



CERTIFICATION TEST REPORT

Report Number. : 4790302419-E6V3

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-A136B/DSN, SM-A136B/N

FCC ID : A3LSMA136B

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and
NFC

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

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2022-04-01	Initial issue	Sungeun Lee
V2	2022-04-21	Updated to address TCB's question	Sungeun Lee
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	<i>6</i>
4.2. <i>SAMPLE CALCULATION</i>	<i>6</i>
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>7</i>
4.4. <i>DECISION RULE.....</i>	<i>7</i>
5. EQUIPMENT UNDER TEST.....	8
5.1. <i>DESCRIPTION OF EUT</i>	<i>8</i>
5.2. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	<i>9</i>
5.3. <i>List of test reduction and modes covering other modes:</i>	<i>9</i>
5.4. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>10</i>
5.5. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>12</i>
6. TEST AND MEASUREMENT EQUIPMENT	14
7. SUMMARY TABLE	15
8. MEASUREMENT METHODS	16
9. REFERENCE MEASUREMENTS RESULTS	17
9.1. <i>ON TIME AND DUTY CYCLE RESULTS.....</i>	<i>17</i>
9.2. <i>DUTY CYCLE PLOTS</i>	<i>17</i>
9.3. <i>26 dB BANDWIDTH.....</i>	<i>18</i>
9.3.1. <i>802.11a.....</i>	<i>19</i>
9.3.2. <i>802.11n HT20.....</i>	<i>19</i>
9.3.3. <i>802.11n HT40.....</i>	<i>19</i>
9.3.4. <i>802.11ac VHT80.....</i>	<i>20</i>
9.3.5. <i>STRADDLE CHANNEL.....</i>	<i>20</i>
10. ANTENNA PORT TEST RESULTS.....	21
10.1. <i>6 dB BANDWIDTH</i>	<i>21</i>
10.1.1. <i>UNII-3 BAND.....</i>	<i>22</i>
10.2. <i>OUTPUT POWER AND PPSD</i>	<i>23</i>
10.2.1. <i>802.11a MODE</i>	<i>25</i>
10.2.2. <i>802.11n HT20 MODE</i>	<i>26</i>

10.2.3.	802.11n HT40 MODE	27
10.2.4.	802.11ac VHT80 MODE	28
10.2.5.	STRADDLE CHANNEL.....	29
10.2.6.	OUTPUT POWER AND PPSD PLOTS (WORST CASE).....	30
11.	TRANSMITTER ABOVE 1 GHz.....	35
11.1.	<i>TX ABOVE 1GHz 1Tx MODE IN THE 5.2GHz BAND.....</i>	<i>38</i>
11.2.	<i>TX ABOVE 1GHz 1Tx MODE IN THE 5.3GHz BAND.....</i>	<i>42</i>
11.3.	<i>TX ABOVE 1GHz 1Tx MODE IN THE 5.5 GHz BAND.....</i>	<i>46</i>
11.4.	<i>TX ABOVE 1GHz 1Tx MODE IN THE 5.8 GHz BAND.....</i>	<i>50</i>
12.	WORST-CASE BELOW 1 GHz	54
12.1.	<i>USB C to C cable</i>	<i>54</i>
12.2.	<i>USB A to C cable</i>	<i>55</i>
13.	AC POWER LINE CONDUCTED EMISSIONS.....	56
14.	DYNAMIC FREQUENCY SELECTION.....	61
14.1.	<i>OVERVIEW.....</i>	<i>61</i>
14.1.1.	<i>LIMITS.....</i>	<i>61</i>
14.1.2.	<i>TEST AND MEASUREMENT SYSTEM.....</i>	<i>64</i>
14.1.3.	<i>SETUP OF EUT.....</i>	<i>67</i>
14.1.4.	<i>DESCRIPTION OF EUT</i>	<i>68</i>
14.2.	<i>RESULTS FOR 80 MHz BANDWIDTH (UNII-2A BAND).....</i>	<i>69</i>
14.2.1.	<i>TEST CHANNEL</i>	<i>69</i>
14.2.2.	<i>RADAR WAVEFORM AND TRAFFIC.....</i>	<i>69</i>
14.2.3.	<i>OVERLAPPING CHANNEL TESTS.....</i>	<i>70</i>
14.2.4.	<i>MOVE AND CLOSING TIME</i>	<i>70</i>
14.3.	<i>RESULTS FOR 80 MHz BANDWIDTH (UNII-2C BAND).....</i>	<i>73</i>
14.3.1.	<i>TEST CHANNEL</i>	<i>73</i>
14.3.2.	<i>RADAR WAVEFORM AND TRAFFIC.....</i>	<i>73</i>
14.3.3.	<i>OVERLAPPING CHANNEL TESTS.....</i>	<i>74</i>
14.3.4.	<i>MOVE AND CLOSING TIME</i>	<i>74</i>

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC
MODEL NUMBER: SM-A136B/DSN, SM-A136B/N
SERIAL NUMBER: R3CT2062ZZH, R3CT2062HAY (CONDUCTED);
R3CT20636MK (RADIATED);
DATE TESTED: 2022-02-16 ~ 2022-03-31;

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:



Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Sungeun 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 789033 D02 General UNII Test Procedures New Rules v02r01
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
6. KDB 291071 DR01-44460(Sept 21, 2021)
7. 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	
<input checked="" type="checkbox"/>	Chamber 1(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	Chamber 5(3m Full-anechoic chamber)

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>.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	3.02 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 Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC.
 This test report addresses the NII (WLAN) operational mode.

This report covers the Samsung models SM-A136B/DSN and SM-A136B/N.
 These models are identical in hardware except SM-A136B/N has single SIM tray.
 With some pre-scan, model SM-A136B/DSN was set for final test.

