.01	Initial report	2025-9-2

1 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013; KDB789033	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart E Section 15.207	ANSI C63.10-2013; KDB789033	N/A
Maximum Conducted Output Power	47 CFR Part 15 Subpart C Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Emission Bandwidth	47 CFR Part 15 Subpart C Section 15.407 (a)(e)	ANSI C63.10-2013; KDB789033	PASS
Maximum Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Band Edge Measurements	47 CFR Part 15 Subpart C Section 15.209 & 15.407(b)	ANSI C63.10-2013; KDB789033	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013; KDB789033	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E Section 15.407 (c)	47 CFR Part 15 Subpart E	PASS
Radiated Spurious Emissions	47 CFR Part 15 Subpart E Section 15.407 (b)	ANSI C63.10-2013; KDB789033	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

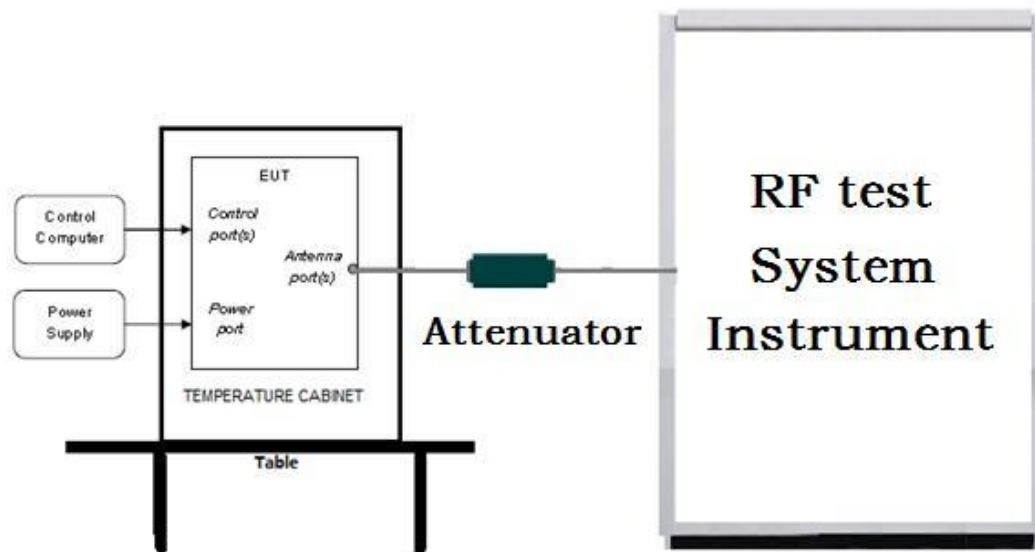
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3 Test Requirement

3.1 Test setup

3.1.1 For Conducted test setup



3.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

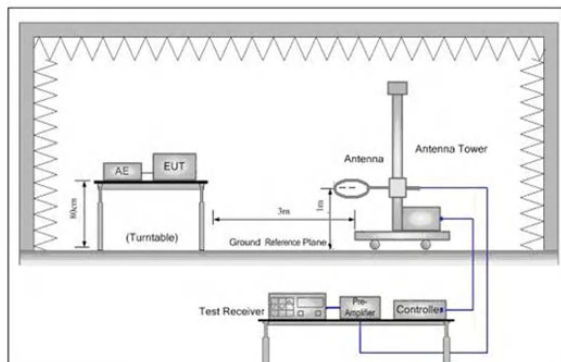


Figure 1. Below 30MHz

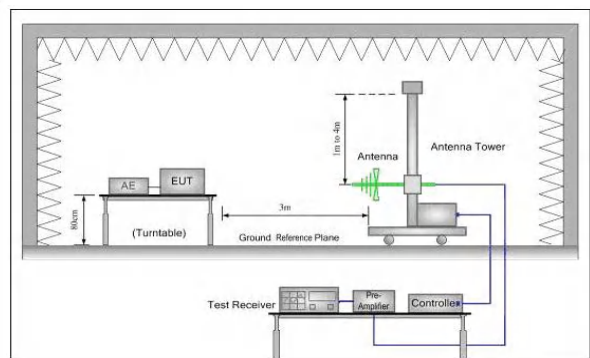


Figure 2. 30MHz to 1GHz

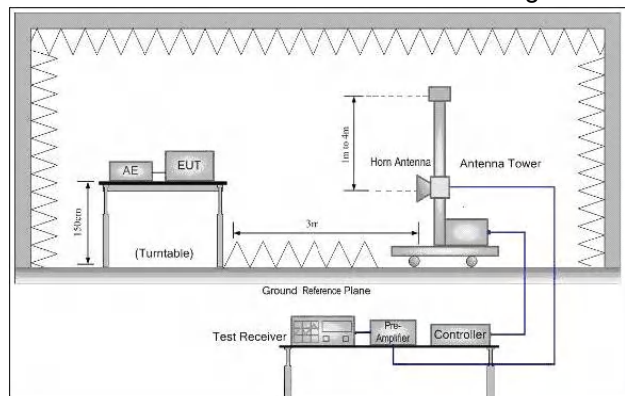
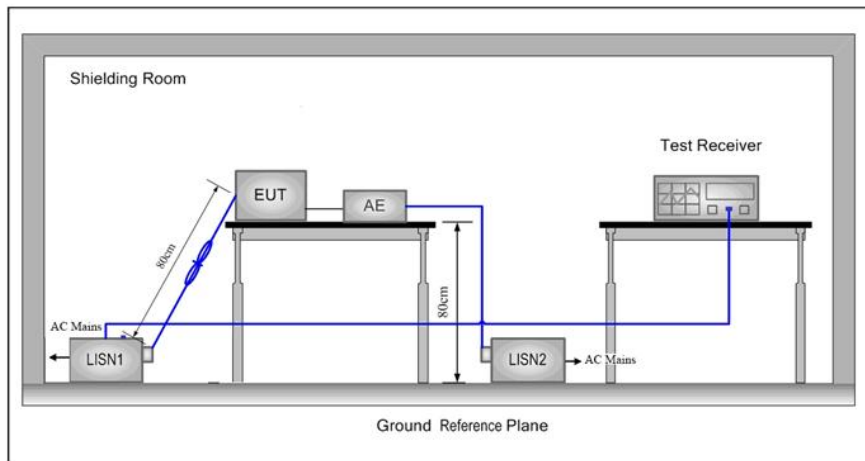


Figure 3. Above 1GHz

3.1.3 For Conducted Emissions test setup

Conducted Emissions setup



3.2 Test Environment

Operating Environment:		
Conducted Emissions:		
Temperature:	25.6 °C	
Humidity:	60 % RH	
Atmospheric Pressure:	1009 mbar	
Radiated Emissions:		
Temperature:	25.5 °C	
Humidity:	54 % RH	
Atmospheric Pressure:	1009mbar	
Radio conducted item test (RF Conducted test room):		
Temperature:	25.3 °C	
Humidity:	50 % RH	
Atmospheric Pressure:	1009 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	5
TL/VL	-30	4.5
TH/VL	50	4.5
TL/VH	-30	5.5
TH/VH	50	5.5
Remark:		
1)The EUT just work in such extreme temperature of -30 °C to 50 °C and the extreme voltage of 4.5V to 5.5V, so here the EUT is tested in the temperature of -30 °C to 50 °C and the voltage of 4.5V to 5.5V.		
2)VN: Normal Voltage; TN: Normal Temperature;		
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;		
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.		

3.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n(20M)	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11n(40M)	5150MHz ~5250 MHz	Channel 38	N/A	Channel 46
		5190MHz	N/A	5230MHz

Run Software:

```
管理员: C:\Windows\System32\cmd.exe - adb shell

root@CarPlayBox:/#

root@CarPlayBox:/# rtwpriv wlan0 mp_pwrctlm 3
rtwpriv wlan0 mp_pwrctlm 3
wlan0      mp_pwrctlm:PwrCtlDM start TSSI tracking on

root@CarPlayBox:/#

root@CarPlayBox:/# rtwpriv wlan0 1 0 b 11M 1 2000
rtwpriv wlan0 mp_txpower dbm=20
rtwpriv wlan0 1 0 b 11M 1 2000
rtwpriv wlan0 mp_txpower dbm=20
config packet Period =2000
Packet Pattern = random Byte
wlan0      mp_rate:Set data rate to 3 index 0
wlan0      mp_ant_tx:switch Tx antenna to b
wlan0      mp_bandwidth:No change current BW 0

wlan0      mp_channel:No change current channel:1
wlan0      1:Set PMac Tx Mode OK

root@CarPlayBox:/# rtwpriv wlan0 mp_txpower dbm=20
wlan0      mp_txpower:Path Set power dbm :20.0

root@CarPlayBox:/#

root@CarPlayBox:/#

root@CarPlayBox:/#
```

Test mode:

Pre-scan under all rate at lowest channel for Ant1

Through Pre-scan, 6Mbps is the worst case of 802.11a (20M); MCS0 is the worst case of 802.11n (20M)MCS0 is the worst case of 802.11n(40M).

4 General Information

4.1 Client Information

Applicant:	Shen Zhen laikeweier Technology Co,Ltd.
Address of Applicant:	303. A2, HC Park,159 Hangcheng Avenue, Sanwei community. Hangcheng street,Bao'an District, Shenzhen, China
Manufacturer:	Shen Zhen laikeweier Technology Co,Ltd.
Address of Manufacturer:	303. A2, HC Park,159 Hangcheng Avenue, Sanwei community. Hangcheng street,Bao'an District, Shenzhen, China
Factory:	Shen Zhen laikeweier Technology Co,Ltd.
Address of Factory:	303. A2, HC Park,159 Hangcheng Avenue, Sanwei community. Hangcheng street,Bao'an District, Shenzhen, China

4.2 General Description of EUT

Product Name:	Wireless Carplay/Android Auto Adapter
Model No.:	C0051,C0053, C0051-H01, C0051-H02, C0051-H30, C0051-H31, C0051-H32, C0051-H33 C0053-H01, C0053-H02, C0053-H30, C0053-H31, C0053-H32, C0053-H33
Test Model No.:	C0051,C0053
Trade Mark:	N/A
Software Version:	20250630126
Hardware Version:	V1.1
EUT Power Supply:	Power supply DC5V
EUT Supports Radios application:	U-NII-1: 5.15-5.25GHz
EUT Type:	Indoor devices

4.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11a/n(20M): 5150MHz ~5250 MHz IEEE802.11n(40M): 5150MHz ~5250 MHz
Channel Numbers:	IEEE 802.11a/n(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11n(40M): 5150MHz ~5250MHz/ 2 channel
Type of Modulation:	IEEE for 802.11a/n: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)
Sample Type:	☒ Mobile ☐ Portable
Test Software of EUT:	cmd
Antenna Type:	Chip antenna
Antenna gain:	1.86dBi
Cable loss:	1.0 dB

Operation Frequency each of channel

(U-NII-1) 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	36	5180	40	5200
	44	5220	48	5240
40MHz	38	5190	46	5230

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

4.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

4.6 Test Facility

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.7 Deviation from Standards

None.

4.8 Abnormalities from Standard Conditions

None.

4.9 Other Information Requested by the Customer

None.

4.10 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	3×10^{-8}
2	RF power, conducted	0.86dB
3	Radiated Spurious emission test	5.12dB (Below 1GHz)
		4.6dB (Above 1GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.8°C
6	Humidity test	2.0%
7	DC power voltages	0.5%

5 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2024/9/2	2025/9/1
Spectrum analyzer	R&S	FSU26	CQA-038	2024/9/2	2025/9/1
Spectrum analyzer	R&S	FSU40	CQA-075	2024/9/2	2025/9/1
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2024/9/2	2025/9/1
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2024/9/2	2025/9/1
Preamplifier	EMCI	EMC184055SE	CQA-089	2024/9/2	2025/9/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2023/9/8	2026/9/7
Bilog Antenna	R&S	HL562	CQA-011	2023/11/01	2026/10/31
Horn Antenna	R&S	HF906	CQA-012	2023/11/01	2026/10/31
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2023/9/7	2026/9/6
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2024/9/2	2025/9/1
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2024/9/2	2025/9/1
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2024/9/2	2025/9/1
Antenna Connector	CQA	RFC-01	CQA-080	2024/9/2	2025/9/1
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2024/9/2	2025/9/1
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2024/9/2	2025/9/1
Power meter	R&S	NRVD	CQA-029	2024/9/2	2025/9/1
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2024/9/2	2025/9/1
EMI Test Receiver	R&S	ESR7	CQA-005	2024/9/2	2025/9/1
LISN	R&S	ENV216	CQA-003	2024/9/2	2025/9/1
Coaxial cable	CQA	N/A	CQA-C009	2024/9/2	2025/9/1
DC power	KEYSIGHT	E3631A	CQA-028	2024/9/2	2025/9/1

Test software:

	Manufacturer	Software brand	Software version
Radiated Emissions test software	Tonscend	JS1120-3	Version:8
Conducted Emissions test software	Audix	e3	Version:9
RF Conducted test software	Audix	e3	V3.5.39

6 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E

Appendix A): Emission Bandwidth

26dB Emission bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II C 1

6 dB bandwidth (5.725-5.85 GHz band)

Test Requirement 47 CFR Part 15, Subpart C 15.407 (e)

