CERTIFICATION TEST REPORT

Report Number : 4790309672-FR3V2

Applicant : Kaonbroadband CO., LTD.
884-3, Seongnam-daero, Bundang-gu, Seongnam-si
Gyeonggi-do, South Korea

Model : AR1344P, AR1344, AR1344E, AR1344E2, EVO6700AP2

FCC ID : 2AXCW-AP67002

EUT Description : WiFi6 Smart Mesh

Test Standard(s) : FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
May 10, 2022

Prepared by:
UL Korea, Ltd.
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Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
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IAS ACCREDITED
Testing Laboratory
TL-637

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	04/20/22	Initial issue	Jaehyong Lee
V2	05/10/22	Updated to address about the TCB's question	Jaehyong Lee

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Kaonbroadband CO., LTD.

EUT DESCRIPTION: WiFi6 Smart Mesh

MODEL NUMBER: AR1344P, AR1344, AR1344E, AR1344E2, EVO6700AP2

SERIAL NUMBER: Proto type (CONDUCTED);
Proto type (RADIATED);

DATE TESTED: Feb. 28, 2022 – Mar. 31, 2022;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Robby Lee
Senior Laboratory Engineer
UL Korea, Ltd.

Tested By:

Jaehyong Lee
Laboratory Engineer Associate
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01
4. KDB 662911 D01 v02r01
5. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2
☒ Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

UL Korea, Ltd. is accredited by National Radio Research Agency, Designation Number KR0161, for all testing performed within the scope of this report.

ISED CABID	ISED Company Number	FCC Registration
KR0161	2324L	644529

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.87 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Accuracy Method specified in Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WiFi6 Smart Mesh. This test report addresses the 802.11a/n/ac (UNII) operational mode.

This report covers the models AR1344P and AR1344, AR1344E, AR1344E2, EVO6700AP2. The difference between these models is only the momory size.

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Model	Memory size
AR1344P, AR1344E2, EVO6700AP2	256MB/512MB (FLASH MEMORY / SDRAM)
AR1344, AR1344E	128MB/256MB (FLASH MEMORY / SDRAM)

The model AR1344P was set for final test.

WiFi operating mode

Frequency rage	Mode	ANT1	ANT2	ANT3	ANT4
5GHz (5180 MHz ~ 5825 MHz)	802.11a SISO	-	-	-	-
	802.11a MIMO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11n SISO	-	-	-	-
	802.11n MIMO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11ac SISO	-	-	-	-
	802.11ac MIMO	TX/RX	TX/RX	TX/RX	TX/RX

Simultaneous TX Condition

Simultaneous Tx Condition - RSDB

Mode	# of TX	5GHz WLAN				2.4GHz WLAN		Test Case
		ANT1	ANT2	ANT3	ANT4	ANT1	ANT2	
2.4GHz + 5GHz RSDB MIMO	6	O	O	O	O	O	O	O

MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
5180 - 5240	802.11a MIMO	18.07	64.12
	802.11n(HT20) MIMO	18.58	72.11
5190 – 5230	802.11n(HT40) MIMO	20.44	110.66
5210	802.11ac(VHT80) MIMO	19.54	89.95
5250	802.11ac(VHT160) MIMO	19.39	86.90
5260 - 5320	802.11a MIMO	19.30	85.11
	802.11n(HT20) MIMO	19.89	97.50
5270 - 5310	802.11n(HT40) MIMO	21.73	148.94
5290	802.11ac(VHT80) MIMO	19.76	94.62
5500 - 5720	802.11a MIMO	18.75	74.99
	802.11n(HT20) MIMO	18.71	74.30
5510 - 5710	802.11n(HT40) MIMO	20.98	125.31
5530 - 5690	802.11ac(VHT80) MIMO	21.19	131.52
5570	802.11ac(VHT160) MIMO	19.94	98.63
5745 - 5825	802.11a MIMO	23.44	220.80
	802.11n(HT20) MIMO	23.80	239.88
5755 - 5795	802.11n(HT40) MIMO	23.97	249.46
5775	802.11ac(VHT80) MIMO	23.32	214.78

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The internal antenna was Permanently attached.
Therefore this E.U.T Complies with the requirement of §15.203.

The radio utilizes a internal antenna, with a maximum gain of:

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	ANT3 Gain [dBi]	ANT4 Gain [dBi]	Correlated Chains Directional Gain [dBi]
UNII 1 5150 - 5250	1.98	1.98	1.98	1.98	8.00
UNII 2A 5250 - 5350	1.97	1.97	1.97	1.97	7.99
UNII 2C 5470 - 5725	1.94	1.94	1.94	1.94	7.96
UNII 3 5725 - 5850	1.86	1.86	1.86	1.86	7.88

5.3. List of test reduction and modes covering other modes:

The output power on covered modes is equal to or less than one referenced.

Authorized Frequency Band			
Mode	**Antenna Stream**	**Mode**	**Covered by**
802.11a	MIMO	802.11a 4TX	
802.11n HT20	MIMO	802.11n HT20 4TX	
802.11ac VHT20	MIMO	802.11ac VHT20 4TX	802.11n HT20 4TX
802.11n HT40	MIMO	802.11n HT40 4TX	
802.11ac VHT40	MIMO	802.11ac VHT40 4TX	802.11n HT40 4TX
802.11ac VHT80	MIMO	802.11ac VHT80 4TX	
802.11ac VHT160	MIMO	802.11ac VHT160 4TX	

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

For UNII-1, Radiated emission tests were performed with higher power than reported power.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case selection criteria for test items :
- For the spurious emissions, all test mode were investigated, test result of 802.11a/n HT20 were worst case. so the test data for 802.11a/n HT20 mode were only reported in this test report.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps 4Tx
802.11n HT20 mode: MCS0 4Tx
802.11n HT40 mode: MCS0 4Tx
802.11ac VHT80 mode: MCS0 4Tx
802.11ac VHT160 mode: MCS0 4Tx

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Switching Mode Power Adaptor	CHENZHOU FRECOM ELECTRONICS	F18L16-120150SPAU	N/A	N/A

I/O CABLE

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Pin	Shielded	1.5m	N/A
2	LAN	2	RJ-45	Shielded	2.0m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software exercised the EUT to enable NII mode.

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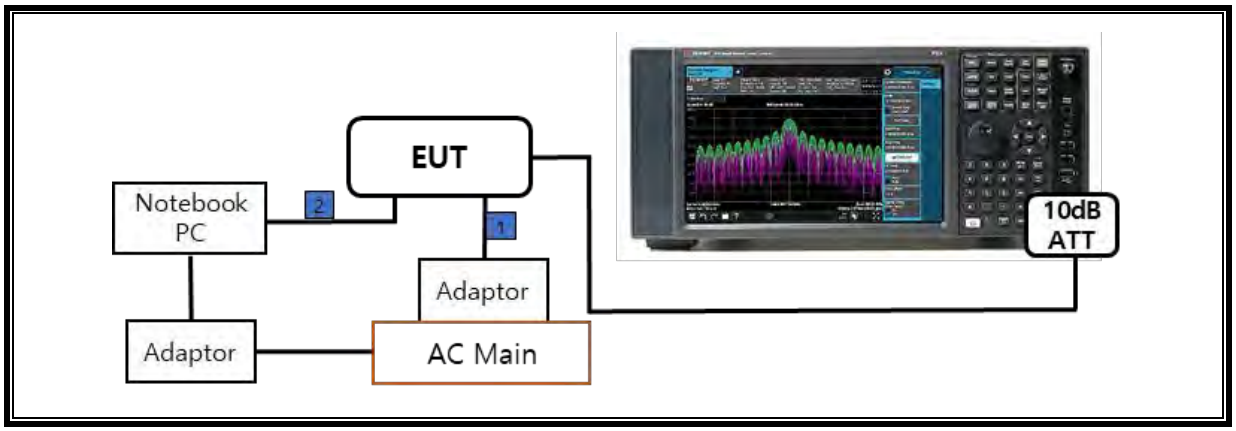
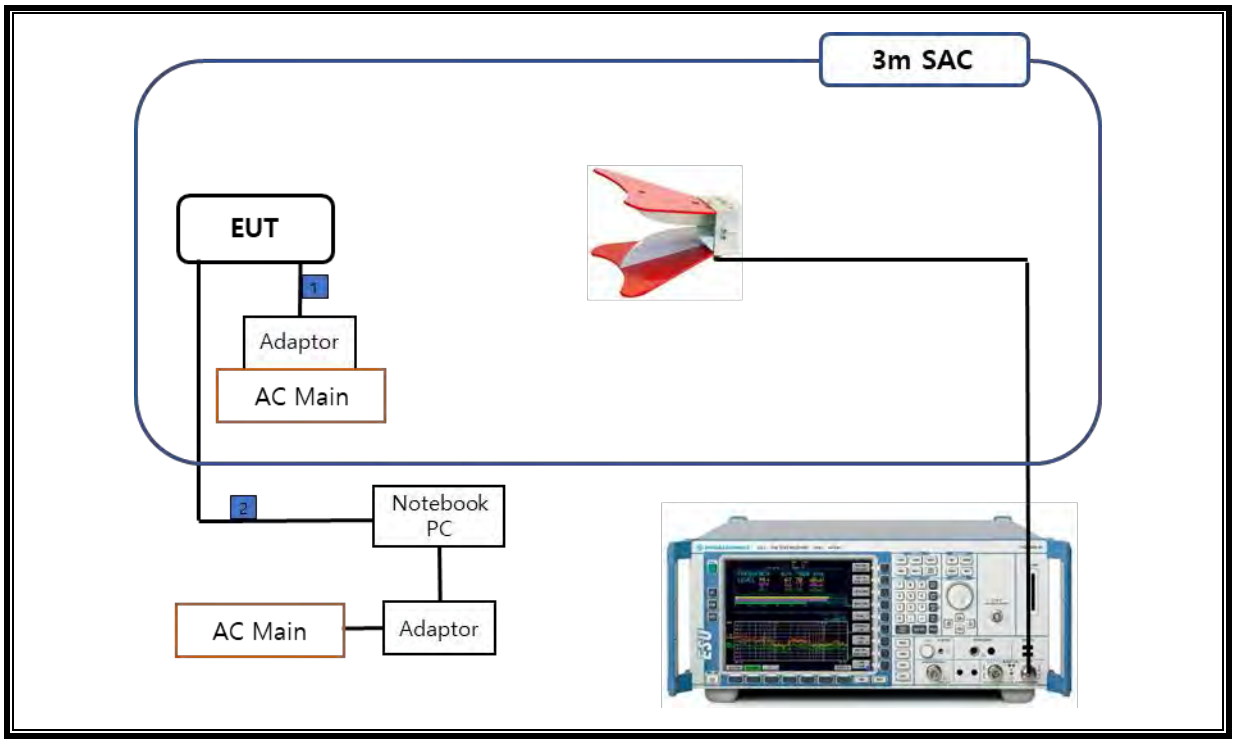
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00218957	2023-01-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2023-01-15
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2023-10-13
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2023-01-11
RF Switching Unit	TA Engineering	TA-018S-16	SW-1	N/A
10dB ATTENUATOR	MINI-CIRCUITS	BW-K10-2W44+	2117	2022-10-22
Power Sensor	R&S	NRP8S	104520	2022-08-04
Power Sensor	R&S	NRP8S	104521	2022-08-04
Power Sensor	R&S	NRP8S	111164	2022-10-15
Power Sensor	R&S	NRP-Z91	102681	2022-08-04
Attenuator	R&S	10dB	None	2022-08-05
Attenuator	R&S	10dB	None	2022-08-05
Attenuator	R&S	10dB	None	2022-08-05
Attenuator	R&S	10dB	None	2022-08-05
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	102592	2022-08-02
Notch Filter	Micro-Tronics	BRM50702-02	G037	2022-08-03
Notch Filter	Micro-Tronics	BRM50716-2	006	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
LISN	R&S	ENV216	102478	2022-08-06
OPEN SWITCH AND CONTROL	R&S	OSP220	101437	N/A
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Termination	WEINSCHEL	M1406A	T09	2022-08-03
Attenuator	WEINSCHEL	WA76-30-21	A015	2022-08-03
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	R&S	EMC32	Ver 10.60.10	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.407(e)	6dB Band width (5.8GHz)	500kHz	Condcuted	PASS
15.407 (a)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	< 24dBm or 11+10Log(26dB BW)		PASS
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm		PASS
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		PASS
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		PASS
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line Condcuted	PASS
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	PASS
15.407 (h)(2)	Dynamic Frequency Selection	N/A		Refer to the UNII WLAN DFS Test report (No.: 14221535-E1)

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8. MEASUREMENT METHODS

On-Time and Duty Cycle : KDB 789033 D02 v02r01, Section II.B.

6dB Emission BW : KDB 789033 D02 v02r01, Section II.C.2.

26dB Emission BW : KDB 789033 D02 v02r01, Section II.C.1.

99% Occupied BW : KDB 789033 D02 v02r01, Section II.D.

Conducted Output Power : KDB 789033 D02 v02r01, Section II.E.3.a(Method PM)

Conducted Output Power for Straddle Channel (ch144/142/138 for 20/40/80MHz BW):

KDB 789033 D02 v02r01, Section II.E.2.b(Method SA-1)

Power Spectral Density : KDB 789033 D02 v02r01, Section II.F.

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

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9. REFERENCE MEASUREMENTS RESULTS

9.1. ON TIME AND DUTY CYCLE RESULTS

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]
802.11a MIMO	2.064	2.095	0.99	98.55	-
802.11n(HT20) MIMO	2.972	3.001	0.99	99.03	-
802.11n(HT40) MIMO	2.971	3.001	0.99	98.97	-
802.11ac(VHT80) MIMO	3.387	3.417	0.99	99.13	-
802.11ac(VHT160) MIMO	2.191	2.221	0.99	98.65	-

Note. If the duty cycle is over 98%, compensation is not included in average measurement.

LIMITS

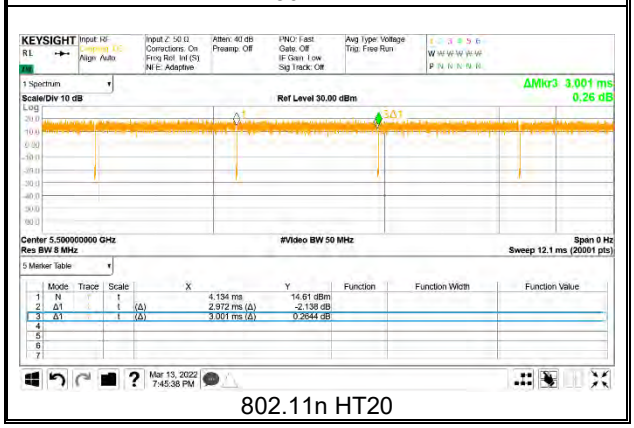
None; for reporting purposes only.

PROCEDURE

KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

9.2. DUTY CYCLE PLOTS

802.11a



802.11n HT20

802.11n HT40 MIMO

802.11ac VHT80 MIMO

802.11ac VHT160 MIMO

9.3. 26 dB & 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

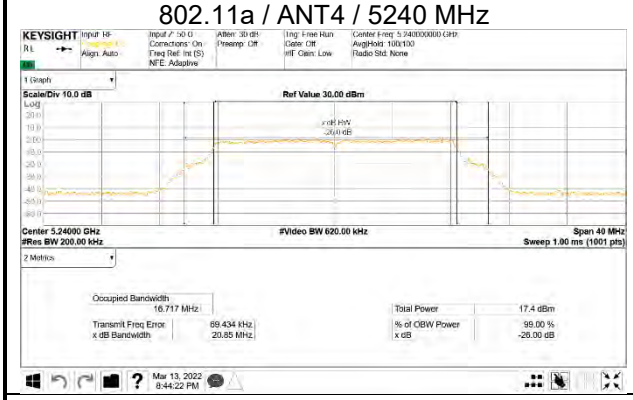
RESULTS

- Please refer to the next page

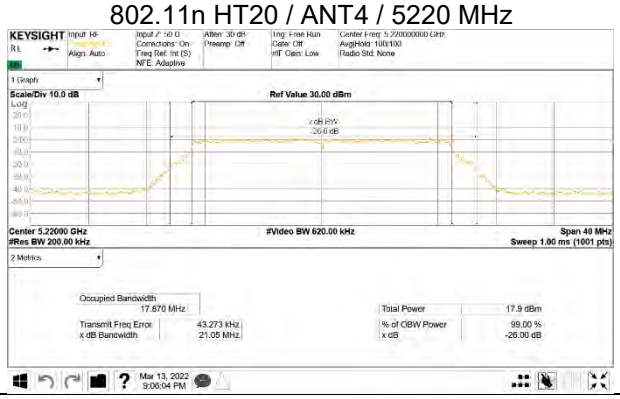
WORST CASE TEST PLOTS

UNII-1

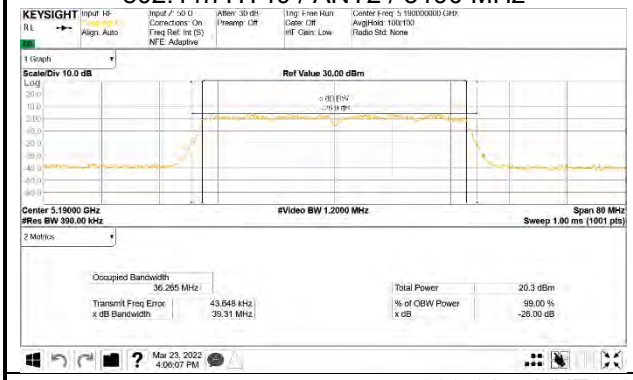
802.11a / ANT4 / 5240 MHz



802.11n HT20 / ANT4 / 5220 MHz

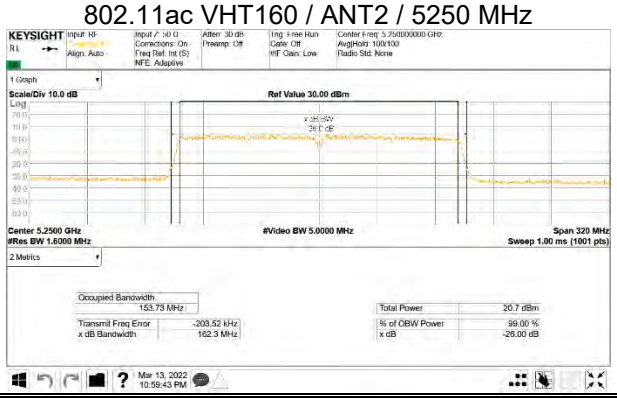


802.11n HT40 / ANT2 / 5190 MHz



802.11ac VHT80 / ANT2 / 5210 MHz

802.11ac VHT160 / ANT2 / 5250 MHz

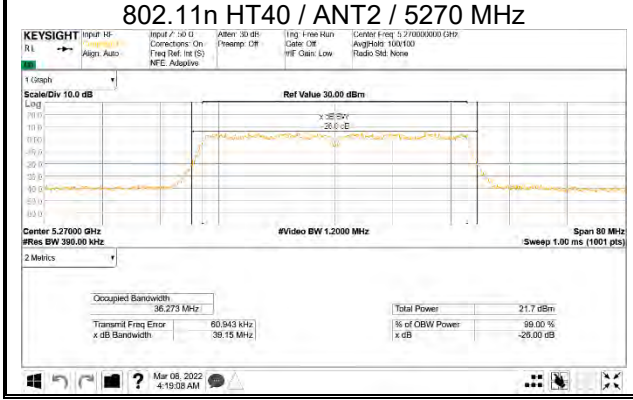


UNII-2A

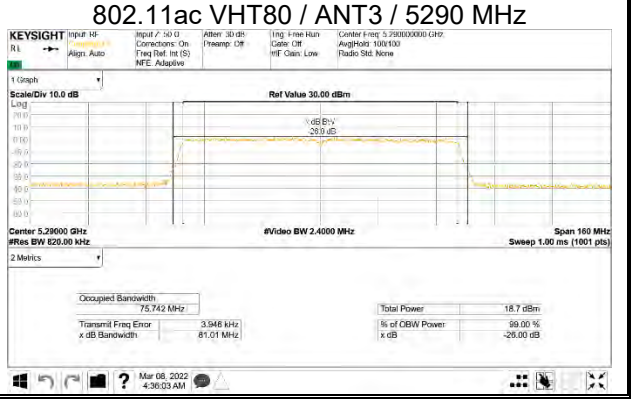
802.11a / ANT4 / 5260 MHz

802.11n HT20 / ANT2 / 5260 MHz

802.11n HT40 / ANT2 / 5270 MHz

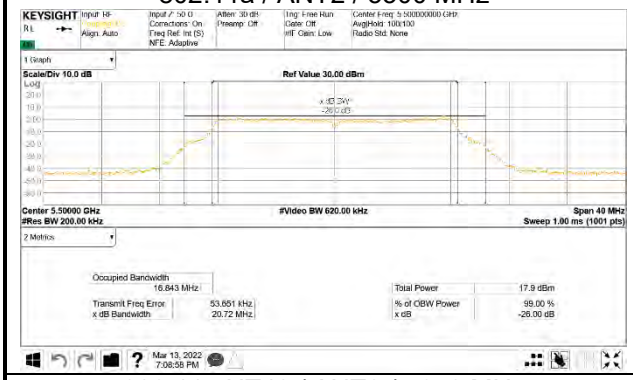


802.11ac VHT80 / ANT3 / 5290 MHz



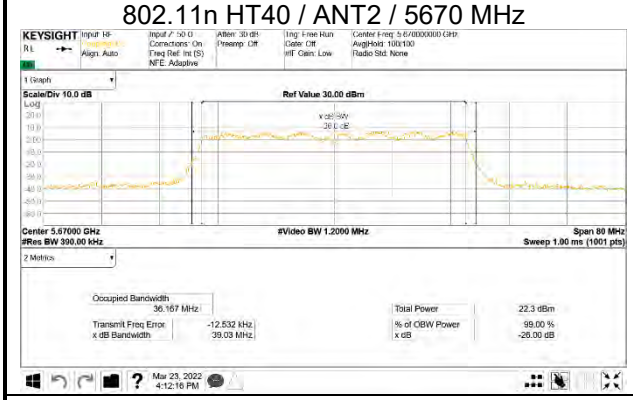
UNII-2C

802.11a / ANT2 / 5500 MHz

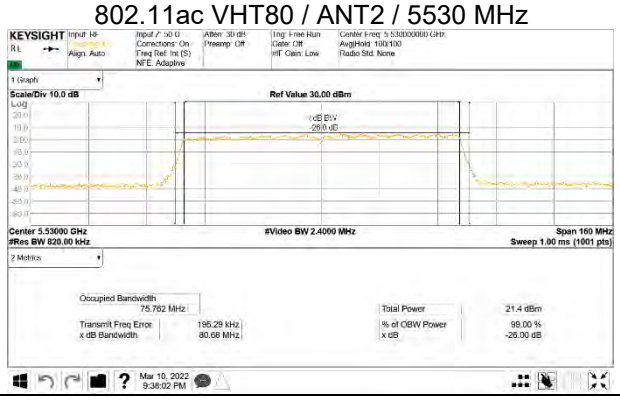


802.11n HT20 / ANT2 / 5700 MHz

802.11n HT40 / ANT2 / 5670 MHz



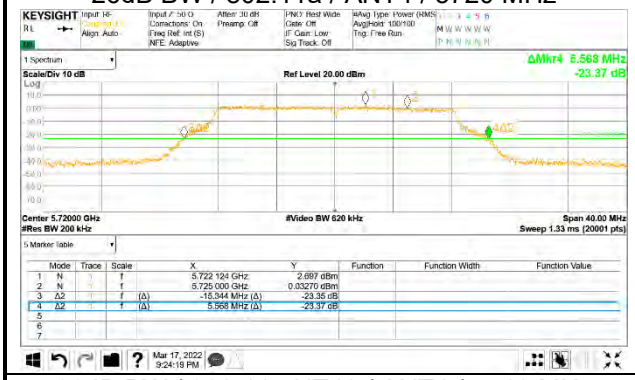
802.11ac VHT80 / ANT2 / 5530 MHz



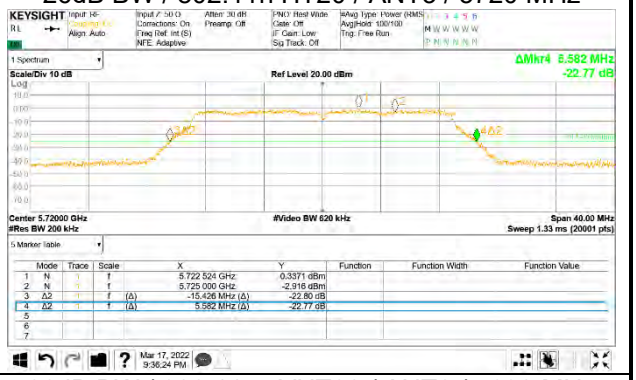
802.11ac VHT160 / ANT2 / 5570 MHz

UNII - Straddle channel

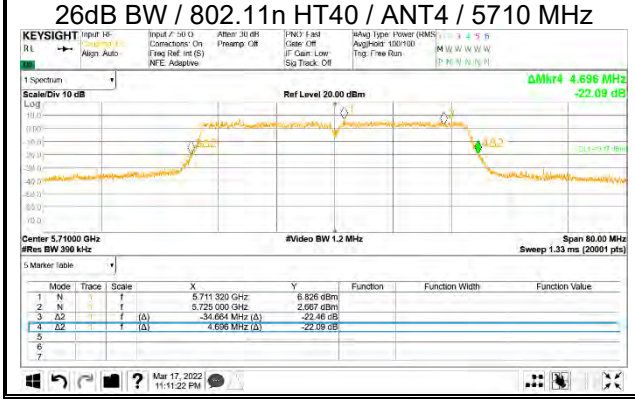
26dB BW / 802.11a / ANT4 / 5720 MHz



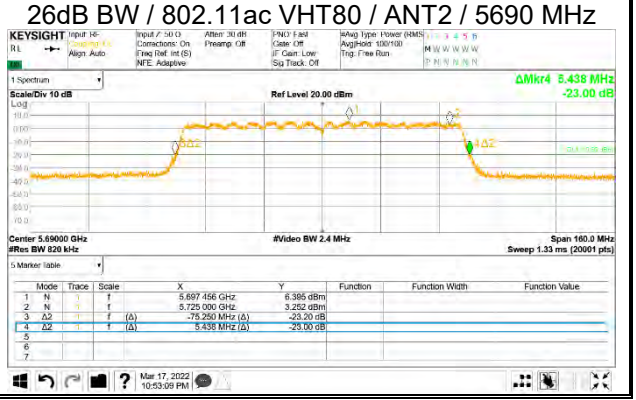
26dB BW / 802.11n HT20 / ANT3 / 5720 MHz