WiFi operating mode

Frequency range	Mode	Ant.
5GHz (5180 MHz ~ 5825 MHz)	802.11a SISO	TX/RX
	802.11n SISO	TX/RX
	802.11ac SISO	TX/RX

MAXIMUM OUTPUT POWER

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

Band	Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
UNII-1	5180 - 5240	802.11a	17.85	60.95
		802.11n(HT20)	16.75	47.32
	5190 - 5230	802.11n(HT40)	15.87	38.64
	5210	802.11ac(VHT80)	13.75	23.71
UNII-2A	5260 - 5320	802.11a	17.97	62.66
		802.11n(HT20)	16.79	47.75
	5190 - 5230	802.11n(HT40)	15.93	39.17
UNII-2C	5500 - 5720	802.11a	17.18	52.24
		802.11n(HT20)	16.06	40.36
	5510 - 5710	802.11n(HT40)	15.25	33.50
UNII-3	5745 - 5825	802.11a	17.42	55.21
		802.11n(HT20)	16.31	42.76
	5755 - 5795	802.11n(HT40)	15.46	35.16
	5775	802.11ac(VHT80)	13.11	20.46

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]	ANT Gain [dBi]
UNII 1 5150 - 5250	-4.01
UNII 2A 5250 - 5350	-4.01
UNII 2C 5470 - 5725	-4.77
UNII 3 5725 - 5850	-5.03

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	SISO	802.11a 1TX	
802.11n HT20		802.11n HT20 1TX	
802.11ac VHT20		802.11ac VHT20 1TX	802.11n HT20 1TX
802.11n HT40		802.11n HT40 1TX	
802.11ac VHT40		802.11ac VHT40 1TX	802.11n HT40 1TX
802.11ac VHT80		802.11ac VHT80 1TX	

Note. The target power is the same, and there is no difference in 11ac(VHT20,40) mode and 11n(HT20,40) spot-check data. Test data was reported in 11n(HT20, 40) modes.

Test case configuration for 802.11a, 802.11n HT20 & 40, 802.11ac VHT20 & 40 & 80 modes :

Mode	Band	SISO Target[dBm]		
		802.11a	802.11n	802.11ac
5GHz (20 MHz)	UNII-1	17	16	16
	UNII-2A	17	16	16
	UNII-2C	17 CH 100: 15 CH 140: 14	16 CH 140: 13	16 CH 140: 13
	UNII-3	17	16	16
5GHz (40 MHz)	UNII-1		15 CH 38: 14	15 CH 38: 14
	UNII-2A		15 CH 62: 14	15 CH 62: 14
	UNII-2C		15 CH 102: 13	15 CH 102: 13
	UNII-3		15	15
5GHz (80 MHz)	UNII-1			13
	UNII-2A			14
	UNII-2C			13
	UNII-3			13

	Band-Edge & Spurious Emission
	Band-Edge & Spurious Emission Spot-Check
	Band-Edge Spot-Check

Note. Compared to the 802.11a mode, target power is the same or lower and the density is low, so only the spot-check test was performed in the 802.11n & 802.11ac mode. Spot check test was performed in the worst tested band of 802.11a mode.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37MANQ1E72SE3	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02115A BWE	N/A
Charger	SAMSUNG	EP-TA200	R37KC6F39T1SE3	N/A
Data Cable	SAMSUNG	EP-DR140AWE	GH39-01999A	N/A
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

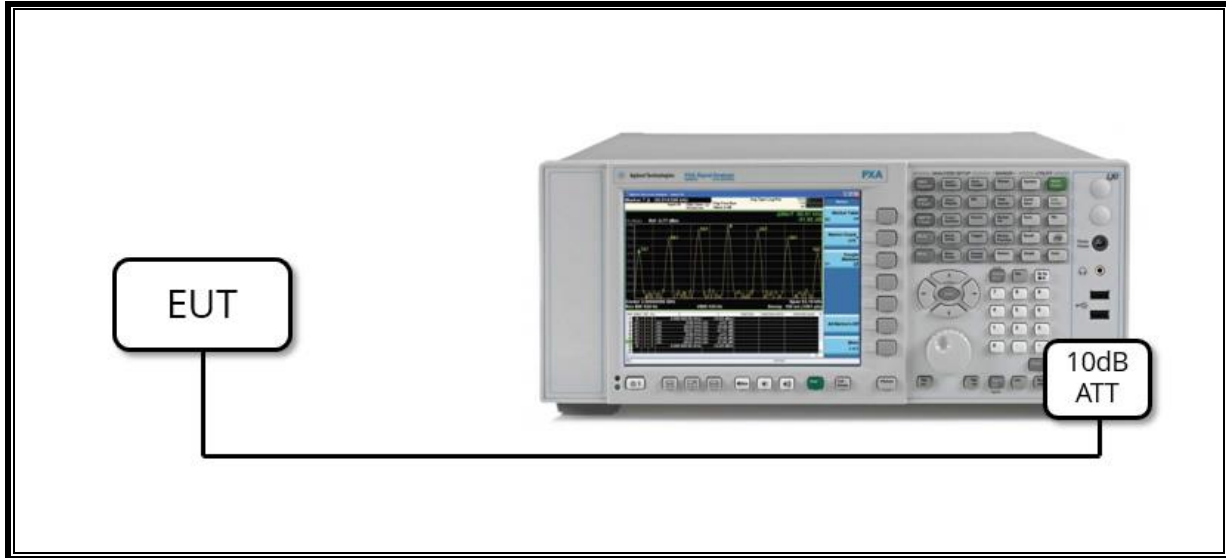
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C to C Type	Shielded	1.0 m	N/A
2	DC Power	1	A to C Type	Shielded	1.0 m	N/A
3	Audio	2	Mini-Jack	Unshielded	0.7 m	N/A