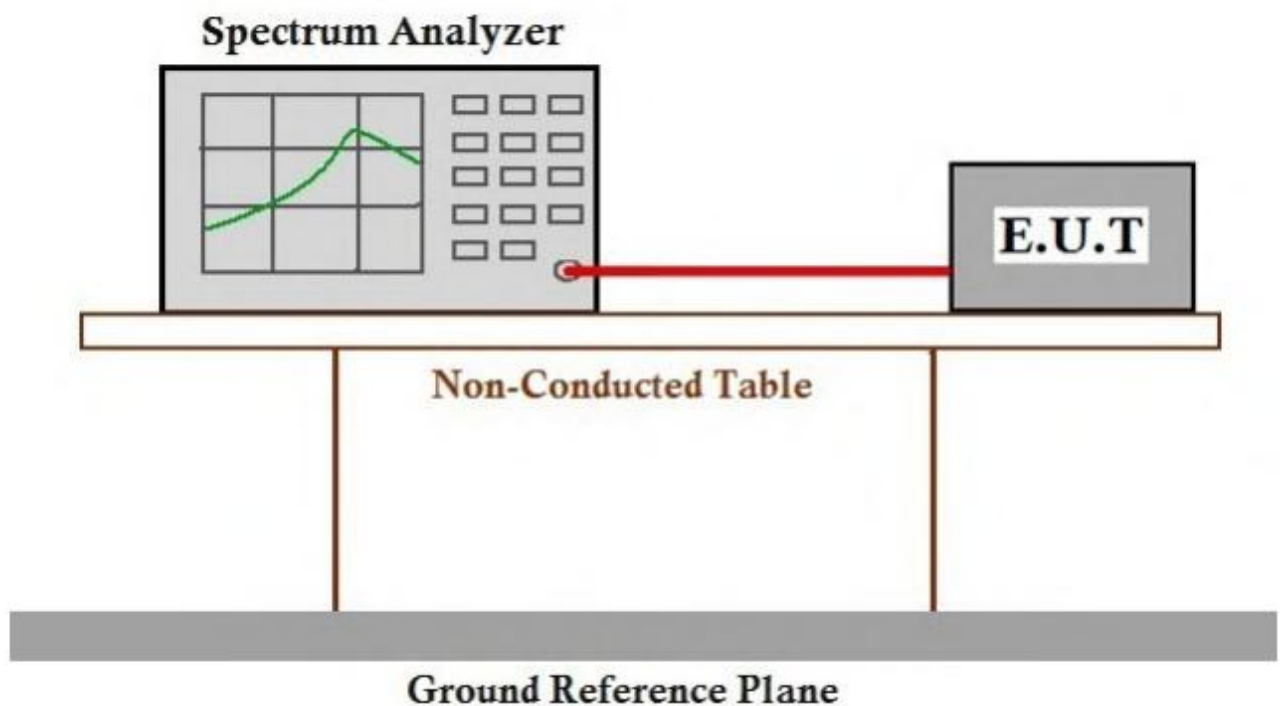
Test Method: KDB 789033 D02 II C 2

Limit: ≥ 500 kHz

Test Procedure:

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- 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%.

Test Setup Diagram



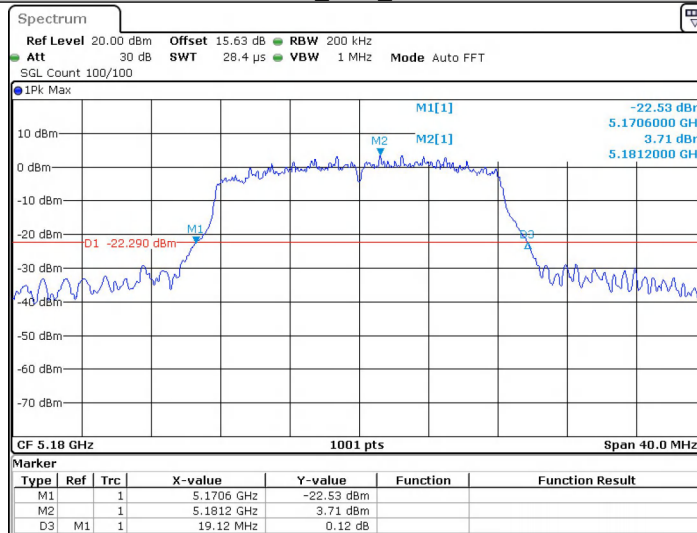
Result Table

TestMode	Freq(MHz)	26db EBW [MHz]	FL[MHz]	FH[MHz]
11A	5180	19.12	5170.60	5189.72
	5200	19.92	5189.80	5209.72
	5240	19.60	5230.52	5250.12
11N20SISO	5180	19.04	5170.48	5189.52
	5200	19.64	5190.08	5209.72
	5240	19.68	5230.20	5249.88
11N40SISO	5190	38.72	5170.56	5209.28
	5230	41.12	5209.68	5250.80

TestMode	Freq(MHz)	OCB [MHz]
11A	5180	17.063
	5200	17.183
	5240	17.103
11N20SISO	5180	16.863
	5200	17.223
	5240	17.223
11N40SISO	5190	35.964
	5230	36.843

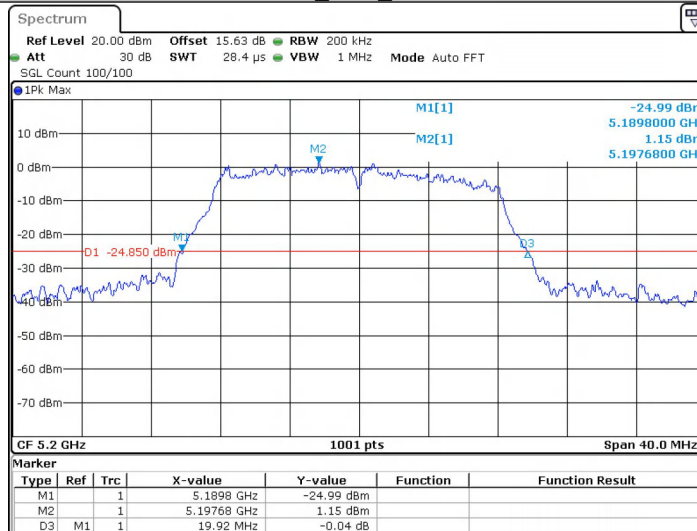
Test Graph

11A_Ant1_5180



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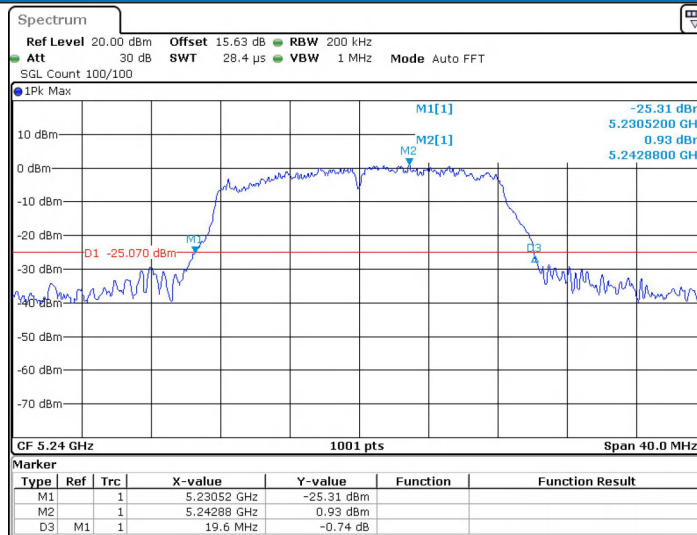
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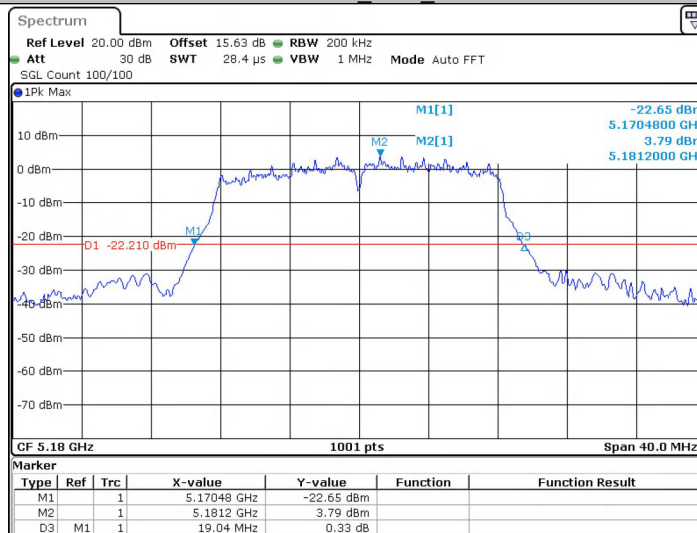
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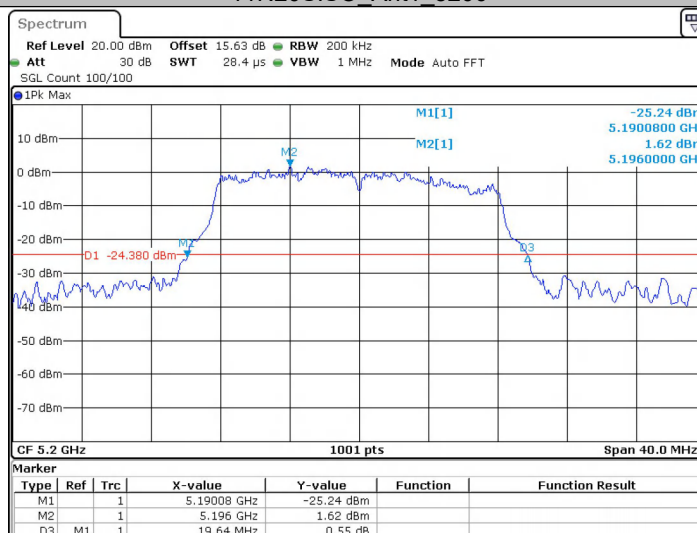
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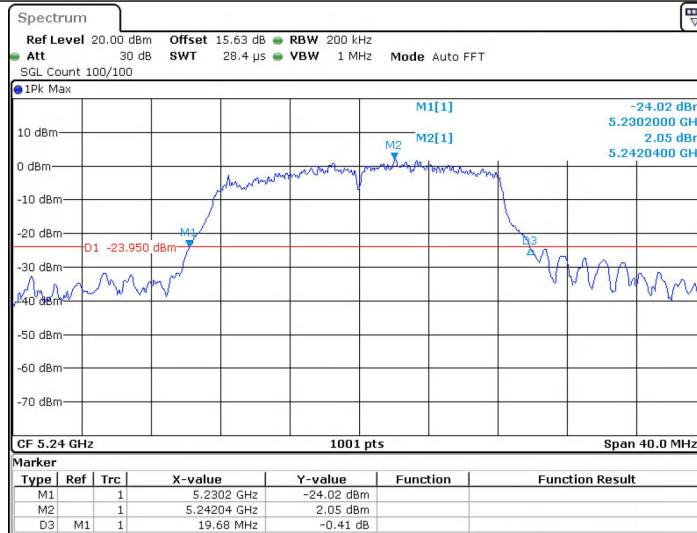
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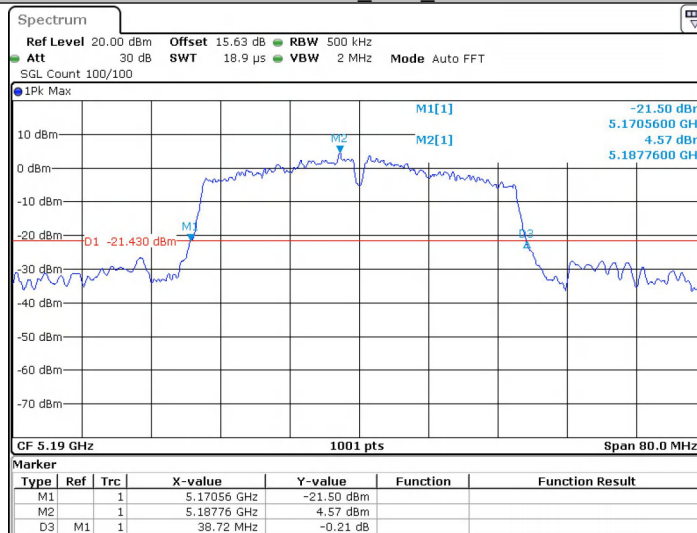
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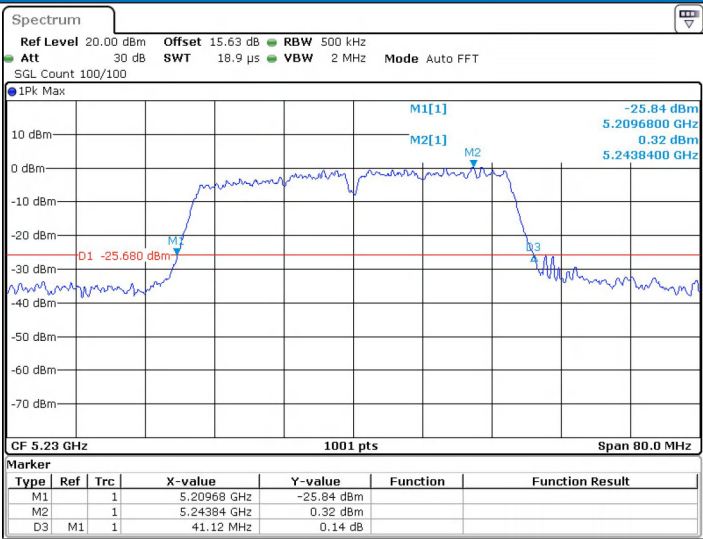
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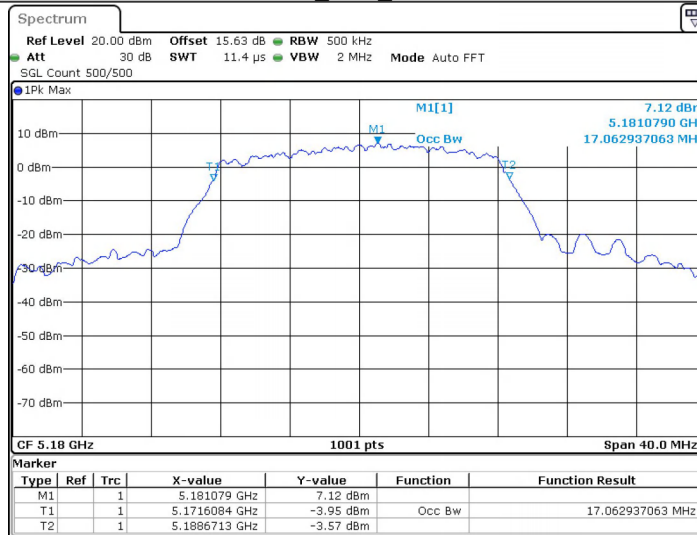
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11N40SISO_Ant1_5230