26dB BW / 802.11n HT40 / ANT4 / 5710 MHz



26dB BW / 802.11ac VHT80 / ANT2 / 5690 MHz



9.3.1. 5.2 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-1	802.11a	Low	5180	21.18	20.93	20.88	21.09	20.85
		Mid	5220	21.22	21.29	21.14	21.18	
		High	5220	21.21	21.05	21.15	20.85	
	802.11n HT20	Low	5180	21.27	21.24	21.25	21.17	21.05
		Mid	5220	21.22	21.57	21.29	21.05	
		High	5240	21.28	21.21	21.36	21.26	
	802.11n HT40	Low	5190	39.68	39.31	39.42	39.45	39.31
		High	5230	39.60	39.33	39.41	39.35	
	802.11ac VHT80	Mid	5210	81.86	80.66	81.19	81.41	80.66

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz](Note1)			
				ANT1	ANT2	ANT3	ANT4
UNII-1	802.11a	Low	5180	16.74	16.71	16.80	16.65
		Mid	5220	16.75	16.77	16.79	16.71
		High	5240	16.74	16.76	16.78	16.72
	802.11n HT20	Low	5180	17.85	17.78	17.81	17.81
		Mid	5220	17.91	17.81	17.88	17.87
		High	5240	17.92	17.82	17.82	17.85
	802.11n HT40	Low	5190	36.25	36.27	36.28	36.22
		High	5230	36.32	36.29	36.31	36.27
	802.11ac VHT80	Mid	5210	75.70	75.58	75.73	75.75

Note1. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-1 & 2A	802.11ac VHT160	Mid	5250	163.40	162.30	162.70	162.70

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-1 & 2A	802.11ac VHT160	Mid	5250	154.08	154.08	153.73	153.61

9.3.2. 5.3 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2A	802.11a	Low	5260	20.92	20.93	21.28	20.81	20.81
		Mid	5300	21.20	20.84	21.13	21.41	
		High	5320	21.26	21.24	20.95	20.85	
	802.11n HT20	Low	5260	21.26	21.07	21.22	21.39	21.07
		Mid	5300	21.41	21.32	21.22	21.36	
		High	5320	21.28	21.16	21.27	21.20	
	802.11n HT40	Low	5270	39.71	39.15	39.31	39.56	39.15
		High	5310	39.80	39.49	39.19	39.49	
	802.11ac VHT80	Mid	5290	81.64	81.07	81.01	81.57	81.01

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz](Note2)			
				ANT1	ANT2	ANT3	ANT4
UNII-2A	802.11a	Low	5260	16.65	16.63	16.71	16.64
		Mid	5300	16.72	16.69	16.80	16.72
		High	5320	16.70	16.67	16.73	16.66
	802.11n HT20	Low	5260	17.84	17.71	17.82	17.85
		Mid	5300	17.85	17.77	17.87	17.84
		High	5320	17.87	17.78	17.86	17.83
	802.11n HT40	Low	5270	36.26	36.27	36.23	36.23
		High	5310	36.32	36.34	36.33	36.17
	802.11ac VHT80	Mid	5290	75.81	75.77	75.74	75.74

Note2. As a result of 99% bandwidth test, the bandwidth of UNII-2A does not interfere with UNII-1.

9.3.3. 5.5 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Low	5500	21.28	20.72	21.07	20.84	20.72
		Mid	5580	21.04	20.81	20.78	21.12	
		High	5700	20.83	21.16	20.85	21.08	
	802.11n HT20	Low	5500	21.12	21.08	21.26	21.21	20.98
		Mid	5580	21.26	21.18	21.35	21.17	
		High	5700	21.24	20.98	21.19	21.26	
	802.11n HT40	Low	5510	39.71	39.22	39.52	39.41	39.03
		Mid	5550	39.99	39.23	39.58	39.22	
		High	5670	39.28	39.03	39.42	39.47	
	802.11ac VHT80	Low	5530	81.37	80.68	81.76	81.57	80.68
		High	5610	81.82	80.94	80.92	80.97	

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11a	Low	5500	16.72	16.84	16.63	16.56
		Mid	5600	16.68	16.69	16.54	16.56
		High	5700	16.54	16.70	16.56	16.50
	802.11n HT20	Low	5500	17.80	17.81	17.77	17.73
		Mid	5600	17.84	17.73	17.76	17.74
		High	5700	17.80	17.83	17.80	17.80
	802.11n HT40	Low	5510	36.33	36.26	36.32	36.34
		Mid	5590	36.36	36.17	36.28	36.26
		High	5670	36.23	36.17	36.36	36.37
	802.11ac VHT80	Low	5530	75.82	75.76	75.90	75.93
		High	5610	75.70	75.71	75.92	75.80

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11ac VHT160	Mid	5570	162.40	162.20	163.10	162.80

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11ac VHT160	Mid	5570	153.90	153.99	154.11	154.52

9.3.4. STRADDLE CHANNEL

Band	Mode	Center Freq. [MHz]	26 dB BW [MHz]							
			ANT1		ANT2		ANT3		ANT4	
			UNII-2C	UNII-3	UNII-2C	UNII-3	UNII-2C	UNII-3	UNII-2C	UNII-3
Straddle Channel	802.11a	5720	15.55	5.69	15.71	5.44	15.50	5.56	15.34	5.57
	802.11n HT20	5720	15.58	5.64	15.52	5.41	15.43	5.58	15.53	5.55
	802.11n HT40	5710	34.68	4.92	34.68	4.60	34.76	4.93	34.66	4.70
	802.11ac VHT80	5690	75.78	5.94	75.25	5.44	75.39	5.28	75.72	5.80

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB & 99% BANDWIDTH

LIMITS

FCC §15.407

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

6dB Bandwidth

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS

802.11a / ANT2 / 5745 MHz

802.11n HT20 / ANT2 / 5745 MHz

802.11n HT40 / ANT1 / 5795 MHz

802.11ac VHT80 / ANT4 / 5775 MHz

10.1.1. 5.8 GHz BAND

Band	Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]				Worst [MHz]	Minimum Limit [MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	16.40	15.76	16.37	16.35	15.76	0.5
		Mid	5785	16.48	16.34	16.36	16.41		
		High	5825	16.37	16.58	16.40	16.37		
	802.11n HT20	Low	5745	17.25	16.94	17.63	17.60	16.94	
		Mid	5785	16.99	17.59	17.63	17.59		
		High	5825	17.31	17.62	17.63	17.60		
	802.11n HT40	Low	5755	36.36	36.38	36.41	36.05	35.47	
		High	5795	35.47	36.08	36.43	35.84		
	802.11ac VHT80	Mid	5775	75.93	76.11	76.38	75.81	75.81	

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-3	802.11a	Low	5745	16.54	16.32	16.43	16.42
		Mid	5785	16.50	16.62	16.58	16.84
		High	5825	16.85	16.57	16.52	16.42
	802.11n HT20	Low	5745	17.71	17.80	17.87	17.72
		Mid	5785	17.79	17.80	17.81	17.87
		High	5825	17.79	17.70	17.69	17.76
	802.11n HT40	Low	5755	36.28	36.23	36.06	36.32
		High	5795	36.18	36.47	36.48	36.37
	802.11ac VHT80	Mid	5775	76.12	75.29	75.50	75.63

10.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1) (2) (3)

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

TEST PROCEDURE

KDB 789033 Method PM is used for output power.

KDB 789033 Method SA-2 is used for only power of straddle Ch. and PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD.

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DIRECTIONAL ANTENNA GAIN

For OUTPUT POWER and PSD: The TX chains are correlated and the antenna gains are unequal among the chains. The directional gain is:

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	ANT3 Gain [dBi]	ANT4 Gain [dBi]	Directional Gain for Output Power [dBi]	Directional Gain for PSD [dBi]
UNII 1 5150 - 5250	1.98	1.98	1.98	1.98	1.98	8.00
UNII 2A 5250 - 5350	1.97	1.97	1.97	1.97	1.97	7.99
UNII 2C 5470 - 5725	1.94	1.94	1.94	1.94	1.94	7.96
UNII 3 5725 - 5850	1.86	1.86	1.86	1.86	1.86	7.88

Note: Array gain calculation for CDD

For power measurements on IEEE 802.11 devices:

- Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$
- Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT}

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10.2.1. 4Tx MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Directional Gain For power [dBi]	Directional Gain For PSD [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
UNII-1	802.11a	Low	5180	1.98	8.00	23.98	9
		Mid	5220				
		High	5240				
	802.11n HT20	Low	5180			23.98	9
		Mid	5220				
		High	5240				
	802.11n HT40	Low	5190			23.98	9
		High	5230				
	802.11ac VHT80	Mid	5210			23.98	9
UNII-1 & 2A	802.11ac VHT160	Mid	5250			23.98	9

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB
	802.11ac VHT160	-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-1	802.11a	Low	5180	12.45	13.05	10.81	11.57	18.07	23.98
		Mid	5220	12.40	12.84	10.72	11.67	18.00	
		High	5240	12.25	12.79	10.57	11.70	17.92	
	802.11n HT20	Low	5180	12.93	13.39	11.49	12.19	18.58	23.98
		Mid	5220	12.88	13.32	11.28	12.28	18.53	
		High	5240	12.87	13.29	11.21	12.23	18.49	
	802.11n HT40	Low	5190	13.79	14.29	12.25	12.94	19.41	23.98
		High	5230	15.02	15.21	13.01	14.10	20.44	
	802.11ac VHT80	Mid	5210	14.08	14.37	12.18	13.12	19.54	23.98
UNII-1 & 2A	802.11ac VHT160	Mid	5250	13.93	14.49	12.16	12.45	19.39	23.98

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]
Corr'd Power
= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-1	802.11a	Low	5180	1.07	1.63	-0.13	1.04	6.97	9
		Mid	5220	0.34	1.17	-0.94	0.59	6.37	
		High	5240	0.61	0.53	-1.29	0.79	6.26	
	802.11n HT20	Low	5180	1.54	1.94	-0.12	1.03	7.18	9
		Mid	5220	0.51	1.44	-0.68	1.06	6.68	
		High	5240	0.60	0.77	-0.35	1.39	6.66	
	802.11n HT40	Low	5190	0.60	0.88	-2.85	-0.26	5.83	9
		High	5230	0.46	0.70	-1.51	0.64	6.18	
	802.11ac VHT80	Mid	5210	-2.38	-2.95	-5.85	-3.75	2.47	9
UNII-1 & 2A	802.11ac VHT160	Mid	5250	-6.08	-6.08	-8.29	-6.55	-0.64	9

* Calculation of PPSD result :
Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

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10.2.2. 4Tx MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain For power [dBi]	Directional Gain For PSD [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
UNII-2A	802.11a	Low	5260	20.81	1.97	7.99	23.98	9.01
		Mid	5300					
		High	5320					
	802.11n HT20	Low	5260	21.07			23.98	9.01
		Mid	5300					
		High	5320					
	802.11n HT40	Low	5270	39.15			23.98	9.01
		High	5310					
	802.11ac VHT80	Mid	5290	81.01			23.98	9.01

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB
	802.11ac VHT160	-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-2A	802.11a	Low	5260	13.90	14.13	12.12	12.65	19.30	23.98
		Mid	5300	14.09	13.83	11.62	12.51	19.15	
		High	5320	13.83	13.99	11.72	12.47	19.12	
	802.11n HT20	Low	5260	14.57	14.62	12.76	13.22	19.89	23.98
		Mid	5300	14.37	14.50	12.53	13.02	19.71	
		High	5320	14.22	14.42	12.30	12.93	19.58	
	802.11n HT40	Low	5270	16.46	16.52	14.35	15.11	21.73	23.98
		High	5310	14.79	15.03	13.20	13.49	20.22	
	802.11ac VHT80	Mid	5290	14.53	14.50	12.80	12.80	19.76	23.98

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]
Corr'd Power
= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-2A	802.11a	Low	5260	3.29	2.02	0.75	2.40	8.23	9.01
		Mid	5300	2.65	1.33	0.51	2.04	7.73	
		High	5320	2.61	1.45	0.71	2.09	7.79	
	802.11n HT20	Low	5260	3.62	2.34	1.23	2.01	8.40	9.01
		Mid	5300	2.73	1.79	0.32	2.32	7.90	
		High	5320	3.30	1.53	1.02	1.98	8.07	
	802.11n HT40	Low	5270	2.51	2.02	-0.14	1.17	7.52	9.01
		High	5310	1.00	0.36	-1.44	0.44	6.20	
	802.11ac VHT80	Mid	5290	-2.39	-3.22	-4.76	-3.60	2.61	9.01

* Calculation of PPSD result :
Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

10.2.3. 4Tx MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain For power [dBi]	Directional Gain For PSD [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
UNII-2C	802.11a	Low	5500	20.72	1.94	7.96	23.98	9.04
		Mid	5580					
		High	5700					
	802.11n HT20	Low	5500	20.98			23.98	9.04
		Mid	5580					
		High	5700					
	802.11n	Low	5510	39.03			23.98	9.04
		Mid	5550					
		High	5670					
	802.11ac VHT80	Low	5530	80.68			23.98	9.04
		High	5610					
UNII-2C	802.11ac VHT160	Mid	5570	162.20			23.98	9.04

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB
	802.11ac VHT160	-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-2C	802.11a	Low	5500	12.64	14.06	11.98	11.88	18.75	23.98
		Mid	5580	12.01	12.73	12.16	12.84	18.47	
		High	5700	11.92	12.38	12.36	12.86	18.41	
	802.11n HT20	Low	5500	12.42	14.02	12.07	11.66	18.66	23.98
		Mid	5580	11.80	12.67	12.27	12.38	18.31	
		High	5700	12.16	13.81	12.31	12.23	18.71	
	802.11n HT40	Low	5510	13.68	14.92	12.96	12.99	19.73	23.98
		Mid	5550	14.61	16.05	14.56	14.40	20.98	
		High	5670	14.25	14.87	14.82	15.47	20.89	
	802.11ac VHT80	Low	5530	13.86	14.90	13.14	13.25	19.87	23.98
		High	5610	14.79	15.89	15.05	14.85	21.19	23.98
	802.11ac VHT160	Mid	5570	13.50	14.97	13.58	13.41	19.94	23.98

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]
Corr'd Power
= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-2C	802.11a	Low	5500	2.38	2.55	1.71	3.14	8.49	9.04
		Mid	5580	2.31	3.32	1.65	3.01	8.64	
		High	5700	2.86	3.14	0.05	2.83	8.40	
	802.11n HT20	Low	5500	2.10	2.82	-0.05	3.18	8.20	9.04
		Mid	5580	1.89	3.29	0.60	2.83	8.29	
		High	5700	2.51	2.90	0.09	2.61	8.18	
	802.11n HT40	Low	5510	0.29	0.70	-2.09	0.71	6.07	9.04
		Mid	5550	1.91	1.61	0.21	2.79	7.75	
		High	5670	2.29	3.41	0.70	2.40	8.32	
	802.11ac VHT80	Low	5530	-2.41	-1.95	-4.38	-1.94	3.46	9.04
		High	5610	-0.79	0.27	-2.83	-0.09	5.31	
	802.11ac VHT160	Mid	5570	-4.64	-2.97	-6.63	-4.31	1.57	9.04

* Calculation of PPSD result :
Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

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10.2.4. 4Tx MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	17.02	18.35	16.87	17.28	23.44	30
		Mid	5785	17.14	18.13	16.57	16.92	23.25	
		High	5825	16.19	16.36	16.05	17.51	22.59	
	802.11n HT20	Low	5745	16.40	17.83	16.04	16.72	22.82	30
		Mid	5785	17.44	18.92	16.98	17.52	23.80	
		High	5825	17.25	18.67	16.76	17.04	23.52	
	802.11n HT40	Low	5755	17.88	18.56	17.38	17.88	23.97	30
		High	5795	17.75	18.41	17.04	17.54	23.73	
	802.11ac VHT80	Mid	5775	17.25	17.90	16.87	17.13	23.32	30

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]
Corr'd Power
= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/ 500kHz]	PPSD Limit [dBm/ 500kHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	4.23	4.39	2.02	4.87	10.02	30
		Mid	5785	4.78	4.46	1.99	4.90	10.20	
		High	5825	2.79	3.41	0.62	3.70	8.80	
	802.11n HT20	Low	5745	3.04	3.64	1.03	4.28	9.17	30
		Mid	5785	5.03	4.18	2.22	5.05	10.28	
		High	5825	3.59	4.21	2.11	4.78	9.80	
	802.11n HT40	Low	5755	2.22	2.80	0.03	2.67	8.08	30
		High	5795	2.40	1.94	-0.12	2.69	7.88	
	802.11ac VHT80	Mid	5775	-1.50	-0.87	-3.60	-0.93	4.42	30

* Calculation of PPSD result :
Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

10.2.5. 4Tx Mode Straddle channel IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain For power [dBi]	Directional Gain For PSD [dBi]	Power Limit [dBm]	PPSD Limit [dBm/MHz]
UNII-2C	802.11a	Straddle	5720	15.34	1.94	7.96	22.86	9.04
	802.11n HT20	Straddle	5720	15.43			22.88	9.04
	802.11n	Straddle	5710	34.66			23.98	9.04
	802.11ac VHT80	Straddle	5690	75.25			23.98	9.04
Included in Calculations of Corr'd Power & PPSD								
Duty Cycle CF [dB]				802.11a			-	dB
				802.11n HT20			-	dB
				802.11n HT40			-	dB
				802.11ac VHT80			-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm] ANT1	ANT2	ANT3	ANT4	Total Corr'd Power [dBm]	Power Limit [dBm]
UNII-2C	802.11a	Straddle	5720	12.52	13.62	10.74	13.43	18.74	22.86
	802.11n HT20	Straddle	5720	11.78	12.08	9.44	12.26	17.55	22.88
	802.11n HT40	Straddle	5710	15.36	16.22	15.37	15.37	21.61	23.98
	802.11ac VHT80	Straddle	5690	15.95	15.95	14.09	14.08	21.13	23.98

* Calculation of Output Power : Total Corr'd Power = Meas Power(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz] ANT1	ANT2	ANT3	ANT4	Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
UNII-2C	802.11a	Straddle	5720	3.16	3.46	1.16	3.60	8.97	9.04
	802.11n HT20	Straddle	5720	2.38	2.61	0.48	2.97	8.23	
	802.11n HT40	Straddle	5710	2.71	3.70	0.56	3.15	8.70	
	802.11ac VHT80	Straddle	5690	0.59	1.82	-1.80	0.32	6.44	

* Calculation of PPSD result : Corr'd PPSD = Meas PPSD(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF

10.2.6. 4Tx Mode Straddle channel IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB

Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]				Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Straddle	5720	6.29	4.93	4.15	6.16	11.49	30
	802.11n HT20	Straddle	5720	6.41	6.26	4.21	6.58	11.98	
	802.11n HT40	Straddle	5710	5.50	5.82	5.44	5.41	11.56	
	802.11ac VHT80	Straddle	5690	2.45	2.49	-0.07	-0.02	7.41	

* Calculation of Output Power : Total Corr'd Power = Meas Power(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF [dB]

PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/ 500kHz]	PPSD Limit [dBm/ 500kHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Straddle	5720	-0.67	-1.81	-2.79	-1.25	4.46	30
	802.11n HT20	Straddle	5720	-0.34	-0.70	-2.96	-0.87	4.91	
	802.11n HT40	Straddle	5710	-1.63	-1.25	-3.66	-1.24	4.18	
	802.11ac VHT80	Straddle	5690	-4.85	-4.73	-6.88	-5.02	0.73	

* Calculation of PPSD result : Corr'd PPSD = Meas PPSD(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF

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10.2.7. OUTPUT POWER AND PPSD PLOTS(WORST CASE)

UNII-1 & 2A (4TX)

