CERTIFICATION TEST REPORT

Report Number. : 4789901731-FR2V2

Applicant	:	Kaonbroadband CO., LTD. 884-3, Seongnam-daero, Bundang-gu, Seongnam-si Gyeonggi-do, South Korea
Model	:	AR1344P, AR1344, AR1344E, EVO6700AP
FCC ID	:	2AXCW-AP6700
EUT Description	:	Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
August 11, 2021

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

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	07/28/21	Initial issue	Robby Lee
V2	08/11/21	Updated to address about the TCB's comments	Robby Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Kaonbroadband CO., LTD.
EUT DESCRIPTION:	Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax
MODEL NUMBER:	AR1344P, AR1344, AR1344E, EVO6700AP
SERIAL NUMBER:	Proto type (CONDUCTED) Proto type (RADIATED);
DATE TESTED:	MAY 03, 2021 – JULY 28, 2021 & AUG. 11, 2021;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

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:

Anthony Kim
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Robby Lee
Suwon Lab Engineer
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 558074 D01 DTS Meas Guidance v05r02.
4. KDB 662911 D01 Multiple Transmitter Output 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)

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

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	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 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 Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax.
This test report addresses the DTS (WLAN ax) operational mode.

This report covers the models AR1344P and AR1344, AR1344E, EVO6700AP
The difference between these models is only the momory size.

Model	Memory size
AR1344P, EVO6700AP	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	Antenna 1	Antenna 2
2.4GHz (2412 MHz ~ 2462 MHz)	802.11ax(HE20) MIMO / SU	TX/RX	TX/RX
	802.11ax(HE40) MIMO / SU	TX/RX	TX/RX
	802.11ax(HE20) MIMO / RU mode (OFDMA)	TX/RX	TX/RX
	802.11ax(HE40) MIMO / RU mode (OFDMA)	TX/RX	TX/RX

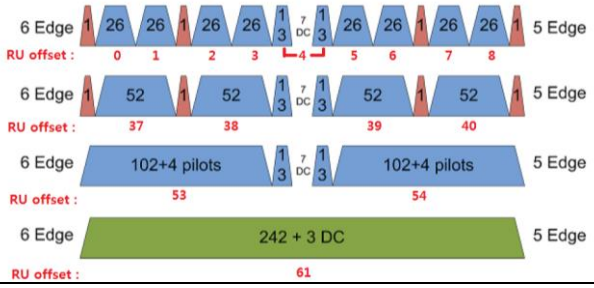
Note: The EUT does supported only MIMO(SDM).

Simultaneous TX Condition

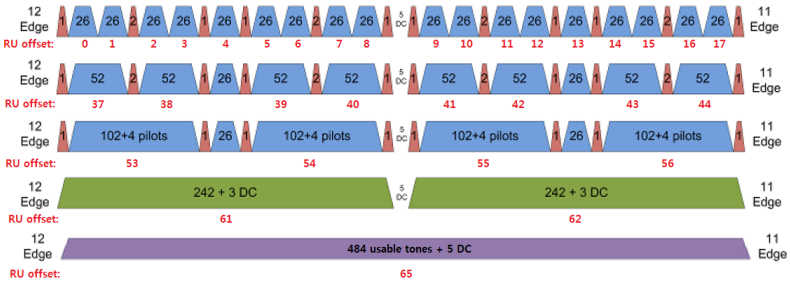
Simultaneous Tx Condition - RSDB

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

802.11ax RU allocations



HE20



HE40

Test RU offset for tones

Mode	Tones number in RU	RU offset
HE20	26T	0
		4
		8
	52T	37
		38
		40
	106T	53
		54
	242T / SU Note 1	61 / -
HE40	26T	0
		9
		17
	52T	37
		41
		44
	106T	53
		54
		56
	242T	61
		62
	484T / SU Note 1	63 / -

Note 1: Full RU(Resource Unit) 242T(HE20) & 484T(HE40) mode and SU(Single User) mode have no difference in physical waveform. This report has been reported the SU mode with highest output power in SISO and the SU mode with highest output power in MIMO.

5.2. 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]	
		ANT1	ANT2	ANT1	ANT2
2412 - 2462	802.11ax(HE20) MIMO	22.56		180.30	
	802.11ax(HE40) MIMO	21.66		146.55	

5.3. 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 an internal antennas, with ANT 1 & 2's maximum gain of 1.88 dBi.

The EUT uses ANT 1 and 2 as the same antenna.

5.4. LIST OF TEST REDUCTION AND MODES

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

Frequency Range [MHz]	Mode	Coverd by
2412 - 2462	802.11ax HE20 RU 242T mode 2TX	802.11ax HE20 SU mode 2TX
	802.11ax HE40 RU 484T mode 2TX	802.11ax HE40 SU mode 2TX

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5.5. TESTED CHANNELS LIST

Ch.	Frequency [MHz]	802.11ax(HE20)	802.11ax(HE40)
1	2412	O	-
2	2417	O	-
3	2422	-	O
6	2437	O	O
9	2452	-	O
10	2457	O	-
11	2462	O	-

5.6. 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.

The EUT is used on the X axis as a fixed device.; therefore, all radiated testing was performed with the EUT in X orientation.

Worst-case selection criteria for test items :

- For the radiated band-edge test, the test data for RU was only reported in this test report because SU mode is same or lower than n mode. And the PSD of 26RU is highest across all RU tones.

- For the spurious emissions, it was tested at the bandwidth/RU allocation with actual highest power and bandwidth/RU allocation with actual highest PSD for each bandwidth.
  (The test data for RU was only reported in this test report because SU mode is same or lower than n mode. And the PSD of 26RU is highest across all RU tones)

- For the 6dB Bandwidth, it was tested at the RU allocation with lowest tones number for each bandwidth.

Based on the baseline scan, the worst-case data rates were:
802.11ax HE20 mode: MCS0 (2TX / SDM)
802.11ax HE40 mode: MCS0 (2TX / SDM)

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacture**	**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 DTS mode.

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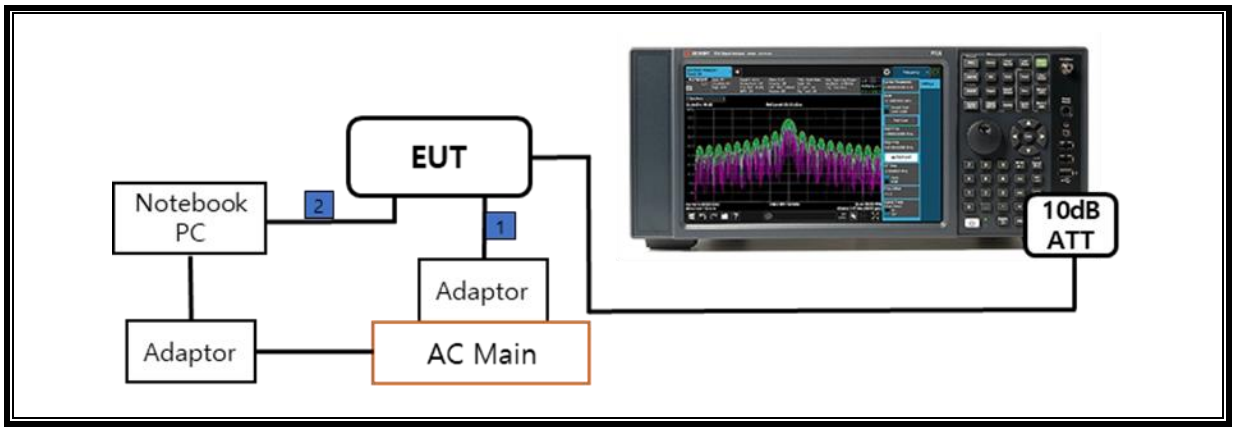
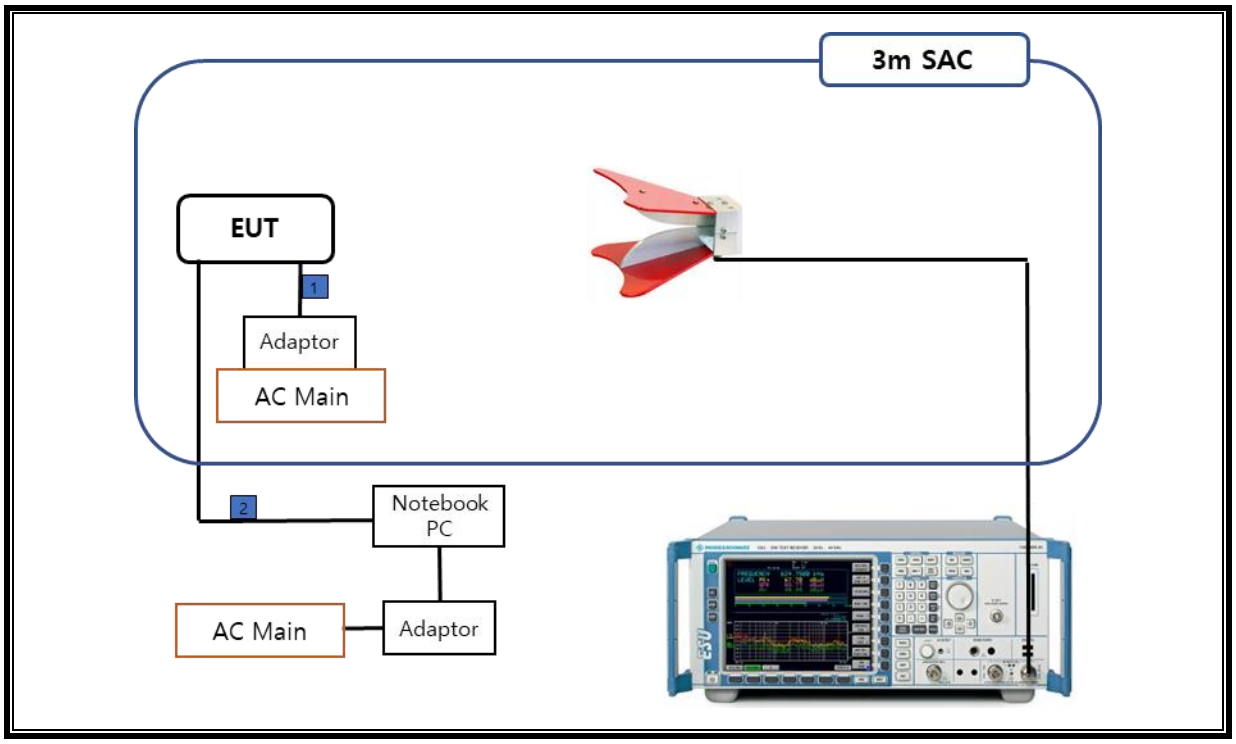
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



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, 40 GHz	ETS	3116C	00166155	2022-08-04
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2021-10-02
Preamplifier	ETS	3116C-PA	00168841	2021-08-06
Preamplifier, 1000 MHz	Sonoma	310N	341282	2021-08-03
Preamplifier, 1000 MHz	Sonoma	310N	351741	2021-08-03
Preamplifier, 1000 MHz	Sonoma	310N	370599	2021-08-06
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2021-08-04
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2021-09-15
* Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2022-01-13
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143652	2022-01-13
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	2021-08-06
Average Power Sensor	Agilent / HP	U2000	MY54270007	2021-08-05
Power Sensor	R&S	NRP-Z91	102681	2021-08-05
Attenuator	PASTERNACK	PE7087-10	A001	2021-08-03
Attenuator	PASTERNACK	PE7087-10	A008	2021-08-03
Attenuator	PASTERNACK	PE7004-10	2	2021-08-04
Attenuator	PASTERNACK	PE7087-10	A009	2021-08-03
* Attenuator	WEINSCHEL	54A-10	74560	2021-08-07 2022-08-04
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2021-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2021-08-03
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2021-08-03
EMI Test Receive, 3 GHz	R&S	ESR3	102592	2021-08-06
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2021-08-03
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2021-08-03
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2021-08-04
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2021-08-03
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2021-08-03
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2021-08-04
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2021-08-03
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2021-08-03
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2021-08-04
LISN	R&S	ENV-216	101837	2021-08-06
LISN	R&S	ENV216	102478	2021-08-07
OPEN SWITCH AND CONTROL	R&S	OSP220	101437	N/A
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2021-10-02
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	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

Note: On August 11, only equipment marked with an asterisk(*) was used.

7. REFERENCE MEASUREMENT RESULTS

7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

None; for reporting purposes only.