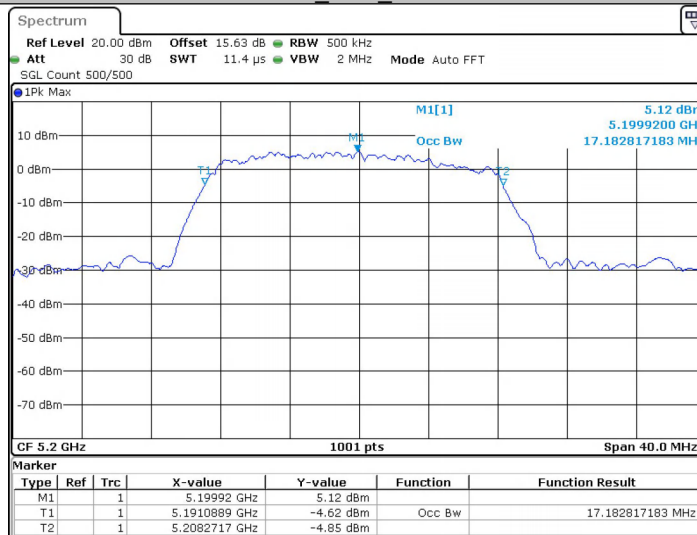
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11A_Ant1_5180



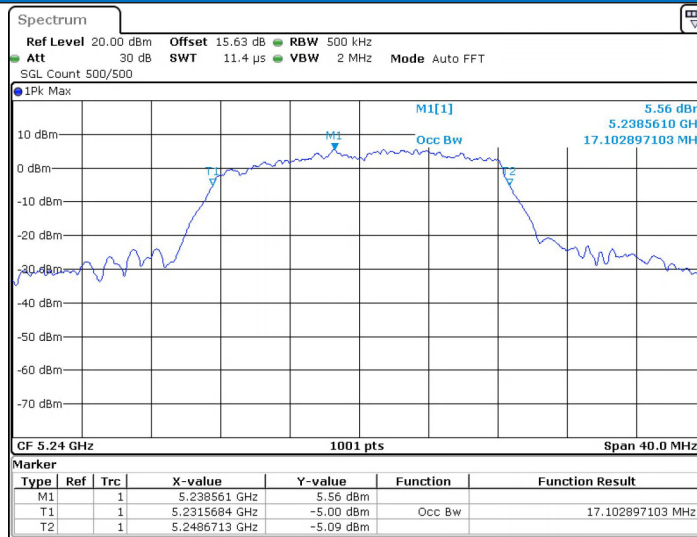
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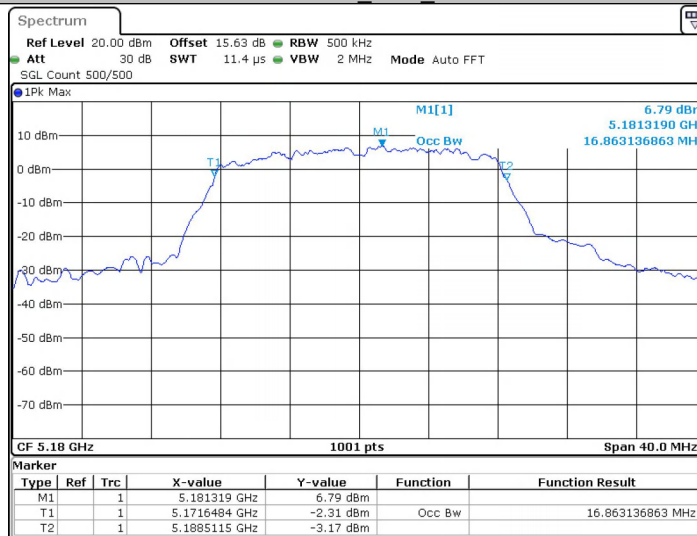


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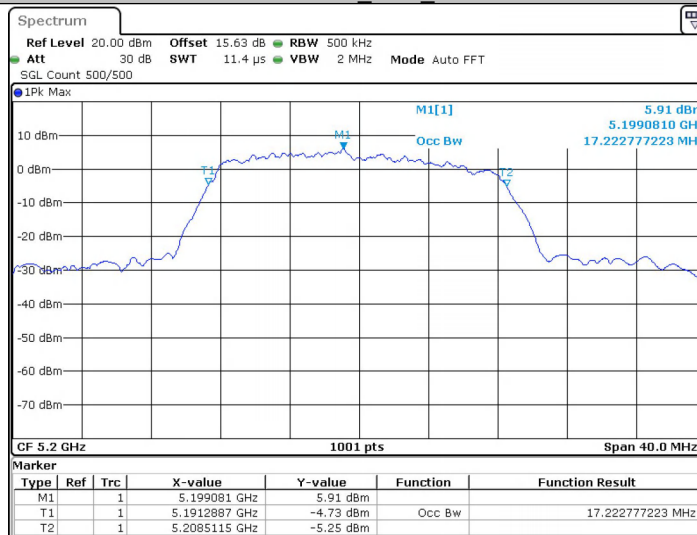
11A_Ant1_5240



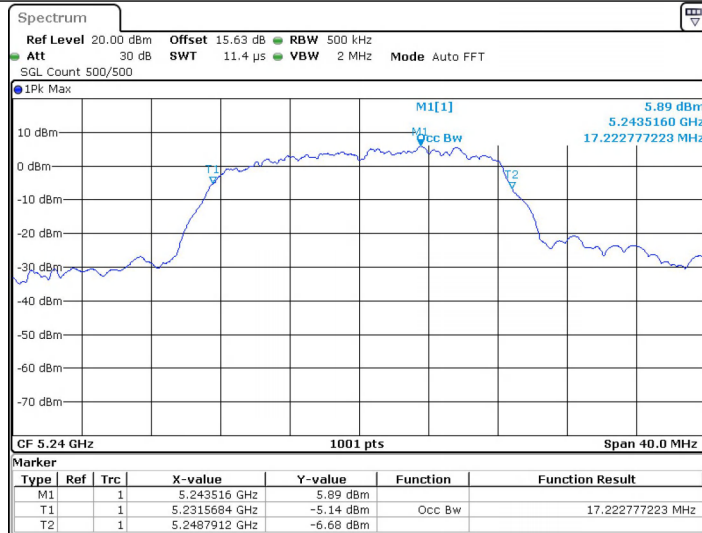
11N20SISO_Ant1_5180



11N20SISO_Ant1_5200

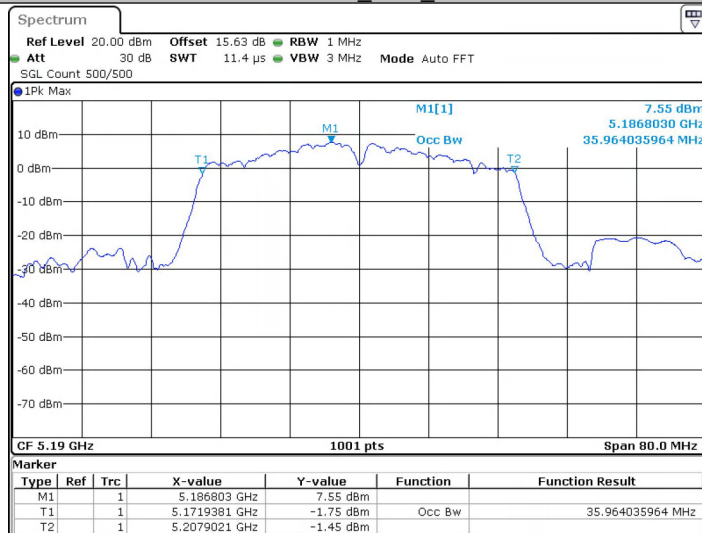


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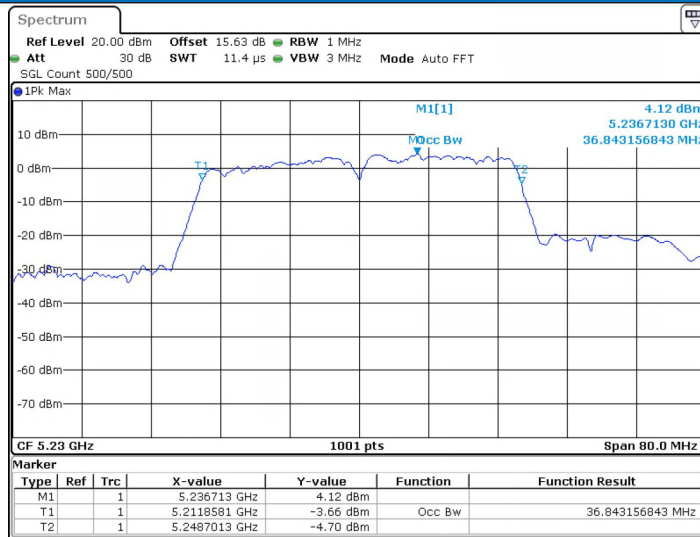
Date: 15.AUG.2025 17:34:14

11N40SISO_Ant1_5190



Date: 15.AUG.2025 18:10:45

11N40SISO_Ant1_5230



Date: 15 AUG.2025 18:13:13

Appendix B): Maximum Conduct Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II E

Limit:

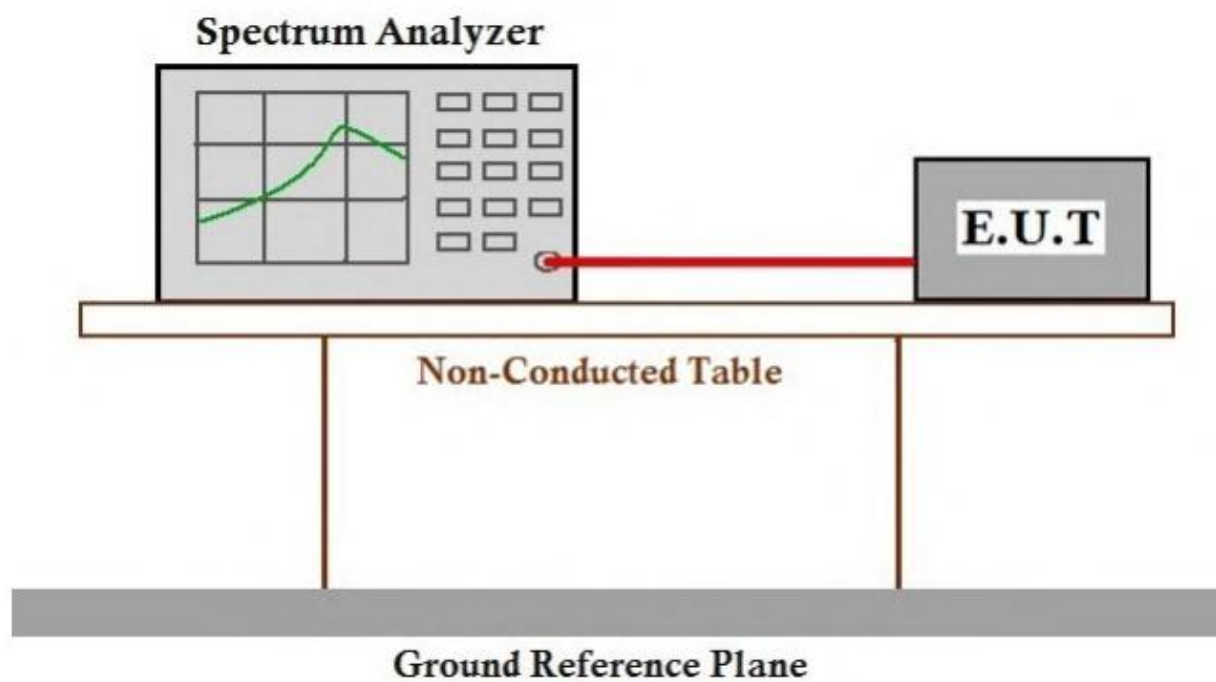
Frequency band(MHz)	Limit
5150-5250	$\leq 1\text{W}(30\text{dBm})$ for Indoor device
	$\leq 250\text{mW}(24\text{dBm})$ for client device
5250-5350	$\leq 250\text{mW}(24\text{dBm})$ for client device or $11\text{dBm}+10\log B^*$
5470-5725	$\leq 250\text{mW}(24\text{dBm})$ for client device or $11\text{dBm}+10\log B^*$
5725-5850	$\leq 1\text{W}(30\text{dBm})$
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Procedure:

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- (1) Set RBW = 1 MHz.
- (2) Set VBW ≥ 3 MHz.
- (3) Detector = power average
- (4) Sweep time = auto.
- (5) Add duty cycle to the measured average power.