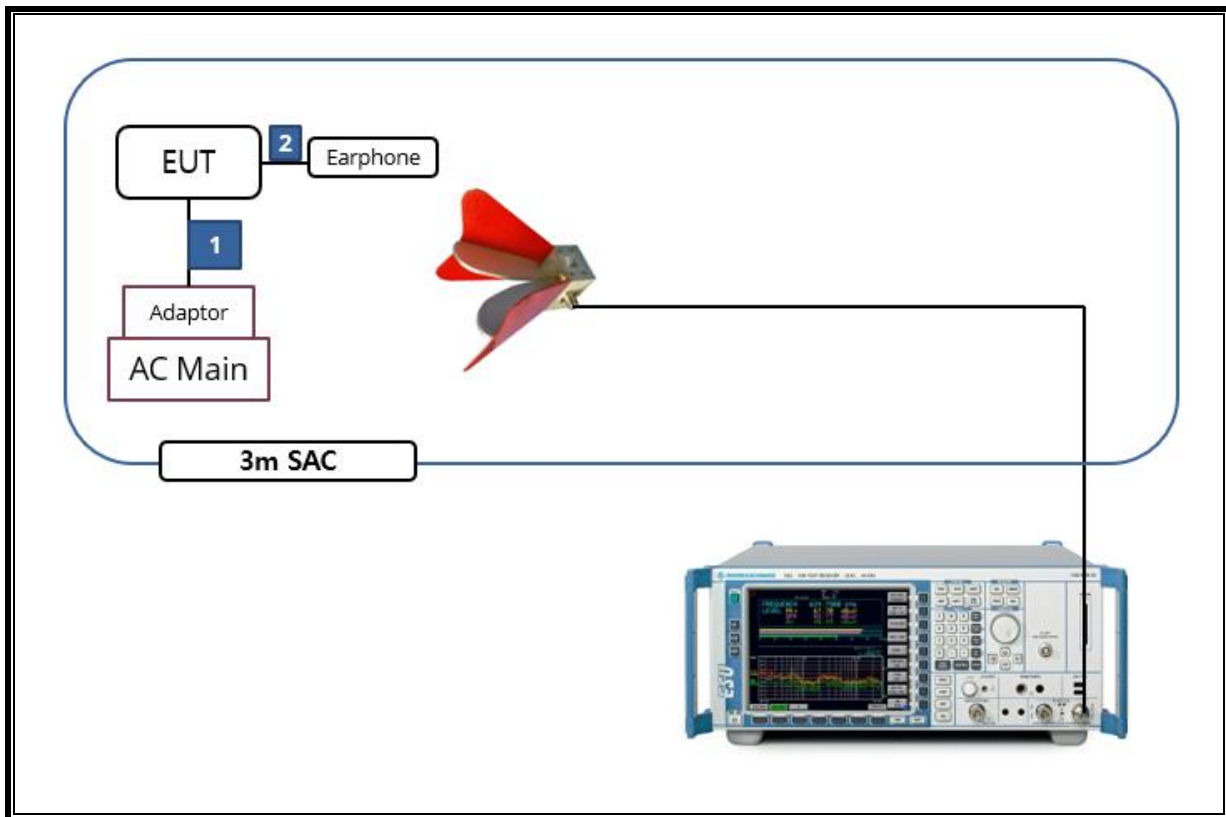
TEST SETUP

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

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	Agilent / HP	N9030A	MY54170614	2022-08-04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022-08-04
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
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	101832	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	ENV-216	101837	2022-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Termination	WEINSCHHEL	M1406A	T09	2022-08-03
Attenuator	WEINSCHHEL	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	UL	UL EMC	Ver 9.5	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.407(e)	6dB Band width (5.8GHz)	> 500kHz	Conducted	Complies
15.407 (a)(1)(iv)	TX Cond. Power (5.150-5.250)	< 24dBm		Complies
15.407 (a)(2)	TX Cond. Power (5.250-5.350 & 5.470-5.725)	< 24dBm or 11+10Log(26dB BW)		Complies
15.407 (a)(3)(i)	TX Cond. Power (5.725-5.850)	< 30dBm		Complies
15.407 (a)(1)(iv) & (a)(2)	PSD (5.150-5.250 5.250-5.350 & 5.470-5.725)	< 11dBm/MHz		Complies
15.407 (a)(3)	PSD (5.725-5.850)	< 30dBm/500kHz		Complies
15.207 (a)	AC Power Line conducted emissions	Section 13	Radiated	Complies
15.407 (b) & 15.209	Radiated Spurious Emission	< 74dBuV/m PK < 54dBuV/m AV		Complies
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Condcuted	Complies ^{Note}

Note. This EUT does not support channel puncturing.

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.b(Method PM-G)

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.

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	2.755	2.810	0.980	98.043	0.09
802.11n(HT20)	2.871	2.926	0.981	98.120	0.08
802.11n(HT40)	0.648	0.701	0.924	92.439	0.34
802.11ac(VHT80)	0.324	0.359	0.903	90.296	0.44