Mode	ANT	Tone	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11ax HE20	ALL	26T	3.082	3.115	0.99	98.94	0	0.324
		52T	2.944	2.977	0.99	98.89	0	0.340
		106T	2.863	2.897	0.99	98.83	0	0.349
		242T	2.816	2.848	0.99	98.88	0	0.355
		SU	3.027	3.058	0.99	98.99	0	0.330
802.11ax HE40	ALL	26T	3.091	3.123	0.99	98.98	0	0.324
		52T	2.945	2.977	0.99	98.93	0	0.340
		106T	2.863	2.896	0.99	98.86	0	0.349
		242T	2.816	2.849	0.99	98.84	0	0.355
		484T	2.802	2.834	0.99	98.87	0	0.357
		SU	2.400	2.431	0.99	98.72	0	0.417

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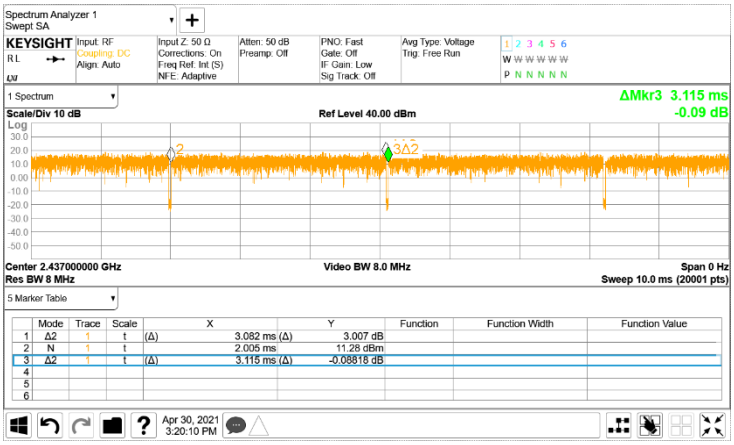
7.1.1. ON TIME AND DUTY CYCLE PLOT

ANT	Mode (Tones)	Tset Plot
MIMO	HE20 (26T)	
	HE20 (52T)	
	HE20 (106T)	

ANT	Mode (Tones)	Tset Plot
MIMO	HE20 (242T)	
	HE20 (SU)	

ANT	Mode (Tones)	Tset Plot
MIMO	HE40 (26T)	
	HE40 (52T)	
	HE40 (106T)	

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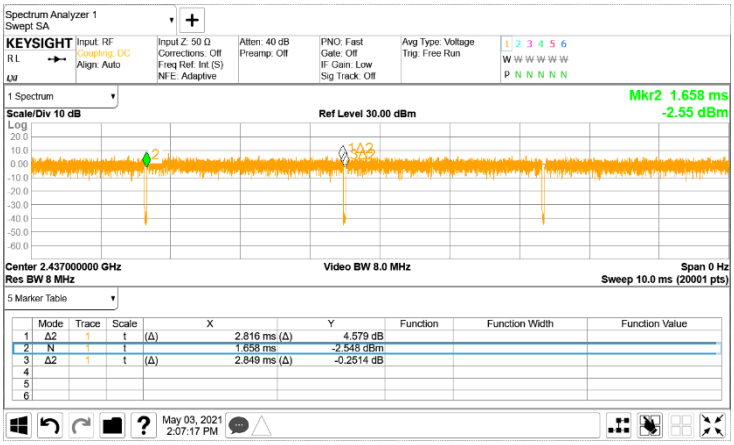
ANT	Mode (Tones)	Tset Plot
MIMO	HE40 (242T)	
	HE40 (484T)	
	HE40 (SU)	

8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05r02, Section 8.2

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.2.3.

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r02, Section 8.4.

Out-of-band EMISSIONS (Conducted) : KDB 558074 D01 v05r02, Section 8.5.

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: KDB 558074 D01 v05r02, Section 8.5.

Out-of-band EMISSIONS IN RESTRICTED BANDS KDB 558074 D01 v05r02, Section 8.6.

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

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9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	> 500kHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	TX conducted output power	< 30dBm		Pass
15.247 (e)	PSD	< 8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Refer to the DTS WLAN Test report (No.:4789901731-FR1)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

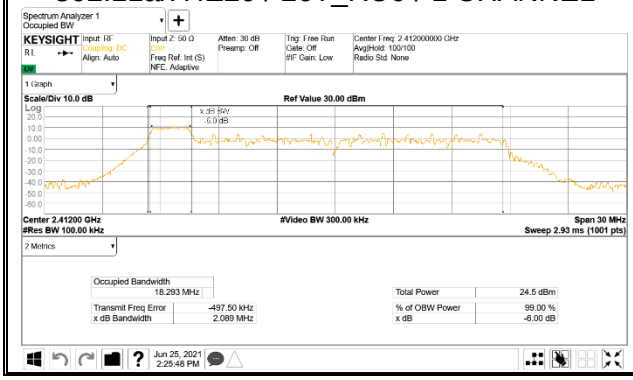
TEST PROCEDURE

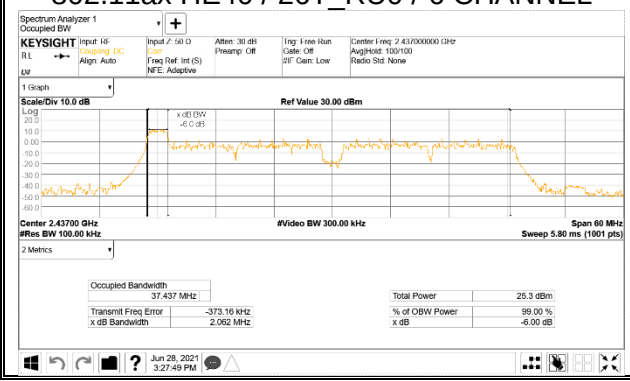
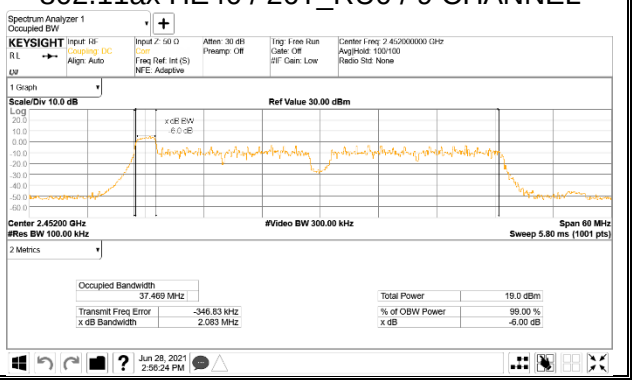
Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to100 kHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS

ANT1	ANT2
802.11ax HE20 / 26T_RU0 / 1 CHANNEL	802.11ax HE20 / 26T_RU0 / 11 CHANNEL
	

ANT1	ANT2
802.11ax HE40 / 26T_RU0 / 6 CHANNEL	802.11ax HE40 / 26T_RU0 / 9 CHANNEL
	

10.1.1. 802.11ax HE20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	Tones	RU offset	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
				ANT1	ANT2	
1	2412	26T	0	2.089	2.184	0.5
2	2417			2.170	2.208	
6	2437			2.146	2.173	
10	2457			2.158	2.171	
11	2462			2.171	2.127	
Worst				**2.089**	**2.127**	

10.1.2. 802.11ax HE40 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	Tones	RU offset	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
				ANT1	ANT2	
3	2422	26T	0	2.066	2.091	0.5
6	2437			2.062	2.132	
9	2452			2.066	2.083	
Worst				**2.062**	**2.083**	

10.2. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Output power measurement was performed utilizing the method AVGPM under KDB558074 D01 15.247 Meas Guidance 8.3.2.3.

Duty cycle correction factor is already added to the average output power results for duty cycle factor < 98%.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is equal among the chains.
The directional gain is:

Bands [MHz]	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]
2 412 – 2 462	1.88	1.88	1.88

RESULTS

- Please refer to the next page

10.2.1. 802.11ax HE20 MIMO MODE IN THE 2.4 GHz BAND

Frequency Range [MHz]	ANT Gain Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2462	1.88	30	30

Included in Calculations of Corr'd Power				
Duty Cycle CF	HE20	26T	0	dB
		52T	0	dB
		106T	0	dB
		242T	0	dB
		SU	0	dB

Calculation of Output Power result
→ Total Corr'd Power = ANT1 Power + ANT2 Power + Duty Cycle CF

Channel	Frequency [MHz]	Tones	RU Offset	Meas Power [dBm]		Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2		
1	2412	26T	0	15.35	15.34	18.36	30
			4	15.76	15.86	18.82	
			8	15.71	15.48	18.61	
		52T	37	14.45	14.30	17.39	
			38	14.77	14.78	17.79	
			40	14.80	14.52	17.67	
		106T	53	14.33	14.43	17.39	
			54	14.51	14.40	17.47	
		242T	61	14.35	14.43	17.40	
		SU	-	14.71	14.81	17.77	
2	2417	26T	0	15.10	15.05	18.09	30
			4	15.68	15.82	18.76	
			8	15.45	15.41	18.44	
		52T	37	15.15	15.22	18.20	
			38	15.59	15.69	18.65	
			40	15.52	15.38	18.46	
		106T	53	15.40	15.46	18.44	
			54	15.67	15.68	18.69	
		242T	61	16.41	16.60	19.52	
		SU	-	16.69	16.83	19.77	
6	2437	26T	0	14.69	15.14	17.93	30
			4	15.76	15.86	18.82	
			8	15.66	15.53	18.61	
		52T	37	16.21	16.17	19.20	
			38	16.58	16.77	19.69	
			40	16.90	16.43	19.68	
		106T	53	17.19	17.28	20.25	
			54	17.51	17.41	20.47	
		242T	61	19.06	19.03	22.06	
		SU	-	19.53	19.57	22.56	

Channel	Frequency [MHz]	Tones	RU Offset	Meas Power [dBm]		Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2		
10	2457	26T	0	14.68	15.15	17.93	30
			4	15.74	15.89	18.83	
			8	15.63	15.50	18.58	
		52T	37	16.25	16.24	19.26	
			38	16.53	16.72	19.64	
			40	16.88	16.47	19.69	
		106T	53	17.12	17.30	20.22	
			54	17.49	17.38	20.45	
		242T	61	17.09	17.34	20.23	
		SU	-	17.28	17.52	20.41	
11	2462	26T	0	14.96	15.01	18.00	30
			4	15.68	15.92	18.81	
			8	15.45	15.90	18.69	
		52T	37	14.26	14.09	17.19	
			38	14.51	14.61	17.57	
			40	14.45	14.85	17.66	
		106T	53	14.09	14.12	17.12	
			54	14.33	14.53	17.44	
		242T	61	12.41	12.62	15.53	
		SU	-	12.63	12.83	15.74	

10.2.2. 802.11ax HE40 MIMO MODE IN THE 2.4 GHz BAND

Frequency Range [MHz]	ANT Gain Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
2422 - 2452	1.88	30	30

Included in Calculations of Corr'd Power				
Duty Cycle CF	HE40	26T	0	dB
		52T	0	dB
		106T	0	dB
		242T	0	dB
		484T	0	dB
		SU	0	dB

Calculation of Output Power result
→ Total Corr'd Power = ANT1 Power + ANT2 Power + Duty Cycle CF

Channel	Frequency [MHz]	Tones	RU Offset	Meas Power [dBm]		Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2		
3	2422	26T	0	10.18	10.53	13.37	30
			9	10.67	10.95	13.82	
			17	10.74	10.61	13.69	
		52T	37	10.51	10.57	13.55	
			40	10.64	10.80	13.73	
			44	10.85	10.63	13.75	
		106T	53	10.28	10.59	13.45	
			56	10.61	10.56	13.60	
		242T	61	10.38	10.67	13.54	
			62	10.80	10.69	13.76	
		484T	65	10.79	10.61	13.71	
		SU	-	10.76	10.86	13.82	
6	2437	26T	0	15.17	15.19	18.19	30
			9	15.33	15.51	18.43	
			17	15.40	15.26	18.34	
		52T	37	16.13	16.15	19.15	
			40	15.76	15.82	18.80	
			44	16.26	15.79	19.04	
		106T	53	16.42	16.49	19.47	
			56	16.48	16.22	19.36	
		242T	61	17.39	17.50	20.46	
			62	17.53	17.29	20.42	
		484T	65	18.45	18.25	21.36	
		SU	-	18.69	18.61	21.66	

Channel	Frequency [MHz]	Tones	RU Offset	Meas Power [dBm]		Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2		
9	2452	26T	0	10.34	10.77	13.57	30
			9	10.55	10.49	13.53	
			17	10.03	10.42	13.24	
		52T	37	10.01	10.55	13.30	
			40	10.57	10.52	13.56	
			44	10.40	10.75	13.59	
		106T	53	10.39	10.62	13.52	
			56	10.43	10.77	13.61	
		242T	61	10.46	10.58	13.53	
			62	10.29	10.61	13.46	
		484T	65	10.09	10.39	13.25	
		SU	-	10.17	10.40	13.30	

10.3. PSD

LIMITS

FCC §15.247

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the method AVGPSD-1 under KDB558074 D01 15.247 Meas Guidance section 8.4.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is equal among the chains.
The directional gain is:

Bands [MHz]	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]
2 412 – 2 462	1.88	1.88	1.88

RESULTS

- Please refer to the next page

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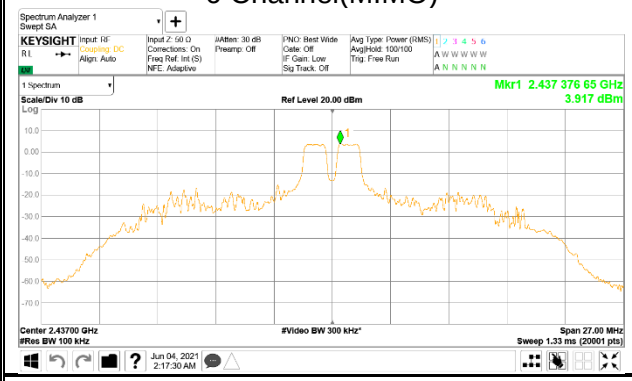
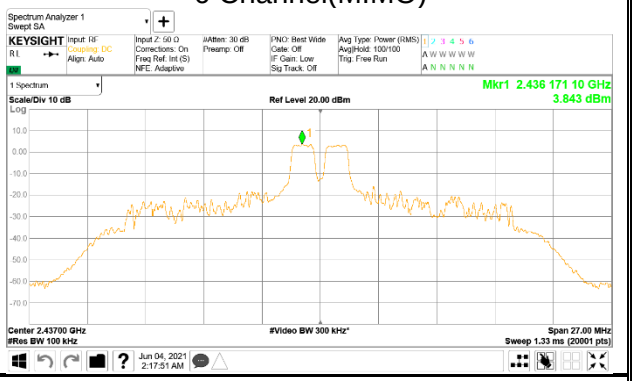
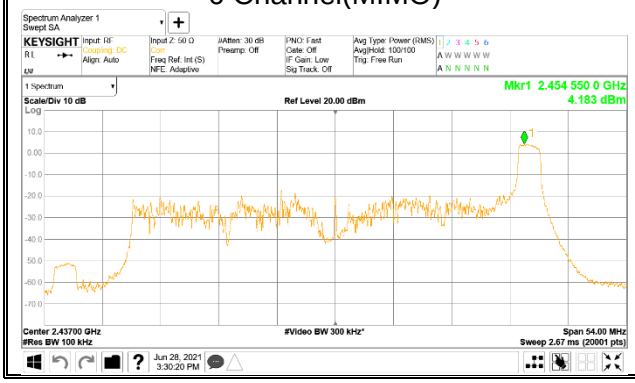
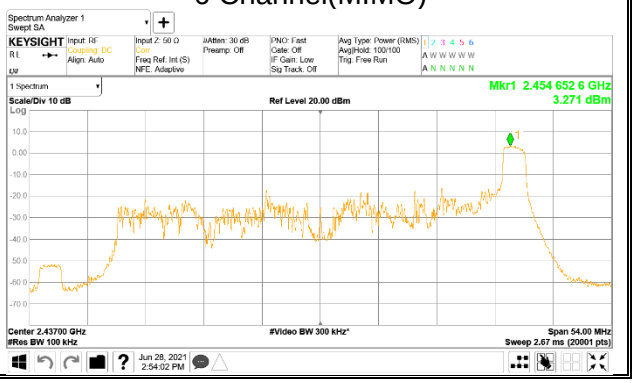
WORST CASE TEST PLOTS