Test Setup Diagram



Measurement Data

Test Mode	Antenna	Freq(MHz)	Result [dBm]	Limit [dBm]	Verdict
11A	Ant1	5180	13.36	≤ 23.98	PASS
		5200	11.69	≤ 23.98	PASS
		5240	11.90	≤ 23.98	PASS
11N20SISO	Ant1	5180	13.33	≤ 23.98	PASS
		5200	11.77	≤ 23.98	PASS
		5240	12.02	≤ 23.98	PASS
11N40SISO	Ant1	5190	12.48	≤ 23.98	PASS
		5230	10.18	≤ 23.98	PASS

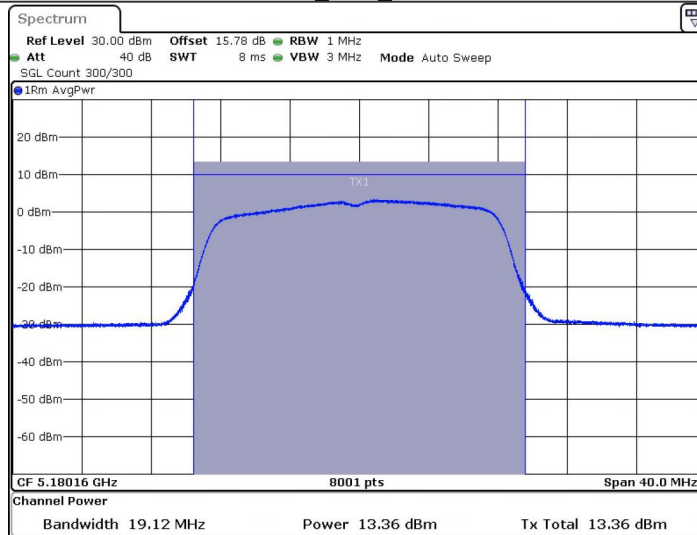
Remark:

Av.Power=Meas.Level+10 log (1/duty cycle)

E.i.r.p=Av.Power+G,

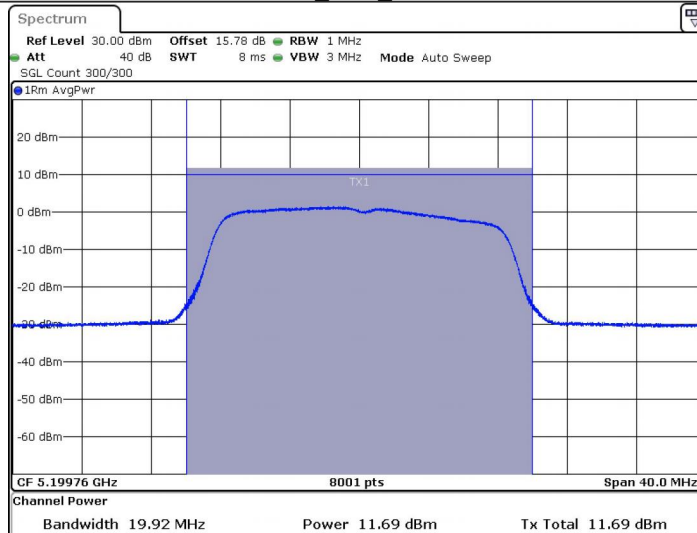
G = antenna gain in dBi.

11A_Ant1_5180



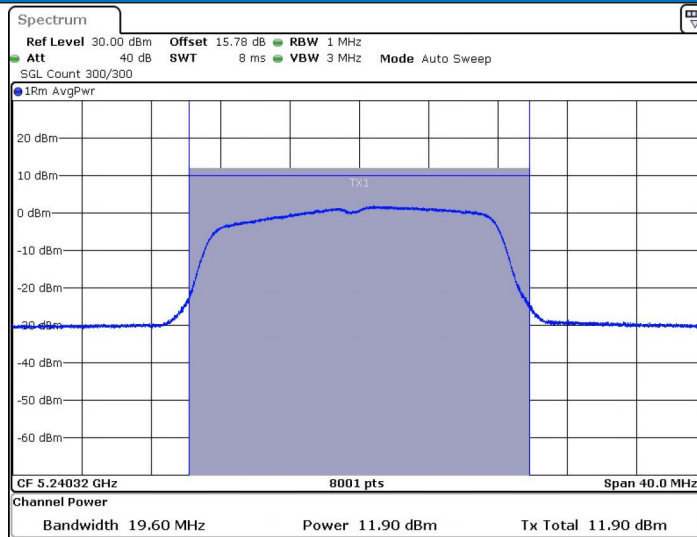
Date: 15.AUG.2025 17:22:37

11A_Ant1_5200



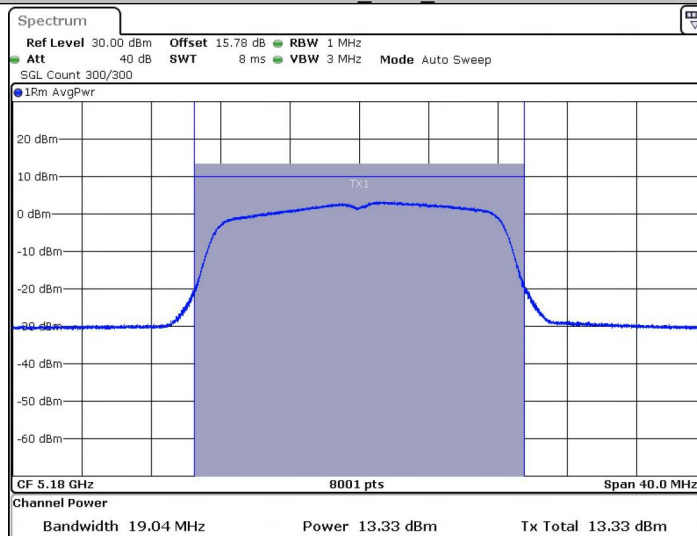
Date: 15.AUG.2025 17:25:10

11A_Ant1_5240



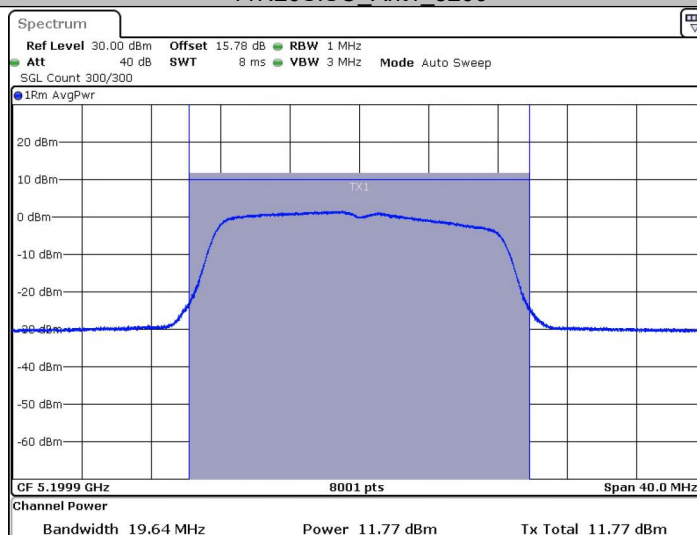
Date: 15.AUG.2025 17:26:44

11N20SISO_Ant1_5180



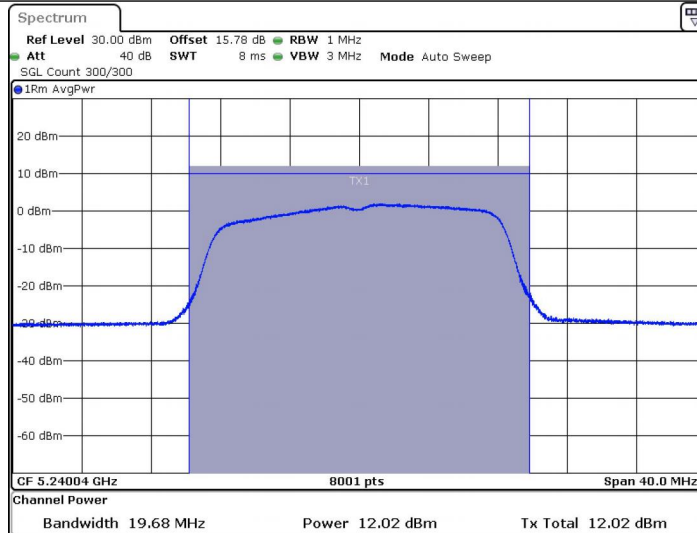
Date: 15.AUG.2025 17:28:20

11N20SISO_Ant1_5200



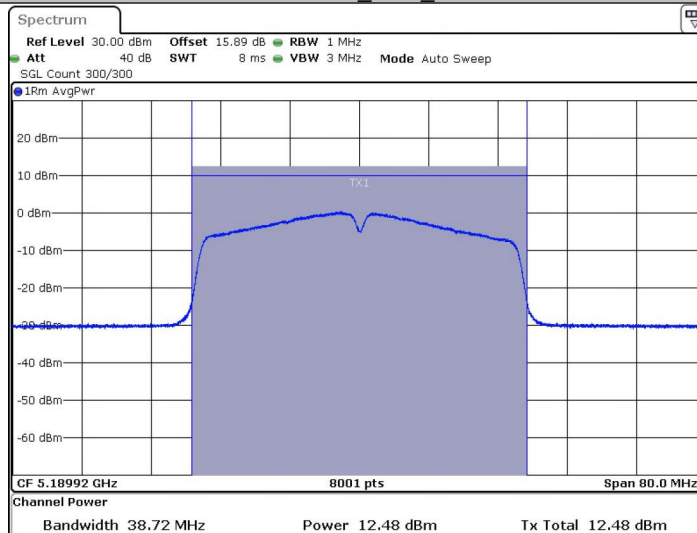
Date: 15.AUG.2025 17:30:24

11N20SISO_Ant1_5240



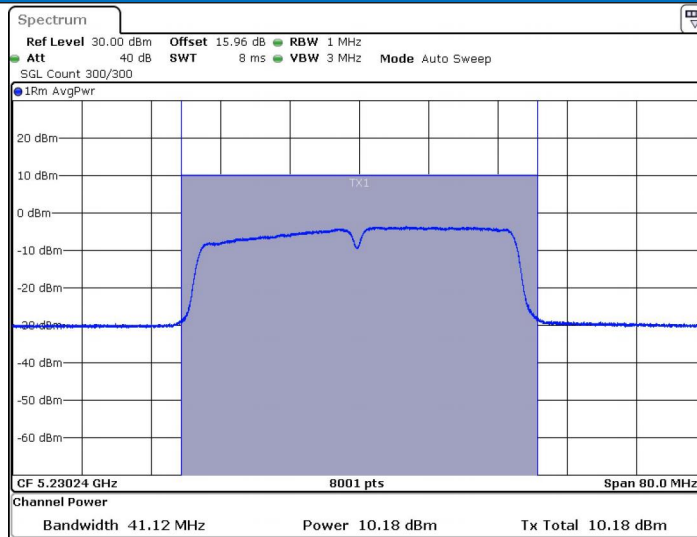
Date: 15.AUG.2025 17:34:37

11N40SISO_Ant1_5190



Date: 15.AUG.2025 18:11:06

11N40SISO_Ant1_5230



Date: 15 AUG.2025 18:13:35

Appendix C): Maximum Power Spectral Density

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II F

Test Procedure:

For 5150-5725MHz:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 1MHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.

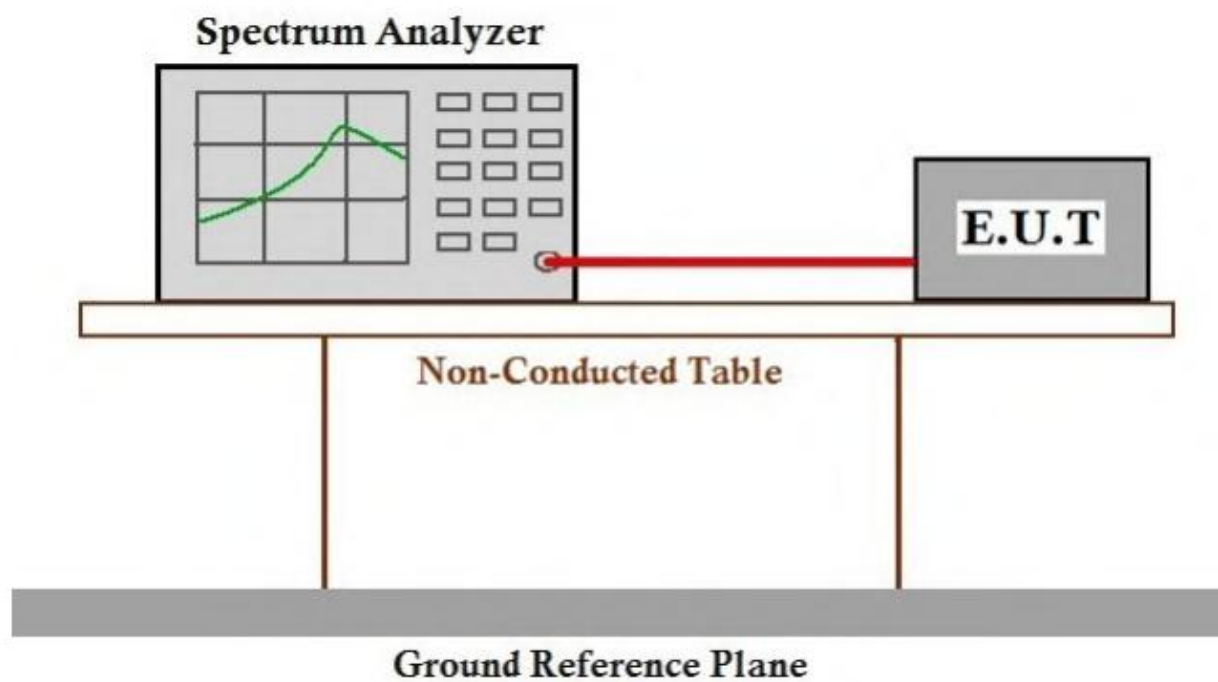
For 5725-5850MHz:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 500KHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.