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



9.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

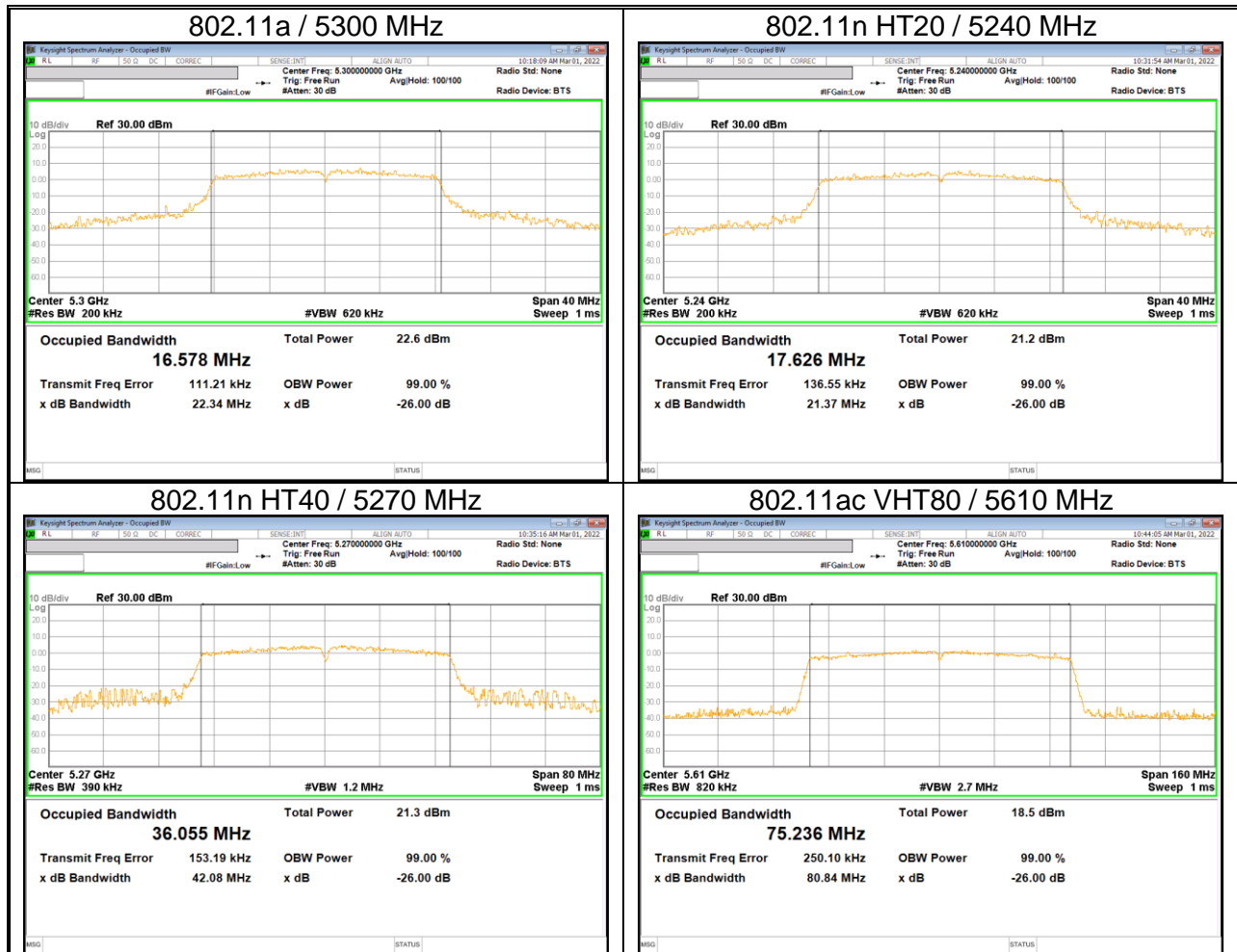
TEST PROCEDURE

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



9.3.1. 802.11a

Band	Channel	Center Freq. [MHz]	26 dB BW [MHz]	Worst	99% BW [MHz]
UNII-1 <small>Note</small>	36	5180	22.280	21.540	16.602
	40	5200	20.510		16.566
	48	5240	21.540		16.610
UNII-2A <small>Note</small>	52	5260	22.290	22.340	16.634
	60	5300	22.340		16.578
	64	5320	21.630		16.584
UNII-2C	100	5500	19.670	19.720	
	116	5580	19.720		
	140	5700	19.570		

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

9.3.2. 802.11n HT20

Band	Channel	Center Freq. [MHz]	26 dB BW [MHz]	Worst	99% BW [MHz]
UNII-1 <small>Note</small>	36	5180	19.830	21.370	17.618
	40	5200	20.360		17.638
	48	5240	21.370		17.626
UNII-2A <small>Note</small>	52	5260	20.500	20.660	17.599
	60	5300	20.120		17.626
	64	5320	20.660		17.609
UNII-2C	100	5500	20.040	20.100	
	116	5580	19.830		
	140	5700	20.100		

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

9.3.3. 802.11n HT40

Band	Channel	Center Freq. [MHz]	26 dB BW [MHz]	Worst	99% BW [MHz]
UNII-1 <small>Note</small>	38	5190	39.340	41.170	35.954
	46	5230	41.170		36.061
UNII-2A <small>Note</small>	54	5270	42.080	42.080	36.055
	62	5310	40.690		36.038
UNII-2C	102	5510	40.280	41.770	
	118	5590	40.050		
	134	5670	41.770		

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

9.3.4. 802.11ac VHT80

Band	Channel	Center Freq. [MHz]	26 dB BW [MHz]	Worst	99% BW [MHz]
UNII-1 ^{Note}	42	5210	80.830	80.830	75.168
UNII-2A ^{Note}	58	5290	80.420	80.420	75.157
UNII-2C	106	5530	80.220	80.840	
	122	5610	80.840		

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

9.3.5. STRADDLE CHANNEL

Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]	
			UNII-2C	UNII-3
802.11a	Straddle	5720	16.444	7.012
802.11n HT20	Straddle	5720	14.814	5.156
802.11n HT40	Straddle	5710	35.358	5.328
802.11ac VHT80	Straddle	5690	75.006	5.336