ANT 1	ANT 2
802.11ax HE20 / 26T_RU4 / 6 Channel(MIMO)	802.11ax HE20 / 26T_RU4 / 6 Channel(MIMO)
	
802.11ax HE40 / 26T_RU17 / 6 Channel(MIMO)	802.11ax HE40 / 26T_RU17 / 6 Channel(MIMO)
	

10.3.1. 802.11ax HE20 MIMO MODE IN THE 2.4 GHz BAND

Included in Calculations of Corr'd Power				
Duty Cycle CF	HE20	26T	0	dB
		SU	0	dB

2TX
Total PSD = ANT1 Meas PSD + ANT2 Meas PSD + Duty Cycle CF

Channel	Frequency [MHz]	Tones	RU Offset	Meas PPSD [dBm/100kHz]		Total Corr'd PPSD [dBm/100kHz]	PPSD Limit [dBm/3kHz]	Margin [dB]
				ANT1	ANT2			
1	2412	26T	0	3.21	3.07	6.15	8.00	-1.85
			4	4.24	3.31	6.81		-1.19
			8	3.70	3.33	6.53		-1.47
		SU	-	-6.77	-6.94	-3.84		-11.84
2	2417	26T	0	2.36	2.15	5.27	8.00	-2.73
			4	3.18	3.17	6.18		-1.82
			8	2.98	2.84	5.92		-2.08
		SU	-	-4.90	-4.95	-1.91		-9.91
6	2437	26T	0	3.18	2.94	6.07	8.00	-1.93
			4	3.92	3.84	6.89		-1.11
			8	3.75	3.32	6.55		-1.45
		SU	-	-1.74	-2.02	1.13		-6.87
10	2457	26T	0	2.14	2.39	5.28	8.00	-2.72
			4	2.90	3.03	5.98		-2.02
			8	2.95	3.03	6.00		-2.00
		SU	-	-3.94	-4.33	-1.12		-9.12
11	2462	26T	0	2.54	2.25	5.41	8.00	-2.59
			4	3.42	3.42	6.43		-1.57
			8	3.13	3.28	6.22		-1.78
		SU	-	-9.11	-8.92	-6.00		-14.00

10.3.2. 802.11ax HE40 MIMO MODE IN THE 2.4 GHz BAND

Included in Calculations of Corr'd Power				
Duty Cycle CF	HE40	26T	0	dB
		SU	0	dB

2TX
Total PSD = ANT1 Meas PSD + ANT2 Meas PSD + Duty Cycle CF

Channel	Frequency [MHz]	Tones	RU Offset	Meas PPSD [dBm/100kHz]		Total Corr'd PPSD [dBm/100kHz]	PPSD Limit [dBm/3kHz]	Margin [dB]
				ANT1	ANT2			
3	2422	26T	0	-1.30	-1.71	1.51	8.00	-6.49
			9	-1.02	-1.43	1.79		-6.21
			17	-0.54	-1.23	2.14		-5.86
		SU	-	-12.66	-13.33	-9.97		-17.97
6	2437	26T	0	3.69	3.30	6.51	8.00	-1.49
			9	3.53	2.89	6.23		-1.77
			17	4.18	3.27	6.76		-1.24
		SU	-	-4.91	-5.81	-2.32		-10.32
9	2452	26T	0	-2.22	-2.23	0.79	8.00	-7.21
			9	-2.17	-2.74	0.57		-7.43
			17	-1.97	-2.72	0.68		-7.32
		SU	-	-14.35	-14.79	-11.55		-19.55