802.11a / ANT1 / 5180 MHz

802.11a / ANT2 / 5180 MHz

802.11a / ANT3 / 5180 MHz

802.11a / ANT4 / 5180 MHz

802.11a / ANT1 / 5260 MHz

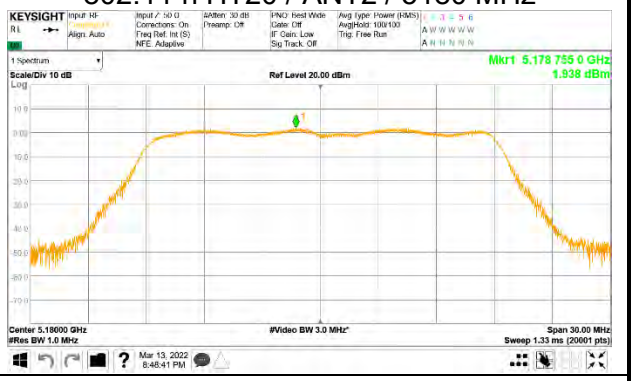
802.11a / ANT2 / 5260 MHz

802.11a / ANT3 / 5260 MHz

802.11a / ANT4 / 5260 MHz

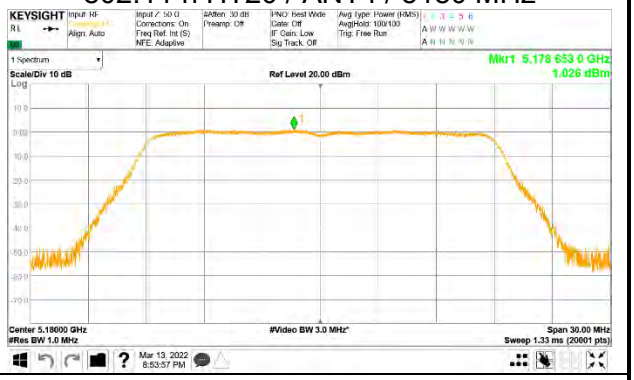
802.11n HT20 / ANT1 / 5180 MHz

802.11 n HT20 / ANT2 / 5180 MHz



802.11 n HT20 / ANT3 / 5180 MHz

802.11 n HT20 / ANT4 / 5180 MHz

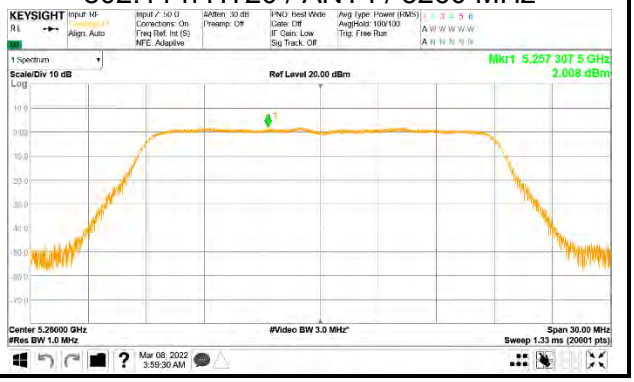


802.11n HT20 / ANT1 / 5260 MHz

802.11 n HT20 / ANT2 / 5260 MHz

802.11 n HT20 / ANT3 / 5260 MHz

802.11 n HT20 / ANT4 / 5260 MHz



802.11n HT40 / ANT1 / 5230 MHz

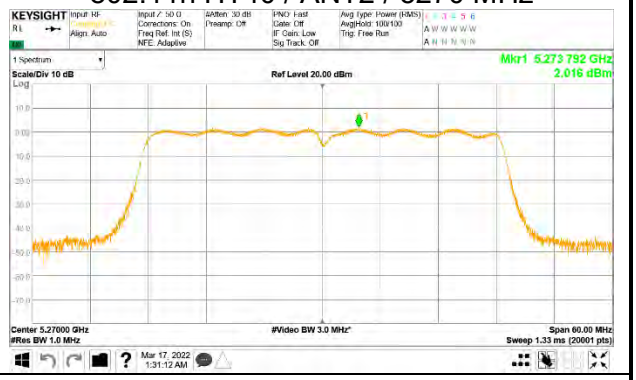
802.11n HT40 / ANT2 / 5230 MHz

802.11n HT40 / ANT3 / 5230 MHz

802.11n HT40 / ANT4 / 5230 MHz

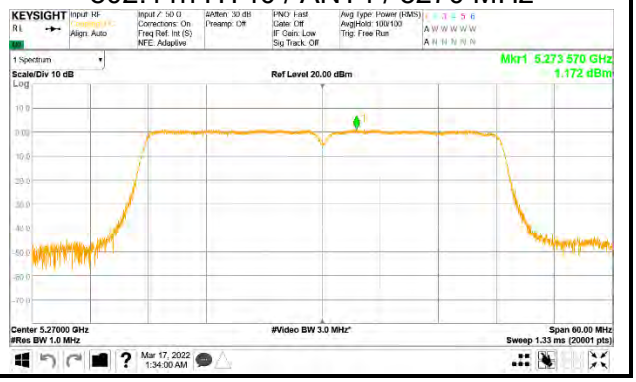
802.11n HT40 / ANT1 / 5270 MHz

802.11n HT40 / ANT2 / 5270 MHz



802.11n HT40 / ANT3 / 5270 MHz

802.11n HT40 / ANT4 / 5270 MHz



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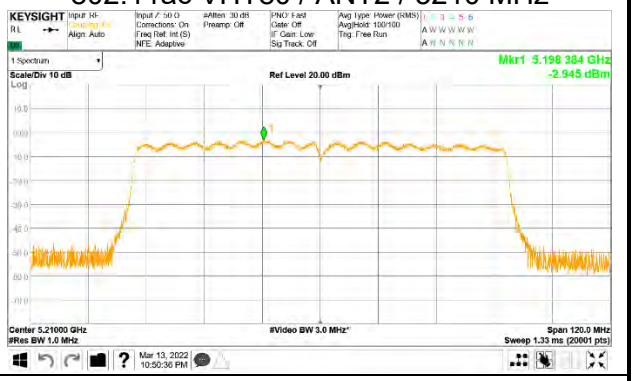
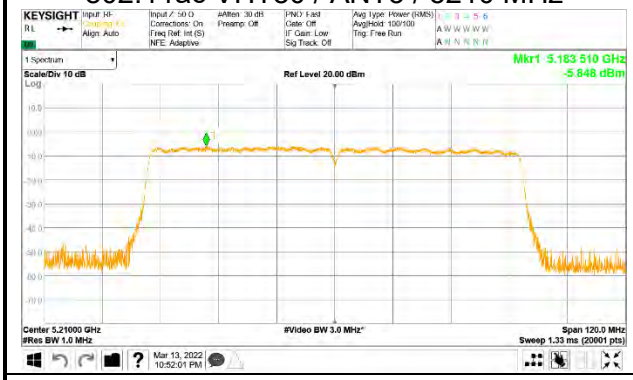
802.11ac VHT80 / ANT1 / 5210 MHz

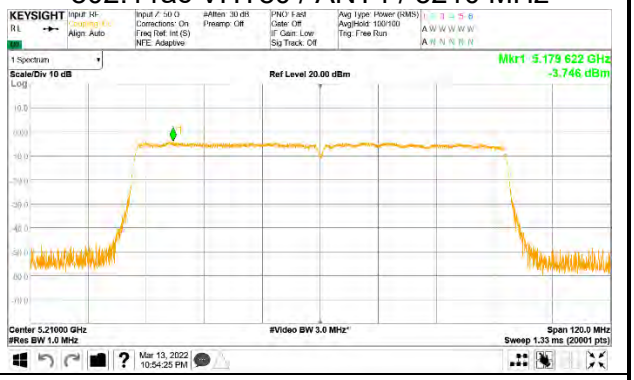
802.11ac VHT80 / ANT2 / 5210 MHz



802.11ac VHT80 / ANT3 / 5210 MHz

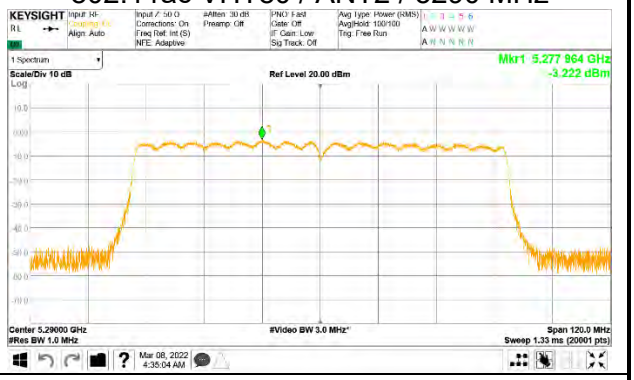


802.11ac VHT80 / ANT4 / 5210 MHz

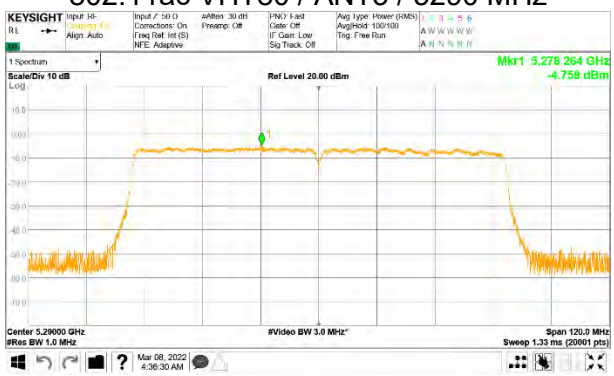


802.11ac VHT80 / ANT1 / 5290 MHz

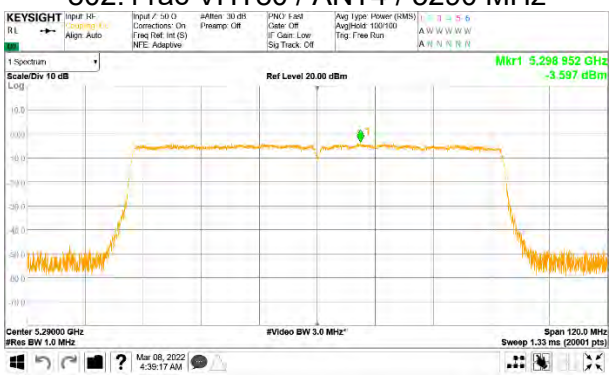
802.11ac VHT80 / ANT2 / 5290 MHz



802.11ac VHT80 / ANT3 / 5290 MHz

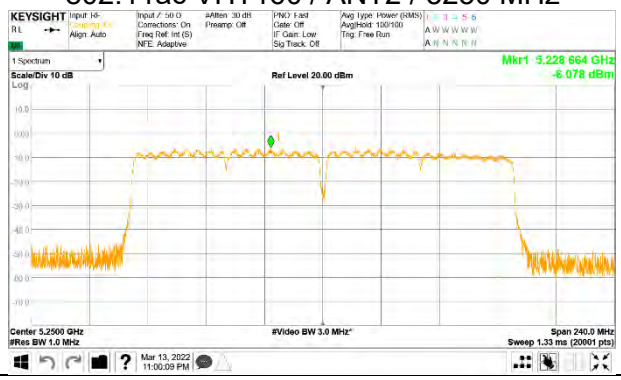


802.11ac VHT80 / ANT4 / 5290 MHz



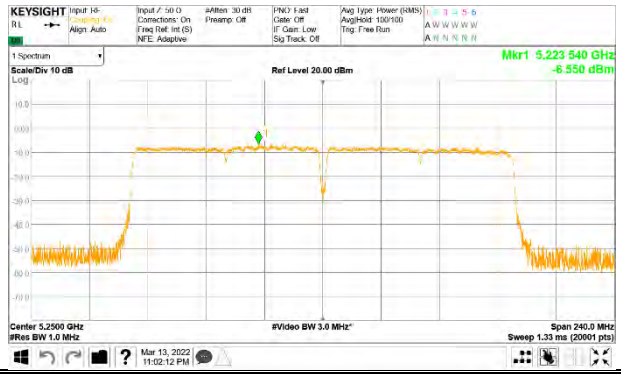
802.11ac VHT160 / ANT1 / 5250 MHz

802.11ac VHT160 / ANT2 / 5250 MHz



802.11ac VHT160 / ANT3 / 5250 MHz

802.11ac VHT160 / ANT4 / 5250 MHz



UNII-2C (4TX)

802.11a / ANT1 / 5580 MHz

802.11a / ANT2 / 5580 MHz

802.11a / ANT3 / 5580 MHz

802.11a / ANT4 / 5580 MHz

802.11n HT20 / ANT1 / 5580 MHz

802.11n HT20 / ANT2 / 5580 MHz

802.11n HT20 / ANT3 / 5580 MHz

802.11n HT20 / ANT4 / 5580 MHz

802.11n HT40 / ANT1 / 5670 MHz

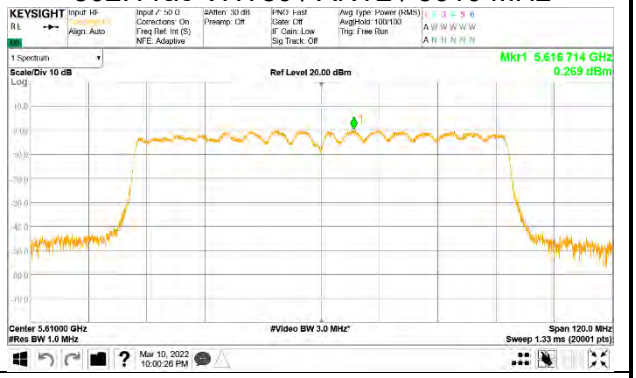
802.11n HT40 / ANT2 / 5670 MHz

802.11n HT40 / ANT3 / 5670 MHz

802.11n HT40 / ANT4 / 5670 MHz

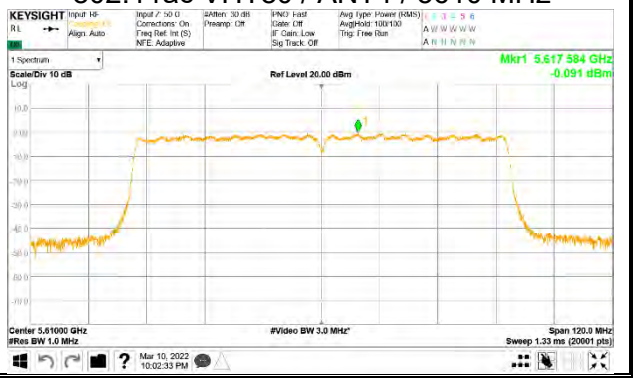
802.11ac VHT80 / ANT1 / 5610 MHz

802.11ac VHT80 / ANT2 / 5610 MHz

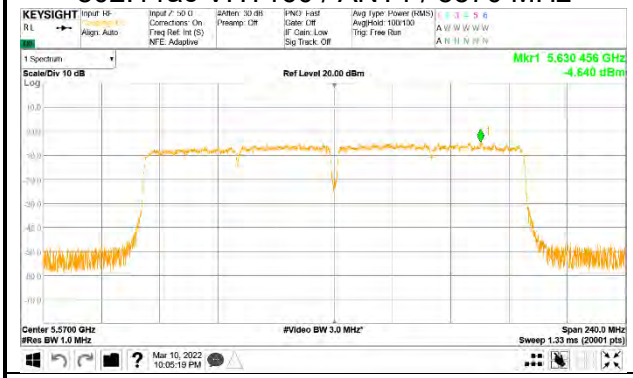


802.11ac VHT80 / ANT3 / 5610 MHz

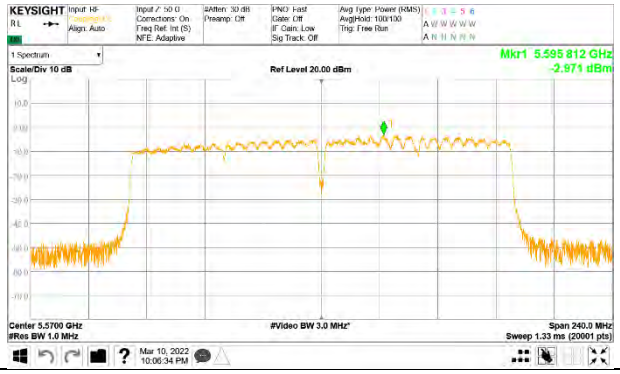
802.11ac VHT80 / ANT4 / 5610 MHz



802.11ac VHT160 / ANT1 / 5570 MHz

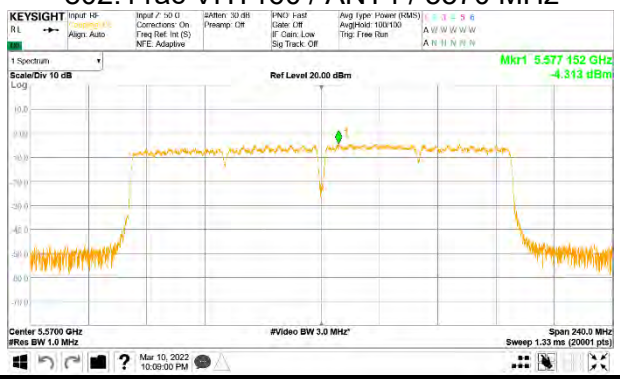


802.11ac VHT160 / ANT2 / 5570 MHz



802.11ac VHT160 / ANT3 / 5570 MHz

802.11ac VHT160 / ANT4 / 5570 MHz



UNII-3 (4TX)

802.11a / ANT1 / 5785 MHz

802.11a / ANT2 / 5785 MHz

802.11a / ANT3 / 5785 MHz

802.11a / ANT4 / 5785 MHz

802.11n HT20 / ANT1 / 5785 MHz

802.11n HT20 / ANT2 / 5785 MHz

802.11n HT20 / ANT3 / 5785 MHz

802.11n HT20 / ANT4 / 5785 MHz

802.11n HT40 / ANT1 / 5755 MHz

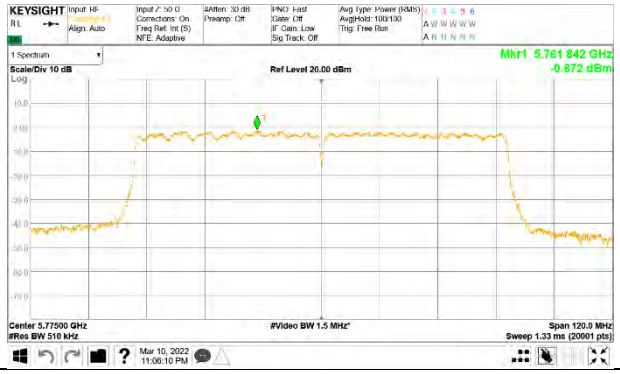
802.11n HT40 / ANT2 / 5755 MHz

802.11n HT40 / ANT3 / 5755 MHz

802.11n HT40 / ANT4 / 5755 MHz

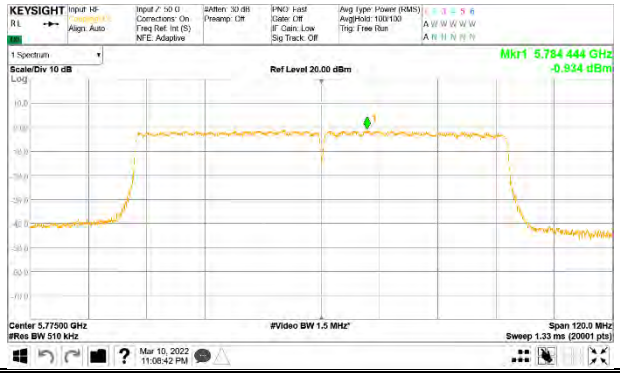
802.11ac VHT80 / ANT1 / 5775 MHz

802.11ac VHT80 / ANT2 / 5775 MHz



802.11ac VHT80 / ANT3 / 5775 MHz

802.11ac VHT80 / ANT4 / 5775 MHz

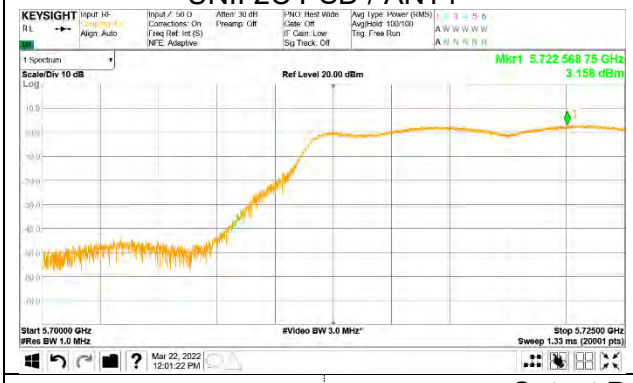


UNII Straddle Ch. IEEE 802.11a mode Output Power and PSD

4TX

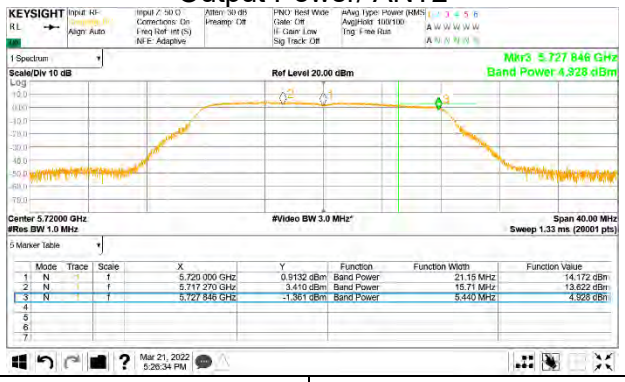
Output Power / ANT1

UNII 2C PSD / ANT1

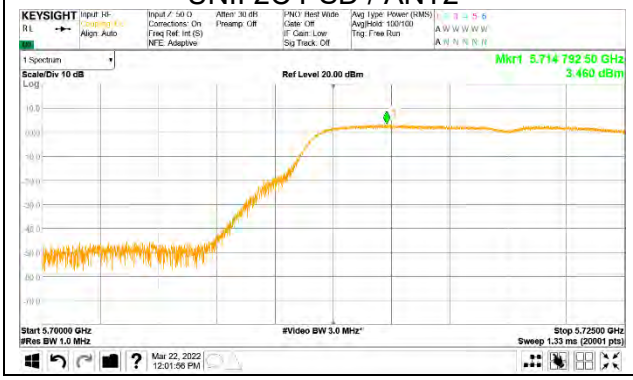


UNII 3 PSD / ANT1

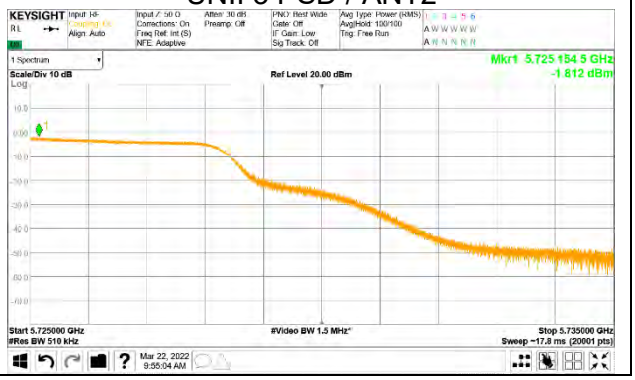
Output Power/ ANT2



UNII 2C PSD / ANT2

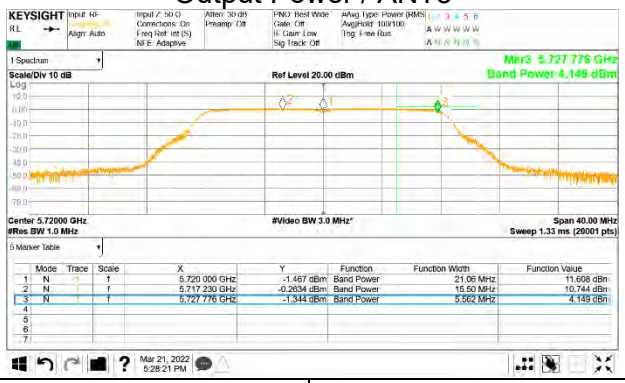


UNII 3 PSD / ANT2



4TX

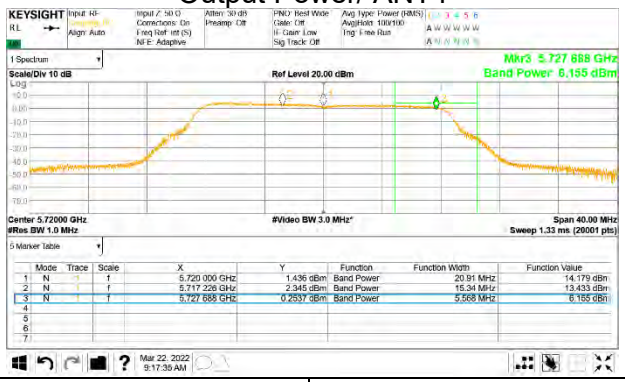
Output Power / ANT3



UNII 2C PSD / ANT3

UNII 3 PSD / ANT3

Output Power/ ANT4



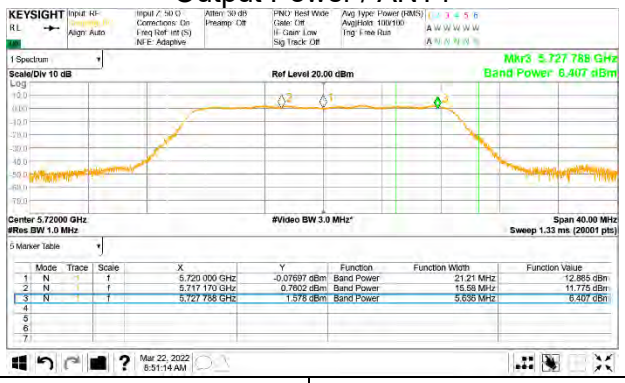
UNII 2C PSD / ANT4

UNII 3 PSD / ANT4

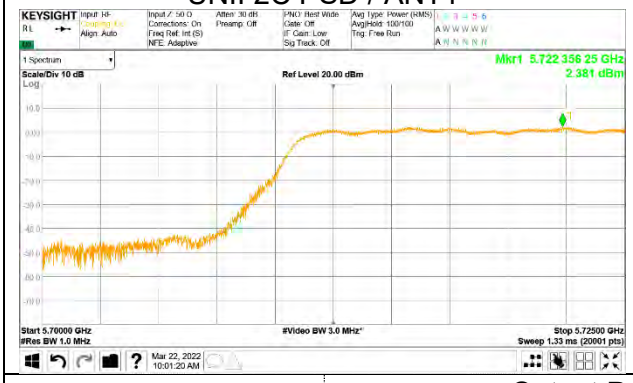
UNII Straddle Ch. IEEE 802.11n HT20 mode Output Power and PSD