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407

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

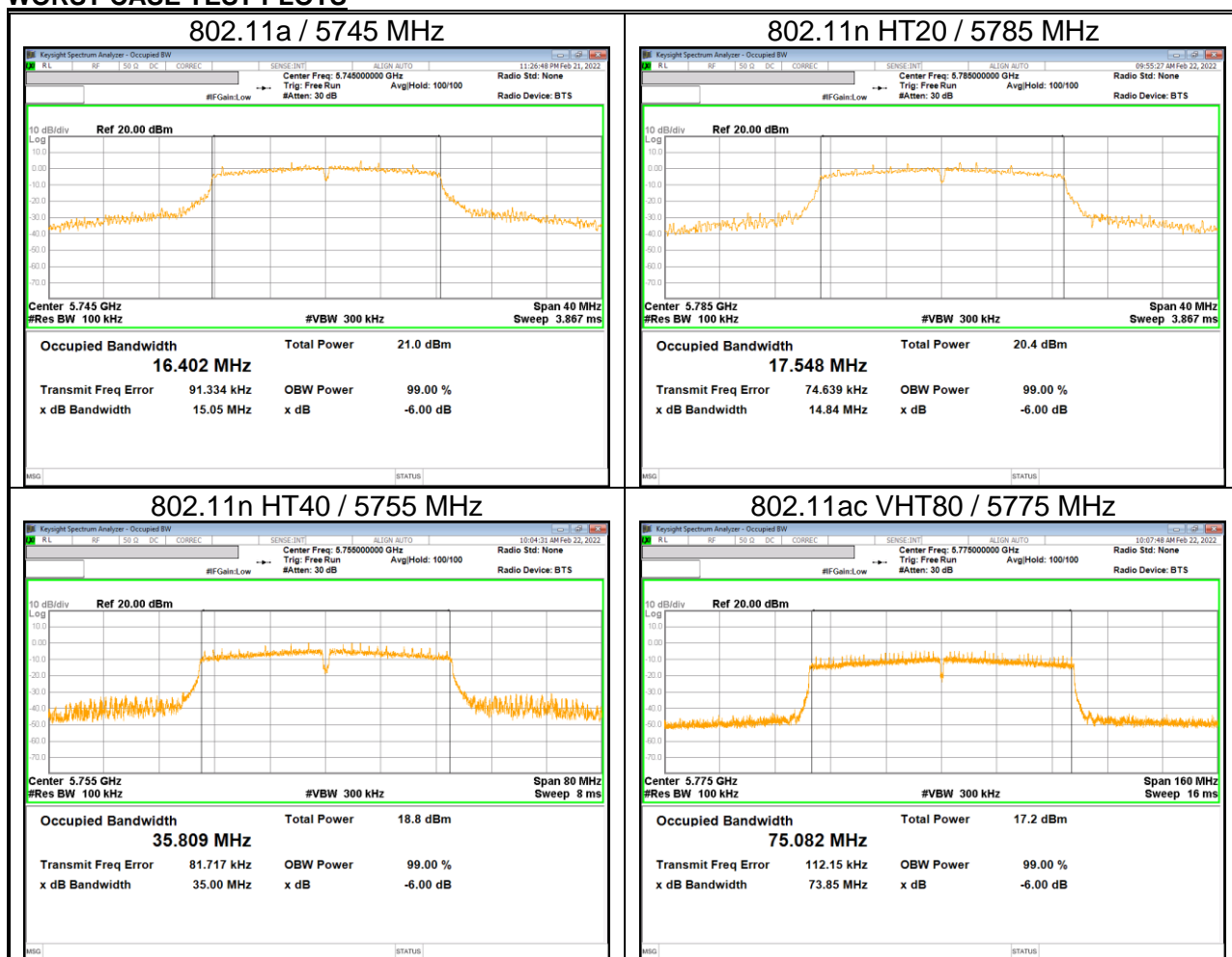
TEST PROCEDURE

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 100kHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS



10.1.1. UNII-3 BAND

Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]	Worst	Minimum Limit [MHz]
802.11a	149	5745	15.050	15.050	0.5
	157	5785	15.060		
	165	5825	15.650		
802.11n HT20	149	5745	15.110	14.840	
	157	5785	14.840		
	165	5825	15.060		
802.11n HT40	151	5755	35.000	35.000	
	159	5795	35.050		
802.11ac VHT80	155	5775	73.850	73.850	

10.2. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a)(1)(iv), (a)(2), (a)(3)(i), (a)(3)(iii)

FCC

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 $11 \text{ dBm} + 10 \log B$, 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 5.725-5.850 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. 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.

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 $\geq 3 \times$ RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD. For the band 5.850-5.895 GHz, The correlated gain is added to the result to convert e.i.r.p.

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]	ANT Gain [dBi]
UNII 1 5150 - 5250	-4.01
UNII 2A 5250 - 5350	-4.01
UNII 2C 5470 - 5725	-4.77
UNII 3 5725 - 5850	-5.03

10.2.1. 802.11a MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Corr'd Power [dBm]	Limit [dBm]
UNII-1	36	5180	17.77	17.77	23.98
	40	5200	17.80	17.80	
	48	5240	17.85	17.85	
UNII-2A	52	5260	17.87	17.87	23.98
	60	5300	17.97	17.97	
	64	5320	17.90	17.90	
UNII-2C	100	5500	15.16	15.16	23.98
	116	5580	17.18	17.18	
	140	5700	14.29	14.29	
UNII-3	149	5745	17.33	17.33	30.00
	157	5785	17.38	17.38	
	165	5825	17.42	17.42	

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

PSD Results

Band	Channel	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
UNII-1	36	5180	7.996	-	7.996	11.00
	40	5200	7.823	-	7.823	
	48	5240	7.830	-	7.830	
UNII-2A	52	5260	7.864	-	7.864	11.00
	60	5300	7.944	-	7.944	
	64	5320	7.830	-	7.830	
UNII-2C	100	5500	5.031	-	5.031	11.00
	116	5580	7.069	-	7.069	
	140	5700	4.368	-	4.368	
UNII-3	149	5745	4.495	-	4.495	30.00/500kHz
	157	5785	4.704	-	4.704	
	165	5825	4.717	-	4.717	

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.2. 802.11n HT20 MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Corr'd Power [dBm]	Limit [dBm]
UNII-1	36	5180	16.61	16.61	23.98
	40	5200	16.66	16.66	
	48	5240	16.75	16.75	
UNII-2A	52	5260	16.77	16.77	23.98
	60	5300	16.79	16.79	
	64	5320	16.75	16.75	
UNII-2C	100	5500	16.13	16.13	23.98
	116	5580	16.06	16.06	
	140	5700	13.15	13.15	
UNII-3	149	5745	16.21	16.21	30.00
	157	5785	16.31	16.31	
	165	5825	16.30	16.30	

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

PSD Results

Band	Channel	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
UNII-1	36	5180	6.471	-	6.471	11.00
	40	5200	6.697	-	6.697	
	48	5240	6.675	-	6.675	
UNII-2A	52	5260	6.552	-	6.552	11.00
	60	5300	7.094	-	7.094	
	64	5320	6.826	-	6.826	
UNII-2C	100	5500	5.955	-	5.955	11.00
	116	5580	6.379	-	6.379	
	140	5700	3.242	-	3.242	
UNII-3	149	5745	3.406	-	3.406	30.00/500kHz
	157	5785	3.244	-	3.244	
	165	5825	3.520	-	3.520	

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.3. 802.11n HT40 MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Corr'd Power [dBm]	Limit [dBm]
UNII-1	38	5190	13.69	13.69	23.98
	46	5230	15.87	15.87	
UNII-2A	54	5270	15.93	15.93	23.98
	62	5310	14.88	14.88	
UNII-2C	102	5510	13.47	13.47	23.98
	118	5590	15.25	15.25	
	134	5670	15.27	15.27	
UNII-3	151	5755	15.44	15.44	30.00
	159	5795	15.46	15.46	

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

PSD Results

Band	Channel	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
UNII-1	38	5190	0.404	0.34	0.744	11.00
	46	5230	2.484	0.34	2.824	
UNII-2A	54	5270	2.483	0.34	2.823	11.00
	62	5310	1.591	0.34	1.931	
UNII-2C	102	5510	-0.268	0.34	0.072	11.00
	118	5590	1.536	0.34	1.876	
	134	5670	1.981	0.34	2.321	
UNII-3	151	5755	-0.823	0.34	-0.483	30.00/500kHz
	159	5795	-0.846	0.34	-0.506	