10.4. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

RESULTS

- Please refer to the next page

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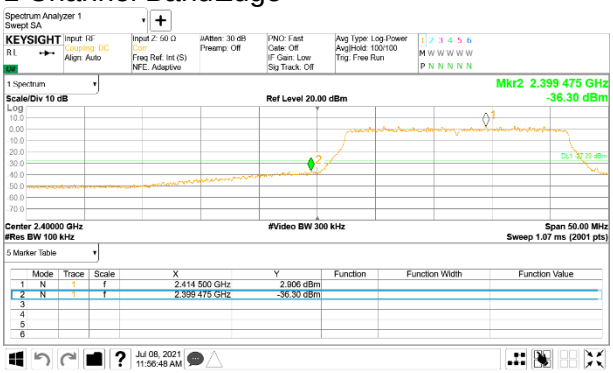
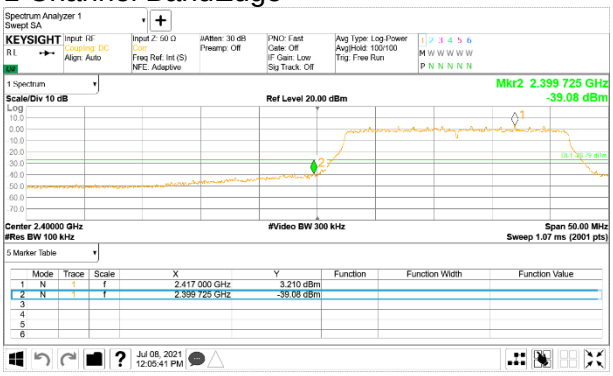
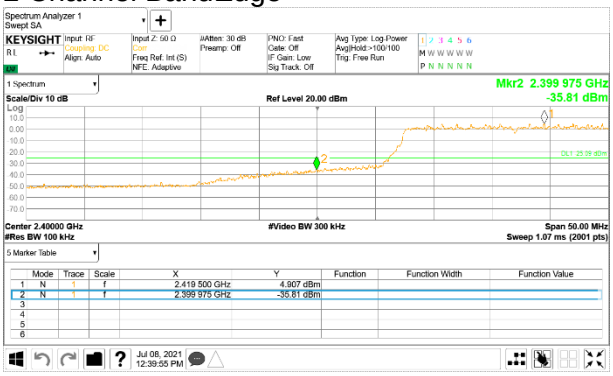
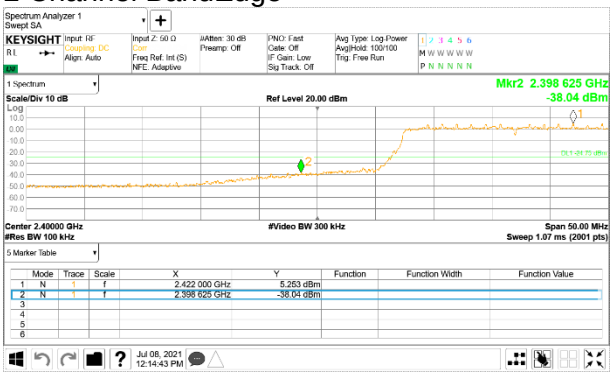
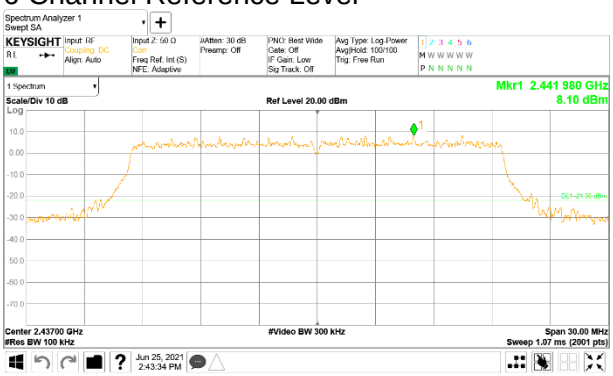
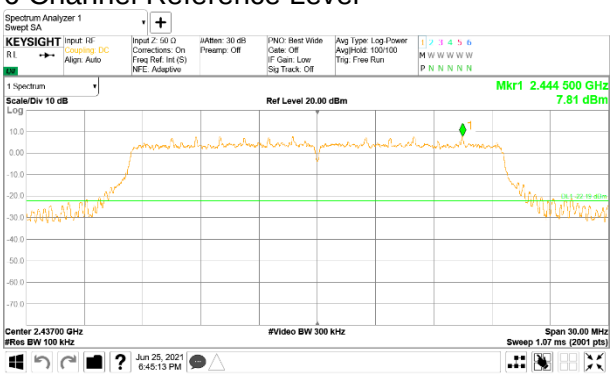
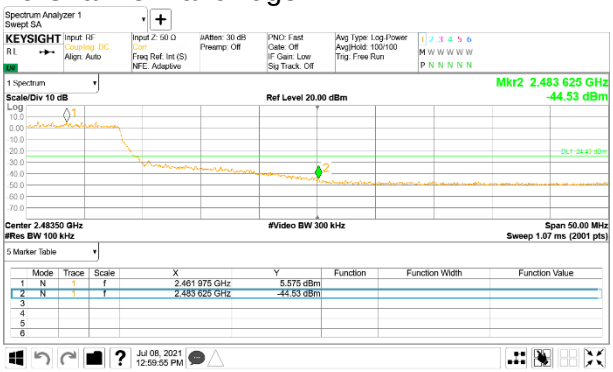
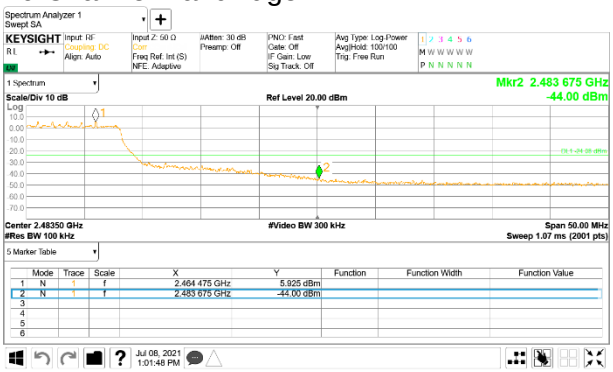
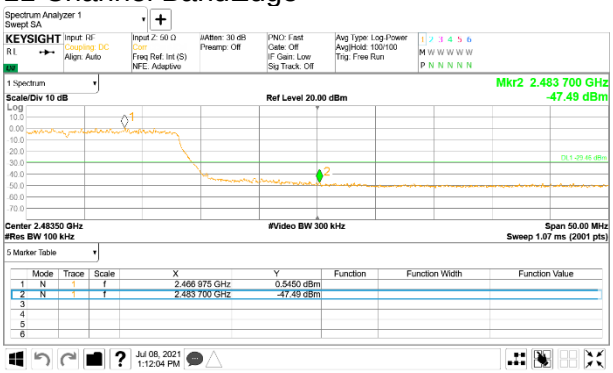
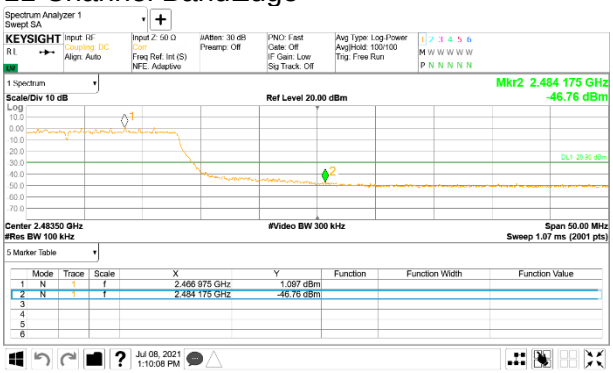
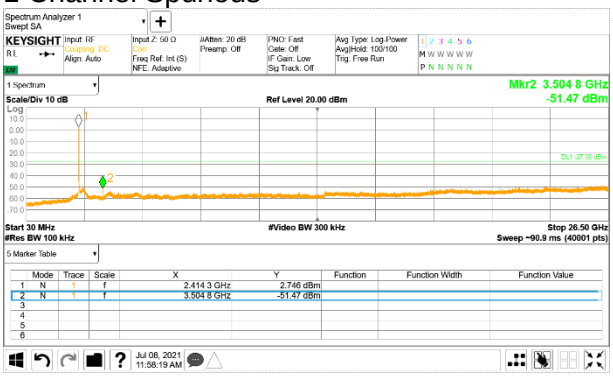
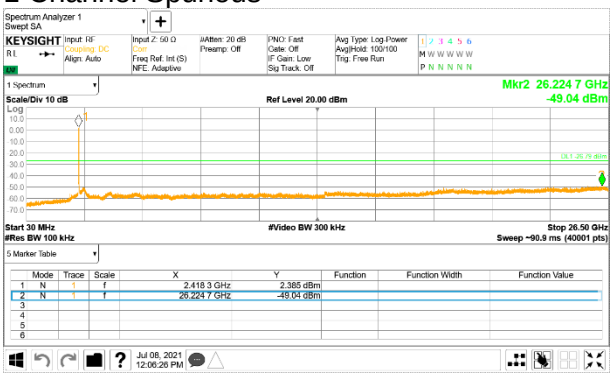
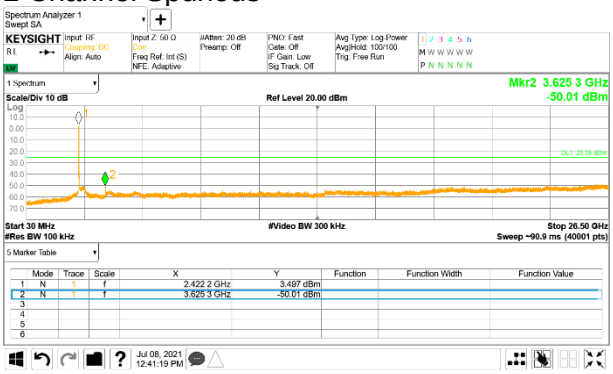
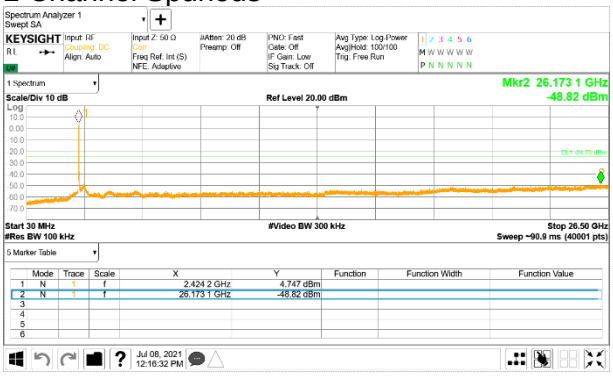
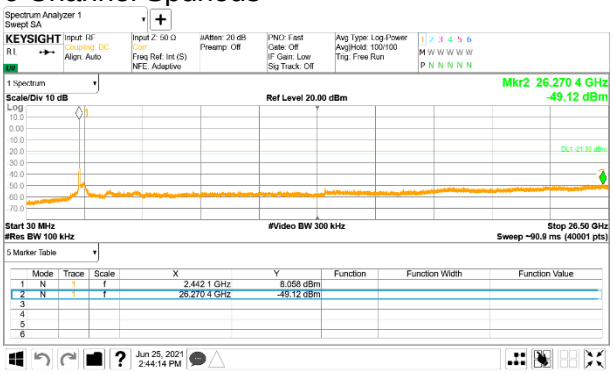
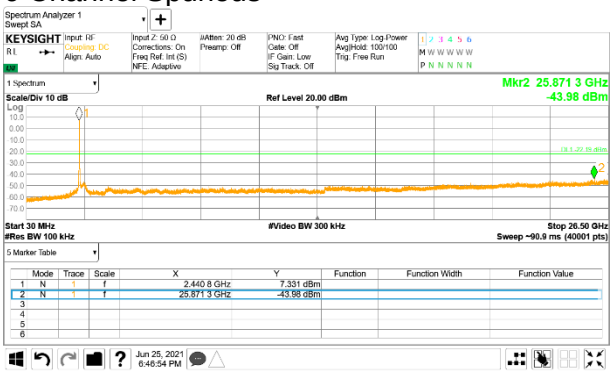
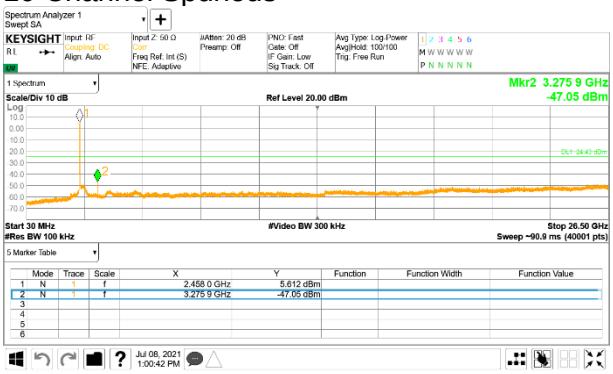
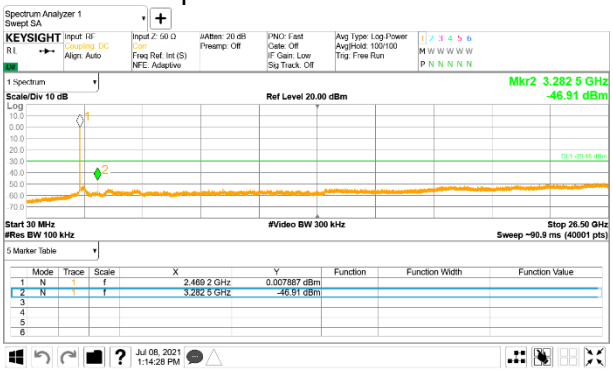
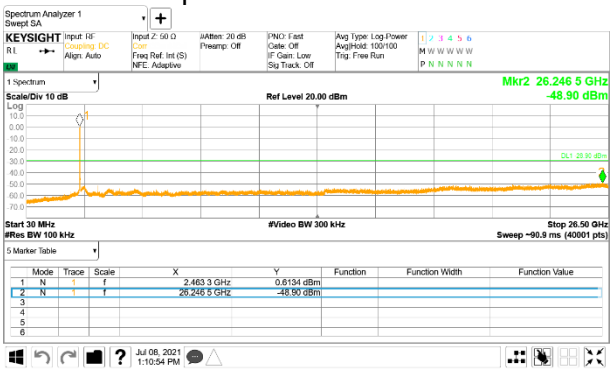
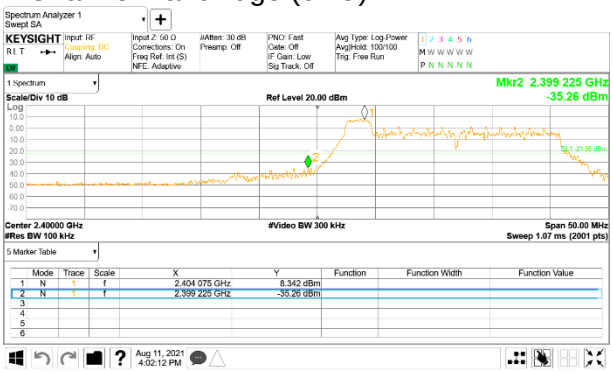
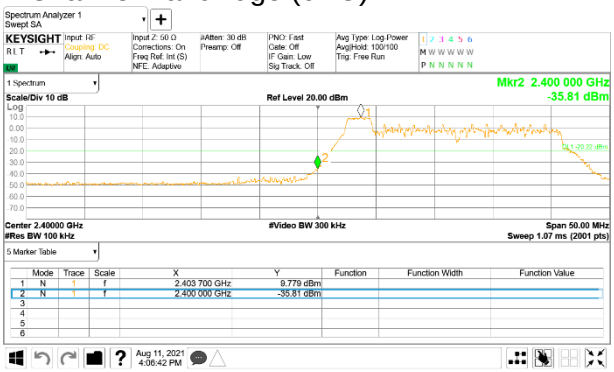
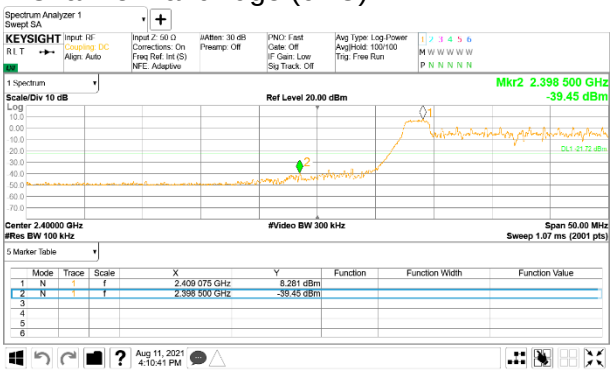
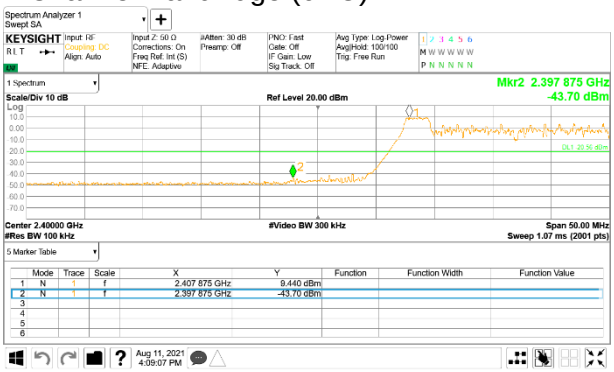
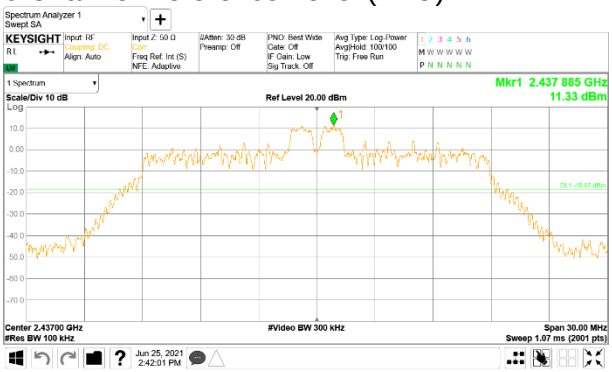
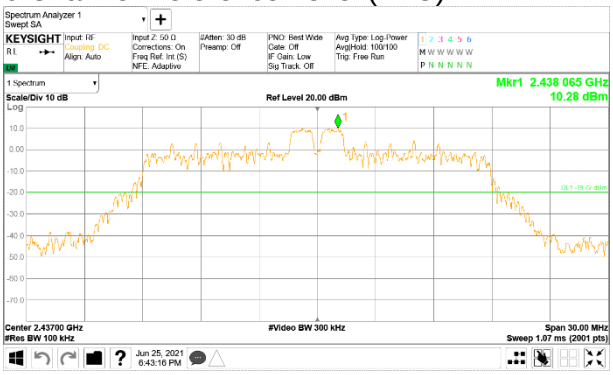
10.4.1. 802.11ax HE20 MODE IN THE 2.4 GHz BAND

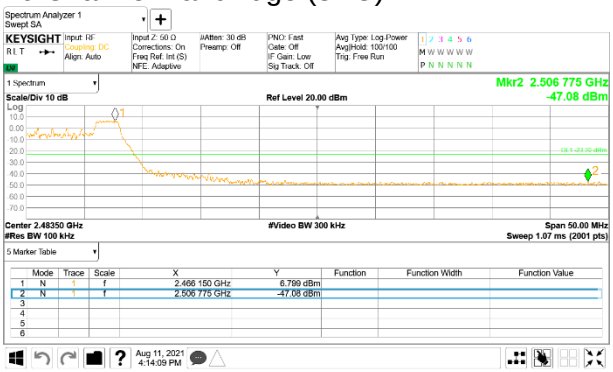
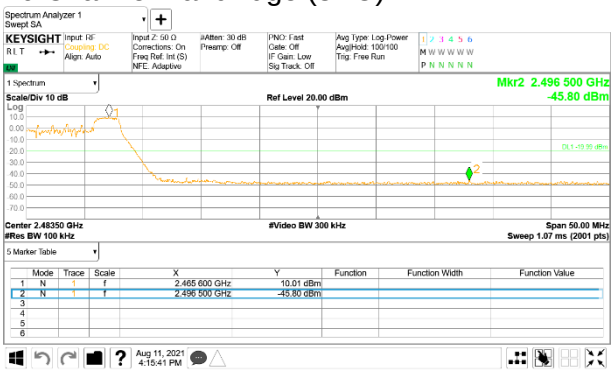
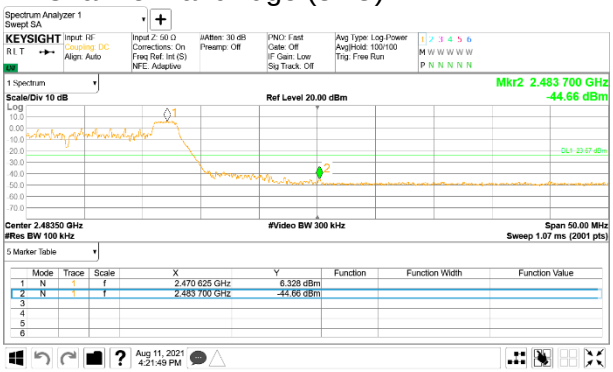
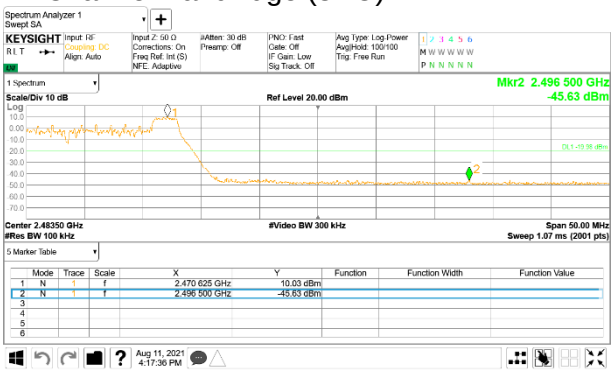
SU	
ANT1	**ANT2**
1 Channel BandEdge	1 Channel BandEdge
	