4TX

Output Power / ANT1

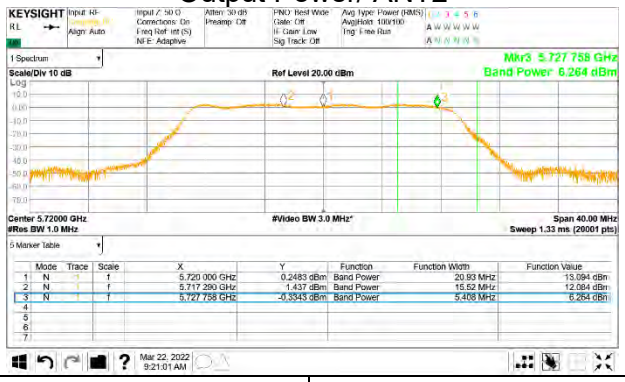


UNII 2C PSD / ANT1

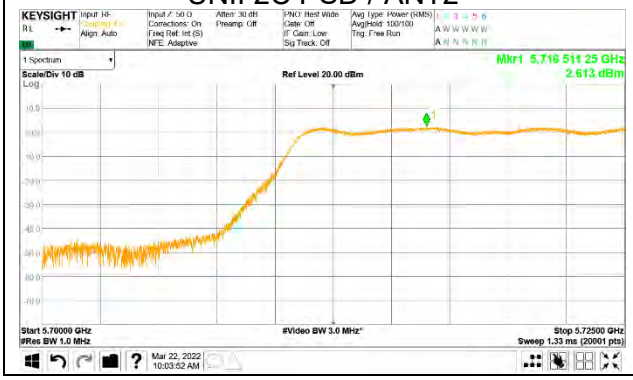


UNII 3 PSD / ANT1

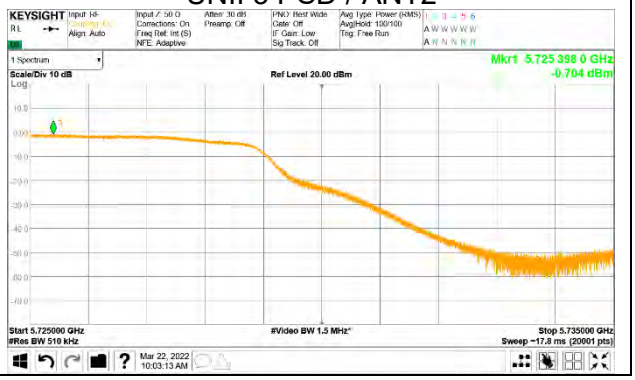
Output Power/ ANT2



UNII 2C PSD / ANT2

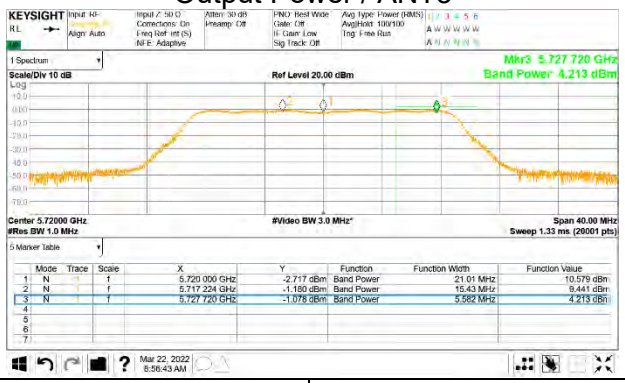


UNII 3 PSD / ANT2

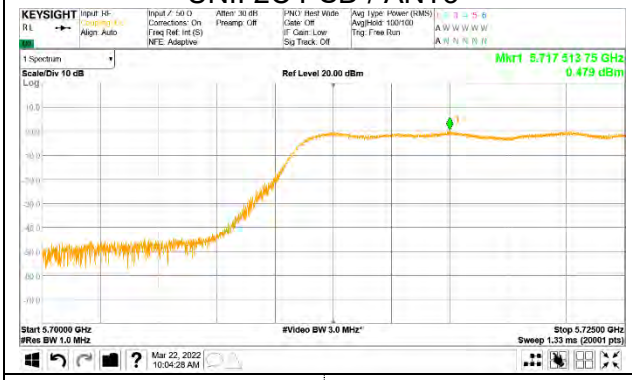


4TX

Output Power / ANT3

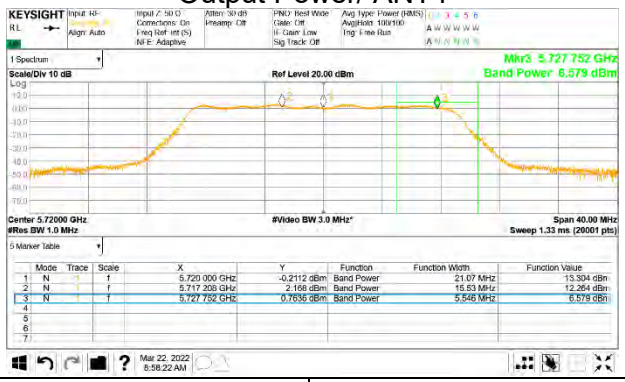


UNII 2C PSD / ANT3

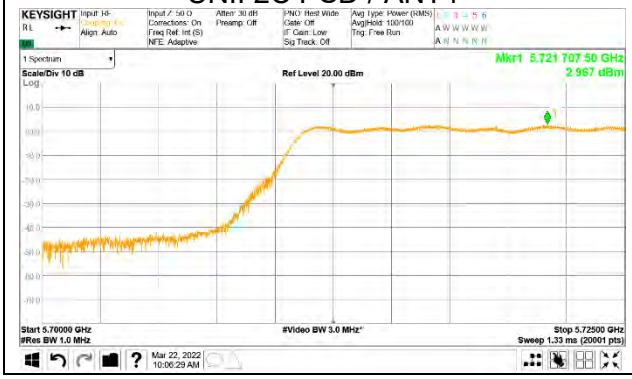


UNII 3 PSD / ANT3

Output Power/ ANT4



UNII 2C PSD / ANT4

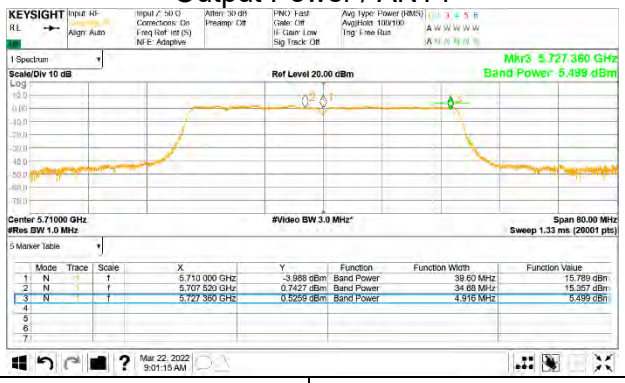


UNII 3 PSD / ANT4

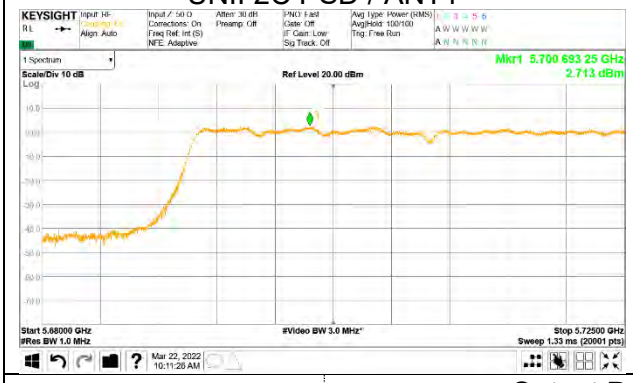
UNII Straddle Ch. IEEE 802.11n HT40 mode Output Power and PSD

4TX

Output Power / ANT1

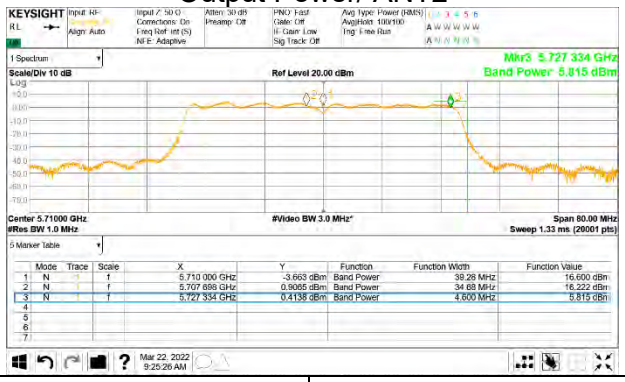


UNII 2C PSD / ANT1



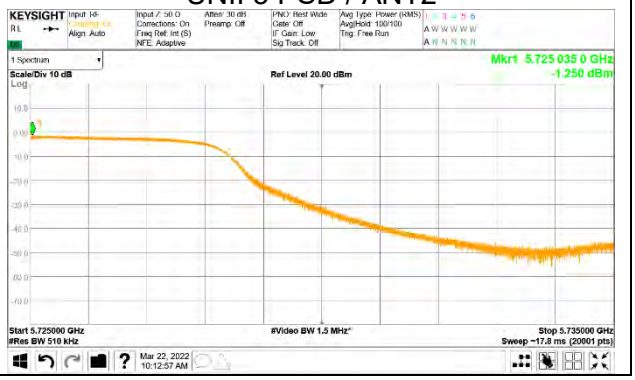
UNII 3 PSD / ANT1

Output Power/ ANT2



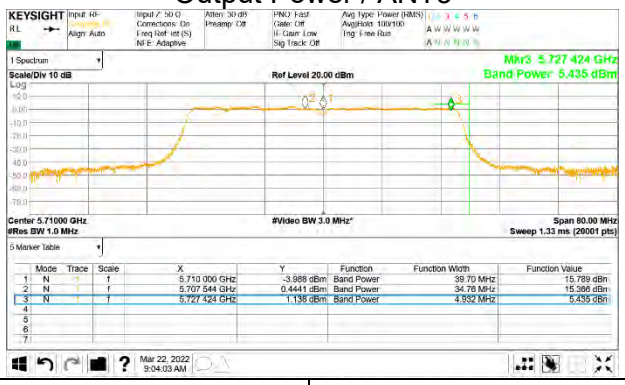
UNII 2C PSD / ANT2

UNII 3 PSD / ANT2

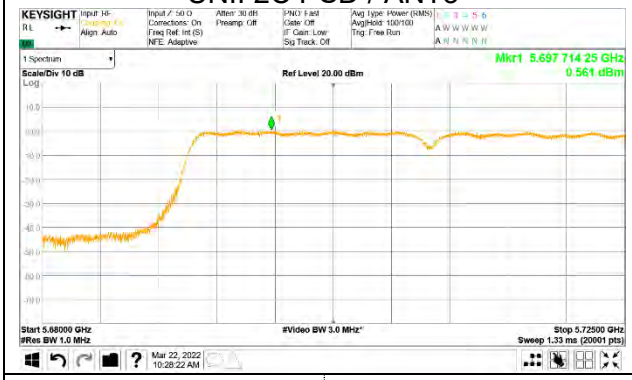


4TX

Output Power / ANT3

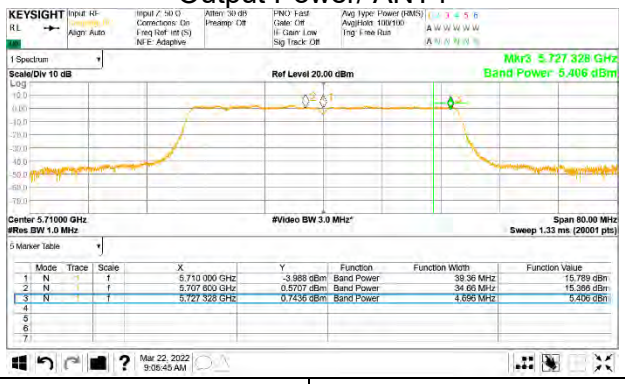


UNII 2C PSD / ANT3



UNII 3 PSD / ANT3

Output Power/ ANT4



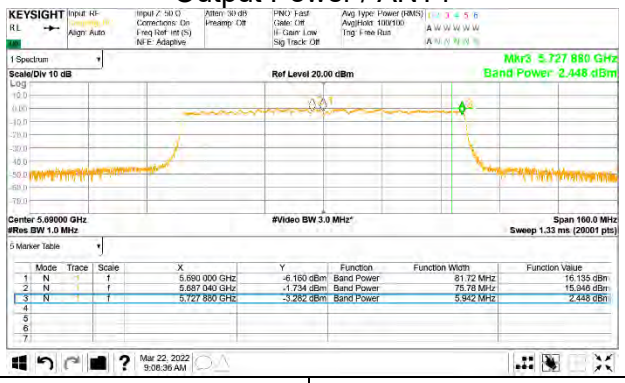
UNII 2C PSD / ANT4

UNII 3 PSD / ANT4

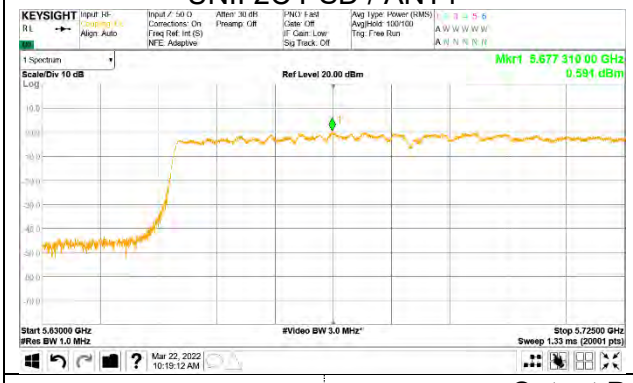
UNII Straddle Ch. IEEE 802.11ac VHT80 mode Output Power and PSD

4TX

Output Power / ANT1

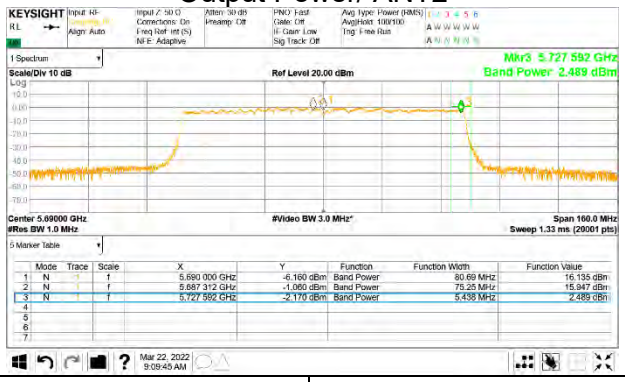


UNII 2C PSD / ANT1

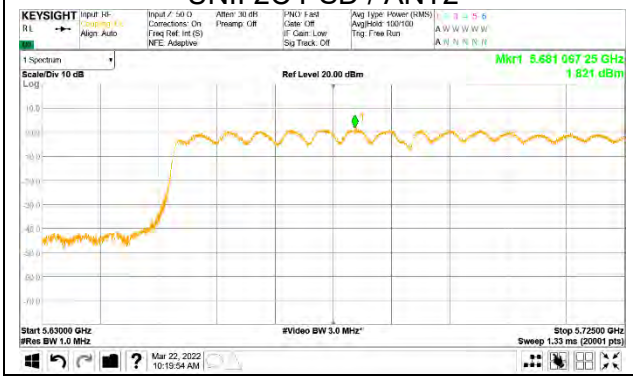


UNII 3 PSD / ANT1

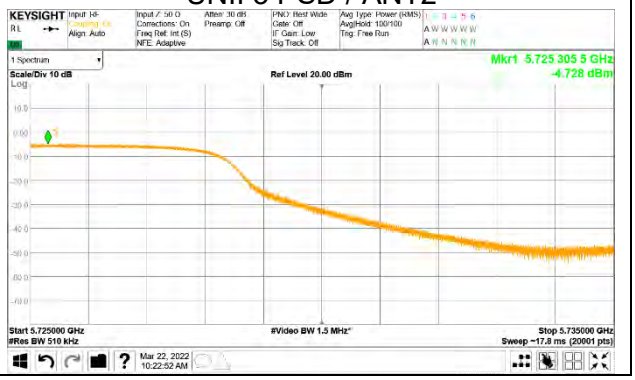
Output Power/ ANT2



UNII 2C PSD / ANT2

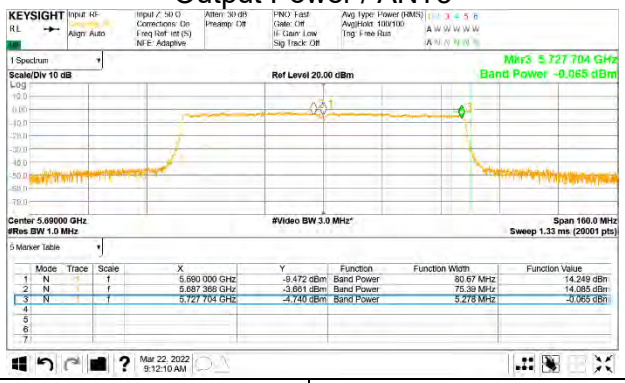


UNII 3 PSD / ANT2



4TX

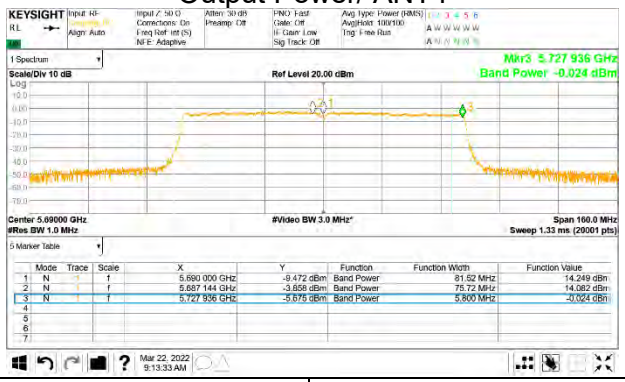
Output Power / ANT3



UNII 2C PSD / ANT3

UNII 3 PSD / ANT3

Output Power/ ANT4



UNII 2C PSD / ANT4

UNII 3 PSD / ANT4

11. TRANSMITTER ABOVE 1 GHz

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~ 156.52525	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.7 ~ 156.9	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		
			3600 ~ 4400		

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

FCC §15.407 (b)

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) 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.
(2) 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.
(3) 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.
(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz 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 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 at the band edge.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary,
provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Note

- Limit translation to field strength level (FCC §15.407)

E[dBuV/m] = EIRP[dBm] + 95.2 = -27dBm + 95.2 = 68.2dBuV/m

E[dBuV/m] = EIRP[dBm] + 95.2 = -17dBm + 95.2 = 78.2dBuV/m

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 100 cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Reference to KDB 789033 D02 v02r01 UNII part G) 6) c) Method AD:
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

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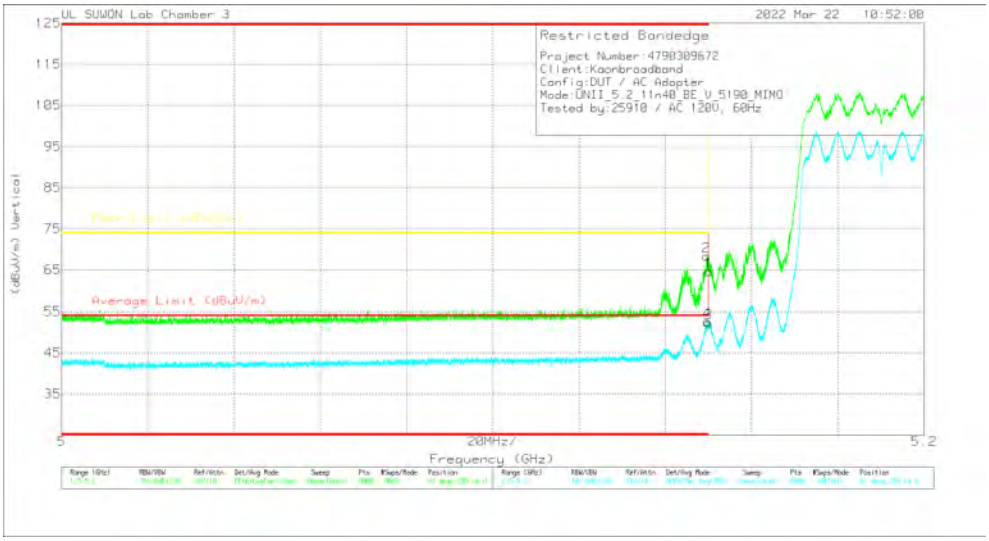
11.1. TX ABOVE 1GHz IN THE 5.2GHz BAND