Limit:

Frequency band(MHz)	Limit
5150-5250	$\leq 17\text{dBm}$ in 1MHz for Indoor device
	$\leq 11\text{dBm}$ in 1MHz for client device
5250-5350	$\leq 11\text{dBm}$ in 1MHz for client device
5470-5725	$\leq 11\text{dBm}$ in 1MHz for client device
5725-5850	$\leq 30\text{dBm}$ in 500 kHz
Remark:	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.

Test Setup Diagram



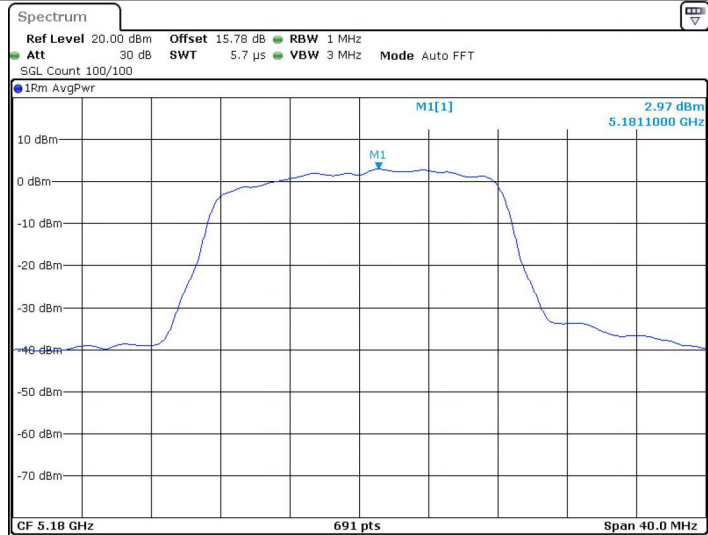
Result Table

TestMode	Freq(MHz)	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	5180	2.97	≤11.00	PASS
	5200	1.26	≤11.00	PASS
	5240	1.70	≤11.00	PASS
11N20SISO	5180	3.21	≤11.00	PASS
	5200	1.30	≤11.00	PASS
	5240	2.37	≤11.00	PASS
11N40SISO	5190	0.17	≤11.00	PASS
	5230	-3.43	≤11.00	PASS

Remark:

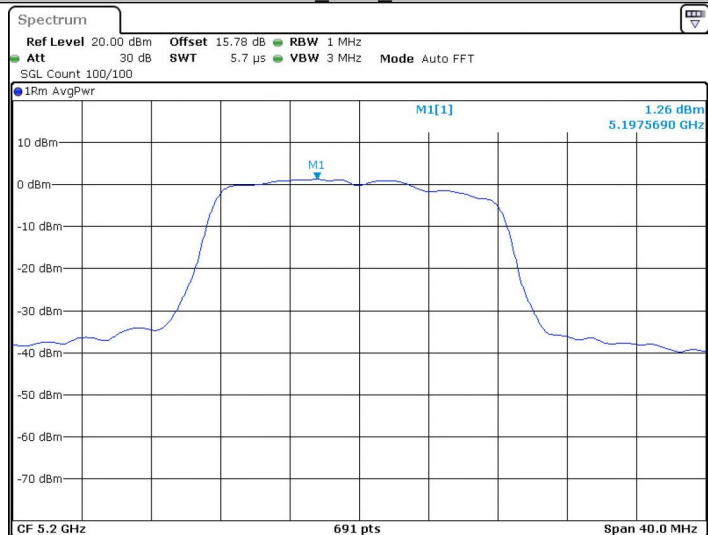
PSD = Meas PSD + Duty Cycle Factor

11A_Ant1_5180



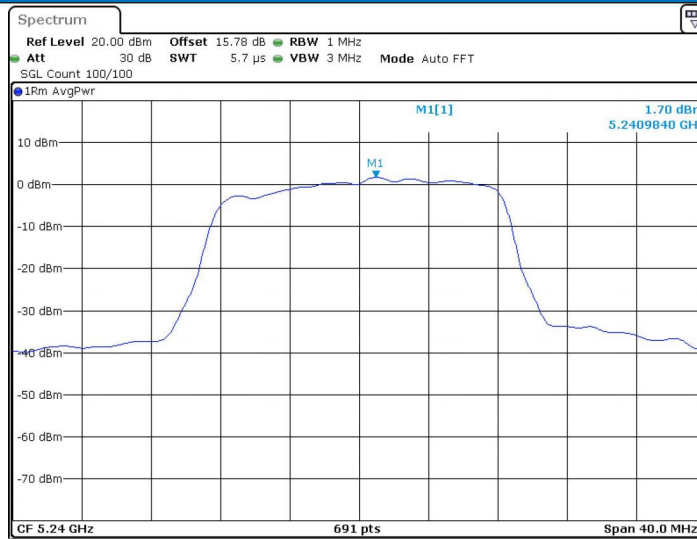
Date: 15.AUG.2025 17:22:43

11A_Ant1_5200



Date: 15.AUG.2025 17:25:15

11A_Ant1_5240



Date: 15.AUG.2025 17:26:49

11N20SISO_Ant1_5180



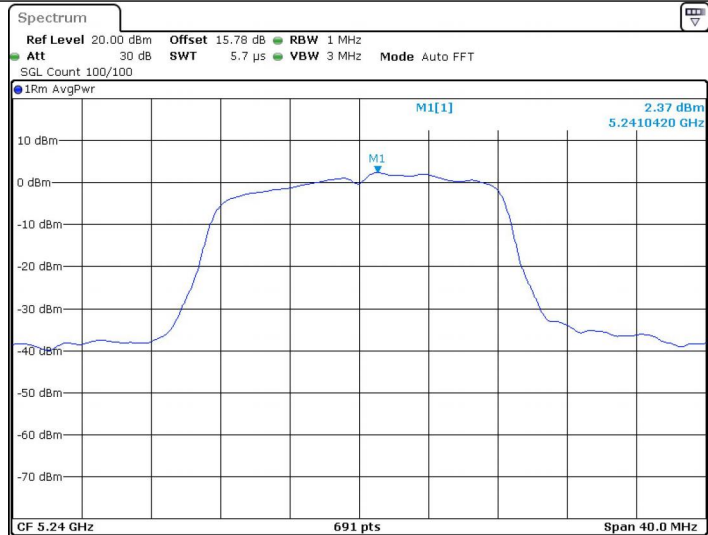
Date: 15.AUG.2025 17:28:26

11N20SISO_Ant1_5200



Date: 15.AUG.2025 17:30:29

11N20SISO_Ant1_5240



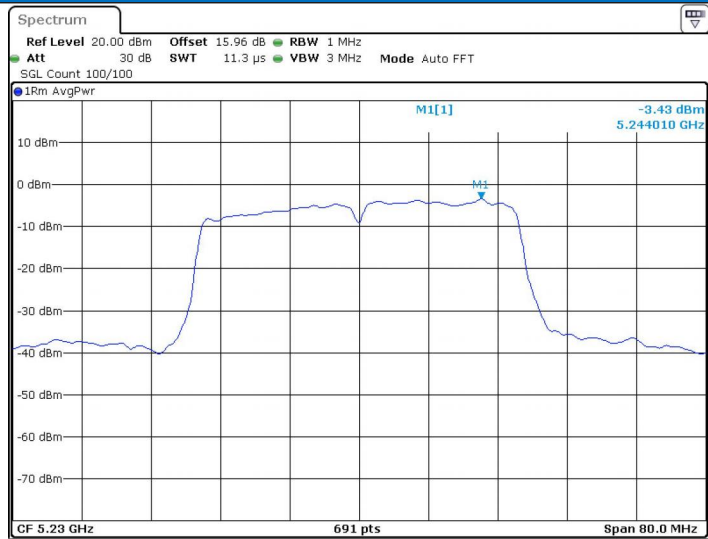
Date: 15.AUG.2025 17:34:43

11N40SISO_Ant1_5190



Date: 15.AUG.2025 18:11:12

11N40SISO_Ant1_5230



Date: 15 AUG.2025 18:13:40

Appendix D): Band Edge Measurements

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)

Test Method: KDB 789033 D02 II G

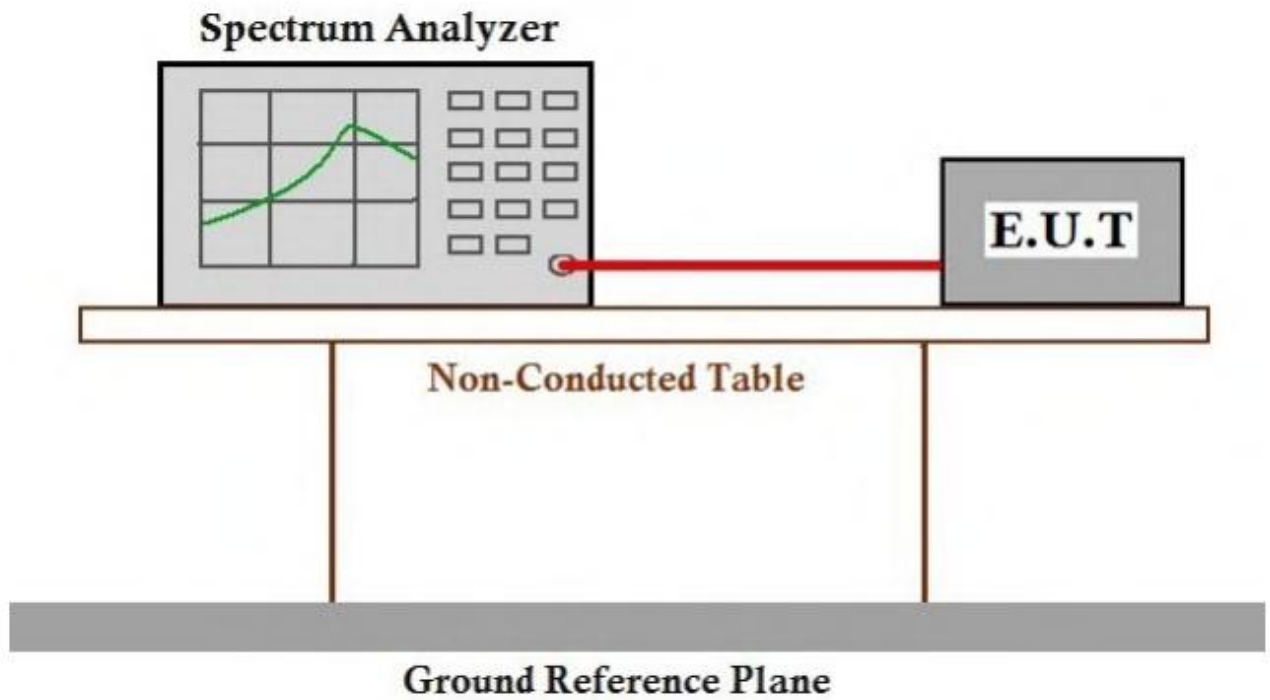
Test Procedure:

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

Limit:

For transmitters operating in the 5.15-5.25 GHz band:	All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.25-5.35 GHz band:	All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.47-5.725 GHz band:	All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz (68.2dBuV/m).
For transmitters operating in the 5.725-5.85 GHz band:	(i) All emissions shall be limited to a level of -27 dBm/MHz (68.2dBuV/m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz (105.2dBuV/m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz (110.8dBuV/m) at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz (122.2dBuV/m) at the band edge.