2 Channel BandEdge	2 Channel BandEdge
	
6 Channel Reference Level	6 Channel Reference Level
	

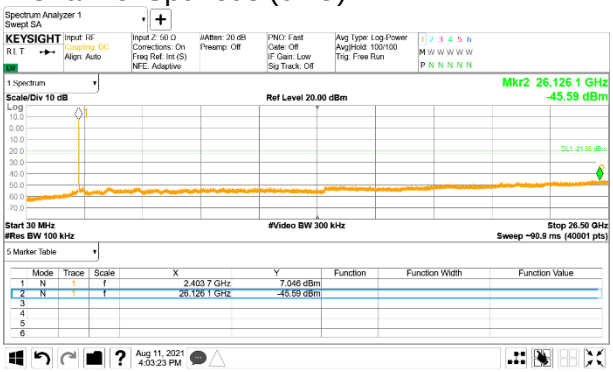
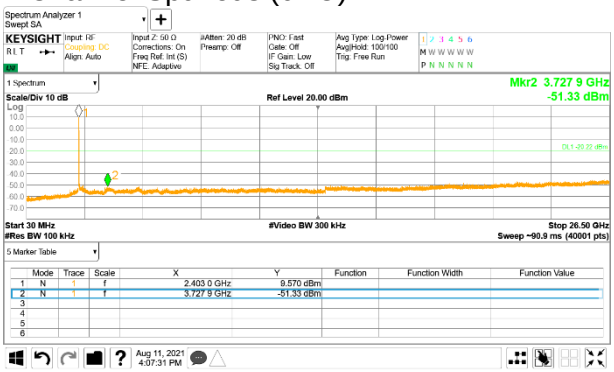
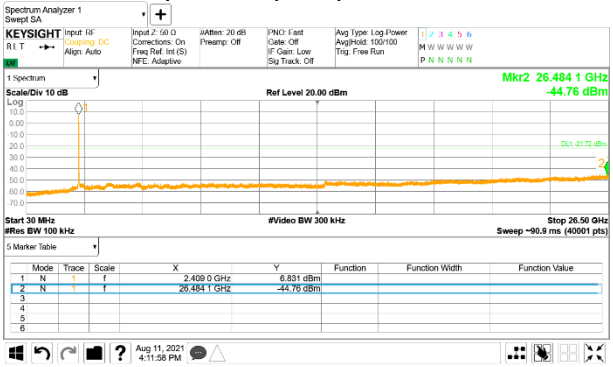
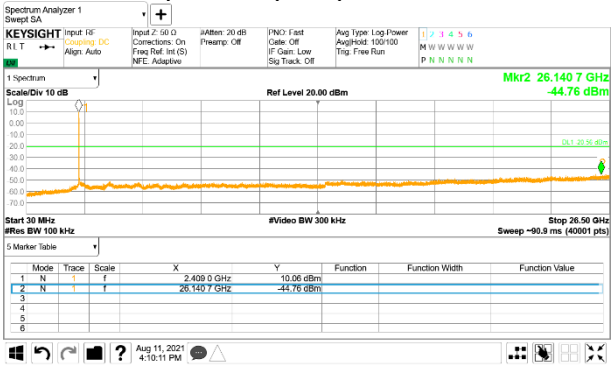
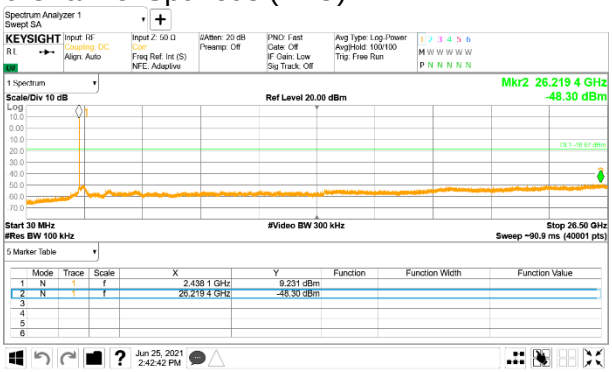
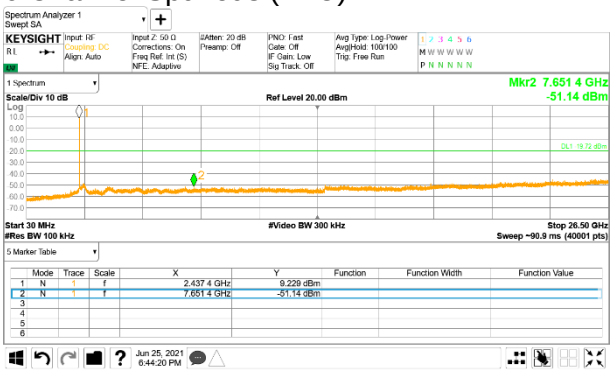
SU	
ANT1	**ANT2**
10 Channel BandEdge	10 Channel BandEdge
	
11 Channel BandEdge	11 Channel BandEdge
	

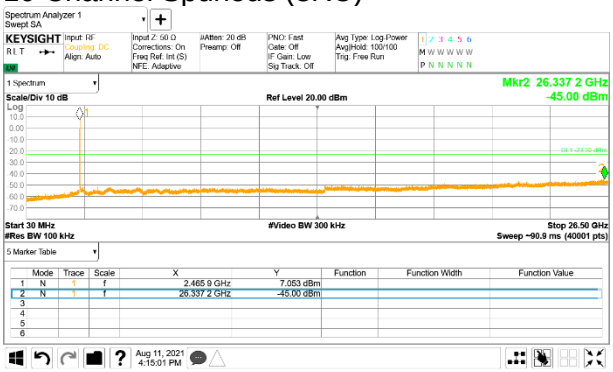
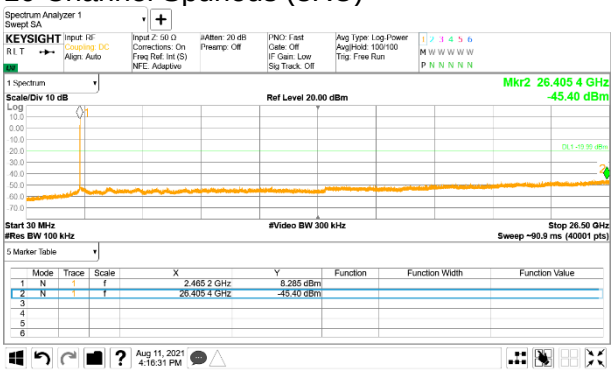
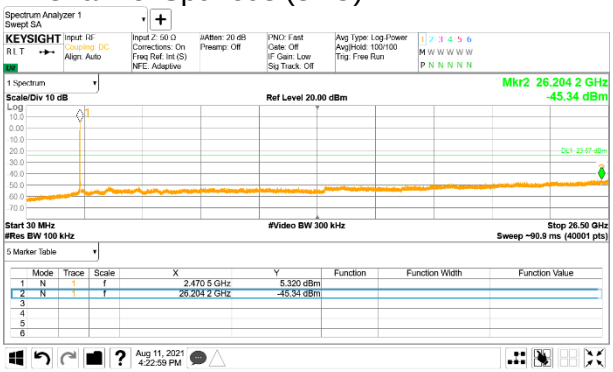
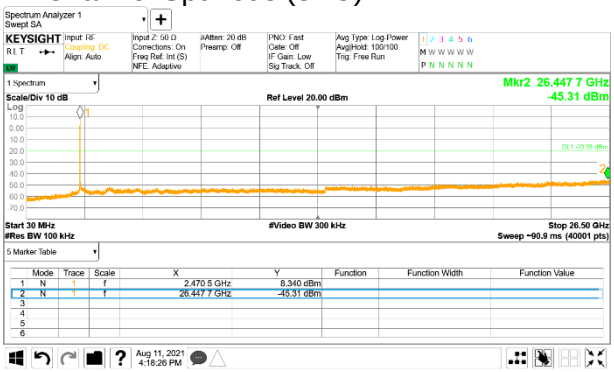
SU	
ANT1	**ANT2**
1 Channel Spurious	1 Channel Spurious
	
2 Channel Spurious	2 Channel Spurious
	
6 Channel Spurious	6 Channel Spurious
	

SU	
ANT1	**ANT2**
10 Channel Spurious	10 Channel Spurious
	
11 Channel Spurious	11 Channel Spurious
	

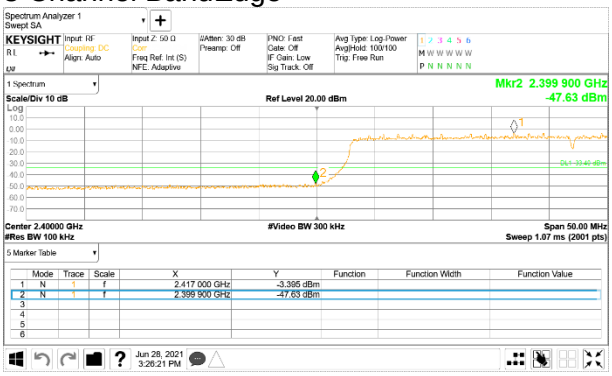
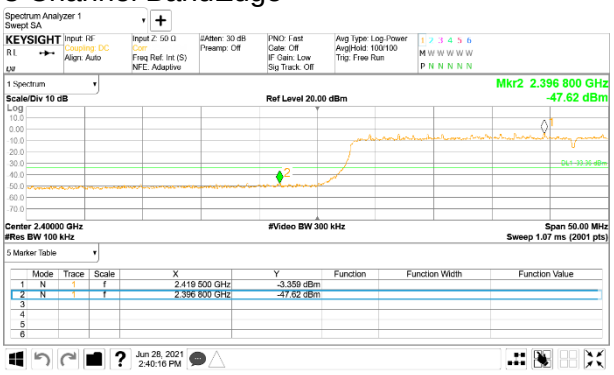
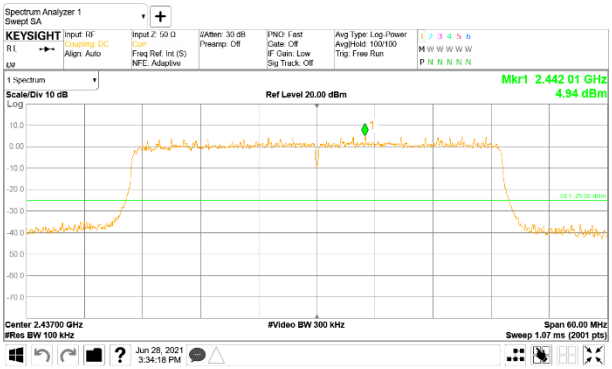
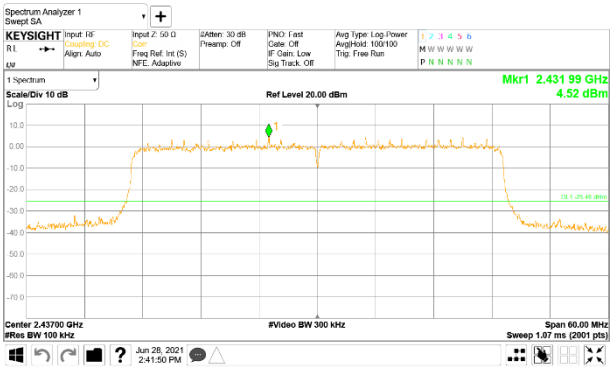
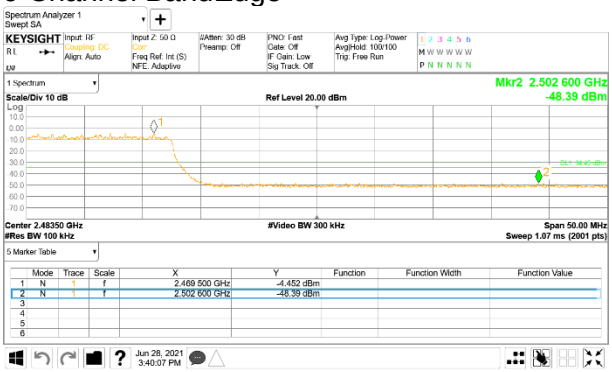
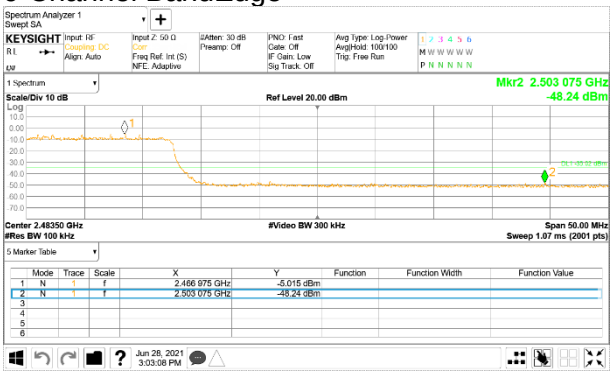
26Tone	
ANT1	**ANT2**
1 Channel BandEdge (0RU) 	1 Channel BandEdge (0RU) 
2 Channel BandEdge (0RU) 	2 Channel BandEdge (0RU) 
6 Channel Reference Level (4RU) 	6 Channel Reference Level (4RU) 