BANDEDGE (WORST CASE: 802.11n HT40 / MIMO / 5190 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.14999	50.99	Pk	34.8	-21.2	0	64.59	-	-	74	-9.41	81	205	V
2	* 5.14954	54.77	Pk	34.8	-21.2	0	68.37	-	-	74	-5.63	81	205	V
3	* 5.14999	38.64	RMS	34.8	-21.2	0	52.24	54	-1.76	-	-	81	205	V
4	* 5.14972	39.05	RMS	34.8	-21.2	0	52.65	54	-1.35	-	-	81	205	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5180	MIMO	* 5.13867	41.15	Pk	34.80	-21.10	0	54.85	-	-	74.00	-19.15	3	298	H
			* 5.14999	38.63	Pk	34.80	-21.20	0	52.23	-	-	74.00	-21.77	3	298	H
			* 5.00635	29.58	RMS	34.70	-21.20	0	43.08	54.00	-10.92	-	-	3	298	H
			* 5.14999	28.28	RMS	34.80	-21.20	0	41.88	54.00	-12.12	-	-	3	298	H
			* 5.09331	41.22	Pk	34.80	-21.20	0	54.82	-	-	74.00	-19.18	0	369	V
			* 5.14999	37.73	Pk	34.80	-21.20	0	51.33	-	-	74.00	-22.67	0	369	V
			* 5.007	29.66	RMS	34.70	-21.20	0	43.16	54.00	-10.84	-	-	0	369	V
			* 5.14999	27.52	RMS	34.80	-21.20	0	41.12	54.00	-12.88	-	-	0	369	V
802.11n(HT20)	5180	MIMO	* 5.07148	41.31	Pk	34.70	-21.20	0	54.81	-	-	74.00	-19.19	200	261	H
			* 5.14999	40.33	Pk	34.80	-21.20	0	53.93	-	-	74.00	-20.07	200	261	H
			* 5.14774	29.57	RMS	34.80	-21.10	0	43.27	54.00	-10.73	-	-	200	261	H
			* 5.14999	28.60	RMS	34.80	-21.20	0	42.20	54.00	-11.80	-	-	200	261	H
			* 5.13957	41.30	Pk	34.80	-21.10	0	55.00	-	-	74.00	-19.00	6	100	V
			* 5.14999	40.88	Pk	34.80	-21.20	0	54.48	-	-	74.00	-19.52	6	100	V
			* 5.14552	29.74	RMS	34.80	-21.10	0	43.44	54.00	-10.56	-	-	6	100	V
			* 5.14999	28.36	RMS	34.80	-21.20	0	41.96	54.00	-12.04	-	-	6	100	V
802.11n(HT40)	5190	MIMO	* 5.14999	51.44	Pk	34.80	-21.20	0	65.04	-	-	74.00	-8.96	196	166	H
			* 5.14997	52.52	Pk	34.80	-21.20	0	66.12	-	-	74.00	-7.88	196	166	H
			* 5.14999	37.00	RMS	34.80	-21.20	0	50.60	54.00	-3.40	-	-	196	166	H
			* 5.14992	37.08	RMS	34.80	-21.20	0	50.68	54.00	-3.32	-	-	196	166	H
			* 5.14999	50.99	Pk	34.80	-21.20	0	64.59	-	-	74.00	-9.41	81	205	V
			* 5.14954	54.77	Pk	34.80	-21.20	0	68.37	-	-	74.00	**-5.63**	81	205	V
			* 5.14999	38.64	RMS	34.80	-21.20	0	52.24	54.00	-1.76	-	-	81	205	V
			* 5.14972	39.05	RMS	34.80	-21.20	0	52.65	54.00	**-1.35**	-	-	81	205	V
802.11ac(VHT80)	5210	MIMO	* 5.14862	49.08	Pk	34.80	-21.10	0	62.78	-	-	74.00	-11.22	0	179	H
			* 5.14999	42.26	Pk	34.80	-21.20	0	55.86	-	-	74.00	-18.14	0	179	H
			* 5.14754	33.27	RMS	34.80	-21.10	0	46.97	54.00	-7.03	-	-	0	179	H
			* 5.14999	30.18	RMS	34.80	-21.20	0	43.78	54.00	-10.22	-	-	0	179	H
			* 5.14232	49.94	Pk	34.80	-21.10	0	63.64	-	-	74.00	-10.36	78	173	V
			* 5.14999	44.70	Pk	34.80	-21.20	0	58.30	-	-	74.00	-15.70	78	173	V
			* 5.14787	34.98	RMS	34.80	-21.10	0	48.68	54.00	-5.32	-	-	78	173	V
			* 5.14999	33.80	RMS	34.80	-21.20	0	47.40	54.00	-6.60	-	-	78	173	V
802.11ac(VHT160)	5250	MIMO	* 5.14727	48.52	Pk	34.80	-21.10	0	62.22	-	-	74.00	-11.78	2	285	H
			* 5.14999	44.11	Pk	34.80	-21.20	0	57.71	-	-	74.00	-16.29	2	285	H
			* 5.14782	33.67	RMS	34.80	-21.10	0	47.37	54.00	-6.63	-	-	2	285	H
			* 5.14999	31.04	RMS	34.80	-21.20	0	44.64	54.00	-9.36	-	-	2	285	H
			* 5.14754	44.98	Pk	34.80	-21.10	0	58.68	-	-	74.00	-15.32	4	117	V
			* 5.14999	43.07	Pk	34.80	-21.20	0	56.67	-	-	74.00	-17.33	4	117	V
			* 5.12477	32.00	RMS	34.80	-21.10	0	45.70	54.00	-8.30	-	-	4	117	V
			* 5.14999	31.53	RMS	34.80	-21.20	0	45.13	54.00	-8.87	-	-	4	117	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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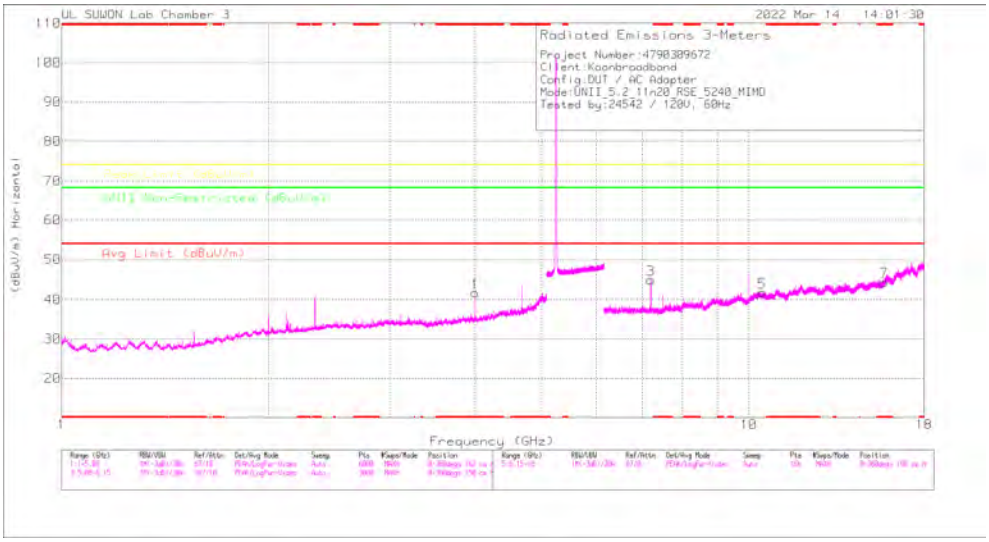
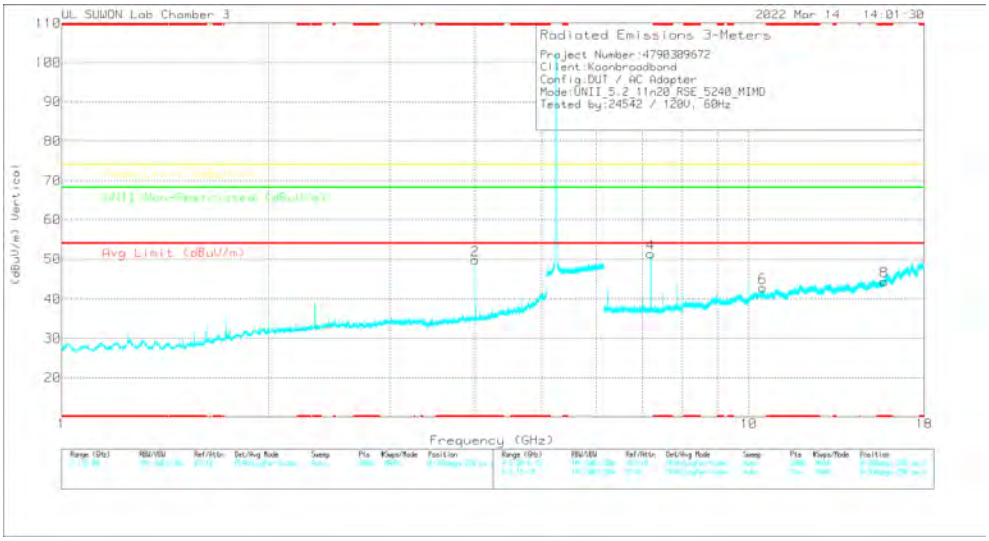
HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11n HT20 / MIMO / 5240 MHz)

5240 MHz HORIZONTAL



5240 MHz VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

5240 MHz DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.99981	49.68	PK-U	33.9	-32.1	51.48	-	-	74	-22.52	-	-	345	368	H
* 4.00002	44.75	ADR	33.9	-32.1	46.55	54	-7.45	-	-	-	-	345	368	H
7.20012	40.43	PK-U	36.1	-25.8	50.73	-	-	-	-	68.2	-17.47	335	112	H
10.48009	33.65	PK-U	38.2	-21.5	50.35	-	-	-	-	68.2	-17.85	63	100	H
* 15.71702	34.93	PK-U	40.5	-21.5	53.93	-	-	74	-20.07	-	-	288	269	H
* 15.72511	23.11	ADR	40.5	-21.5	42.11	54	-11.89	-	-	-	-	288	269	H
* 4.00002	52.08	PK-U	33.9	-32.1	53.88	-	-	74	-20.12	-	-	10	106	V
* 4.00003	48.81	ADR	33.9	-32.1	50.61	54	-3.39	-	-	-	-	10	106	V
7.19992	43.65	PK-U	36.1	-25.8	53.95	-	-	-	-	68.2	-14.25	13	282	V
10.48006	34.66	PK-U	38.2	-21.5	51.36	-	-	-	-	68.2	-16.84	55	213	V
* 15.72186	34.91	PK-U	40.5	-21.6	53.81	-	-	74	-20.19	-	-	6	298	V
* 15.71995	23.64	ADR	40.5	-21.5	42.64	54	-11.36	-	-	-	-	6	298	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak

Note: In the above emissions, frequencies other than harmonic are local oscillator generated during product operation regardless of RF transmission and were measured only in worst mode.

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

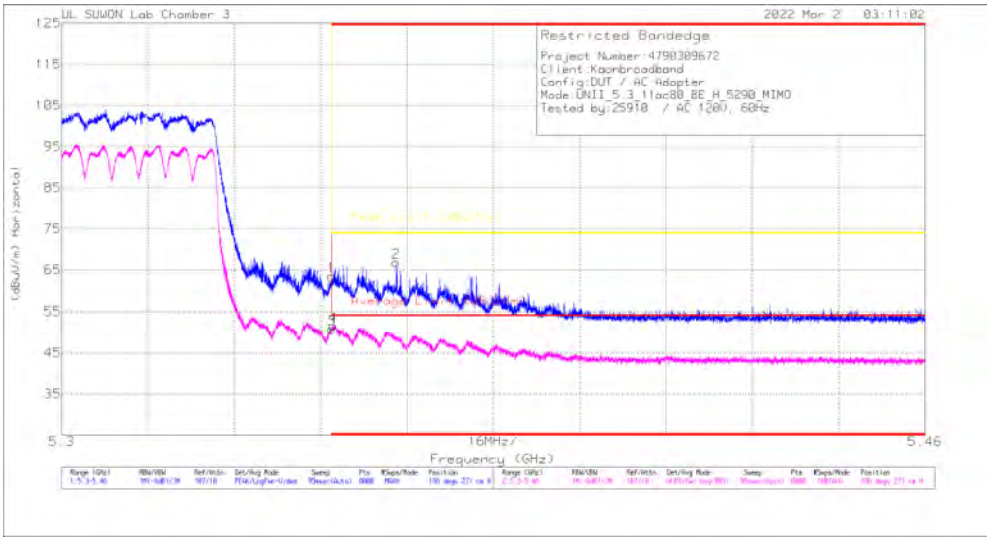
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5180	MIMO	10.361	34.88	PK-U	38.10	-21.30	0	51.68	-	-	-	-	68.20	-16.52	65	100	H
			* 15.53561	35.44	PK-U	40.20	-22.00	0	53.64	-	-	74.00	-20.36	-	-	150	223	H
			* 15.53927	23.67	ADR	40.20	-21.90	0	41.97	54.00	-12.03	-	-	-	-	150	223	H
			10.360	35.05	PK-U	38.10	-21.30	0	51.85	-	-	-	-	68.20	-16.35	51	211	V
			* 15.53632	35.54	PK-U	40.20	-22.00	0	53.74	-	-	74.00	-20.26	-	-	1	215	V
			* 15.53981	23.89	ADR	40.20	-21.90	0	42.19	54.00	-11.81	-	-	-	-	1	215	V
	5220	MIMO	10.434	34.18	PK-U	38.10	-21.60	0	50.68	-	-	-	-	68.20	-17.52	187	104	H
			* 15.66088	34.83	PK-U	40.40	-21.70	0	53.53	-	-	74.00	-20.47	-	-	244	275	H
			* 15.66101	23.23	ADR	40.40	-21.70	0	41.93	54.00	-12.07	-	-	-	-	244	275	H
			10.440	35.20	PK-U	38.10	-21.60	0	51.70	-	-	-	-	68.20	-16.50	53	219	V
			* 15.66293	35.32	PK-U	40.40	-21.80	0	53.92	-	-	74.00	-20.08	-	-	6	300	V
			* 15.65994	23.53	ADR	40.40	-21.80	0	42.13	54.00	-11.87	-	-	-	-	6	300	V
	5240	MIMO	10.479	34.02	PK-U	38.20	-21.50	0	50.72	-	-	-	-	68.20	-17.48	63	100	H
			* 15.72036	34.90	PK-U	40.50	-21.50	0	53.90	-	-	74.00	-20.10	-	-	292	246	H
			* 15.72046	23.22	ADR	40.50	-21.50	0	42.22	54.00	-11.78	-	-	-	-	292	246	H
			10.480	34.46	PK-U	38.20	-21.50	0	51.16	-	-	-	-	68.20	-17.04	54	216	V
			* 15.71844	35.04	PK-U	40.50	-21.50	0	54.04	-	-	74.00	-19.96	-	-	5	211	V
			* 15.72067	23.59	ADR	40.50	-21.50	0	42.59	54.00	-11.41	-	-	-	-	5	211	V
802.11n(HT20)	5180	MIMO	10.358	34.71	PK-U	38.10	-21.30	0	51.51	-	-	-	-	68.20	-16.69	65	100	H
			* 15.54014	35.92	PK-U	40.20	-21.90	0	54.22	-	-	74.00	**-19.78**	-	-	353	100	H
			* 15.54146	23.47	ADR	40.20	-21.90	0	41.77	54.00	-12.23	-	-	-	-	353	100	H
			10.360	35.27	PK-U	38.10	-21.30	0	52.07	-	-	-	-	68.20	**-16.13**	52	211	V
			* 15.53962	35.20	PK-U	40.20	-21.90	0	53.50	-	-	74.00	-20.50	-	-	4	209	V
			* 15.54017	23.64	ADR	40.20	-21.90	0	41.94	54.00	-12.06	-	-	-	-	4	209	V
	5220	MIMO	10.440	34.25	PK-U	38.10	-21.60	0	50.75	-	-	-	-	68.20	-17.45	62	101	H
			* 15.65983	34.76	PK-U	40.40	-21.80	0	53.36	-	-	74.00	-20.64	-	-	296	230	H
			* 15.66144	22.94	ADR	40.40	-21.70	0	41.64	54.00	-12.36	-	-	-	-	296	230	H
			10.440	34.79	PK-U	38.10	-21.50	0	51.39	-	-	-	-	68.20	-16.81	54	214	V
			* 15.6595	35.01	PK-U	40.40	-21.80	0	53.61	-	-	74.00	-20.39	-	-	4	296	V
			* 15.66015	23.48	ADR	40.40	-21.80	0	42.08	54.00	-11.92	-	-	-	-	4	296	V
	5240	MIMO	10.480	33.65	PK-U	38.20	-21.50	0	50.35	-	-	-	-	68.20	-17.85	63	100	H
			* 15.71702	34.93	PK-U	40.50	-21.50	0	53.93	-	-	74.00	-20.07	-	-	288	269	H
			* 15.72511	23.11	ADR	40.50	-21.50	0	42.11	54.00	-11.89	-	-	-	-	288	269	H
			10.480	34.66	PK-U	38.20	-21.50	0	51.36	-	-	-	-	68.20	-16.84	55	213	V
			* 15.72186	34.91	PK-U	40.50	-21.60	0	53.81	-	-	74.00	-20.19	-	-	6	298	V
			* 15.71995	23.64	ADR	40.50	-21.50	0	42.64	54.00	**-11.36**	-	-	-	-	6	298	V

Note1. PK-U - U-NII: Maximum Peak
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

11.2. TX ABOVE 1GHz IN THE 5.3GHz BAND

BANDEDGE (WORST CASE: 802.11ac VHT80 / MIMO / 5290 MHz)

HORIZONTAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	49.11	Pk	35.1	-20.7	0	63.51	-	-	74	-10.49	186	271	H
2	* 5.36197	52.46	Pk	35.1	-20.7	0	66.86	-	-	74	-7.14	186	271	H
3	* 5.35001	36.33	RMS	35.1	-20.7	0	50.73	54	-3.27	-	-	186	271	H
4	* 5.35033	37.1	RMS	35.1	-20.7	0	51.5	54	-2.5	-	-	186	271	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5320	MIMO	* 5.35001	40.44	Pk	35.10	-20.70	0	54.84	-	-	74.00	-19.16	187	270	H
			* 5.35377	42.78	Pk	35.10	-20.70	0	57.18	-	-	74.00	-16.82	187	270	H
			* 5.35001	29.56	RMS	35.10	-20.70	0	43.96	54.00	-10.04	-	-	187	270	H
			* 5.35285	30.59	RMS	35.10	-20.70	0	44.99	54.00	-9.01	-	-	187	270	H
			* 5.35001	39.56	Pk	35.10	-20.70	0	53.96	-	-	74.00	-20.04	21	105	V
			* 5.36663	42.83	Pk	35.10	-20.70	0	57.23	-	-	74.00	-16.77	21	105	V
			* 5.35001	29.85	RMS	35.10	-20.70	0	44.25	54.00	-9.75	-	-	21	105	V
			* 5.36235	30.71	RMS	35.10	-20.70	0	45.11	54.00	-8.89	-	-	21	105	V
802.11n(HT20)	5320	MIMO	* 5.35001	40.24	Pk	35.10	-20.70	0	54.64	-	-	74.00	-19.36	154	203	H
			* 5.36697	41.43	Pk	35.10	-20.70	0	55.83	-	-	74.00	-18.17	154	203	H
			* 5.35001	28.75	RMS	35.10	-20.70	0	43.15	54.00	-10.85	-	-	154	203	H
			* 5.35145	29.97	RMS	35.10	-20.80	0	44.27	54.00	-9.73	-	-	154	203	H
			* 5.35001	40.56	Pk	35.10	-20.70	0	54.96	-	-	74.00	-19.04	22	104	V
			* 5.35777	42.80	Pk	35.10	-20.70	0	57.20	-	-	74.00	-16.80	22	104	V
			* 5.35001	29.64	RMS	35.10	-20.70	0	44.04	54.00	-9.96	-	-	22	104	V
			* 5.35037	30.57	RMS	35.10	-20.70	0	44.97	54.00	-9.03	-	-	22	104	V
802.11n(HT40)	5310	MIMO	* 5.35001	50.55	Pk	35.10	-20.70	0	64.95	-	-	74.00	-9.05	186	273	H
			* 5.35015	51.53	Pk	35.10	-20.70	0	65.93	-	-	74.00	-8.07	186	273	H
			* 5.35001	35.97	RMS	35.10	-20.70	0	50.37	54.00	-3.63	-	-	186	273	H
			* 5.35041	37.08	RMS	35.10	-20.70	0	51.48	54.00	-2.52	-	-	186	273	H
			* 5.35001	47.75	Pk	35.10	-20.70	0	62.15	-	-	74.00	-11.85	78	206	V
			* 5.35253	51.04	Pk	35.10	-20.80	0	65.34	-	-	74.00	-8.66	78	206	V
			* 5.35001	34.64	RMS	35.10	-20.70	0	49.04	54.00	-4.96	-	-	78	206	V
			* 5.35049	35.04	RMS	35.10	-20.70	0	49.44	54.00	-4.56	-	-	78	206	V
802.11ac(VHT80)	5290	MIMO	* 5.35001	49.11	Pk	35.10	-20.70	0	63.51	-	-	74.00	-10.49	186	271	H
			* 5.36197	52.46	Pk	35.10	-20.70	0	66.86	-	-	74.00	-7.14	186	271	H
			* 5.35001	36.33	RMS	35.10	-20.70	0	50.73	54.00	-3.27	-	-	186	271	H
			* 5.35033	37.10	RMS	35.10	-20.70	0	51.50	54.00	**-2.50**	-	-	186	271	H
			* 5.35001	45.98	Pk	35.10	-20.70	0	60.38	-	-	74.00	-13.62	86	197	V
			* 5.35345	52.65	Pk	35.10	-20.70	0	67.05	-	-	74.00	**-6.95**	86	197	V
			* 5.35001	34.29	RMS	35.10	-20.70	0	48.69	54.00	-5.31	-	-	86	197	V
			* 5.35277	35.77	RMS	35.10	-20.70	0	50.17	54.00	-3.83	-	-	86	197	V
802.11ac(VHT160)	5250	MIMO	* 5.35001	44.97	Pk	35.10	-20.70	0	59.37	-	-	74.00	-14.63	189	274	H
			* 5.37287	49.47	Pk	35.10	-20.60	0	63.97	-	-	74.00	-10.03	189	274	H
			* 5.35001	34.49	RMS	35.10	-20.70	0	48.89	54.00	-5.11	-	-	189	274	H
			* 5.35013	35.21	RMS	35.10	-20.70	0	49.61	54.00	-4.39	-	-	189	274	H
			* 5.35001	43.34	Pk	35.10	-20.70	0	57.74	-	-	74.00	-16.26	86	165	V
			* 5.35759	47.98	Pk	35.10	-20.70	0	62.38	-	-	74.00	-11.62	86	165	V
			* 5.35001	32.01	RMS	35.10	-20.70	0	46.41	54.00	-7.59	-	-	86	165	V
			* 5.35743	34.35	RMS	35.10	-20.70	0	48.75	54.00	-5.25	-	-	86	165	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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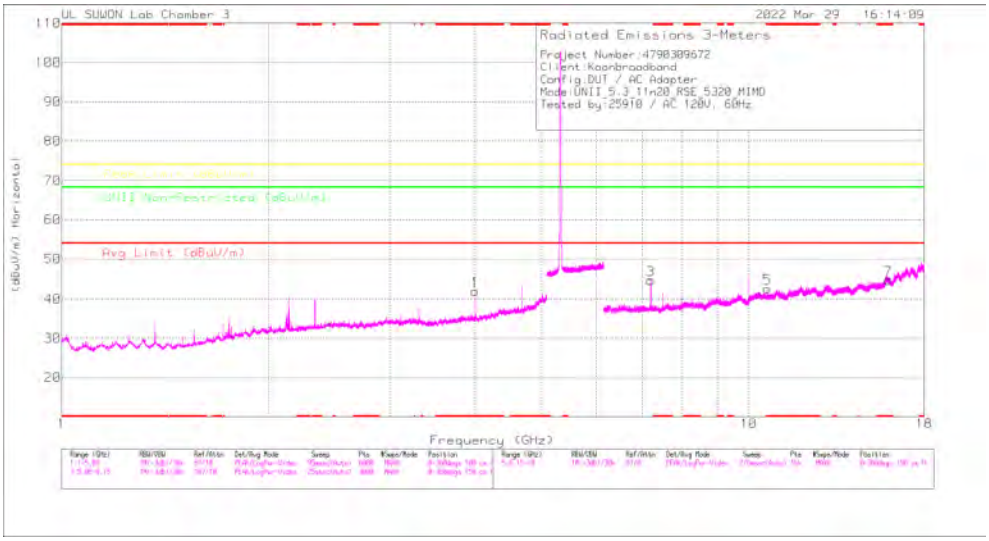
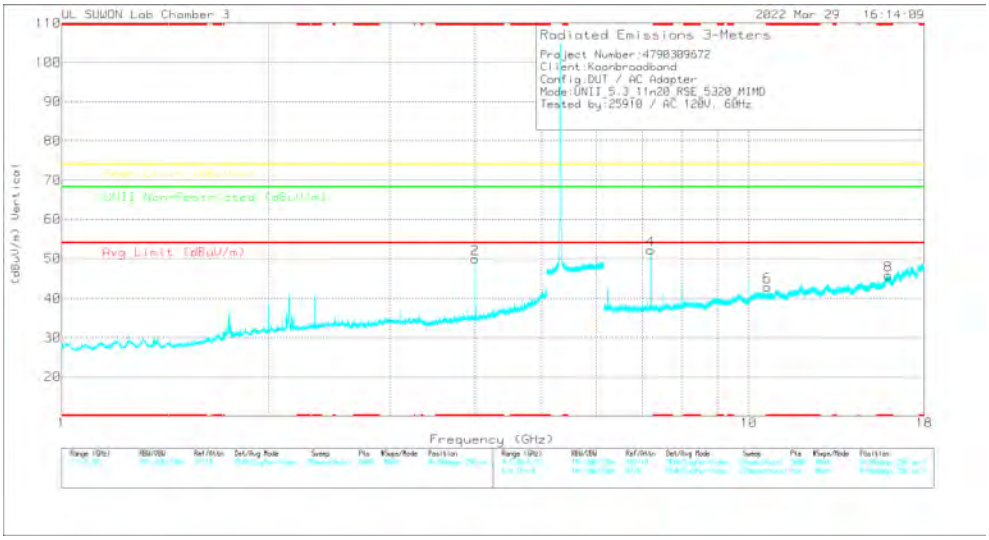
HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11n HT20 / MIMO / 5320 MHz)

5320 MHz HORIZONTAL



5320 MHz VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

5320 MHz DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.00004	49.06	PK-U	33.9	-31.9	51.06	-	-	74	-22.94	-	-	303	100	H
* 3.99996	43.86	ADR	33.9	-31.9	45.86	54	-8.14	-	-	-	-	303	100	H
7.19985	40.32	PK-U	36.1	-25.2	51.22	-	-	-	-	68.2	-16.98	338	106	H
* 10.60106	44.37	PK-U	38.3	-21	61.67	-	-	74	-12.33	-	-	248	103	H
* 10.6019	29.07	ADR	38.3	-21	46.37	54	-7.63	-	-	-	-	248	103	H
* 15.90081	34.01	PK-U	40.8	-20.5	54.31	-	-	74	-19.69	-	-	250	106	H
* 15.89804	22.68	ADR	40.8	-20.5	42.98	54	-11.02	-	-	-	-	250	106	H
* 4.00004	52.2	PK-U	33.9	-31.9	54.2	-	-	74	-19.8	-	-	9	108	V
* 4	49.15	ADR	33.9	-31.9	51.15	54	-2.85	-	-	-	-	9	108	V
7.19998	43.36	PK-U	36.1	-25.2	54.26	-	-	-	-	68.2	-13.94	18	271	V
* 10.60214	52.5	PK-U	38.3	-21	69.8	-	-	74	-4.2	-	-	203	112	V
* 10.60181	35.61	ADR	38.3	-21	52.91	54	-1.09	-	-	-	-	203	112	V
* 15.89701	34.75	PK-U	40.8	-20.5	55.05	-	-	74	-18.95	-	-	5	189	V
* 15.89997	22.85	ADR	40.8	-20.6	43.05	54	-10.95	-	-	-	-	5	189	V

***** - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

Note: In the above emissions, frequencies other than harmonic are local oscillator generated during product operation regardless of RF transmission and were measured only in worst mode.