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.4. 802.11ac VHT80 MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Corr'd Power [dBm]	Limit [dBm]
UNII-1	42	5210	13.75	13.75	23.98
UNII-2A	58	5290	13.73	13.73	23.98
UNII-2C	106	5530	13.02	13.02	23.98
	122	5610	13.08	13.08	
UNII-3	155	5775	13.11	13.11	30.00

* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

PSD Results

Band	Channel	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
UNII-1	42	5210	-3.003	0.44	-2.563	11.00
UNII-2A	58	5290	-3.140	0.44	-2.700	11.00
UNII-2C	106	5530	-3.875	0.44	-3.435	11.00
	122	5610	-3.718	0.44	-3.278	
UNII-3	155	5775	-6.136	0.44	-5.696	30.00/500kHz

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.5. STRADDLE CHANNEL

Output Power Results

Mode	Band	Center Freq. [MHz]	Meas Power [dBm]	DCCF.	Corr'd Power [dBm]	Limit [dBm]
802.11a	UNII-2C	5720	6.313	-	6.313	23.16
	UNII-3		-1.091	-	-1.091	30.00
802.11n HT20	UNII-2C	5720	3.981	-	3.981	22.70
	UNII-3		2.902	-	2.902	30.00
802.11n HT40	UNII-2C	5710	0.893	0.34	1.233	23.98
	UNII-3		-3.416	0.34	-3.076	30.00
802.11ac VHT80	UNII-2C	5690	-3.840	0.44	-3.400	23.98
	UNII-3		-7.546	0.44	-7.106	30.00

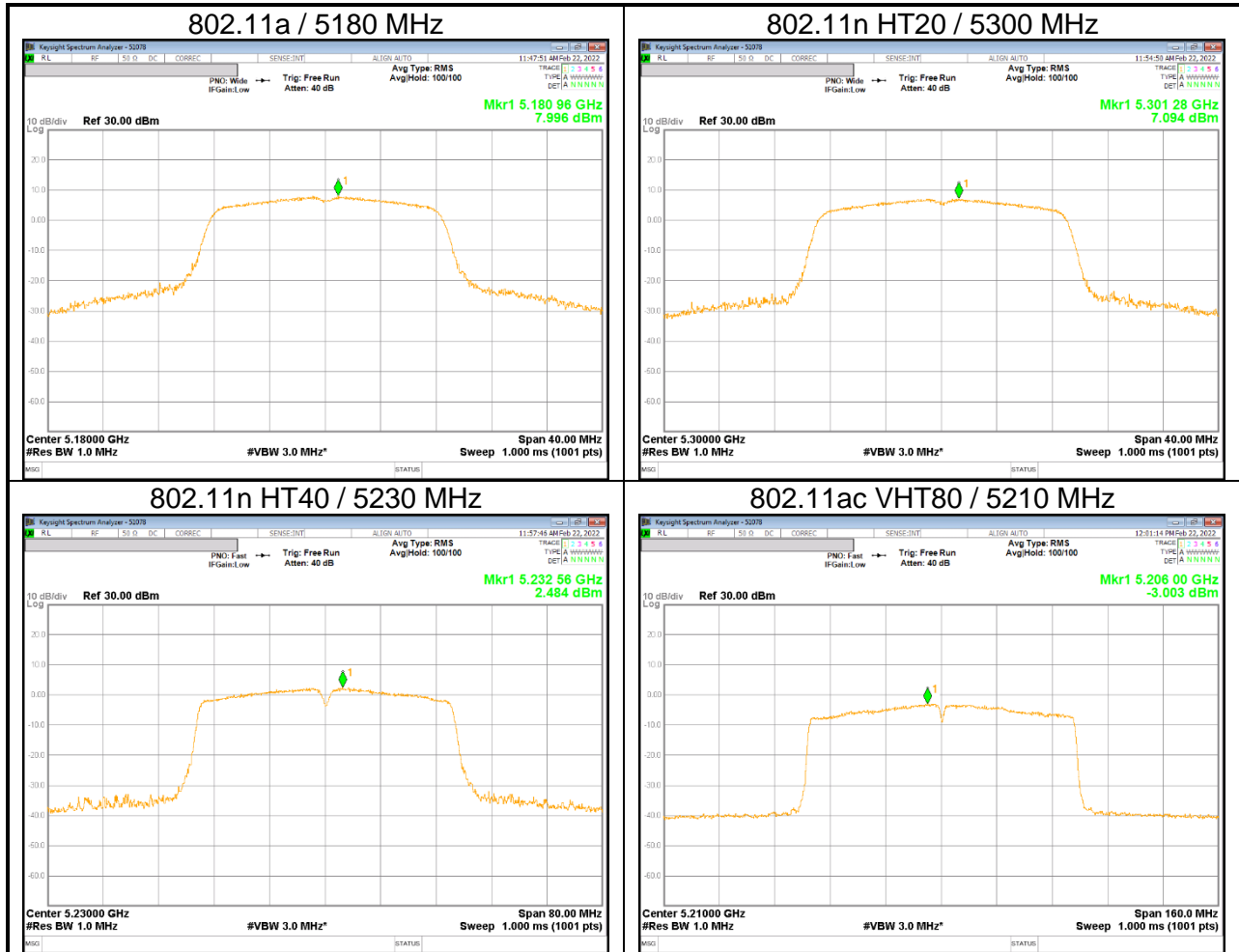
* Calculation of Output Power : Corr'd Power = Meas. Power + Duty CF [dB]