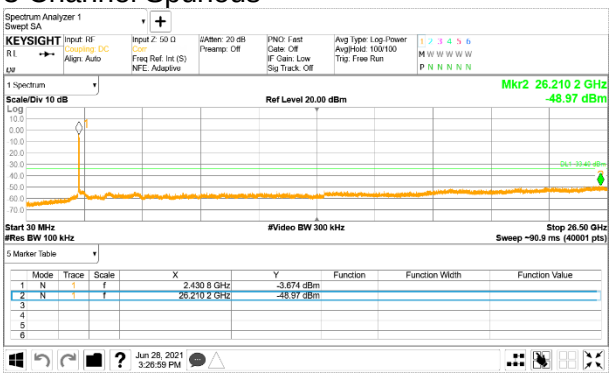
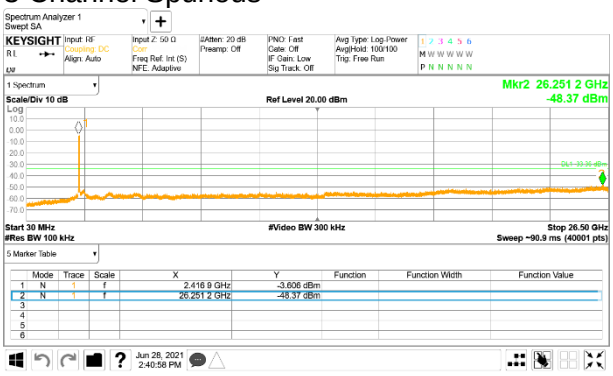
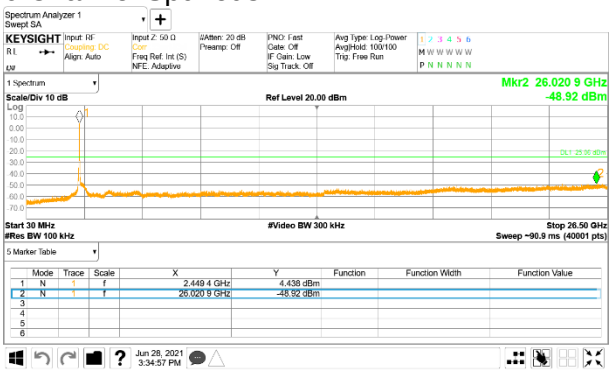
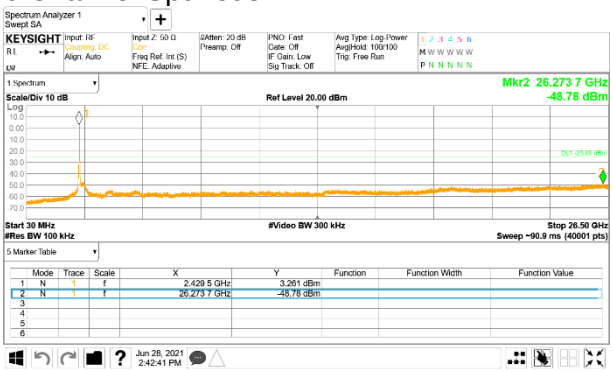
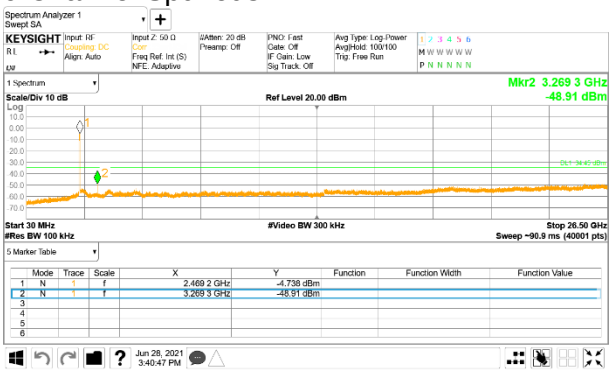
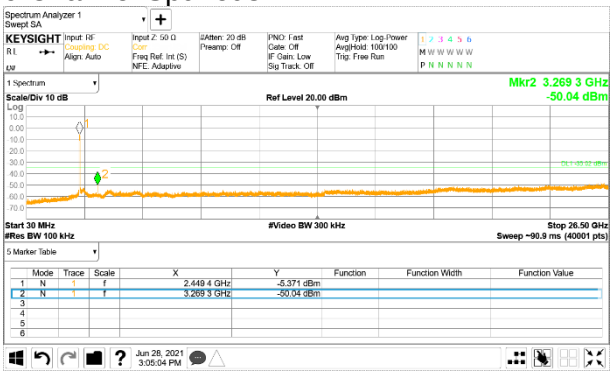
26Tone	
ANT1	**ANT2**
10 Channel BandEdge (8RU)	10 Channel BandEdge (8RU)
	
11 Channel BandEdge (8RU)	11 Channel BandEdge (8RU)
	

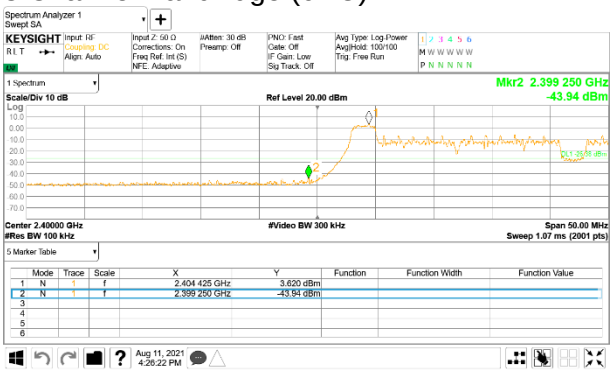
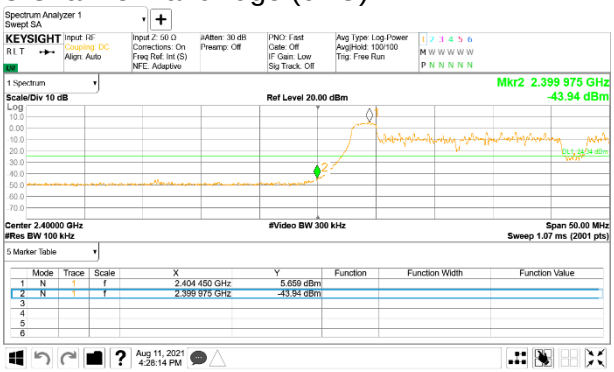
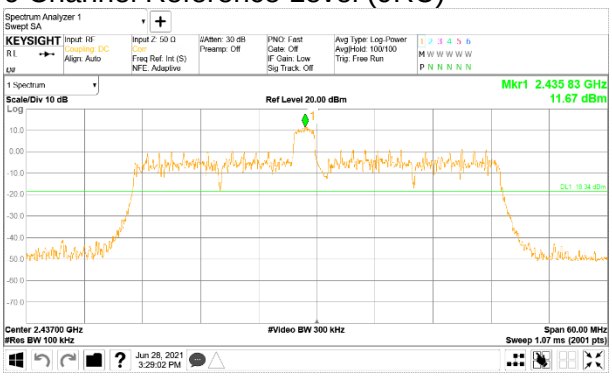
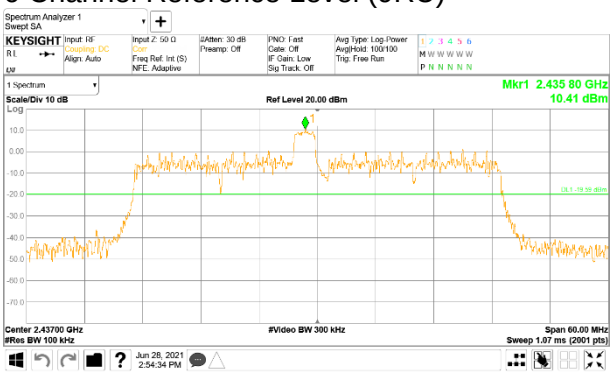
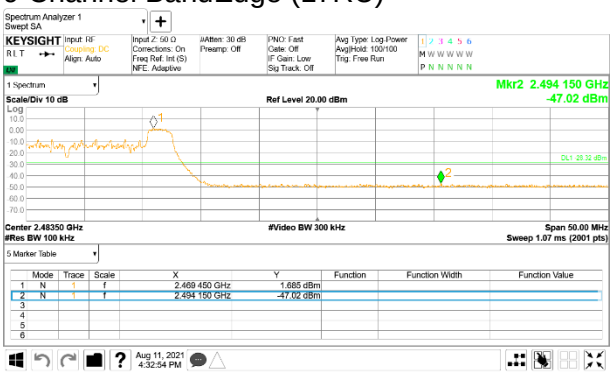
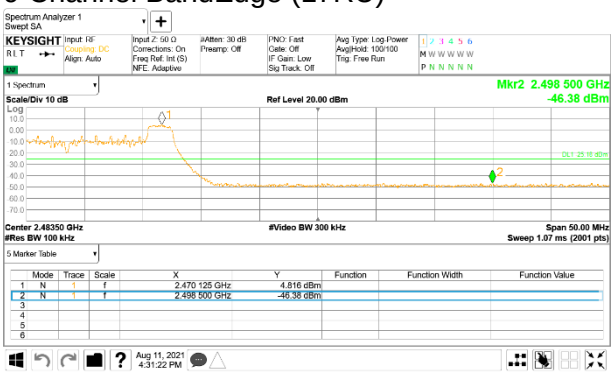
26Tone	
ANT1	**ANT2**
1 Channel Spurious (0RU)	1 Channel Spurious (0RU)
	
2 Channel Spurious (0RU)	2 Channel Spurious (0RU)
	
6 Channel Spurious (4RU)	6 Channel Spurious (4RU)
	

26Tone	
ANT1	**ANT2**
10 Channel Spurious (8RU)	10 Channel Spurious (8RU)
	
11 Channel Spurious (8RU)	11 Channel Spurious (8RU)
	

10.4.2. 802.11ax HE40 MODE IN THE 2.4 GHz BAND

SU	
ANT1	**ANT2**
3 Channel BandEdge	3 Channel BandEdge
	
6 Channel Reference Level	6 Channel Reference Level
	
9 Channel BandEdge	9 Channel BandEdge
	

SU	
ANT1	**ANT2**
3 Channel Spurious	3 Channel Spurious
	
6 Channel Spurious	6 Channel Spurious
	
9 Channel Spurious	9 Channel Spurious
	

26Tone	
ANT1	**ANT2**
3 Channel BandEdge (0RU)	3 Channel BandEdge (0RU)
	
6 Channel Reference Level (9RU)	6 Channel Reference Level (9RU)
	
9 Channel BandEdge (17RU)	9 Channel BandEdge (17RU)
	

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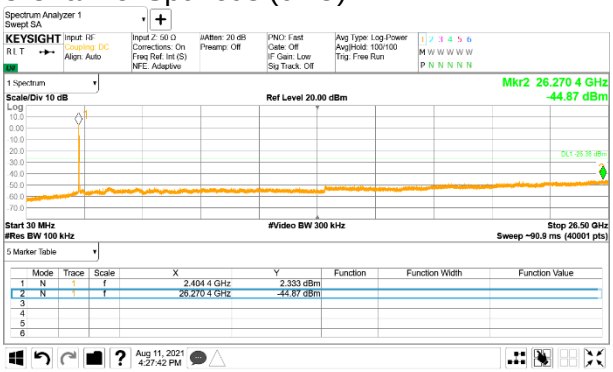
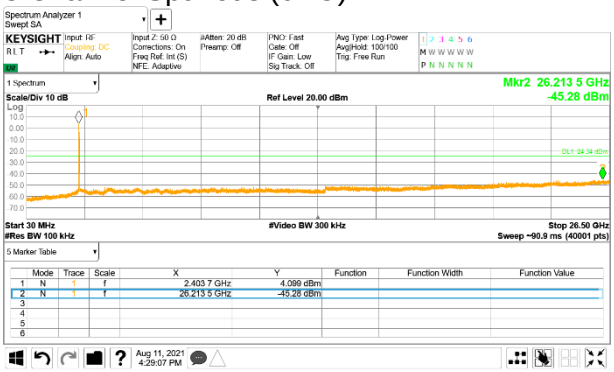
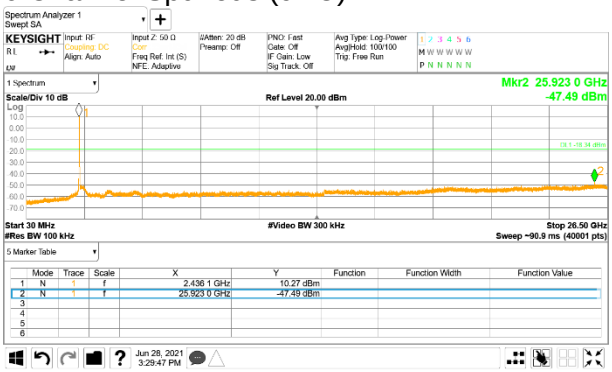
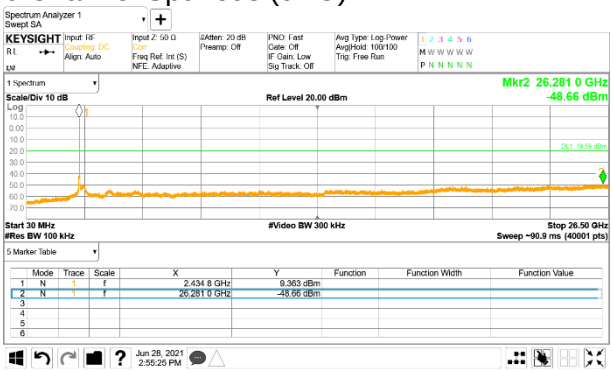
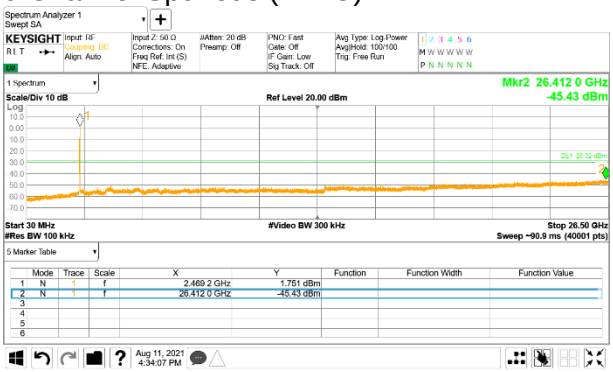
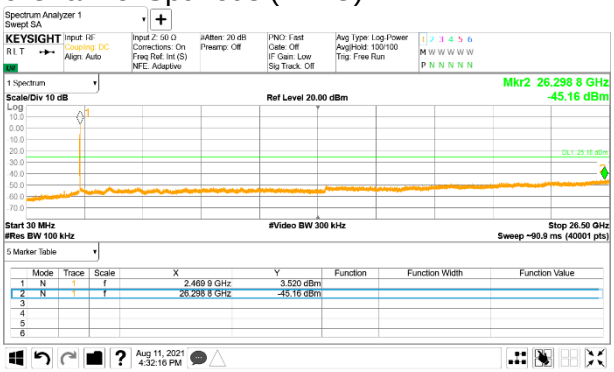
26Tone	
ANT1	**ANT2**
3 Channel Spurious (0RU)	3 Channel Spurious (0RU)
	
6 Channel Spurious (9RU)	6 Channel Spurious (9RU)
	
9 Channel Spurious (17RU)	9 Channel Spurious (17RU)
	

11. RADIATED TEST RESULTS

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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz and 150 cm for above 1 GHz. 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.