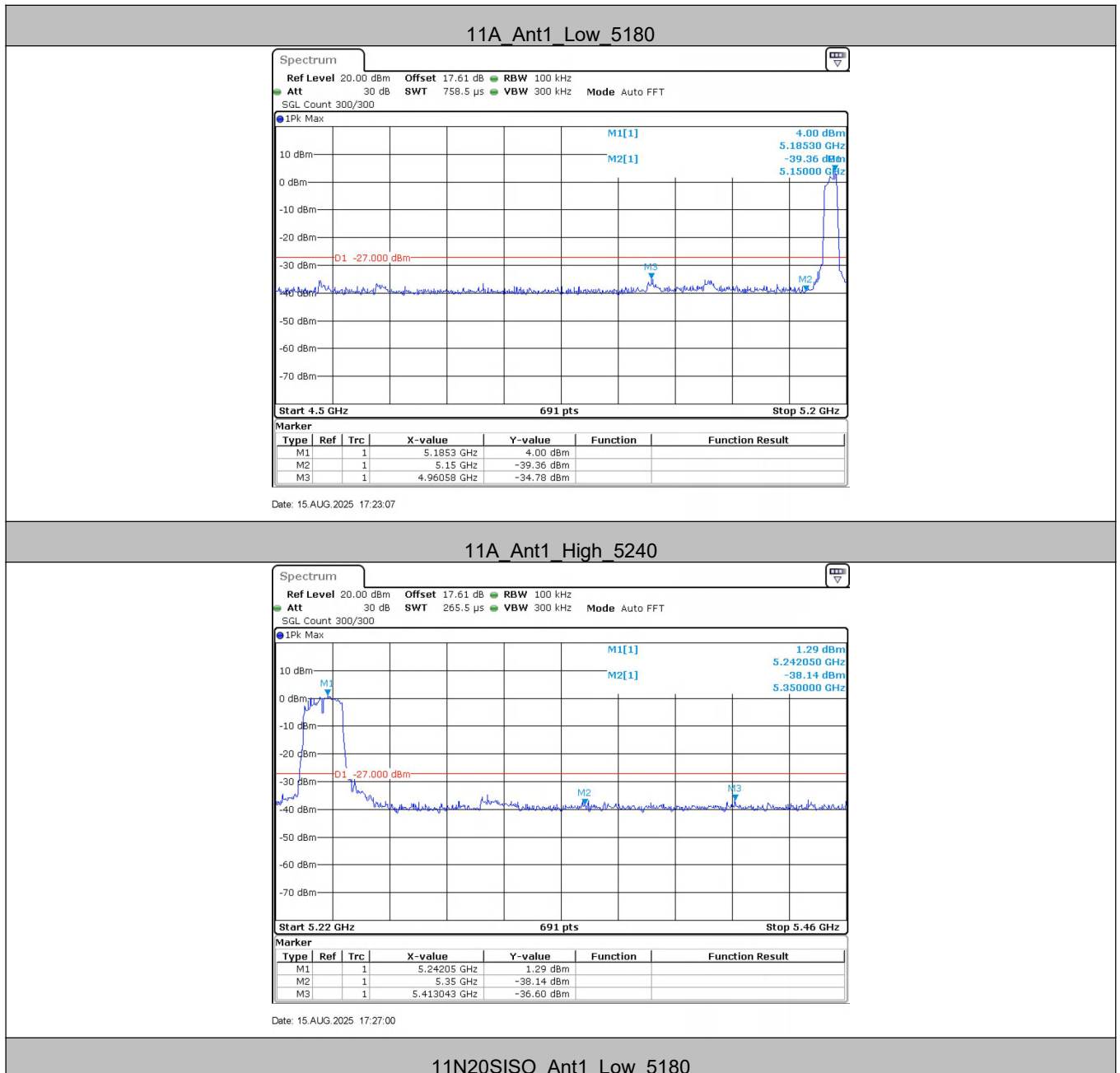
Test Setup Diagram

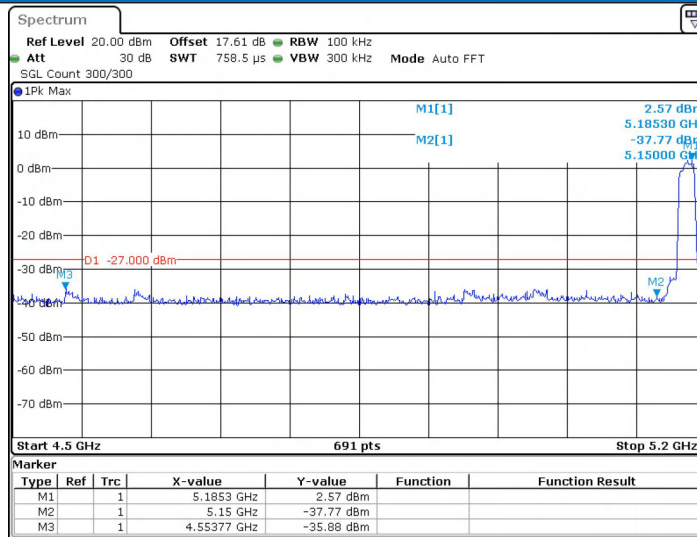


Test Result:**6.1.1 Test Result B1**

TestMode	ChName	Freq(MHz)	Result[dBm]	Limit[dBm]	Verdict
11A	Low	5180	-34.78	≤ -27	PASS
	High	5240	-36.6	≤ -27	PASS
11N20SISO	Low	5180	-35.88	≤ -27	PASS
	High	5240	-36.44	≤ -27	PASS
11N40SISO	Low	5190	-34.71	≤ -27	PASS
	High	5230	-37.42	≤ -27	PASS

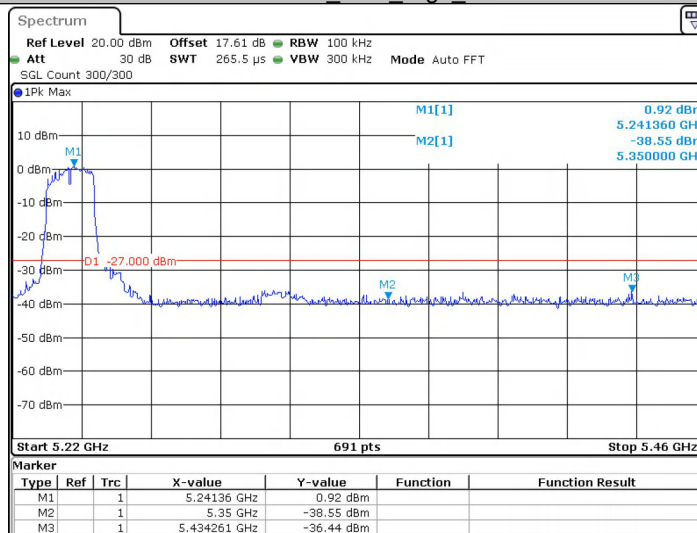
6.1.2 Test Graphs B1





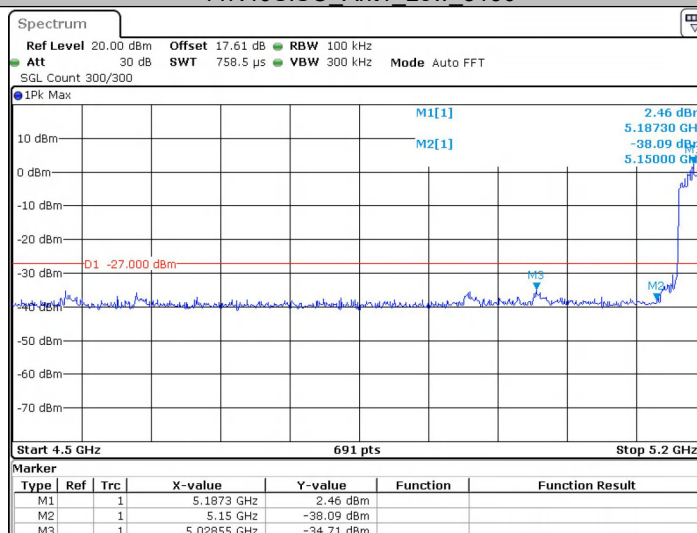
Date: 15 AUG. 2025 17:28:50

11N20SISO_Ant1_High_5240



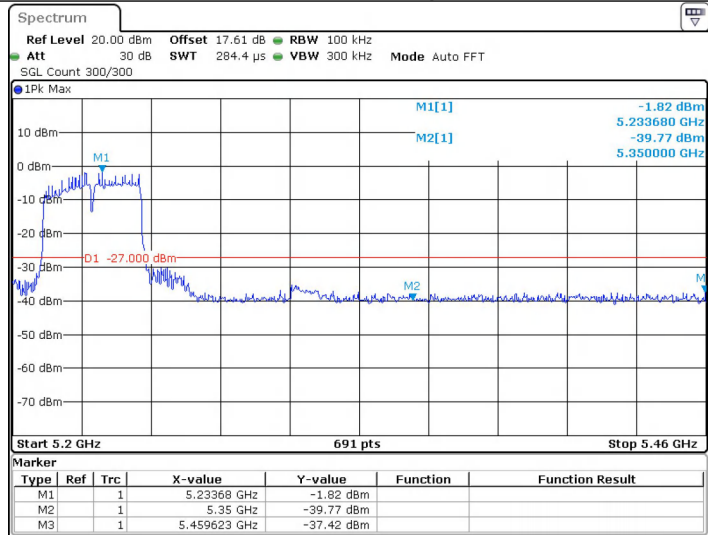
Date: 15 AUG. 2025 17:34:54

11N40SISO_Ant1_Low_5190



Date: 15 AUG. 2025 18:11:36

11N40SISO_Ant1_High_5230



Date: 15 AUG 2025 18:13:52

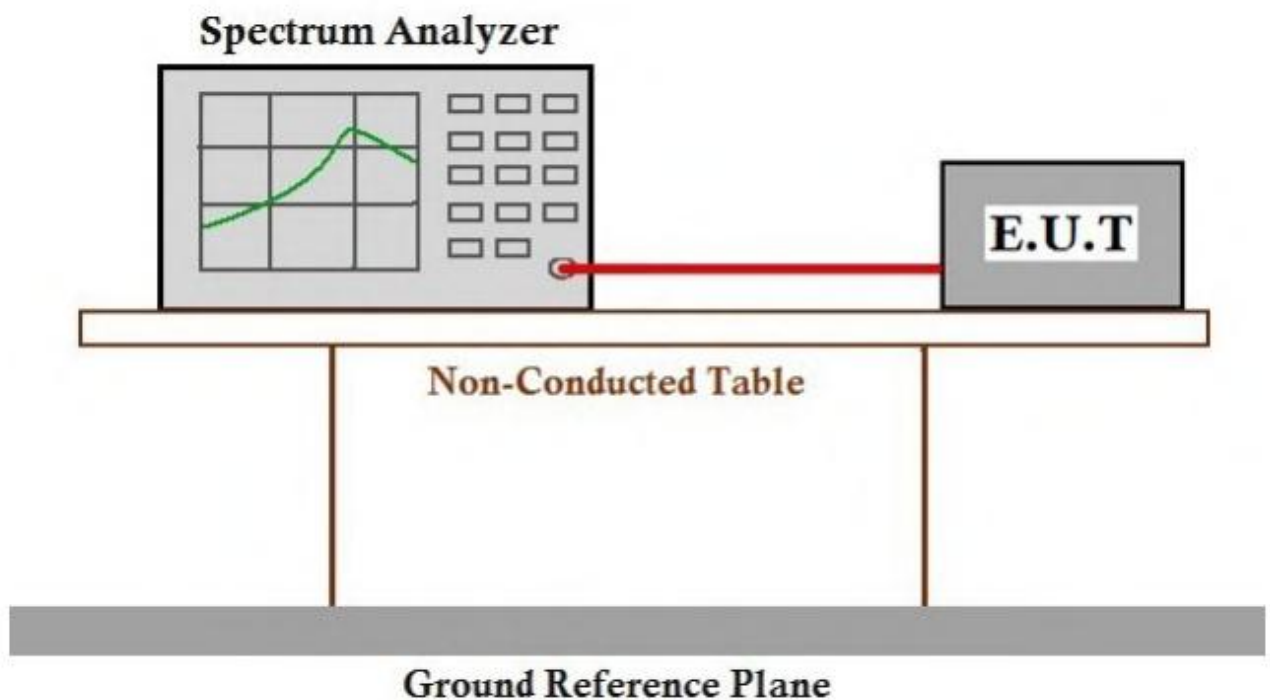
Appendix E): Frequency Stability

Test Requirement 47 CFR Part 15, Subpart C 15.407 (g)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit: The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

Test Setup Diagram



Measurement Data

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp	Voltage	Measured Frequency	Limit
(°C)		(MHz)	(MHz)
50	VN	5240.03	5150-5250
40		5240.02	5150-5250
30		5240.01	5150-5250
20		5240.02	5150-5250
10		5240.02	5150-5250
0		5240.01	5150-5250
-10		5240.02	5150-5250
-30		5240.03	5150-5250

Frequency Stability Versus Temp.			
Operating Frequency: 5240 MHz			
Temp.	Voltage	Measured Frequency	Limit
		(MHz)	(MHz)
TN	VL	5240.03	5150-5250
	VN	5240.02	5150-5250
	VH	5240.01	5150-5250

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

Appendix F): Antenna Requirement

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.407(a)(1) (2) requirement:

The conducted output power limit specified in paragraph (a) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (a) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power and the peak power spectral density shall be reduced by the by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is Chip antenna.

The connection/connection type between the antenna to the EUT's antenna port is: permanently attachment

This is either permanently attachment or a unique coupling that satisfies the requirement.

Appendix G): Operation in the absence of information to the transmit

15.407(c) requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

Operation in the absence of information to the transmit

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

Appendix H): Restricted bands around fundamental frequency (Radiated Emission)

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:	Below 1GHz test procedure as below: - The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. - The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. - Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel Above 1GHz test procedure as below: - Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre). - Test the EUT in the lowest channel , the Highest channel - The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. - Repeat above procedures until all frequencies measured was complete.				
Limit:	Frequency	Limit (dBμV/m @3cm)	Remark		
	30MHz-88MHz	40.0	Quasi-peak Value		
	88MHz-216MHz	43.5	Quasi-peak Value		
	216MHz-960MHz	46.0	Quasi-peak Value		
	960MHz-1GHz	54.0	Quasi-peak Value		
	Above 1GHz	54.0	Average Value		
		74.0	Peak Value		

Test plot as follows:

Worse case mode:		802.11a		Test channel:		52			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5150.00	59.07	-3.63	55.44	74	-18.56	peak	H	1.5	344
5150.00	44.63	-3.63	41.00	54	-13.00	AVG	H	1.5	190
5150.00	60.16	-3.63	56.53	74	-17.47	peak	V	1.5	258
5150.00	46.82	-3.63	43.19	54	-10.81	AVG	V	1.5	114

Worse case mode:		802.11a		Test channel:		64			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5350.00	58.93	-3.59	55.34	74	-18.66	peak	H	1.5	256
5350.00	44.23	-3.59	40.64	54	-13.36	AVG	H	1.5	19
5350.00	59.32	-3.59	55.73	74	-18.27	peak	V	1.5	125
5350.00	46.65	-3.59	43.06	54	-10.94	AVG	V	1.5	12

Worse case mode:		802.11n(HT20)		Test channel:		52			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5150.00	58.87	-3.63	55.24	74	-18.76	peak	H	1.5	243
5150.00	44.01	-3.63	40.38	54	-13.62	AVG	H	1.5	159
5150.00	59.27	-3.63	55.64	74	-18.36	peak	V	1.5	205
5150.00	46.62	-3.63	42.99	54	-11.01	AVG	V	1.5	52

Worse case mode:		802.11n(HT20)		Test channel:		64			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5350.00	58.80	-3.59	55.21	74	-18.79	peak	H	1.5	248
5350.00	44.10	-3.59	40.51	54	-13.49	AVG	H	1.5	264
5350.00	60.01	-3.59	56.42	74	-17.58	peak	V	1.5	73
5350.00	46.20	-3.59	42.61	54	-11.39	AVG	V	1.5	132