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

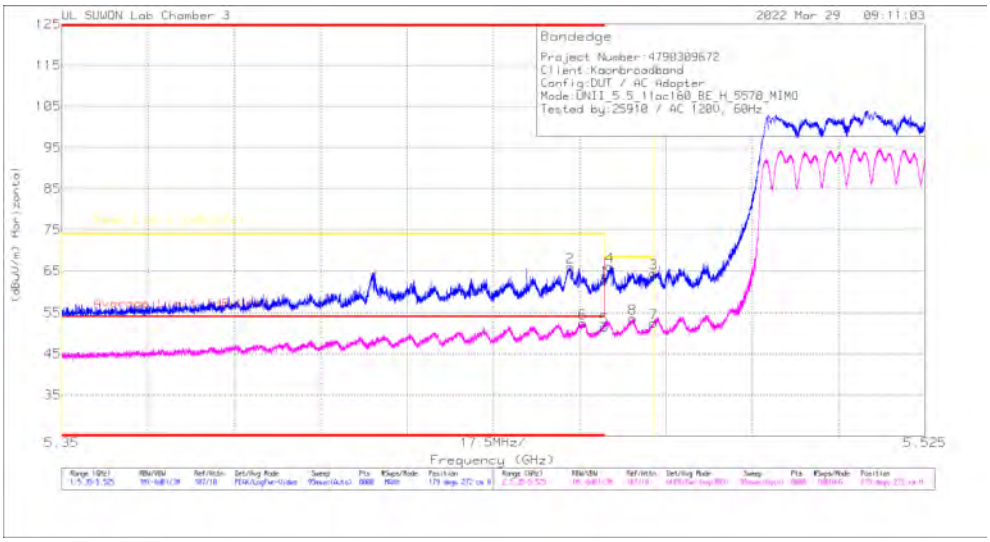
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5260	MIMO	10.520	33.68	PK-U	38.20	-21.00	0	50.88	-	-	-	-	68.20	-17.32	61	100	H
			* 15.78166	35.27	PK-U	40.60	-21.00	0	54.87	-	-	74.00	-19.13	-	-	292	152	H
			* 15.78133	23.19	ADR	40.60	-21.00	0	42.79	54.00	-11.21	-	-	-	-	292	152	H
			10.520	40.24	PK-U	38.20	-21.00	0	57.44	-	-	-	-	68.20	**-10.76**	155	100	V
			* 15.78034	35.19	PK-U	40.60	-21.00	0	54.79	-	-	74.00	-19.21	-	-	3	298	V
			* 15.78	23.63	ADR	40.60	-21.00	0	43.23	54.00	-10.77	-	-	-	-	3	298	V
	5300	MIMO	* 10.60007	34.77	PK-U	38.30	-21.00	0	52.07	-	-	74.00	-21.93	-	-	185	110	H
			* 10.60019	22.55	ADR	38.30	-21.00	0	39.85	54.00	-14.15	-	-	-	-	185	110	H
			* 15.89813	34.50	PK-U	40.80	-20.50	0	54.80	-	-	74.00	-19.20	-	-	131	103	H
			* 15.90243	22.80	ADR	40.80	-20.50	0	43.10	54.00	-10.90	-	-	-	-	131	103	H
			* 10.60011	39.56	PK-U	38.30	-21.00	0	56.86	-	-	74.00	-17.14	-	-	163	100	V
			* 10.60049	25.58	ADR	38.30	-21.00	0	42.88	54.00	-11.12	-	-	-	-	163	100	V
			* 15.90011	23.24	ADR	40.80	-20.60	0	43.44	54.00	-10.56	-	-	-	-	35	193	V
			* 15.90051	34.64	PK-U	40.80	-20.50	0	54.94	-	-	74.00	-19.06	-	-	35	193	V
	5320	MIMO	* 10.64051	34.36	PK-U	38.30	-21.50	0	51.16	-	-	74.00	-22.84	-	-	191	140	H
			* 10.63944	22.26	ADR	38.30	-21.50	0	39.06	54.00	-14.94	-	-	-	-	191	140	H
			* 15.9602	33.52	PK-U	40.90	-20.90	0	53.52	-	-	74.00	-20.48	-	-	133	138	H
			* 15.96264	22.11	ADR	40.90	-20.90	0	42.11	54.00	-11.89	-	-	-	-	133	138	H
			* 10.63958	38.47	PK-U	38.30	-21.50	0	55.27	-	-	74.00	-18.73	-	-	152	212	V
			* 10.63947	24.90	ADR	38.30	-21.50	0	41.70	54.00	-12.30	-	-	-	-	152	212	V
			* 15.96201	34.54	PK-U	40.90	-20.90	0	54.54	-	-	74.00	-19.46	-	-	152	100	V
			* 15.96028	22.22	ADR	40.90	-20.90	0	42.22	54.00	-11.78	-	-	-	-	152	100	V
802.11n(HT20)	5260	MIMO	10.520	34.01	PK-U	38.20	-20.90	0	51.31	-	-	-	-	68.20	-16.89	64	100	H
			* 15.78336	34.80	PK-U	40.60	-20.90	0	54.50	-	-	74.00	-19.50	-	-	231	102	H
			* 15.78083	23.12	ADR	40.60	-20.90	0	42.82	54.00	-11.18	-	-	-	-	231	102	H
			10.521	39.68	PK-U	38.20	-20.90	0	56.98	-	-	-	-	68.20	-11.22	156	214	V
			* 15.78452	36.08	PK-U	40.60	-20.90	0	55.78	-	-	74.00	-18.22	-	-	163	264	V
			* 15.78265	23.79	ADR	40.60	-21.00	0	43.39	54.00	-10.61	-	-	-	-	163	264	V
	5300	MIMO	* 10.60084	34.91	PK-U	38.30	-21.00	0	52.21	-	-	74.00	-21.79	-	-	187	110	H
			* 10.60113	23.10	ADR	38.30	-21.00	0	40.40	54.00	-13.60	-	-	-	-	187	110	H
			* 15.90173	34.16	PK-U	40.80	-20.50	0	54.46	-	-	74.00	-19.54	-	-	0	349	H
			* 15.90249	22.68	ADR	40.80	-20.50	0	42.98	54.00	-11.02	-	-	-	-	0	349	H
			* 10.6001	39.59	PK-U	38.30	-21.00	0	56.89	-	-	74.00	**-17.11**	-	-	162	100	V
			* 10.60002	24.72	ADR	38.30	-21.00	0	42.02	54.00	-11.98	-	-	-	-	162	100	V
			* 15.90359	35.73	PK-U	40.80	-20.50	0	56.03	-	-	74.00	-17.97	-	-	164	364	V
			* 15.90025	23.22	ADR	40.80	-20.50	0	43.52	54.00	-10.48	-	-	-	-	164	364	V
	5320	MIMO	* 10.63996	35.34	PK-U	38.30	-21.10	0	52.54	-	-	74.00	-21.46	-	-	189	126	**H**
			* 10.63979	23.15	ADR	38.30	-21.10	0	40.35	54.00	-13.65	-	-	-	-	189	126	**H**
			* 15.95893	34.98	PK-U	40.90	-20.50	0	55.38	-	-	74.00	-18.62	-	-	144	107	**H**
			* 15.96083	22.88	ADR	40.90	-20.50	0	43.28	54.00	-10.72	-	-	-	-	144	107	**H**
			* 10.63993	39.07	PK-U	38.30	-21.10	0	56.27	-	-	74.00	-17.73	-	-	161	212	**V**
			* 10.6407	25.48	ADR	38.30	-21.10	0	42.68	54.00	-11.32	-	-	-	-	161	212	**V**
			* 15.96374	36.35	PK-U	40.90	-20.40	0	56.85	-	-	74.00	-17.15	-	-	164	355	**V**
			* 15.96158	23.87	ADR	40.90	-20.50	0	44.27	54.00	**-9.73**	-	-	-	-	164	355	**V**

Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

11.3. TX ABOVE 1GHz IN THE 5.5 GHz BAND

BANDEDGE (WORST CASE: 802.11ac VHT160 / MIMO / 5570 MHz)

HORIZONTAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45998	47.8	Pk	35.3	-20.3	62.8	-	-	74	-11.2	179	272	H
2	* 5.45313	50.94	Pk	35.3	-20.3	65.94	-	-	74	-8.06	179	272	H
3	5.46998	49.37	Pk	35.3	-20.2	64.47	-	-	68.2	-3.73	179	272	H
4	5.4611	50.99	Pk	35.3	-20.2	66.09	-	-	68.2	-2.11	179	272	H
5	* 5.45998	36.45	RMS	35.3	-20.3	51.45	54	-2.55	-	-	179	272	H
6	* 5.45563	37.54	RMS	35.3	-20.3	52.54	54	-1.46	-	-	179	272	H
7	5.46998	37.43	RMS	35.3	-20.2	52.53	-	-	-	-	179	272	H
8	5.46576	38.6	RMS	35.3	-20.3	53.6	-	-	-	-	179	272	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

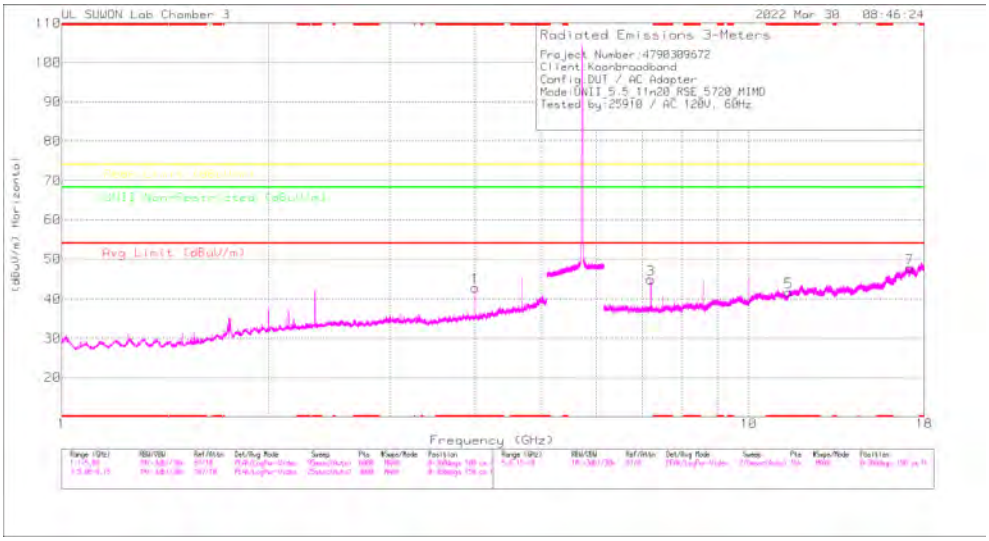
BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5500	MIMO	* 5.44147	41.58	Pk	35.30	-20.60	0	56.28	-	-	74.00	-17.72	198	158	H
			* 5.45998	38.71	Pk	35.30	-20.60	0	53.41	-	-	74.00	-20.59	198	158	H
			5.46291	41.40	Pk	35.30	-20.60	0	56.10	-	-	68.20	-12.10	198	158	H
			5.46998	39.38	Pk	35.30	-20.60	0	54.08	-	-	68.20	-14.12	198	158	H
			* 5.45858	29.65	RMS	35.30	-20.60	0	44.35	54.00	-9.65	-	-	198	158	H
			* 5.45998	28.88	RMS	35.30	-20.60	0	43.58	54.00	-10.42	-	-	198	158	H
			* 5.45935	41.23	Pk	35.30	-20.50	0	56.03	-	-	74.00	-17.97	11	133	V
			* 5.45998	39.40	Pk	35.30	-20.60	0	54.10	-	-	74.00	-19.90	11	133	V
			5.46210	41.12	Pk	35.30	-20.50	0	55.92	-	-	68.20	-12.28	11	133	V
			5.46998	39.93	Pk	35.30	-20.60	0	54.63	-	-	68.20	-13.57	11	133	V
			* 5.45926	29.70	RMS	35.30	-20.50	0	44.50	54.00	-9.50	-	-	11	133	V
			* 5.45998	28.40	RMS	35.30	-20.60	0	43.10	54.00	-10.90	-	-	11	133	V
	5700	MIMO	5.72500	41.28	Pk	35.70	-20.00	0	56.98	-	-	68.20	-11.22	175	244	H
			5.72539	46.33	Pk	35.70	-20.00	0	62.03	-	-	68.20	-6.17	175	244	H
			5.72500	38.66	Pk	35.70	-20.00	0	54.36	-	-	68.20	-13.84	16	100	V
			5.72588	43.57	Pk	35.70	-20.00	0	59.27	-	-	68.20	-8.93	16	100	V
802.11n(HT20)	5500	MIMO	* 5.43447	41.37	Pk	35.30	-20.60	0	56.07	-	-	74.00	-17.93	199	146	H
			* 5.45998	39.92	Pk	35.30	-20.60	0	54.62	-	-	74.00	-19.38	199	146	H
			5.46099	41.69	Pk	35.30	-20.60	0	56.39	-	-	68.20	-11.81	199	146	H
			5.46998	39.81	Pk	35.30	-20.60	0	54.51	-	-	68.20	-13.69	199	146	H
			* 5.45659	29.67	RMS	35.30	-20.60	0	44.37	54.00	-9.63	-	-	199	146	H
			* 5.45998	28.64	RMS	35.30	-20.60	0	43.34	54.00	-10.66	-	-	199	146	H
			* 5.42274	41.54	Pk	35.20	-20.70	0	56.04	-	-	74.00	-17.96	11	133	V
			* 5.45998	38.59	Pk	35.30	-20.60	0	53.29	-	-	74.00	-20.71	11	133	V
			5.46320	41.44	Pk	35.30	-20.60	0	56.14	-	-	68.20	-12.06	11	133	V
			5.46998	39.08	Pk	35.30	-20.60	0	53.78	-	-	68.20	-14.42	11	133	V
			* 5.45954	29.40	RMS	35.30	-20.60	0	44.10	54.00	-9.90	-	-	11	133	V
			* 5.45998	28.48	RMS	35.30	-20.60	0	43.18	54.00	-10.82	-	-	11	133	V
	5700	MIMO	5.72500	42.09	Pk	35.70	-20.00	0	57.79	-	-	68.20	-10.41	164	243	H
			5.72510	44.97	Pk	35.70	-20.00	0	60.67	-	-	68.20	-7.53	164	243	H
			5.72500	39.60	Pk	35.70	-20.00	0	55.30	-	-	68.20	-12.90	17	100	V
			5.72505	42.67	Pk	35.70	-20.00	0	58.37	-	-	68.20	-9.83	17	100	V
802.11n(HT40)	5510	MIMO	* 5.45946	42.68	Pk	35.30	-20.60	0	57.38	-	-	74.00	-16.62	198	238	H
			* 5.45998	40.33	Pk	35.30	-20.60	0	55.03	-	-	74.00	-18.97	198	238	H
			5.46700	49.07	Pk	35.30	-20.60	0	63.77	-	-	68.20	-4.43	198	238	H
			5.46998	47.13	Pk	35.30	-20.60	0	61.83	-	-	68.20	-6.37	198	238	H
			* 5.45987	30.96	RMS	35.30	-20.60	0	45.66	54.00	-8.34	-	-	198	238	H
			* 5.45998	30.03	RMS	35.30	-20.60	0	44.73	54.00	-9.27	-	-	198	238	H
			* 5.4579	45.22	Pk	35.30	-20.60	0	59.92	-	-	74.00	-14.08	318	182	V
			* 5.45998	41.69	Pk	35.30	-20.60	0	56.39	-	-	74.00	-17.61	318	182	V
			5.46775	51.64	Pk	35.30	-20.60	0	66.34	-	-	68.20	**-1.86**	318	182	V
			5.46998	43.94	Pk	35.30	-20.60	0	58.64	-	-	68.20	-9.56	318	182	V
			* 5.45749	31.04	RMS	35.30	-20.60	0	45.74	54.00	-8.26	-	-	318	182	V
			* 5.45998	29.77	RMS	35.30	-20.60	0	44.47	54.00	-9.53	-	-	318	182	V
	5670	MIMO	5.72500	41.23	Pk	35.70	-20.00	0	56.93	-	-	68.20	-11.27	127	176	H
			5.72633	45.59	Pk	35.70	-20.00	0	61.29	-	-	68.20	-6.91	127	176	H
			5.72500	42.09	Pk	35.70	-20.00	0	57.79	-	-	68.20	-10.41	303	206	V
			5.72547	45.85	Pk	35.70	-20.00	0	61.55	-	-	68.20	-6.65	303	206	V
802.11ac(VHT80)	5530	MIMO	* 5.45685	48.94	Pk	35.30	-20.60	0	63.64	-	-	74.00	-10.36	195	160	H
			* 5.45998	43.39	Pk	35.30	-20.60	0	58.09	-	-	74.00	-15.91	195	160	H
			5.46142	49.33	Pk	35.30	-20.60	0	64.03	-	-	68.20	-4.17	195	160	H
			5.46998	45.63	Pk	35.30	-20.60	0	60.33	-	-	68.20	-7.87	195	160	H
			* 5.45687	34.66	RMS	35.30	-20.60	0	49.36	54.00	-4.64	-	-	195	160	H
			* 5.45998	33.59	RMS	35.30	-20.60	0	48.29	54.00	-5.71	-	-	195	160	H
			* 5.45725	47.31	Pk	35.30	-20.60	0	62.01	-	-	74.00	-11.99	18	133	V
			* 5.45998	42.87	Pk	35.30	-20.60	0	57.57	-	-	74.00	-16.43	18	133	V
			5.46746	49.77	Pk	35.30	-20.60	0	64.47	-	-	68.20	-3.73	18	133	V
			5.46998	43.98	Pk	35.30	-20.60	0	58.68	-	-	68.20	-9.52	18	133	V
			* 5.45768	34.43	RMS	35.30	-20.60	0	49.13	54.00	-4.87	-	-	18	133	V
			* 5.45998	31.61	RMS	35.30	-20.60	0	46.31	54.00	-7.69	-	-	18	133	V
	5610	MIMO	5.72500	41.16	Pk	35.70	-20.00	0	56.86	-	-	68.20	-11.34	171	257	H
			5.73322	47.28	Pk	35.70	-19.90	0	63.08	-	-	68.20	-5.12	171	257	H
			5.72500	40.04	Pk	35.70	-20.00	0	55.74	-	-	68.20	-12.46	304	204	V
			5.72702	43.60	Pk	35.70	-20.00	0	59.30	-	-	68.20	-8.90	304	204	V
802.11ac(VHT160)	5570 (Low)	MIMO	* 5.45998	47.80	Pk	35.30	-20.30	0	62.80	-	-	74.00	-11.20	179	272	**H**
			* 5.45313	50.94	Pk	35.30	-20.30	0	65.94	-	-	74.00	-8.06	179	272	**H**
			5.46998	49.37	Pk	35.30	-20.20	0	64.47	-	-	68.20	-3.73	179	272	**H**
			5.46110	50.99	Pk	35.30	-20.20	0	66.09	-	-	68.20	-2.11	179	272	**H**
			* 5.45998	36.45	RMS	35.30	-20.30	0	51.45	54.00	-2.55	-	-	179	272	**H**
			* 5.45563	37.54	RMS	35.30	-20.30	0	52.54	54.00	**-1.46**	-	-	179	272	**H**
			* 5.45998	44.89	Pk	35.30	-20.30	0	59.89	-	-	74.00	-14.11	90	176	**V**
			* 5.41288	47.08	Pk	35.20	-20.30	0	61.98	-	-	74.00	-12.02	90	176	**V**
			5.46998	45.59	Pk	35.30	-20.20	0	60.69	-	-	68.20	-7.51	90	176	**V**
			5.46991	46.59	Pk	35.30	-20.20	0	61.69	-	-	68.20	-6.51	90	176	**V**
			* 5.45998	34.04	RMS	35.30	-20.30	0	49.04	54.00	-4.96	-	-	90	176	**V**
			* 5.45989	34.83	RMS	35.30	-20.30	0	49.83	54.00	-4.17	-	-	90	176	**V**
	5570 (High)	MIMO	5.72501	41.88	Pk	35.70	-19.70	0	57.88	-	-	68.20	-10.32	179	259	**H**
			5.73010	43.89	Pk	35.70	-19.60	0	59.99	-	-	68.20	-8.21	179	259	**H**
			5.72501	41.33	Pk	35.70	-19.70	0	57.33	-	-	68.20	-10.87	89	185	**V**
			5.73266	42.10	Pk	35.70	-19.60	0	58.20	-	-	68.20	-10.00	89	185	**V**

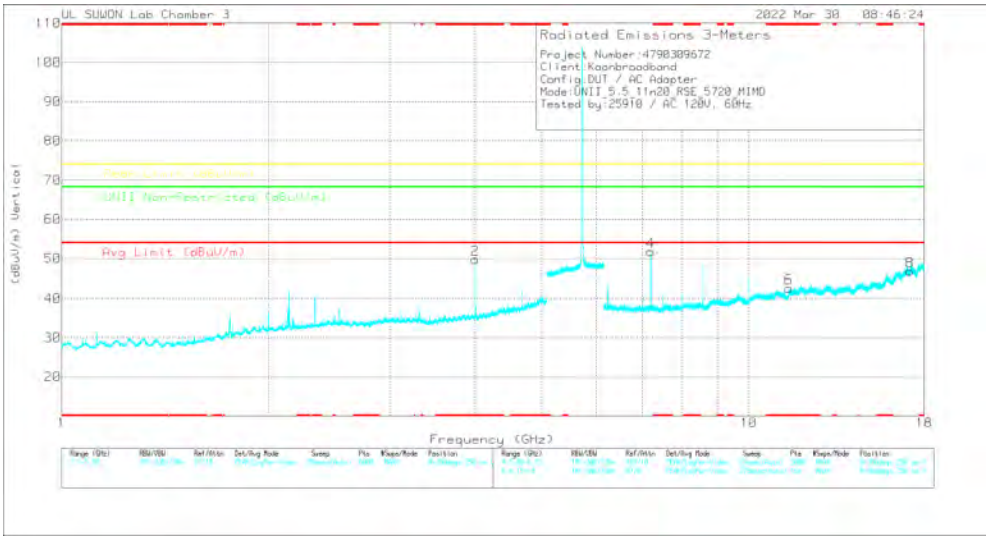
Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11n HT20 / MIMO / 5720 MHz)

5720 MHz HORIZONTAL



5720 MHz VERTICAL



Note. Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

5720 MHz DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.9999	49.29	PK-U	33.9	-32.1	51.09	-	-	74	-22.91	-	-	304	100	H
* 3.99996	44.01	ADR	33.9	-32.1	45.81	54	-8.19	-	-	-	-	304	100	H
7.20015	39.99	PK-U	36.1	-25.8	50.29	-	-	-	-	68.2	-17.91	340	110	H
* 11.44031	33.56	PK-U	38.6	-21.8	50.36	-	-	74	-23.64	-	-	310	100	H
* 11.44015	22.71	ADR	38.6	-21.8	39.51	54	-14.49	-	-	-	-	310	100	H
17.1617	32.99	PK-U	42.2	-18.3	56.89	-	-	-	-	68.2	-11.31	201	157	H
* 3.99996	52.36	PK-U	33.9	-32.1	54.16	-	-	74	-19.84	-	-	13	106	V
* 4.00001	49.18	ADR	33.9	-32.1	50.98	54	-3.02	-	-	-	-	13	106	V
7.20004	43.36	PK-U	36.1	-25.8	53.66	-	-	-	-	68.2	-14.54	17	108	V
* 11.44012	24.07	ADR	38.6	-21.8	40.87	54	-13.13	-	-	-	-	349	381	V
* 11.44011	34.02	PK-U	38.6	-21.8	50.82	-	-	74	-23.18	-	-	349	381	V
17.16769	32.78	PK-U	42.2	-18.3	56.68	-	-	-	-	68.2	-11.52	100	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

Note: In the above emissions, frequencies other than harmonic are local oscillator generated during product operation regardless of RF transmission and were measured only in worst mode.