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 for average measurements. (Restriced bandedge, Final detection of spurious harmonic emissions)

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 1 GHz to 26 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 9 kHz to 30 MHz; 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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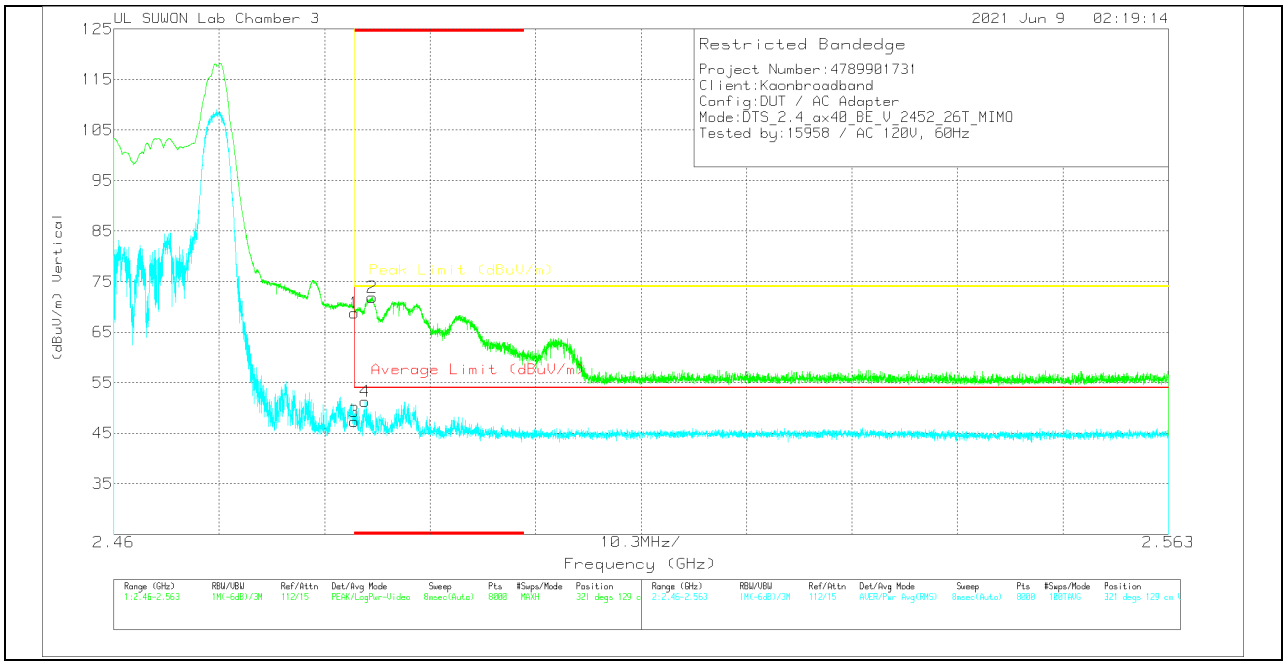
11.1. TRANSMITTER ABOVE 1 GHz

BANDEDGE (WORST CASE: 802.11ax HE40_MIMO_CH 9)

VERTICAL Result



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	* 2.4835	60.87	Pk	32.9	-25	68.77	-	-	74	-5.23	321	129	V
2	* 2.48524	64.02	Pk	32.9	-25	71.92	-	-	74	-2.08	321	129	V
3	* 2.4835	39.37	RMS	32.9	-25	47.27	54	-6.73	-	-	321	129	V
4	* 2.48453	43.36	RMS	32.9	-25	51.26	54	-2.74	-	-	321	129	V

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

BANDEDGE TEST DATA

802.11ax(HE20)

Freq. [MHz]	Tone / RU	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
2412	26T / 0 RU	MIMO	* 2.39	52.77	Pk	32.80	-25.20	0	60.37	-	-	74.00	-13.63	205	169	H
			* 2.38989	53.92	Pk	32.80	-25.20	0	61.52	-	-	74.00	-12.48	205	169	H
			* 2.39	34.62	RMS	32.80	-25.20	0	42.22	54.00	-11.78	-	-	205	169	H
			* 2.3899	35.36	RMS	32.80	-25.20	0	42.96	54.00	-11.04	-	-	205	169	H
			* 2.39	56.02	Pk	32.80	-25.20	0	63.62	-	-	74.00	-10.38	295	188	V
			* 2.38988	56.85	Pk	32.80	-25.20	0	64.45	-	-	74.00	-9.55	295	188	V
			* 2.39	35.76	RMS	32.80	-25.20	0	43.36	54.00	-10.64	-	-	295	188	V
			* 2.38967	38.38	RMS	32.80	-25.20	0	45.98	54.00	-8.02	-	-	295	188	V
2417	26T / 0 RU	MIMO	* 2.39	44.76	Pk	32.80	-25.20	0	52.36	-	-	74.00	-21.64	206	170	H
			* 2.38771	47.84	Pk	32.80	-25.20	0	55.44	-	-	74.00	-18.56	206	170	H
			* 2.39	35.66	RMS	32.80	-25.20	0	43.26	54.00	-10.74	-	-	206	170	H
			* 2.38812	35.99	RMS	32.80	-25.20	0	43.59	54.00	-10.41	-	-	206	170	H
			* 2.39	49.14	Pk	32.80	-25.20	0	56.74	-	-	74.00	-17.26	314	187	V
			* 2.38918	52.48	Pk	32.80	-25.10	0	60.18	-	-	74.00	-13.82	314	187	V
			* 2.39	34.63	RMS	32.80	-25.20	0	42.23	54.00	-11.77	-	-	314	187	V
			* 2.38983	36.21	RMS	32.80	-25.20	0	43.81	54.00	-10.19	-	-	314	187	V
2457	26T / 8 RU	MIMO	* 2.4835	47.59	Pk	32.90	-25.00	0	55.49	-	-	74.00	-18.51	208	132	H
			* 2.48356	49.38	Pk	32.90	-25.00	0	57.28	-	-	74.00	-16.72	208	132	H
			* 2.4835	35.90	RMS	32.90	-25.00	0	43.80	54.00	-10.20	-	-	208	132	H
			* 2.4859	36.80	RMS	32.90	-25.00	0	44.70	54.00	-9.30	-	-	208	132	H
			* 2.4835	50.83	Pk	32.90	-25.00	0	58.73	-	-	74.00	-15.27	327	175	V
			* 2.48499	52.48	Pk	32.90	-25.00	0	60.38	-	-	74.00	-13.62	327	175	V
			* 2.4835	37.27	RMS	32.90	-25.00	0	45.17	54.00	-8.83	-	-	327	175	V
			* 2.48441	38.02	RMS	32.90	-25.00	0	45.92	54.00	-8.08	-	-	327	175	V
2462	26T / 8 RU	MIMO	* 2.4835	52.81	Pk	32.90	-25.00	0	60.71	-	-	74.00	-13.29	201	164	H
			* 2.48382	56.06	Pk	32.90	-25.00	0	63.96	-	-	74.00	-10.04	201	164	H
			* 2.4835	34.93	RMS	32.90	-25.00	0	42.83	54.00	-11.17	-	-	201	164	H
			* 2.48404	36.78	RMS	32.90	-25.00	0	44.68	54.00	-9.32	-	-	201	164	H
			* 2.4835	60.93	Pk	32.90	-25.00	0	68.83	-	-	74.00	-5.17	304	206	V
			* 2.48376	63.62	Pk	32.90	-25.00	0	71.52	-	-	74.00	**-2.48**	304	206	V
			* 2.4835	37.40	RMS	32.90	-25.00	0	45.30	54.00	-8.70	-	-	304	206	V
			* 2.48414	42.24	RMS	32.90	-25.00	0	50.14	54.00	**-3.86**	-	-	304	206	V

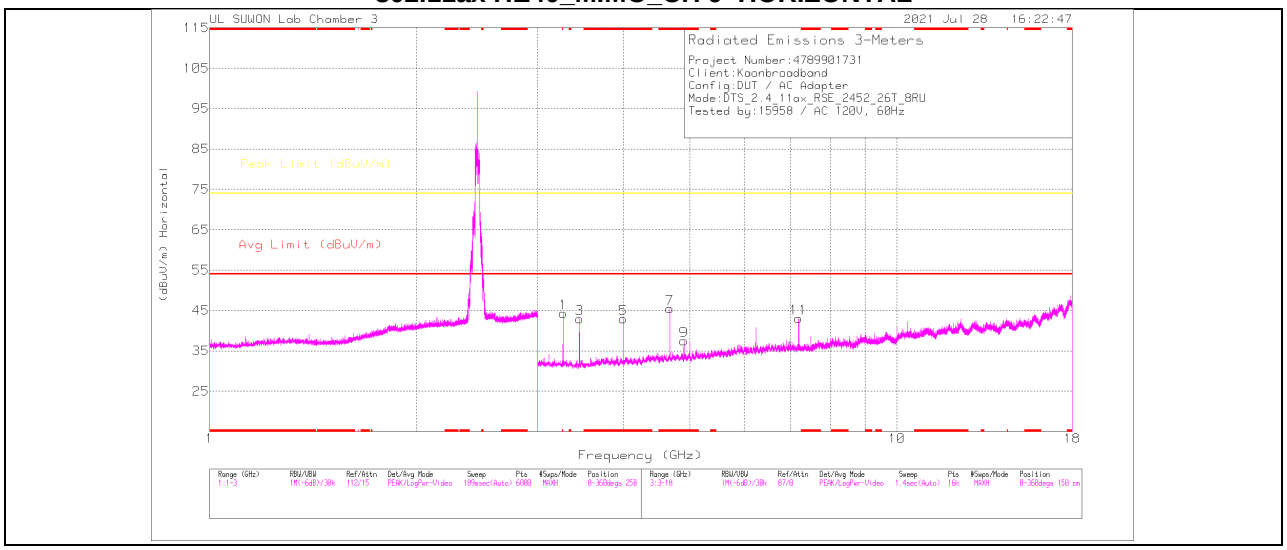
802.11ax(HE40)

Freq. [MHz]	Tone / RU	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
2422	26T / 0 RU	MIMO	* 2.39	56.05	Pk	32.80	-25.20	0	63.65	-	-	74.00	-10.35	208	163	H
			* 2.38994	56.85	Pk	32.80	-25.20	0	64.45	-	-	74.00	-9.55	208	163	H
			* 2.39	37.19	RMS	32.80	-25.20	0	44.79	54.00	-9.21	-	-	208	163	H
			* 2.38993	36.17	RMS	32.80	-25.20	0	43.77	54.00	-10.23	-	-	208	163	H
			* 2.39	64.71	Pk	32.80	-25.20	0	72.31	-	-	74.00	-1.69	304	141	V
			* 2.38994	64.86	Pk	32.80	-25.20	0	72.46	-	-	74.00	**-1.54**	304	141	V
			* 2.39	44.15	RMS	32.80	-25.20	0	51.75	54.00	**-2.25**	-	-	304	141	V
			* 2.38973	42.49	RMS	32.80	-25.20	0	50.09	54.00	-3.91	-	-	304	141	V
2452	26T / 17 RU	MIMO	* 2.4835	56.29	Pk	32.90	-25.00	0	64.19	-	-	74.00	-9.81	192	185	H
			* 2.48507	58.05	Pk	32.90	-25.00	0	65.95	-	-	74.00	-8.05	192	185	H
			* 2.4835	36.89	RMS	32.90	-25.00	0	44.79	54.00	-9.21	-	-	192	185	H
			* 2.48429	39.52	RMS	32.90	-25.00	0	47.42	54.00	-6.58	-	-	192	185	H
			* 2.4835	60.87	Pk	32.90	-25.00	0	68.77	-	-	74.00	-5.23	321	129	V
			* 2.48524	64.02	Pk	32.90	-25.00	0	71.92	-	-	74.00	-2.08	321	129	V
			* 2.4835	39.37	RMS	32.90	-25.00	0	47.27	54.00	-6.73	-	-	321	129	V
			* 2.48453	43.36	RMS	32.90	-25.00	0	51.26	54.00	-2.74	-	-	321	129	V

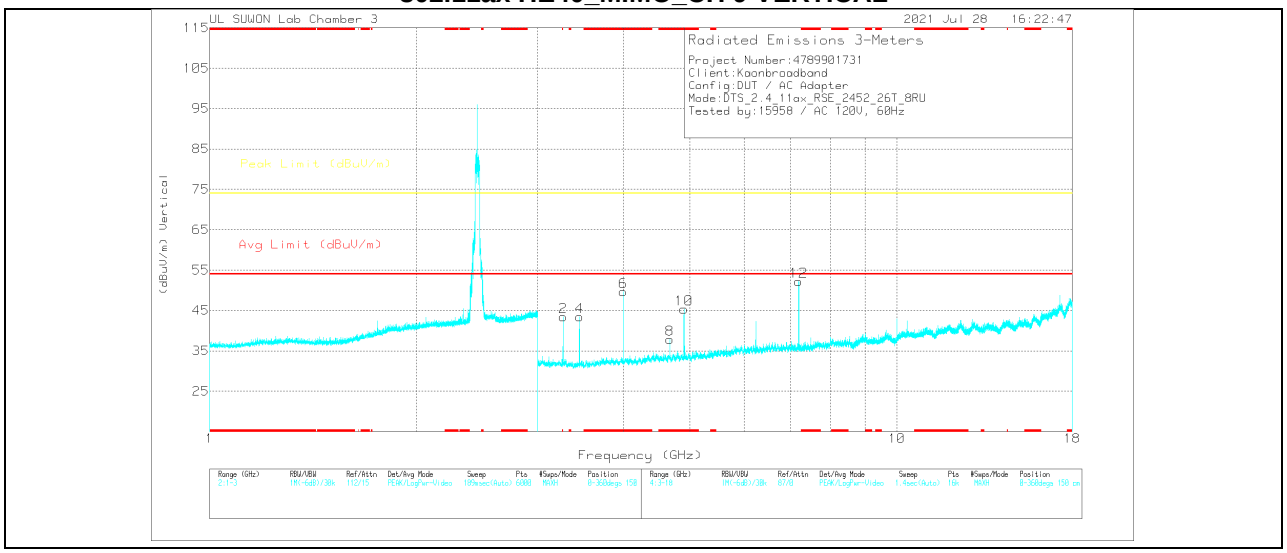
Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Note3. The test data for 26RU was only reported in this test report

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE)