PSD Results

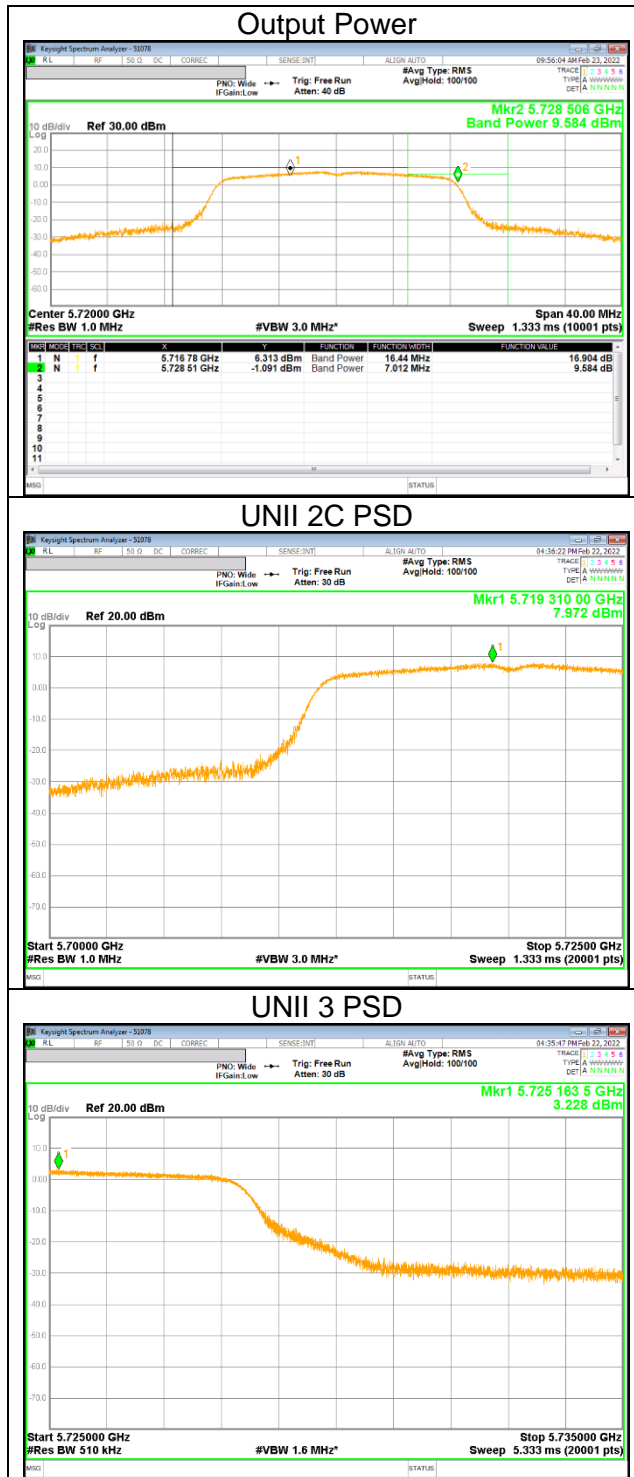
Mode	Band	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
802.11a	UNII-2C	5720	7.972	-	7.972	11.00
	UNII-3		3.228	-	3.228	30.00/500kHz
802.11n HT20	UNII-2C	5720	6.433	-	6.433	11.00
	UNII-3		1.898	-	1.898	30.00/500kHz
802.11n HT40	UNII-2C	5710	2.668	0.34	3.008	11.00
	UNII-3		-3.355	0.34	-3.015	30.00/500kHz
802.11ac VHT80	UNII-2C	5690	-2.932	0.44	-2.492	11.00
	UNII-3		-9.397	0.44	-8.957	30.00/500kHz

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

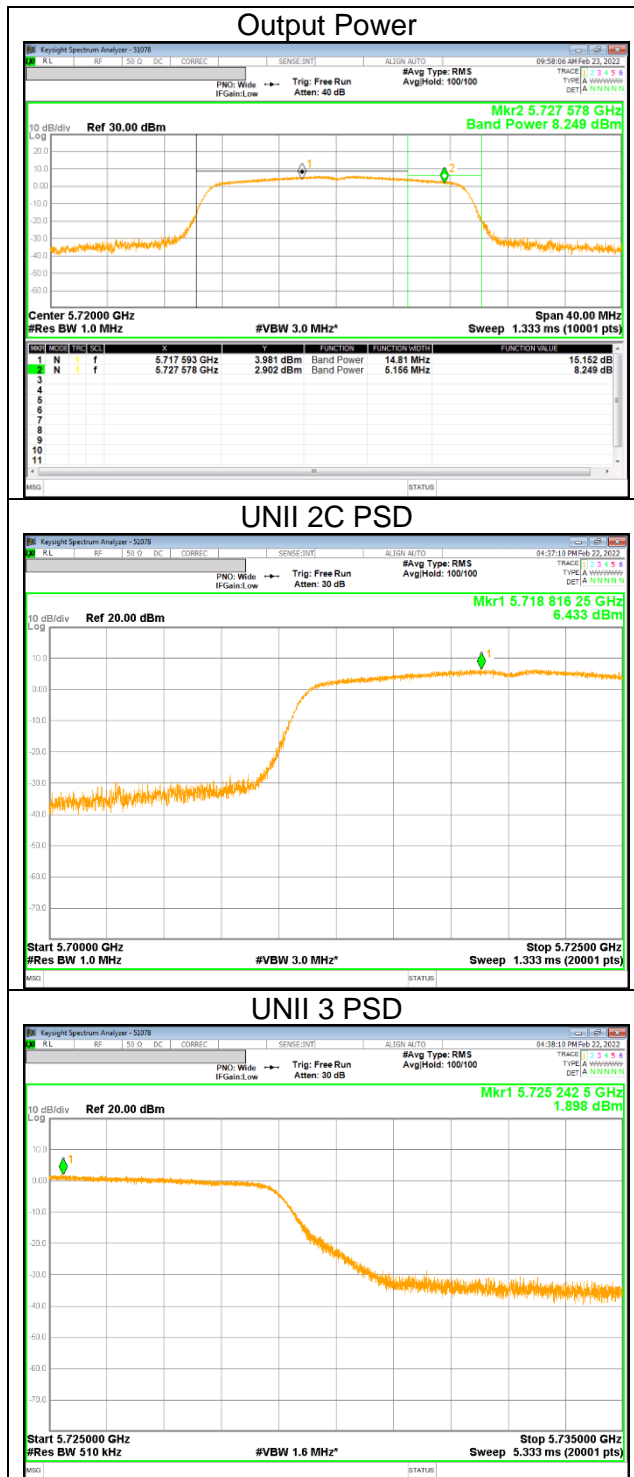
10.2.6. OUTPUT POWER AND PPSD PLOTS (WORST CASE)