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5500	MIMO	* 11.0003	35.41	PK-U	38.50	-21.70	0	52.21	-	-	74.00	-21.79	-	-	51.00	186	H
			* 11.00027	24.72	ADR	38.50	-21.70	0	41.52	54.00	-12.48	-	-	-	-	51.00	186	H
			16.515	33.40	PK-U	42.00	-19.60	0	55.80	-	-	-	-	68.20	-12.40	310.00	272	H
			* 11.00019	35.38	PK-U	38.50	-21.70	0	52.18	-	-	74.00	-21.82	-	-	137	100	V
			* 11.00083	23.65	ADR	38.50	-21.70	0	40.45	54.00	-13.55	-	-	-	-	137	100	V
			16.516	33.75	PK-U	42.00	-19.60	0	56.15	-	-	-	-	68.20	-12.05	51	110	V
	5580	MIMO	* 11.1599	34.89	PK-U	38.60	-21.80	0	51.69	-	-	74.00	-22.31	-	-	55	100	H
			* 11.16	24.26	ADR	38.60	-21.80	0	41.06	54.00	-12.94	-	-	-	-	55	100	H
			16.743	31.75	PK-U	42.30	-19.10	0	54.95	-	-	-	-	68.20	-13.25	307	289	H
			* 11.15876	34.57	PK-U	38.60	-21.80	0	51.37	-	-	74.00	-22.63	-	-	54	218	V
			* 11.1598	22.96	ADR	38.60	-21.80	0	39.76	54.00	-14.24	-	-	-	-	54	218	V
			16.748	31.73	PK-U	42.30	-19.10	0	54.93	-	-	-	-	68.20	-13.27	54	100	V
	5700	MIMO	* 11.39962	33.78	PK-U	38.60	-21.70	0	50.68	-	-	74.00	-23.32	-	-	305	103	H
			* 11.40032	23.51	ADR	38.60	-21.70	0	40.41	54.00	-13.59	-	-	-	-	305	103	H
			17.097	32.87	PK-U	42.30	-18.40	0	56.77	-	-	-	-	68.20	-11.43	126	273	H
			* 11.40001	35.55	PK-U	38.60	-21.70	0	52.45	-	-	74.00	-21.55	-	-	55	324	V
			* 11.40011	24.50	ADR	38.60	-21.70	0	41.40	54.00	-12.60	-	-	-	-	55	324	V
			17.100	32.56	PK-U	42.30	-18.50	0	56.36	-	-	-	-	68.20	-11.84	25	146	V
	5720	MIMO	* 11.44027	34.16	PK-U	38.60	-21.80	0	50.96	-	-	74.00	-23.04	-	-	306	100	H
			* 11.44003	23.36	ADR	38.60	-21.80	0	40.16	54.00	-13.84	-	-	-	-	306	100	H
			17.162	32.57	PK-U	42.20	-18.30	0	56.47	-	-	-	-	68.20	-11.73	235	221	H
			* 11.43952	38.74	PK-U	38.60	-21.70	0	55.64	-	-	74.00	**-18.36**	-	-	187	118	V
			* 11.44102	25.81	ADR	38.60	-21.80	0	42.61	54.00	**-11.39**	-	-	-	-	187	118	V
			17.165	32.33	PK-U	42.20	-18.30	0	56.23	-	-	-	-	68.20	-11.97	80	113	V
802.11n(HT20)	5500	MIMO	* 11.00015	35.23	PK-U	38.50	-21.70	0	52.03	-	-	74.00	-21.97	-	-	53	184	H
			* 11.00004	24.51	ADR	38.50	-21.70	0	41.31	54.00	-12.69	-	-	-	-	53	184	H
			16.500	33.51	PK-U	42.00	-19.60	0	55.91	-	-	-	-	68.20	-12.29	340	140	H
			* 10.99858	37.44	PK-U	38.50	-21.60	0	54.34	-	-	74.00	-19.66	-	-	157	217	V
			* 11.00061	24.76	ADR	38.50	-21.70	0	41.56	54.00	-12.44	-	-	-	-	157	217	V
			16.497	34.17	PK-U	42.00	-19.70	0	56.47	-	-	-	-	68.20	-11.73	1	361	V
	5580	MIMO	* 11.1601	34.23	PK-U	38.60	-21.80	0	51.03	-	-	74.00	-22.97	-	-	51	100	H
			* 11.15998	23.73	ADR	38.60	-21.80	0	40.53	54.00	-13.47	-	-	-	-	51	100	H
			16.744	31.60	PK-U	42.30	-19.10	0	54.80	-	-	-	-	68.20	-13.40	88	364	H
			* 11.15935	34.11	PK-U	38.60	-21.80	0	50.91	-	-	74.00	-23.09	-	-	50	214	V
			* 11.16014	23.05	ADR	38.60	-21.80	0	39.85	54.00	-14.15	-	-	-	-	50	214	V
			16.748	32.01	PK-U	42.30	-19.10	0	55.21	-	-	-	-	68.20	-12.99	330	178	V
	5700	MIMO	* 11.40035	33.58	PK-U	38.60	-21.70	0	50.48	-	-	74.00	-23.52	-	-	307	100	H
			* 11.4001	23.42	ADR	38.60	-21.70	0	40.32	54.00	-13.68	-	-	-	-	307	100	H
			17.099	33.07	PK-U	42.30	-18.50	0	56.87	-	-	-	-	68.20	-11.33	65	325	H
			* 11.40026	34.81	PK-U	38.60	-21.70	0	51.71	-	-	74.00	-22.29	-	-	50	324	V
			* 11.40035	24.21	ADR	38.60	-21.70	0	41.11	54.00	-12.89	-	-	-	-	50	324	V
			17.101	33.03	PK-U	42.30	-18.50	0	56.83	-	-	-	-	68.20	-11.37	360	371	V
	5720	MIMO	* 11.44031	33.56	PK-U	38.60	-21.80	0	50.36	-	-	74.00	-23.64	-	-	310	100	H
			* 11.44015	22.71	ADR	38.60	-21.80	0	39.51	54.00	-14.49	-	-	-	-	310	100	H
			17.162	32.99	PK-U	42.20	-18.30	0	56.89	-	-	-	-	68.20	**-11.31**	201	157	H
			* 11.44012	24.07	ADR	38.60	-21.80	0	40.87	54.00	-13.13	-	-	-	-	349	381	V
			* 11.44011	34.02	PK-U	38.60	-21.80	0	50.82	-	-	74.00	-23.18	-	-	349	381	V
			17.168	32.78	PK-U	42.20	-18.30	0	56.68	-	-	-	-	68.20	-11.52	100	101	V

Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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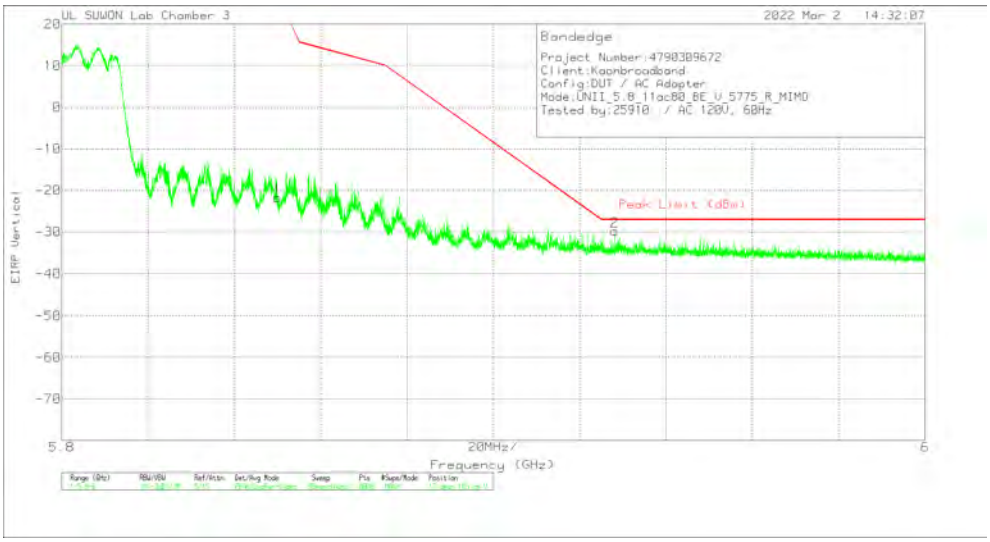
11.4. TX ABOVE 1GHz IN THE 5.8 GHz BAND

BANDEDGE (WORST CASE: 802.11ac VHT80 / MIMO / 5775 MHz)

HORIZONTAL PEAK DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_0021895 7	10dB_ATT[dB]	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85001	-49.71	Pk	35.9	-19.8	11.8	-21.81	26.99	-48.8	17	183	V
2	5.92809	-57.72	Pk	36	-19.8	11.8	-29.72	-27	-2.72	17	183	V

Pk - Peak detector

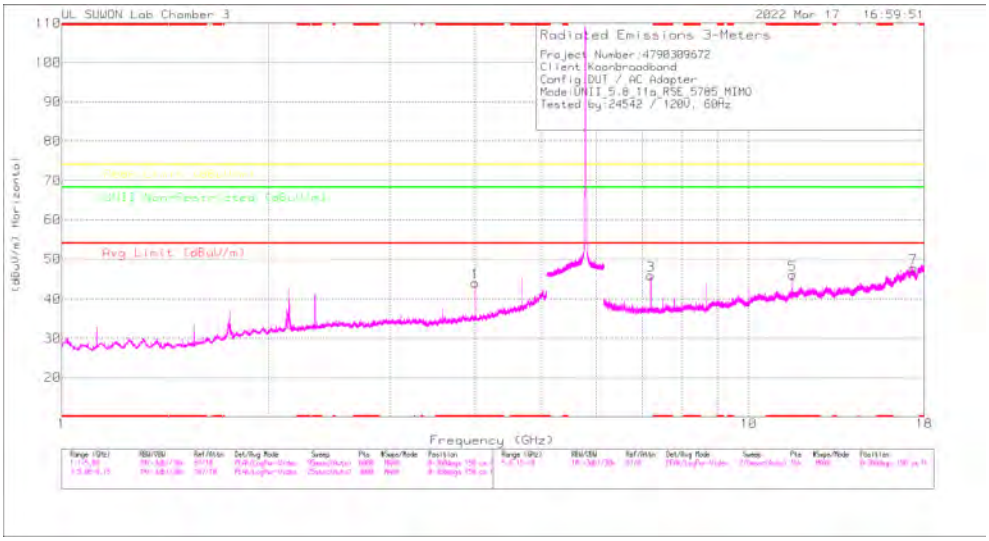
BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBm]	Detector Mode	ANT Factor	Loss [dB]	Conv. F [dB]	DC Corr [dB]	Result [dBm]	PK Limit [dBm]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5745	MIMO	5.64044	-63.13	Pk	35.50	-20.30	0.00	12	-36.13	-27.00	-9.13	132	191	H
			5.72500	-53.31	Pk	35.60	-20.00	0.00	12	-25.91	27.00	-52.91	132	191	H
			5.64957	-61.81	Pk	35.50	-20.20	0.00	12	-34.71	-27.00	-7.71	3	152	V
			5.72500	-38.60	Pk	35.60	-20.00	0.00	12	-11.20	27.00	-38.20	3	152	V
	5825	MIMO	5.85001	-51.20	Pk	35.90	-19.80	0.00	12	-23.30	26.99	-50.29	151	336	H
			5.93979	-62.35	Pk	36.00	-19.70	0.00	12	-34.25	-27.00	-7.25	151	336	H
			5.85001	-51.25	Pk	35.90	-19.80	0.00	12	-23.35	26.99	-50.34	22	152	V
			5.92617	-62.17	Pk	36.00	-19.80	0.00	12	-34.17	-27.00	-7.17	22	152	V
802.11n(HT20)	5745	MIMO	5.64954	-62.07	Pk	35.50	-20.20	0.00	12	-34.97	-27.00	-7.97	165	242	H
			5.72500	-44.28	Pk	35.60	-20.00	0.00	12	-16.88	27.00	-43.88	165	242	H
			5.65013	-61.21	Pk	35.50	-20.20	0.00	12	-34.11	-26.91	-7.20	6	152	V
			5.72500	-43.43	Pk	35.60	-20.00	0.00	12	-16.03	27.00	-43.03	6	152	V
	5825	MIMO	5.85001	-50.90	Pk	35.90	-19.80	0.00	12	-23.00	26.99	-49.99	152	258	H
			5.92764	-62.88	Pk	36.00	-19.80	0.00	12	-34.88	-27.00	-7.88	152	258	H
			5.85001	-48.36	Pk	35.90	-19.80	0.00	12	-20.46	26.99	-47.45	19	155	V
			5.93509	-61.06	Pk	36.00	-19.80	0.00	12	-33.06	-27.00	-6.06	19	155	V
802.11n(HT40)	5755	MIMO	5.64913	-60.84	Pk	35.50	-20.20	0.00	12	-33.74	-27.00	-6.74	163	254	H
			5.72500	-43.18	Pk	35.60	-20.00	0.00	12	-15.78	27.00	-42.78	163	254	H
			5.64384	-59.98	Pk	35.50	-20.30	0.00	12	-32.98	-27.00	-5.98	6	164	V
			5.72500	-40.72	Pk	35.60	-20.00	0.00	12	-13.32	27.00	-40.32	6	164	V
	5795	MIMO	5.85001	-54.69	Pk	35.90	-19.80	0.00	12	-26.79	26.99	-53.78	163	250	H
			5.93077	-61.88	Pk	36.00	-19.80	0.00	12	-33.88	-27.00	-6.88	163	250	H
			5.85001	-54.50	Pk	35.90	-19.80	0.00	12	-26.60	26.99	-53.59	18	185	V
			5.95739	-61.37	Pk	36.00	-19.70	0.00	12	-33.27	-27.00	-6.27	18	185	V
802.11ac(VHT80)	5775 (Fornt)	MIMO	5.65169	-56.66	Pk	35.50	-20.30	0.00	12	-29.66	-25.75	-3.91	171	253	H
			5.72500	-47.02	Pk	35.60	-20.00	0.00	12	-19.62	27.00	-46.62	171	253	H
			5.64652	-58.39	Pk	35.50	-20.30	0.00	12	-31.39	-27.00	-4.39	6	164	V
			5.72500	-47.80	Pk	35.60	-20.00	0.00	12	-20.40	27.00	-47.40	6	164	V
	5775 (Rear)	MIMO	5.85001	-52.32	Pk	35.90	-19.80	0.00	12	-24.42	26.99	-51.41	163	249	H
			5.93292	-60.87	Pk	36.00	-19.80	0.00	12	-32.87	-27.00	-5.87	163	249	H
			5.85001	-49.71	Pk	35.90	-19.80	0.00	12	-21.81	26.99	-48.80	17	183	V
			5.92809	-57.72	Pk	36.00	-19.80	0.00	12	-29.72	-27.00	**-2.72**	17	183	V

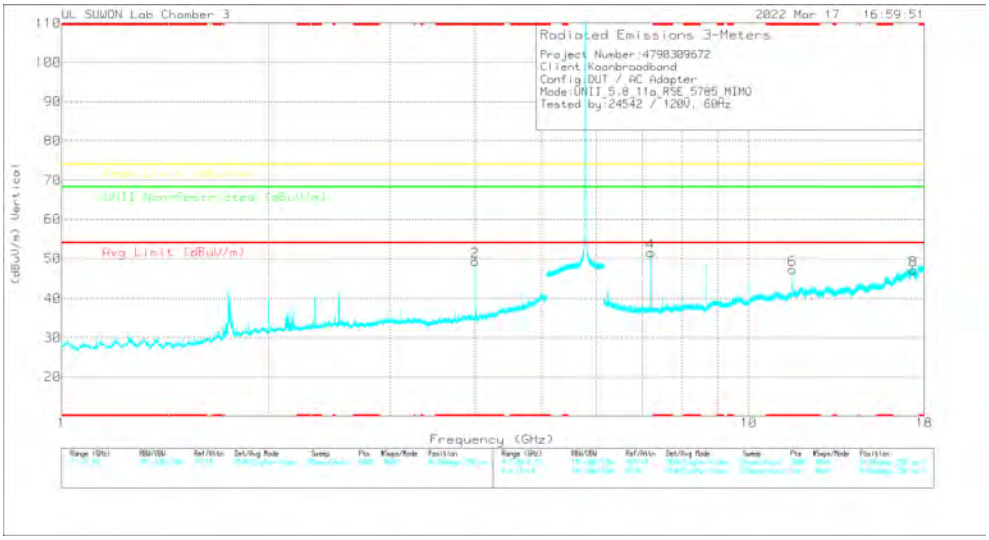
Note. Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / MIMO / 5785 MHz)

5785 MHz HORIZONTAL



5785 MHz VERTICAL



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

5785 MHz DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.00003	48.75	PK-U	33.9	-32.1	50.55	-	-	74	-23.45	-	-	305	100	H
* 4.00008	43.68	ADR	33.9	-32.1	45.48	54	-8.52	-	-	-	-	305	100	H
7.20011	39.36	PK-U	36.1	-25.8	49.66	-	-	-	-	68.2	-18.54	339	108	H
* 11.57583	46.4	PK-U	38.8	-21.9	63.3	-	-	74	-10.7	-	-	204	101	H
* 11.57602	33.13	ADR	38.8	-21.9	50.03	54	-3.97	-	-	-	-	204	101	H
17.3582	34.66	PK-U	42	-17.8	58.86	-	-	-	-	68.2	-9.34	211	219	H
* 4.00007	52.09	PK-U	33.9	-32.1	53.89	-	-	74	-20.11	-	-	9	107	V
* 3.99992	49.04	ADR	33.9	-32.1	50.84	54	-3.16	-	-	-	-	9	107	V
7.19998	43.18	PK-U	36.1	-25.8	53.48	-	-	-	-	68.2	-14.72	17	106	V
* 11.56888	47.33	PK-U	38.8	-21.9	64.23	-	-	74	-9.77	-	-	188	116	V
* 11.57122	35.58	ADR	38.8	-21.9	52.48	54	-1.52	-	-	-	-	188	116	V
17.36253	33.65	PK-U	42	-17.7	57.95	-	-	-	-	68.2	-10.25	8	117	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

Note: In the above emissions, frequencies other than harmonic are local oscillator generated during product operation regardless of RF transmission and were measured only in worst mode.