802.11ax HE40_MIMO_CH 9 HORIZONTAL



802.11ax HE40_MIMO_CH 9 VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.2693	46.08	PK2	33.4	-32.9	46.58	-	-	74	-27.42	351	172	H
* 3.99993	47.02	PK2	33.9	-31.3	49.62	-	-	74	-24.38	82	397	H
* 3.99996	43.22	MAv1	33.9	-31.3	45.82	54	-8.18	-	-	82	397	H
* 4.67585	45.8	PK2	34.5	-30.2	50.1	-	-	74	-23.9	344	291	H
* 4.67509	30.23	MAv1	34.5	-30.2	34.53	54	-19.47	-	-	344	291	H
* 4.90173	57.89	PK2	34.7	-31	61.59	-	-	74	-12.41	175	298	H
* 4.90111	45.03	MAv1	34.7	-30.9	48.83	54	-5.17	-	-	175	298	H
7.19992	39.41	PK2	36.1	-25.5	50.01	-	-	74	-23.99	20	331	H
* 11.46998	31.27	PK2	38.7	-21.2	48.77	-	-	74	-25.23	237	158	H
* 11.50718	20.43	MAv1	38.7	-21.2	37.93	54	-16.07	-	-	237	158	H
3.26936	45.33	PK2	33.4	-32.9	45.83	-	-	74	-28.17	37	229	V
* 4.00014	47.49	PK2	33.9	-31.3	50.09	-	-	74	-23.91	332	299	V
* 4	44.56	MAv1	33.9	-31.3	47.16	54	-6.84	-	-	332	299	V
* 4.67554	41.58	PK2	34.5	-30.2	45.88	-	-	74	-28.12	277	321	V
* 4.67514	29.7	MAv1	34.5	-30.2	34	54	-20	-	-	277	321	V
* 4.90223	48.47	PK2	34.7	-31	52.17	-	-	74	-21.83	342	177	V
* 4.90185	34.58	MAv1	34.7	-31	38.28	54	-15.72	-	-	342	177	V
7.20005	43.71	PK2	36.1	-25.5	54.31	-	-	74	-19.69	14	130	V
* 11.48349	31.75	PK2	38.7	-21.2	49.25	-	-	74	-24.75	81	129	V
* 11.50403	20.33	MAv1	38.7	-21.2	37.83	54	-16.17	-	-	81	129	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum 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.

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HARMONICS AND SPURIOUS EMISSIONS TEST DATA

802.11ax(HE20)-26RU mode

Freq. [MHz]	Tone / RU	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
2412	26T / 4 RU	MIMO	* 4.82394	54.00	PK2	34.60	-30.30	0	58.30	-	-	74.00	-15.70	0	167	H
			* 4.82405	41.13	MAv1	34.60	-30.30	0	45.43	54.00	-8.57	-	-	0	167	H
			7.237	51.79	PK2	36.00	-25.60	0	62.19	-	-	74.00	-11.81	192	147	H
			* 4.82447	51.67	PK2	34.60	-30.30	0	55.97	-	-	74.00	-18.03	152	101	V
			* 4.82407	37.70	MAv1	34.60	-30.30	0	42.00	54.00	-12.00	-	-	152	101	V
			7.235	40.79	PK2	36.00	-25.60	0	51.19	-	-	74.00	-22.81	13	129	V
2417	26T / 4 RU	MIMO	* 4.83385	52.97	PK2	34.60	-30.40	0	57.17	-	-	74.00	-16.83	15	181	H
			* 4.83411	39.72	MAv1	34.60	-30.40	0	43.92	54.00	-10.08	-	-	15	181	H
			7.250	47.76	PK2	36.00	-25.50	0	58.26	-	-	74.00	-15.74	195	155	H
			7.250	33.45	MAv1	36.00	-25.40	0	44.05	-	-	-	-	195	155	H
			* 4.83433	48.55	PK2	34.60	-30.40	0	52.75	-	-	74.00	-21.25	148	362	V
			* 4.83429	35.37	MAv1	34.60	-30.40	0	39.57	54.00	-14.43	-	-	148	362	V
			7.250	37.95	PK2	36.00	-25.40	0	48.55	-	-	74.00	-25.45	41	351	V
			7.250	24.18	MAv1	36.00	-25.40	0	34.78	-	-	-	-	41	351	V
2437	26T / 4 RU	MIMO	* 4.87392	57.61	PK2	34.60	-30.80	0	61.41	-	-	74.00	-12.59	7	178	H
			* 4.87387	44.96	MAv1	34.60	-30.80	0	48.76	54.00	-5.24	-	-	7	178	H
			* 7.3119	53.68	PK2	36.00	-25.10	0	64.58	-	-	74.00	-9.42	188	150	H
			* 7.31178	38.14	MAv1	36.00	-25.10	0	49.04	54.00	-4.96	-	-	188	150	H
			* 4.87401	50.89	PK2	34.60	-30.80	0	54.69	-	-	74.00	-19.31	133	389	V
			* 4.87407	37.73	MAv1	34.60	-30.80	0	41.53	54.00	-12.47	-	-	133	389	V
			* 7.31085	37.82	PK2	36.00	-25.10	0	48.72	-	-	74.00	-25.28	334	103	V
			* 7.311	29.07	MAv1	36.00	-25.10	0	39.97	54.00	-14.03	-	-	334	103	V
2457	26T / 8 RU	MIMO	* 4.9316	57.09	PK2	34.70	-30.90	0	60.89	-	-	74.00	-13.11	175	296	H
			* 4.93124	42.95	MAv1	34.70	-30.90	0	46.75	54.00	-7.25	-	-	175	296	H
			* 7.396	51.24	PK2	36.00	-24.40	0	62.84	-	-	74.00	-11.16	201	143	H
			* 7.3963	36.07	MAv1	36.00	-24.40	0	47.67	54.00	-6.33	-	-	201	143	H
			* 4.93191	49.52	PK2	34.70	-30.90	0	53.32	-	-	74.00	-20.68	194	155	V
			* 4.93177	34.97	MAv1	34.70	-30.90	0	38.77	54.00	-15.23	-	-	194	155	V
			* 7.39759	41.44	PK2	36.00	-24.30	0	53.14	-	-	74.00	-20.86	182	192	V
			* 7.39507	25.61	MAv1	36.00	-24.40	0	37.21	54.00	-16.79	-	-	182	192	V
2462	26T / 4 RU	MIMO	* 4.92389	57.28	PK2	34.70	-30.90	0	61.08	-	-	74.00	-12.92	155	281	H
			* 4.92411	44.18	MAv1	34.70	-30.90	0	47.98	54.00	-6.02	-	-	155	281	H
			* 7.38688	53.18	PK2	36.00	-24.40	0	64.78	-	-	74.00	**-9.22**	188	162	H
			* 7.38662	38.32	MAv1	36.00	-24.40	0	49.92	54.00	**-4.08**	-	-	188	162	H
			* 4.92389	53.69	PK2	34.70	-30.90	0	57.49	-	-	74.00	-16.51	123	395	V
			* 4.9239	40.35	MAv1	34.70	-30.90	0	44.15	54.00	-9.85	-	-	123	395	V
			* 7.38699	44.26	PK2	36.00	-24.40	0	55.86	-	-	74.00	-18.14	39	264	V
			* 7.38666	29.14	MAv1	36.00	-24.40	0	40.74	54.00	-13.26	-	-	39	264	V

802.11ax(HE40)-26RU mode

Freq. [MHz]	Tone / RU	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
2422	26T / 9 RU	MIMO	* 4.8417	55.53	PK2	34.60	-30.40	0	59.73	-	-	74.00	-14.27	360	180	H
			* 4.84116	42.92	MAv1	34.60	-30.40	0	47.12	54.00	-6.88	-	-	360	180	H
			* 7.26384	49.43	PK2	36.00	-25.30	0	60.13	-	-	74.00	-13.87	179	157	H
			* 7.26256	33.57	MAv1	36.00	-25.30	0	44.27	54.00	-9.73	-	-	179	157	H
			* 4.84165	51.80	PK2	34.60	-30.40	0	56.00	-	-	74.00	-18.00	139	115	V
			* 4.84177	38.32	MAv1	34.60	-30.40	0	42.52	54.00	-11.48	-	-	139	115	V
			* 7.26282	37.74	PK2	36.00	-25.30	0	48.44	-	-	74.00	-25.56	330	103	V
			* 7.26606	27.36	MAv1	36.00	-25.40	0	37.96	54.00	-16.04	-	-	330	103	V
2437	26T / 9 RU	MIMO	* 4.87169	57.92	PK2	34.60	-30.70	0	61.82	-	-	74.00	-12.18	4	192	H
			* 4.87123	44.43	MAv1	34.60	-30.70	0	48.33	54.00	-5.67	-	-	4	192	H
			* 7.30757	53.33	PK2	36.00	-25.20	0	64.13	-	-	74.00	-9.87	182	156	H
			* 7.30649	38.81	MAv1	36.00	-25.30	0	49.51	54.00	-4.49	-	-	182	156	H
			* 4.87177	53.02	PK2	34.60	-30.70	0	56.92	-	-	74.00	-17.08	138	376	V
			* 4.87171	39.28	MAv1	34.60	-30.70	0	43.18	54.00	-10.82	-	-	138	376	V
			* 7.30761	44.43	PK2	36.00	-25.20	0	55.23	-	-	74.00	-18.77	207	385	V
			* 7.30725	30.24	MAv1	36.00	-25.20	0	41.04	54.00	-12.96	-	-	207	385	V
2452	26T / 9 RU	MIMO	* 4.90173	57.89	PK2	34.70	-31.00	0	61.59	-	-	74.00	-12.41	175	298	H
			* 4.90111	45.03	MAv1	34.70	-30.90	0	48.83	54.00	-5.17	-	-	175	298	H
			* 7.35251	54.20	PK2	36.00	-24.90	0	65.30	-	-	74.00	**-8.70**	183	164	H
			* 7.35223	40.52	MAv1	36.00	-24.90	0	51.62	54.00	**-2.38**	-	-	183	164	H
			* 4.90223	48.47	PK2	34.70	-31.00	0	52.17	-	-	74.00	-21.83	342	177	V
			* 4.90185	34.58	MAv1	34.70	-31.00	0	38.28	54.00	-15.72	-	-	342	177	V
			* 7.35165	46.33	PK2	36.00	-24.80	0	57.53	-	-	74.00	-16.47	269	378	V
			* 7.35183	32.27	MAv1	36.00	-24.80	0	43.47	54.00	-10.53	-	-	269	378	V

Note1. PK2 - KDB558074 Method: Maximum Peak / MAv1 - KDB558074 Option 1 Maximum RMS Average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Note3. The test data for 26RU was only reported in this test report

11.2. Spurious Emissions for Simultaneous Transmission

11.2.1. 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	100
Frequency[MHz]	2462	5600
Data Rate	1Mbps	6Mbps

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

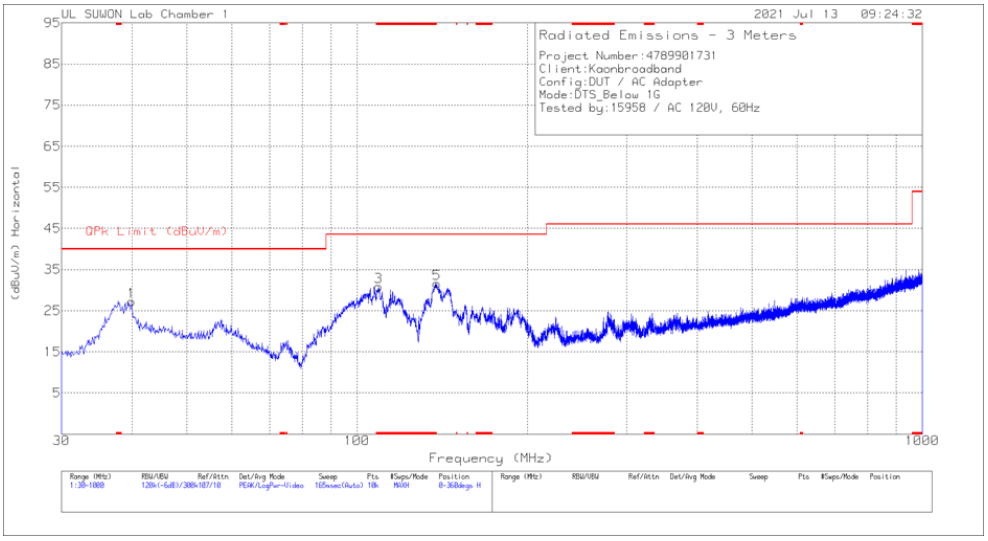
Case 1	2.4 GHz WLAN Antenna ALL	5GHz WLAN Antenna ALL
Mode	802.11b	802.11a
Channel	1	100
Frequency[MHz]	2412	5600
Data Rate	1Mbps	6Mbps

11.2.1. Test Results

Please refer to the FCC Report UNII 802.11a_n_ac WLAN (Report No.: 4789901731-FR3)

11.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (802.11ax HE20 MIMO 2437 MHz SU mode, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (802.11ax HE20 MIMO 2437 MHz SU mode, 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	39.894	39.63	Pk	18.7	-31.1	27.23	40	-12.77	0-360	200	H
3	* 109.152	43.63	Pk	17.4	-30.2	30.83	43.52	-12.69	0-360	300	H
5	138.446	47.49	Pk	13.9	-29.8	31.59	43.52	-11.93	0-360	200	H
2	* 37.76	52.83	Pk	17.8	-31	39.63	40	-.37	0-360	100	V
2	* 37.76	46.01	Qp	17.8	-31	32.81	40	-7.19	0	100	V
4	104.496	45.77	Pk	17.7	-30.2	33.27	43.52	-10.25	0-360	100	V
6	* 137.67	47.86	Pk	13.9	-29.8	31.96	43.52	-11.56	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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12. 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

Please refer to the FCC Report DTS WLAN(Report No.: 4789901731-FR1)

END OF TEST REPORT

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