Worse case mode:		802.11n(HT40)		Test channel:		54			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5150.00	58.38	-3.63	54.75	74	-19.25	peak	H	1.5	322
5150.00	44.83	-3.63	41.20	54	-12.80	AVG	H	1.5	112
5150.00	59.32	-3.63	55.69	74	-18.31	peak	V	1.5	227
5150.00	46.37	-3.63	42.74	54	-11.26	AVG	V	1.5	63

Worse case mode:		802.11n(HT40)		Test channel:		62			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
5350.00	58.63	-3.59	55.04	74	-18.96	peak	H	1.5	262
5350.00	44.33	-3.59	40.74	54	-13.26	AVG	H	1.5	9
5350.00	59.85	-3.59	56.26	74	-17.74	peak	V	1.5	111
5350.00	46.74	-3.59	43.15	54	-10.85	AVG	V	1.5	194

Note:

1) Through Pre-scan transmitting mode with all kind of modulation and data rate, Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor- Antenna Factor-Cable Factor

Appendix I): Radiated Spurious Emissions

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:					
Below 1GHz test procedure as below: a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Above 1GHz test procedure as below: g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre) h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.					
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBµV/cm)	Remark	Measurement distance (cm)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				
Test result: PASS					

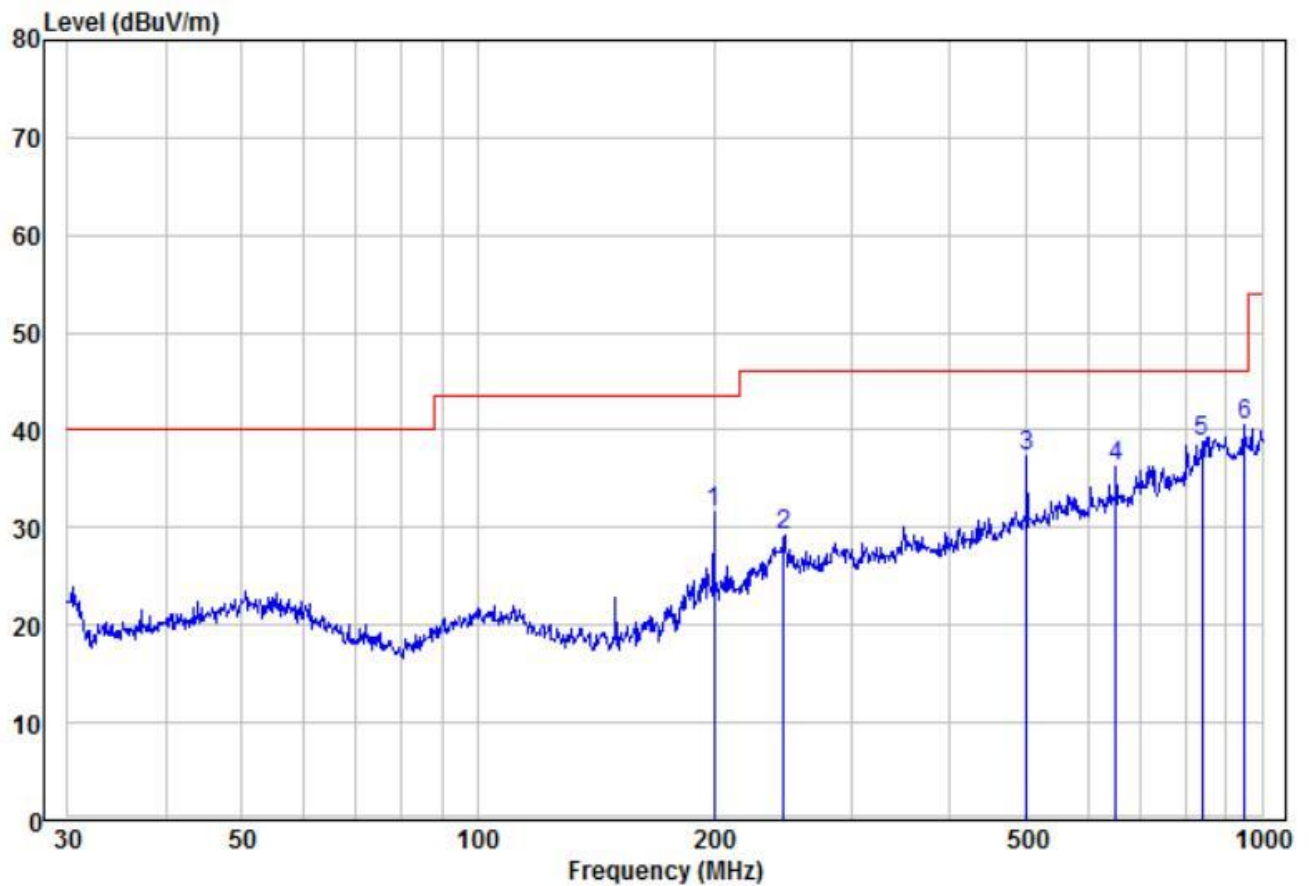
Test Data:

Radiated Emission below 1GHz

30MHz~1GHz

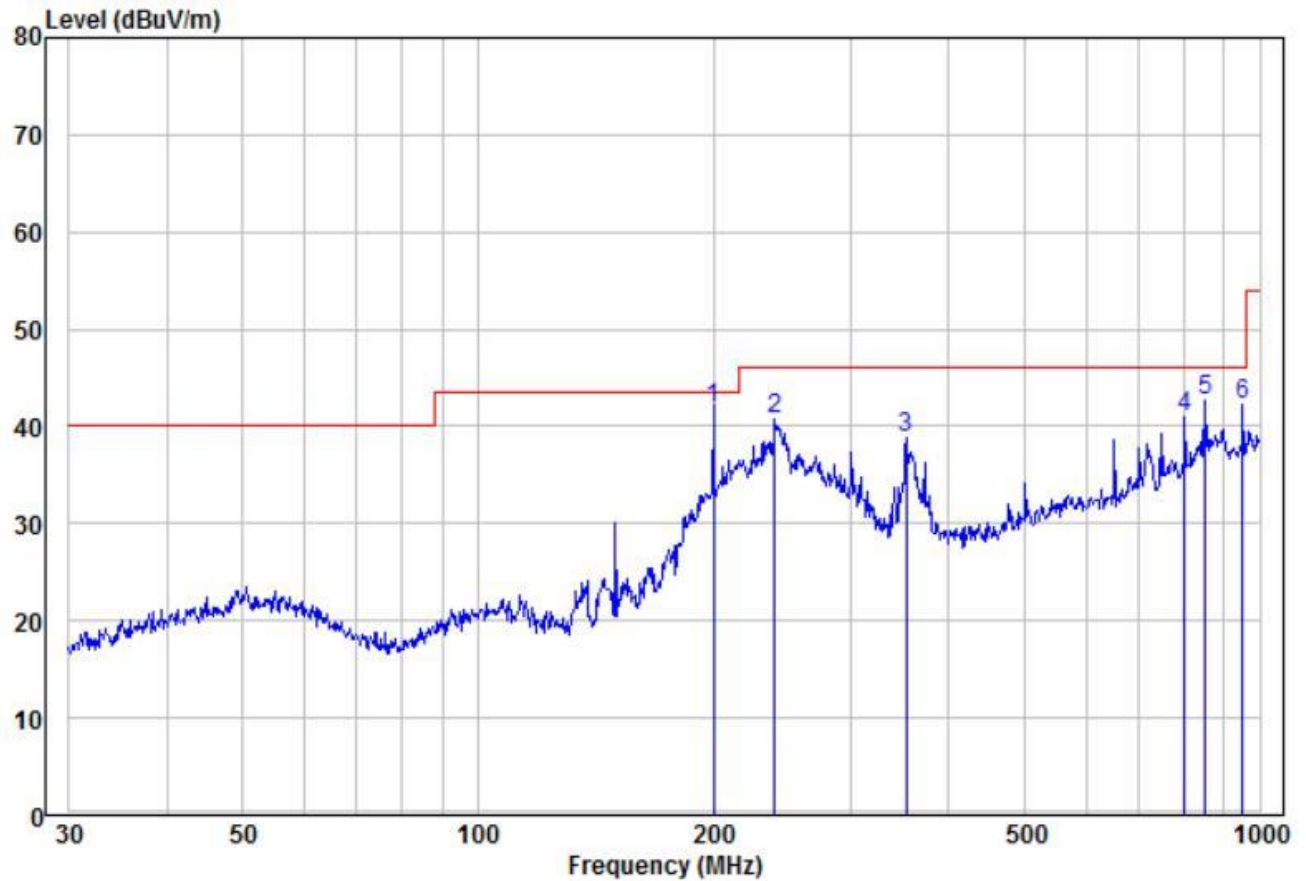
C0051

Test mode:	Transmitting (802.11a 52CH)	Vertical
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	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase	APos	TPos
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB			cm	deg
1	199.99	18.52	13.02	31.54	43.50	-11.96	Peak	VERTICAL	100	13
2	245.95	12.99	16.26	29.25	46.00	-16.75	Peak	VERTICAL	100	60
3	501.18	15.57	21.84	37.41	46.00	-8.59	Peak	VERTICAL	100	171
4	651.94	12.95	23.39	36.34	46.00	-9.66	Peak	VERTICAL	100	255
5	839.18	9.96	28.89	38.85	46.00	-7.15	Peak	VERTICAL	100	308
6 pp	952.09	11.76	28.71	40.47	46.00	-5.53	Peak	VERTICAL	100	336

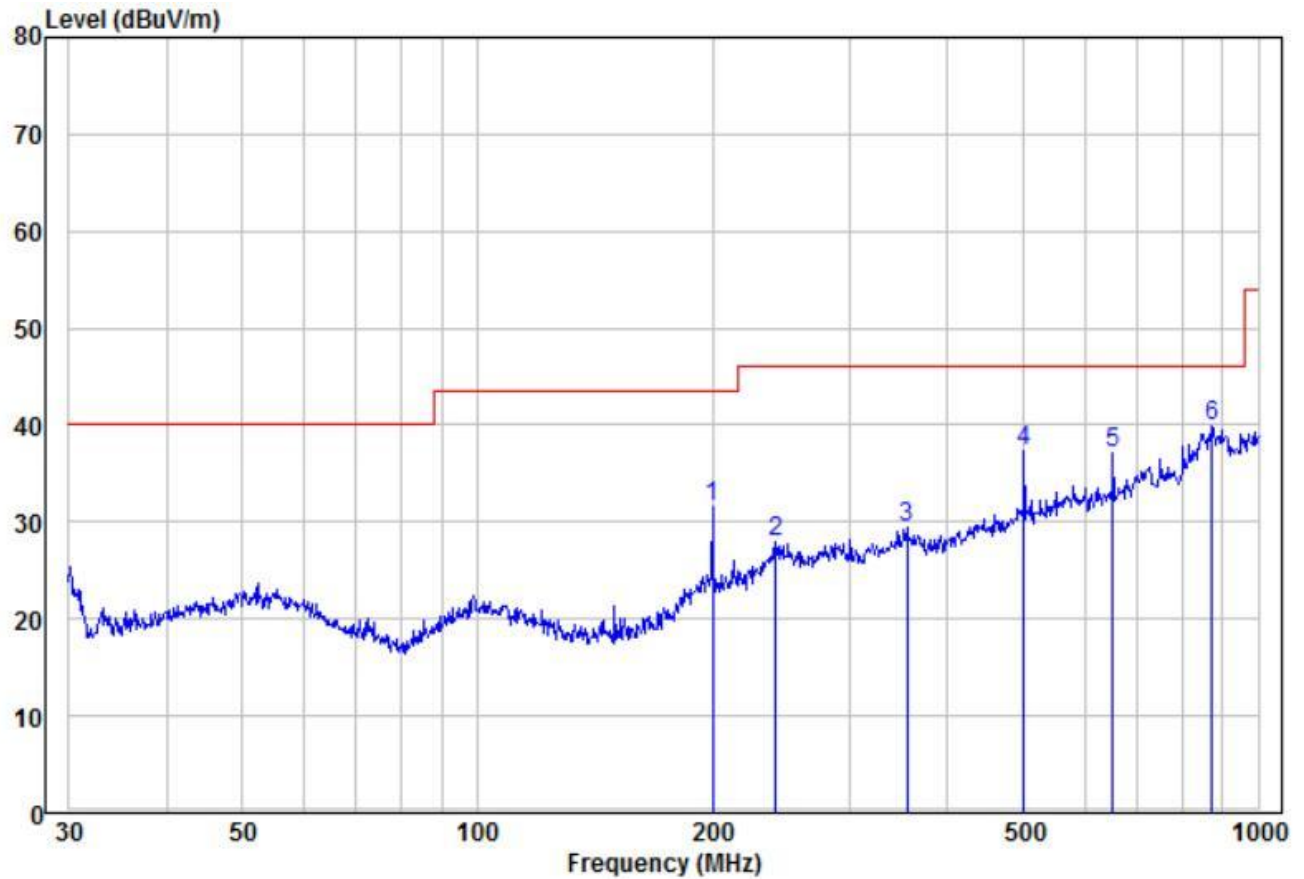
Test mode:	Transmitting (802.11a 52CH)	Horizontal
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		Read		Limit	Over			APos	TPos
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB			cm deg
1 pp	199.99	28.90	13.02	41.92	43.50	-1.58	QP	HORIZONTAL	100 26
2	239.99	24.79	15.90	40.69	46.00	-5.31	Peak	HORIZONTAL	100 79
3	352.94	19.72	19.06	38.78	46.00	-7.22	Peak	HORIZONTAL	100 112
4	801.79	14.22	26.67	40.89	46.00	-5.11	Peak	HORIZONTAL	100 167
5 pk	851.04	13.68	29.07	42.75	46.00	-3.25	Peak	HORIZONTAL	100 199
6	952.09	13.57	28.71	42.28	46.00	-3.72	Peak	HORIZONTAL	100 220