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5745	MIMO	* 11.48883	44.25	PK-U	38.70	-21.70	0	61.25	-	-	74.00	-12.75	-	-	245	100	H
			* 11.49065	31.79	ADR	38.70	-21.70	0	48.79	54.00	-5.21	-	-	-	-	245	100	H
			17.231	34.62	PK-U	42.10	-17.70	0	59.02	-	-	-	-	68.20	**-9.18**	271	289	H
			* 11.49718	45.01	PK-U	38.70	-21.70	0	62.01	-	-	74.00	-11.99	-	-	147	209	V
			* 11.49209	31.80	ADR	38.70	-21.70	0	48.80	54.00	-5.20	-	-	-	-	147	209	V
			17.236	33.51	PK-U	42.10	-17.70	0	57.91	-	-	-	-	68.20	-10.29	360	194	V
	5785	MIMO	* 11.57583	46.40	PK-U	38.80	-21.90	0	63.30	-	-	74.00	-10.70	-	-	204	101	H
			* 11.57602	33.13	ADR	38.80	-21.90	0	50.03	54.00	-3.97	-	-	-	-	204	101	H
			17.358	34.66	PK-U	42.00	-17.80	0	58.86	-	-	-	-	68.20	-9.34	211	219	H
			* 11.56888	47.33	PK-U	38.80	-21.90	0	64.23	-	-	74.00	-9.77	-	-	188	116	V
			* 11.57122	35.58	ADR	38.80	-21.90	0	52.48	54.00	**-1.52**	-	-	-	-	188	116	V
			17.363	33.65	PK-U	42.00	-17.70	0	57.95	-	-	-	-	68.20	-10.25	8	117	V
	5825	MIMO	* 11.65674	45.39	PK-U	38.90	-21.70	0	62.59	-	-	74.00	-11.41	-	-	204	101	H
			* 11.65533	32.76	ADR	38.90	-21.70	0	49.96	54.00	-4.04	-	-	-	-	204	101	H
			17.480	31.93	PK-U	42.00	-17.50	0	56.43	-	-	-	-	68.20	-11.77	112	106	H
			* 11.65159	47.14	PK-U	38.90	-21.70	0	64.34	-	-	74.00	-9.66	-	-	180	316	V
			* 11.65039	35.11	ADR	38.90	-21.70	0	52.31	54.00	-1.69	-	-	-	-	180	316	V
			17.478	31.51	PK-U	42.00	-17.40	0	56.11	-	-	-	-	68.20	-12.09	3	206	V
802.11n(HT20)	5745	MIMO	* 11.49036	41.46	PK-U	38.70	-21.70	0	58.46	-	-	74.00	-15.54	-	-	241	112	H
			* 11.49062	28.17	ADR	38.70	-21.70	0	45.17	54.00	-8.83	-	-	-	-	241	112	H
			17.235	34.35	PK-U	42.10	-17.70	0	58.75	-	-	-	-	68.20	-9.45	113	101	H
			* 11.49514	45.70	PK-U	38.70	-21.70	0	62.70	-	-	74.00	-11.30	-	-	184	121	V
			* 11.49038	33.37	ADR	38.70	-21.70	0	50.37	54.00	-3.63	-	-	-	-	184	121	V
			17.239	34.32	PK-U	42.10	-17.60	0	58.82	-	-	-	-	68.20	-9.38	19	190	V
	5785	MIMO	* 11.57013	45.56	PK-U	38.80	-21.90	0	62.46	-	-	74.00	-11.54	-	-	205	101	H
			* 11.56837	32.55	ADR	38.80	-21.90	0	49.45	54.00	-4.55	-	-	-	-	205	101	H
			17.358	34.48	PK-U	42.00	-17.80	0	58.68	-	-	-	-	68.20	-9.52	271	180	H
			* 11.57015	46.71	PK-U	38.80	-21.90	0	63.61	-	-	74.00	-10.39	-	-	188	305	V
			* 11.57044	33.45	ADR	38.80	-21.90	0	50.35	54.00	-3.65	-	-	-	-	188	305	V
			17.358	33.97	PK-U	42.00	-17.80	0	58.17	-	-	-	-	68.20	-10.03	18	188	V
	5825	MIMO	* 11.65314	47.15	PK-U	38.90	-21.70	0	64.35	-	-	74.00	**-9.65**	-	-	202	110	H
			* 11.65062	35.25	ADR	38.90	-21.70	0	52.45	54.00	-1.55	-	-	-	-	202	110	H
			17.476	32.88	PK-U	42.00	-17.40	0	57.48	-	-	-	-	68.20	-10.72	254	250	H
			* 11.65533	45.74	PK-U	38.90	-21.70	0	62.94	-	-	74.00	-11.06	-	-	171	248	V
			* 11.65032	33.94	ADR	38.90	-21.70	0	51.14	54.00	-2.86	-	-	-	-	171	248	V
			17.476	31.95	PK-U	42.00	-17.40	0	56.55	-	-	-	-	68.20	-11.65	357	361	V

Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

11.5. Spurious Emissions for Simultaneous Transmission

11.5.1. Worst test case RSDB condition

Case 1 (2.4GHz WLAN SISO & 5GHz WLAN MIMO)

Case 1	2.4 GHz WLAN Antenna ANT2	5GHz WLAN Antenna ALL
Mode	802.11b	802.11a
Channel	11	157
Frequency[MHz]	2462	5785
Data Rate	1Mbps	6Mbps

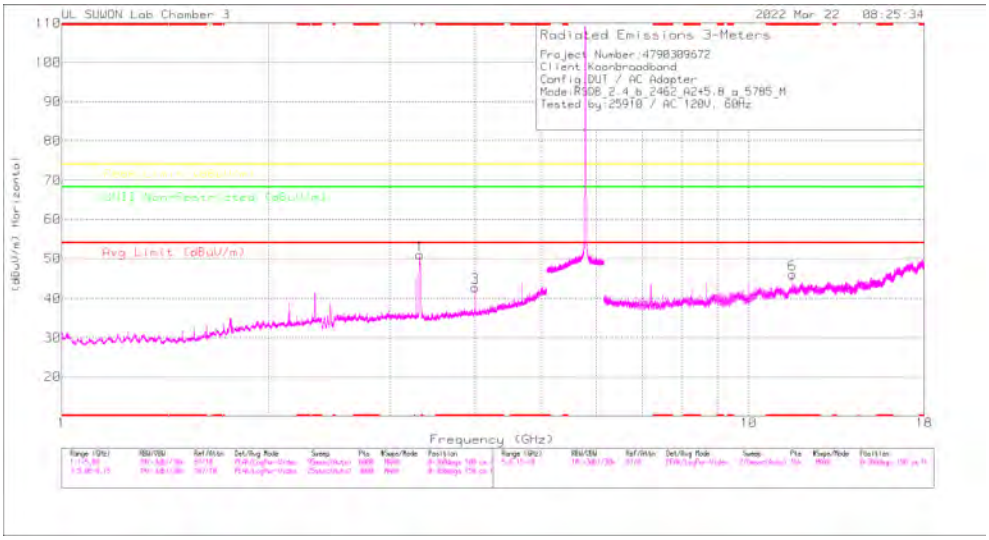
Case 2 (2.4GHz WLAN MIMO & 5GHz WLAN MIMO)

Case 1	2.4 GHz WLAN Antenna ALL	5GHz WLAN Antenna ALL
Mode	802.11b	802.11a
Channel	1	157
Frequency[MHz]	2412	5785
Data Rate	1Mbps	6Mbps

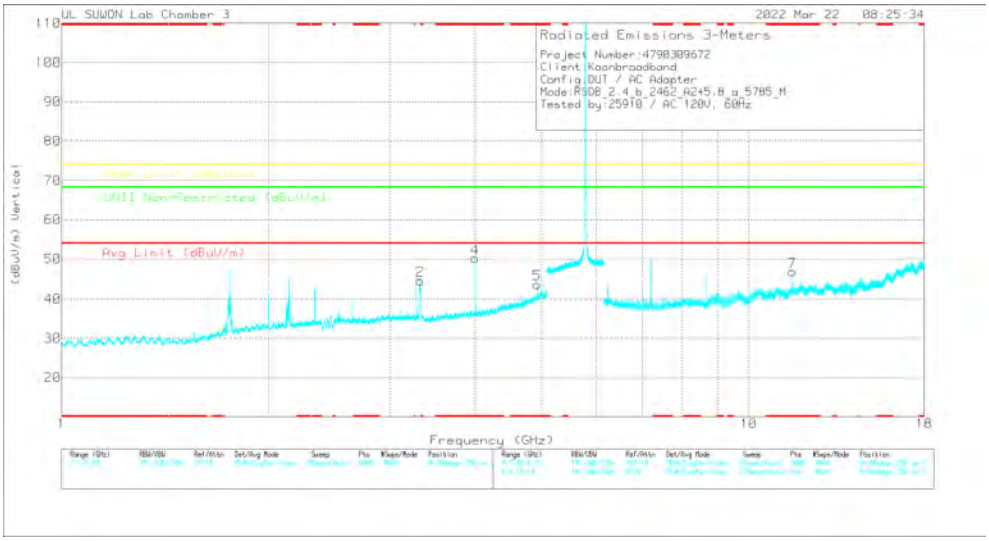
NOTE
The lowest margin condition among the channels and modes were selected for test.
Low, mid, and high channels of 2.4GH WLAN were tested, and the worst case configuration & data were listed in the test report.

HARMONICS AND SPURIOUS EMISSIONS (Case 1)

HORIZONTAL



VERTICAL



Note 1: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.
Note 2: The fundamental of 2.4GHz WLAN was attenuated by a band reject filter.

DATA

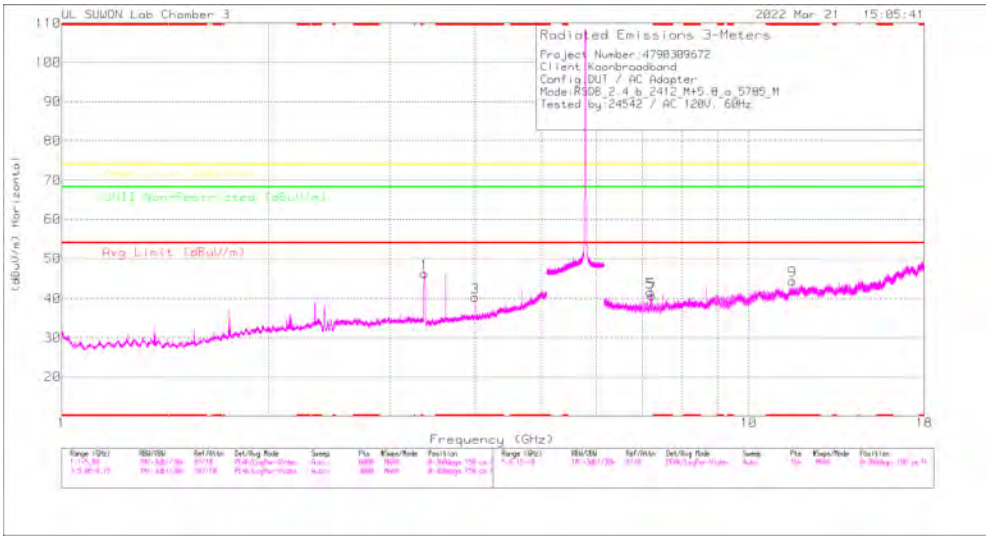
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.3172	59.77	PK-U	33.4	-32.8	60.37	-	-	-	-	68.2	-7.83	135	119	H
* 3.99995	48.89	PK-U	33.9	-31.9	50.89	-	-	74	-23.11	-	-	307	100	H
* 4.00007	43.18	ADR	33.9	-31.9	45.18	54	-8.82	-	-	-	-	307	100	H
* 11.57564	26.44	ADR	38.8	-21.6	43.64	54	-10.36	-	-	-	-	202	115	H
* 11.57753	40.33	PK-U	38.8	-21.7	57.43	-	-	74	-16.57	-	-	202	115	H
3.31786	51.69	PK-U	33.4	-32.8	52.29	-	-	-	-	68.2	-15.91	204	105	V
* 3.99999	51.82	PK-U	33.9	-31.9	53.82	-	-	74	-20.18	-	-	15	101	V
* 3.99999	48.49	ADR	33.9	-31.9	50.49	54	-3.51	-	-	-	-	15	101	V
* 4.92392	44.54	PK-U	34.7	-29.5	49.74	-	-	74	-24.26	-	-	6	158	V
* 4.92422	33.37	ADR	34.7	-29.5	38.57	54	-15.43	-	-	-	-	6	158	V
* 11.5723	39.94	PK-U	38.8	-21.6	57.14	-	-	74	-16.86	-	-	184	296	V
* 11.57416	25.88	ADR	38.8	-21.6	43.08	54	-10.92	-	-	-	-	184	296	V

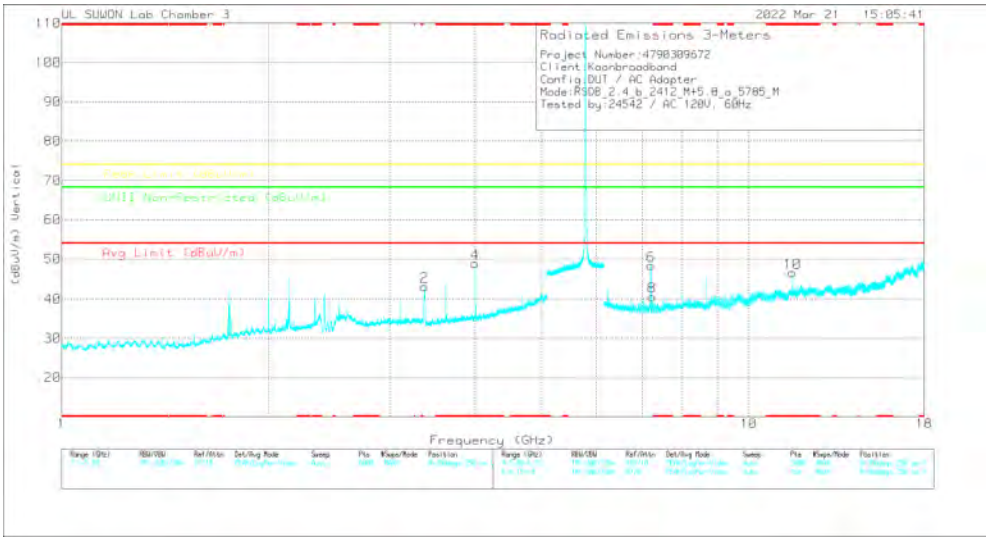
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

HARMONICS AND SPURIOUS EMISSIONS (Case 2)

HORIZONTAL



VERTICAL



Note 1: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.
Note 2: The fundamental of 2.4GHz WLAN was attenuated by a band reject filter.

DATA

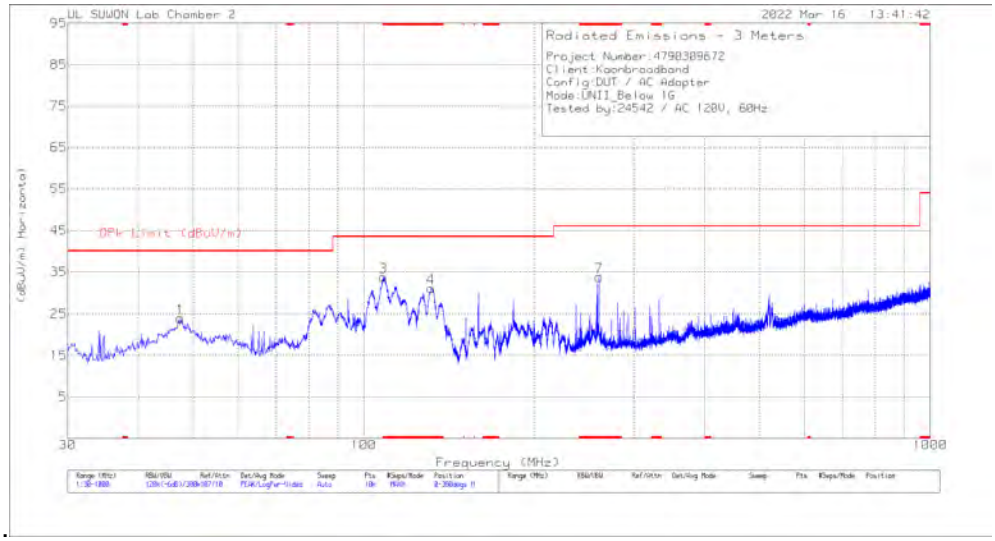
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	5GHz_LP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.36764	57.02	PK-U	33.2	-33	57.22	-	-	-	-	68.2	-10.98	133	314	H
* 4.00003	48.39	PK-U	33.9	-31.9	50.39	-	-	74	-23.61	-	-	306	100	H
* 4.00018	42.86	ADR	33.9	-31.9	44.86	54	-9.14	-	-	-	-	306	100	H
7.20048	38.54	PK-U	36.1	-25.2	49.44	-	-	-	-	68.2	-18.76	340	101	H
7.23614	39.1	PK-U	36	-24.9	50.2	-	-	-	-	68.2	-18	5	104	H
* 11.57728	40.07	PK-U	38.8	-21.7	57.17	-	-	74	-16.83	-	-	200	100	H
* 11.57576	25.96	ADR	38.8	-21.6	43.16	54	-10.84	-	-	-	-	200	100	H
7.20026	41.39	PK-U	36.1	-25.2	52.29	-	-	-	-	68.2	-15.91	17	289	V
7.23634	38.88	PK-U	36	-24.9	49.98	-	-	-	-	68.2	-18.22	14	143	V
* 11.57205	40.79	PK-U	38.8	-21.6	57.99	-	-	74	-16.01	-	-	182	282	V
* 11.57555	26.8	ADR	38.8	-21.6	44	54	-10	-	-	-	-	182	282	V

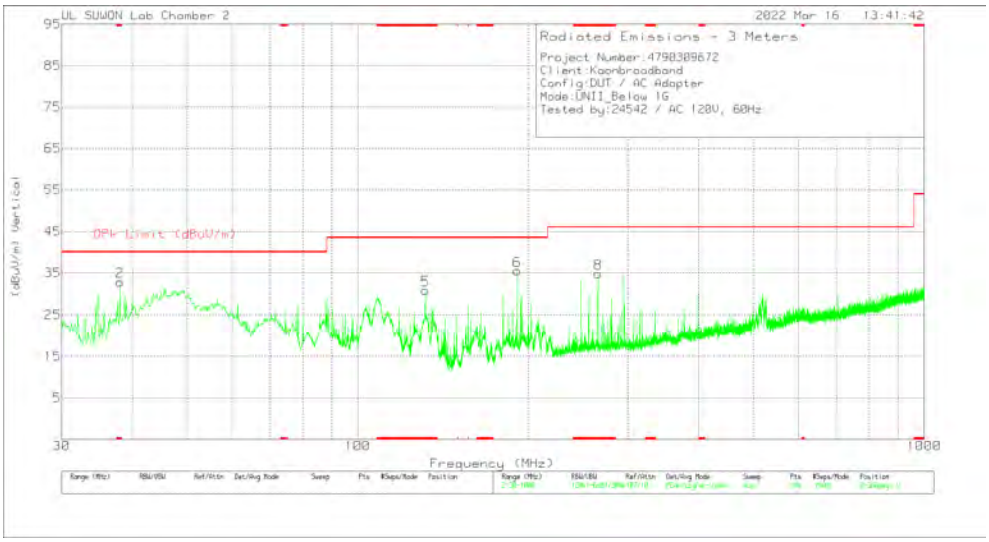
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

12. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (802.11n HT40 MIMO 5755 MHz, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (802.11n HT40 MIMO 5755 MHz, VERTICAL)



Below 1G Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	47.46	35.88	Pk	19.8	-31.7	23.98	40	-16.02	0-360	100	H
3	* 108.182	47.79	Pk	17.3	-31.3	33.79	43.52	-9.73	0-360	200	H
5	* 131.462	48.36	Pk	14.1	-31.2	31.26	43.52	-12.26	0-360	100	H
2	* 260.084	45.69	Pk	18.5	-30.4	33.79	46.02	-12.23	0-360	100	H
2	* 38.051	46.79	Pk	17.9	-31.8	32.89	40	-7.11	0-360	100	V
4	* 131.559	48.1	Pk	14.1	-31.2	31	43.52	-12.52	0-360	100	V
6	191.117	49.64	Pk	16.6	-30.7	35.54	43.52	-7.98	0-360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

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13. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

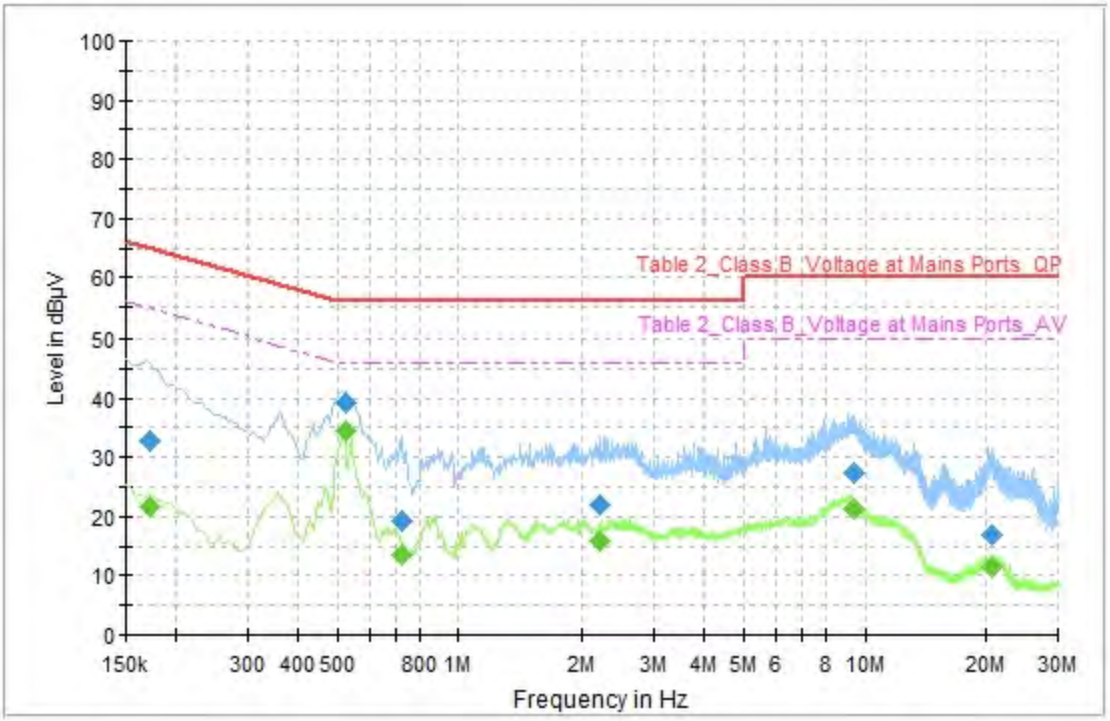
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

WORST EMISSIONS

LINE 1 DATA



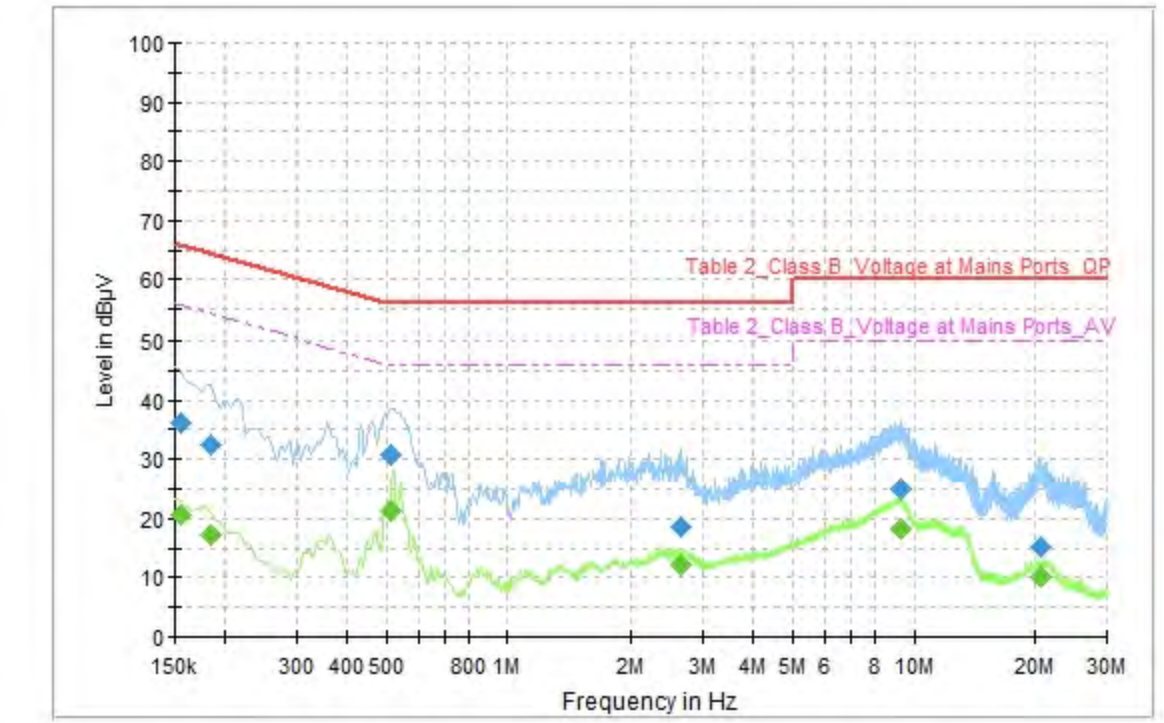
Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.171949	32.93	64.87	31.93	L1	ON	10.0
0.523125	39.15	56.00	16.85	L1	ON	9.9
0.720662	19.41	56.00	36.59	L1	ON	9.8
2.204382	22.10	56.00	33.90	L1	ON	9.7
9.363993	27.29	60.00	32.71	L1	ON	9.7
20.557743	16.97	60.00	43.03	L1	ON	9.8

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.171949	21.56	54.87	33.30	L1	ON	10.0
0.523125	34.49	46.00	11.51	L1	ON	9.9
0.720662	13.47	46.00	32.53	L1	ON	9.8
2.204382	15.93	46.00	30.07	L1	ON	9.7
9.363993	21.41	50.00	28.59	L1	ON	9.7
20.557743	11.54	50.00	38.46	L1	ON	9.8

LINE 2 DATA



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	36.02	65.76	29.74	N	ON	9.8
0.185118	32.46	64.25	31.79	N	ON	9.9
0.514346	30.73	56.00	25.27	N	ON	9.9
2.660912	18.45	56.00	37.55	N	ON	9.7
9.254250	25.16	60.00	34.84	N	ON	9.7
20.509456	15.21	60.00	44.79	N	ON	9.8

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154390	20.51	55.76	35.26	N	ON	9.8
0.185118	17.17	54.25	37.08	N	ON	9.9
0.514346	21.34	46.00	24.66	N	ON	9.9
2.660912	12.05	46.00	33.95	N	ON	9.7
9.254250	18.21	50.00	31.79	N	ON	9.7
20.509456	10.09	50.00	39.91	N	ON	9.8

END OF TEST REPORT

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