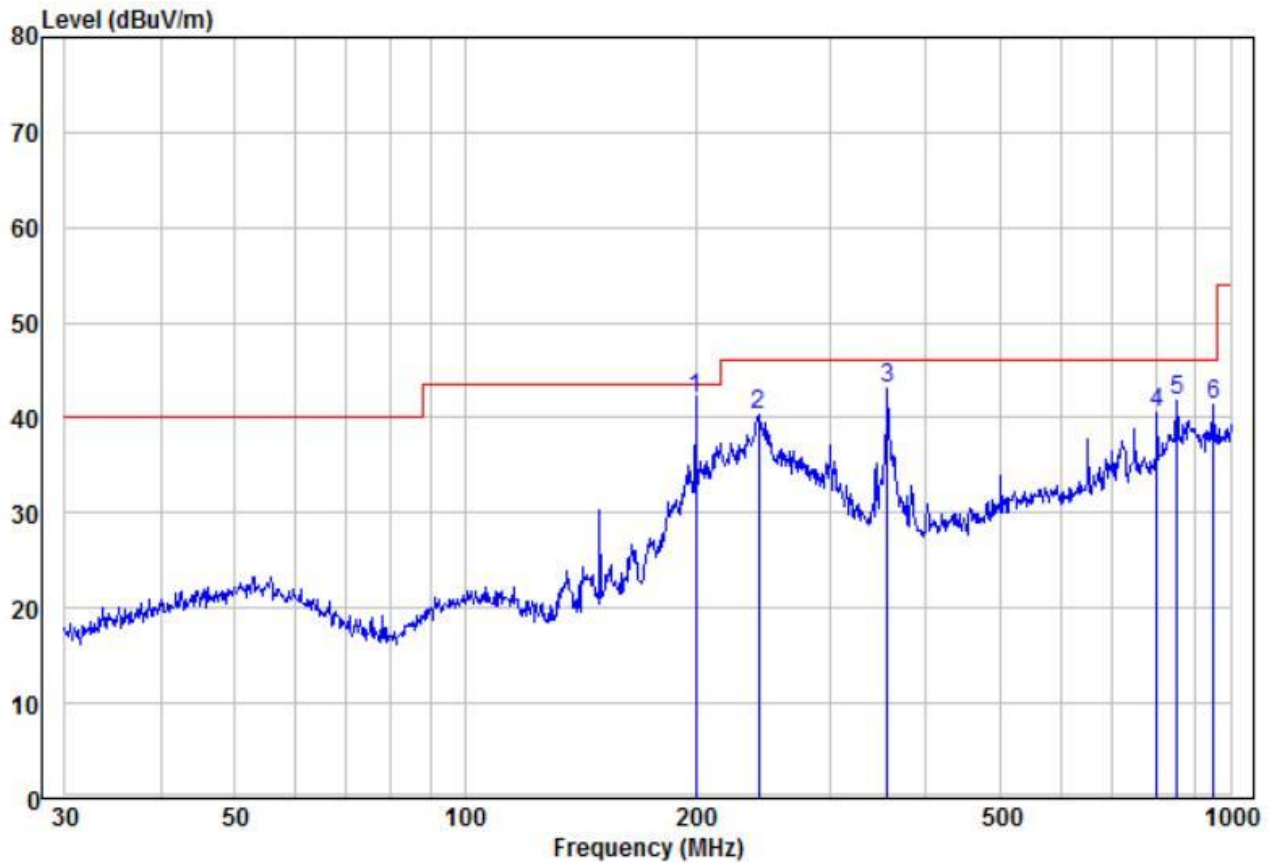
C0053

Test mode:	Transmitting (802.11a 52CH)	Vertical
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	Read			Limit	Over			APos	TPos
Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase		
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB			cm	deg
1	199.99	18.58	13.02	31.60	43.50	-11.90 Peak	VERTICAL	100	52
2	240.83	11.93	15.95	27.88	46.00	-18.12 Peak	VERTICAL	100	66
3	355.43	10.28	19.12	29.40	46.00	-16.60 Peak	VERTICAL	100	83
4	501.18	15.46	21.84	37.30	46.00	-8.70 Peak	VERTICAL	100	299
5	651.94	13.67	23.39	37.06	46.00	-8.94 Peak	VERTICAL	100	301
6 pp	872.18	10.50	29.39	39.89	46.00	-6.11 Peak	VERTICAL	100	324

Test mode:	Transmitting (802.11a 52CH)	Horizontal
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		Read		Limit	Over			APos	TPos
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB			cm deg
1	pp	199.99	29.00	13.02	42.02	43.50	-1.48 QP	HORIZONTAL	100 15
2		241.68	24.28	16.01	40.29	46.00	-5.71 Peak	HORIZONTAL	100 150
3	pk	356.68	23.91	19.15	43.06	46.00	-2.94 Peak	HORIZONTAL	100 181
4		801.79	13.76	26.67	40.43	46.00	-5.57 Peak	HORIZONTAL	100 241
5		851.04	12.66	29.07	41.73	46.00	-4.27 Peak	HORIZONTAL	100 265
6		952.09	12.77	28.71	41.48	46.00	-4.52 Peak	HORIZONTAL	100 341

Transmitter Emission above 1GHz

Test mode:	802.11a(6Mbps)			Test channel:		52 CH			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)		H/V	(m)	(Degree)
10520	52.31	2.26	54.57	74	-19.43	peak	H	1.5	281
10520	37.92	2.26	40.18	54	-13.82	AVG	H	1.5	74
15780	51.39	3.75	55.14	74	-18.86	peak	H	1.5	197
15780	38.46	3.75	42.21	54	-11.79	AVG	H	1.5	169
10520	55.29	2.26	57.55	74	-16.45	peak	V	1.5	267
10520	38.09	2.26	40.35	54	-13.65	AVG	V	1.5	332
15780	52.05	3.75	55.80	74	-18.20	peak	V	1.5	41
15780	35.68	3.75	39.43	54	-14.57	AVG	V	1.5	215

Test mode:	802.11a		Test channel:		52 CH			
Frequency	Emission Level	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dB μ V/m)	(dBm/m)	(dBm/m)	(dB)		H/V	(m)	(Degree)
10520	54.57	-40.59	-27	-13.59	peak	H	1.5	281
15780	55.14	-40.02	-27	-13.02	peak	H	1.5	197
10520	57.55	-37.61	-27	-10.61	peak	V	1.5	267
15780	55.80	-39.36	-27	-12.36	peak	V	1.5	41

Test mode:	802.11a(6Mbps)			Test channel:		40 CH			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
10400	53.88	2.27	56.15	74	-17.85	peak	H	1.5	334
10400	36.13	2.27	38.40	54	-15.60	AVG	H	1.5	261
15600	50.89	3.76	54.65	74	-19.35	peak	H	1.5	122
15600	37.82	3.76	41.58	54	-12.42	AVG	H	1.5	301
10400	55.09	2.27	57.36	74	-16.64	peak	V	1.5	336
10400	39.74	2.27	42.01	54	-11.99	AVG	V	1.5	285
15600	50.58	3.76	54.34	74	-19.66	peak	V	1.5	298
15600	36.54	3.76	40.30	54	-13.70	AVG	V	1.5	4

Test mode:	802.11a		Test channel:		40 CH			
Frequency	Emission Level	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV/m)	(dBm/m)	(dBm/m)	(dB)		H/V	(m)	(Degree)
10400	56.15	-39.01	-27	-12.01	peak	H	1.5	334
15600	54.65	-40.51	-27	-13.51	peak	H	1.5	122
10400	57.36	-37.80	-27	-10.8	peak	V	1.5	336
15600	54.34	-40.82	-27	-12.01	peak	V	1.5	298

Test mode:	802.11a(6Mbps)			Test channel:		64 CH			
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V	(m)	(Degree)
10640	52.49	2.31	54.80	74	-19.20	peak	H	1.5	8
10640	37.39	2.31	39.70	54	-14.30	AVG	H	1.5	153
15960	49.56	3.79	53.35	74	-20.65	peak	H	1.5	237
15960	35.14	3.79	38.93	54	-15.07	AVG	H	1.5	131
10640	53.79	2.31	56.10	74	-17.90	peak	V	1.5	282
10640	37.88	2.31	40.19	54	-13.81	AVG	V	1.5	135
15960	49.88	3.79	53.67	74	-20.33	peak	V	1.5	194
15960	35.20	3.79	38.99	54	-15.01	AVG	V	1.5	359

Test mode:	802.11a		Test channel:		64 CH			
Frequency	Emission Level	Emission Level	Limits	Over	Detect or Type	Ant. Pol.	Antenna Height	Table Angle
(MHz)	(dBμV/m)	(dBm/m)	(dBm/m)	(dB)		H/V	(m)	(Degree)
10640	54.80	-40.36	-27	-13.36	peak	H	1.5	8
15960	53.35	-41.81	-27	-14.81	peak	H	1.5	237
10640	56.10	-39.06	-27	-12.06	peak	V	1.5	282
15960	53.67	-41.49	-27	-14.49	peak	V	1.5	194

Remark:

- 1) The 802.11a 6Mbps of rate is the worst case, only the worst data recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 40GHz,The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

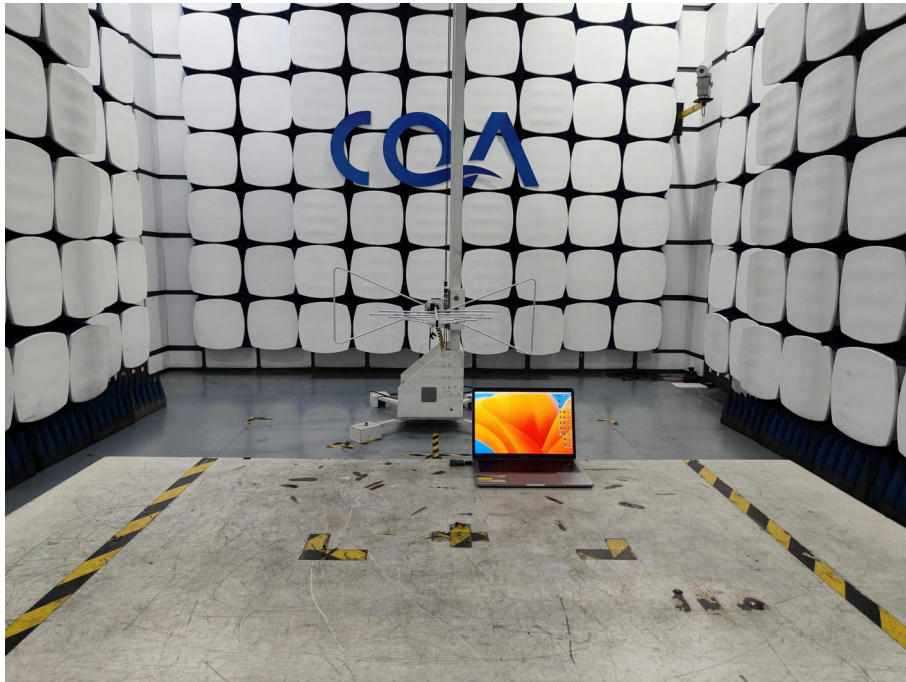
7 Photographs - EUT Test Setup

7.1 Radiated Spurious Emission

9kHz~30MHz:



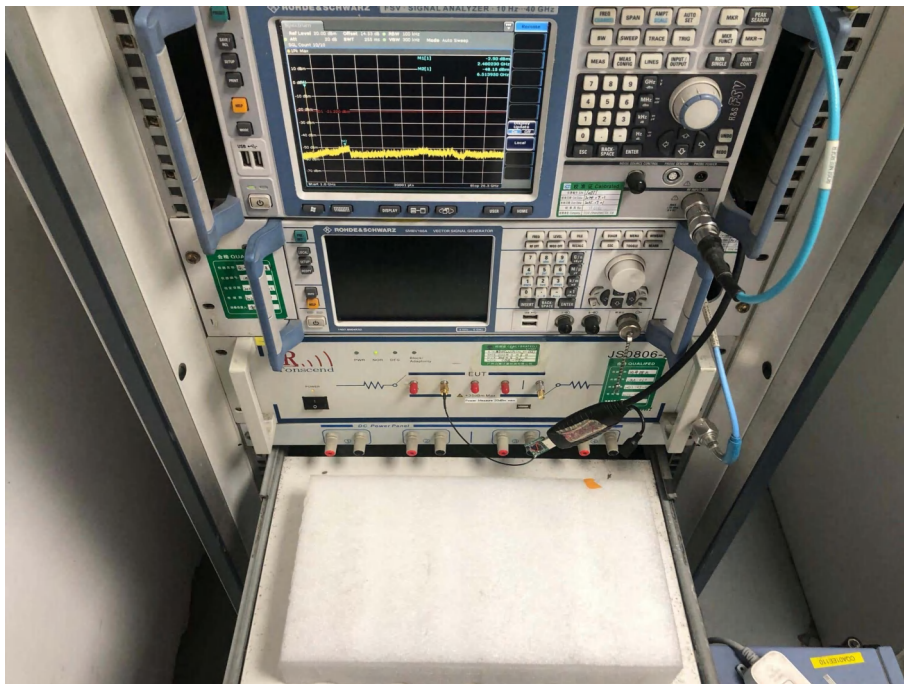
30MHz~1GHz:



Above 1GHz:



7.2 RF Conducted measurement



8 Photographs - EUT Constructional Details

Refer to Photographs - EUT Constructional Details OF EUT for CQASZ20250801864E-01.

*** END OF REPORT ***