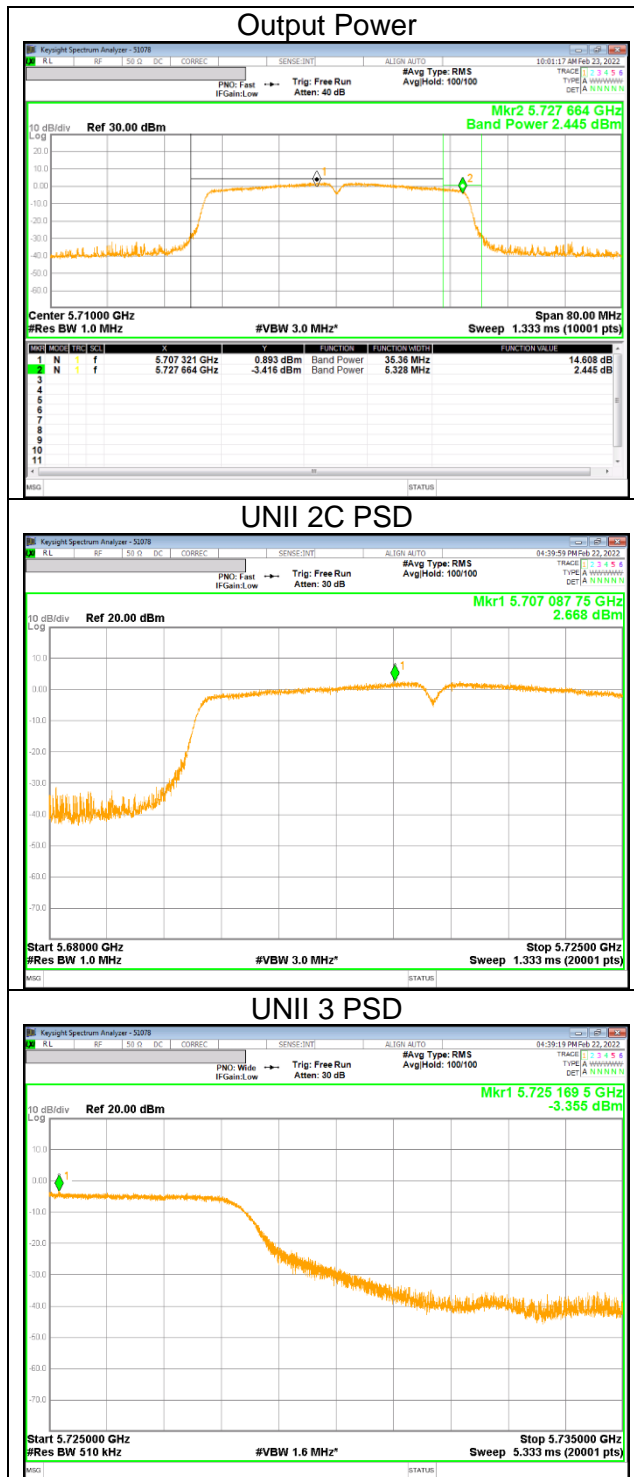
UNII Straddle Ch. IEEE 802.11a mode Output Power and PSD



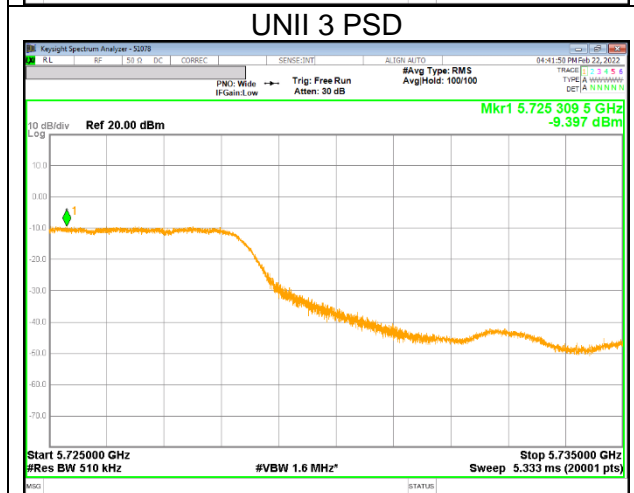
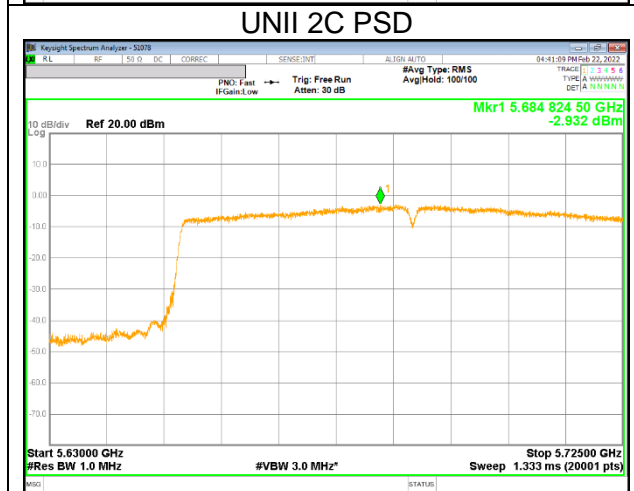
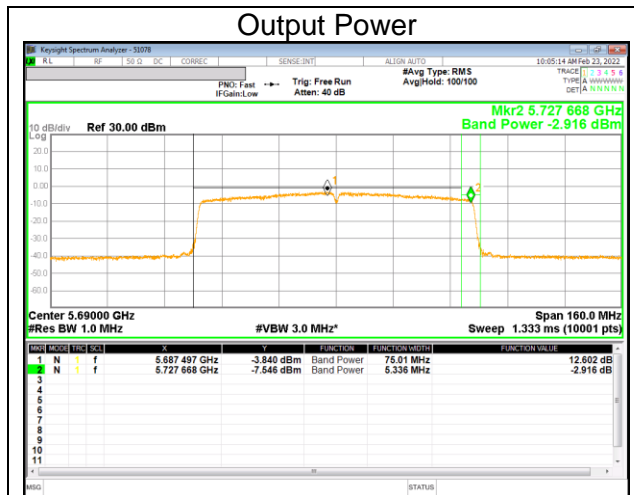
UNII Straddle Ch. IEEE 802.11n HT20 mode Output Power and PSD



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



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



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.
 - (iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz
- (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)

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$$

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -17\text{dBm} + 95.2 = 78.2\text{dBuV/m}$$

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. In UNII-4, unwanted emissions outside of restricted bands are measured with an RMS detector.

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.

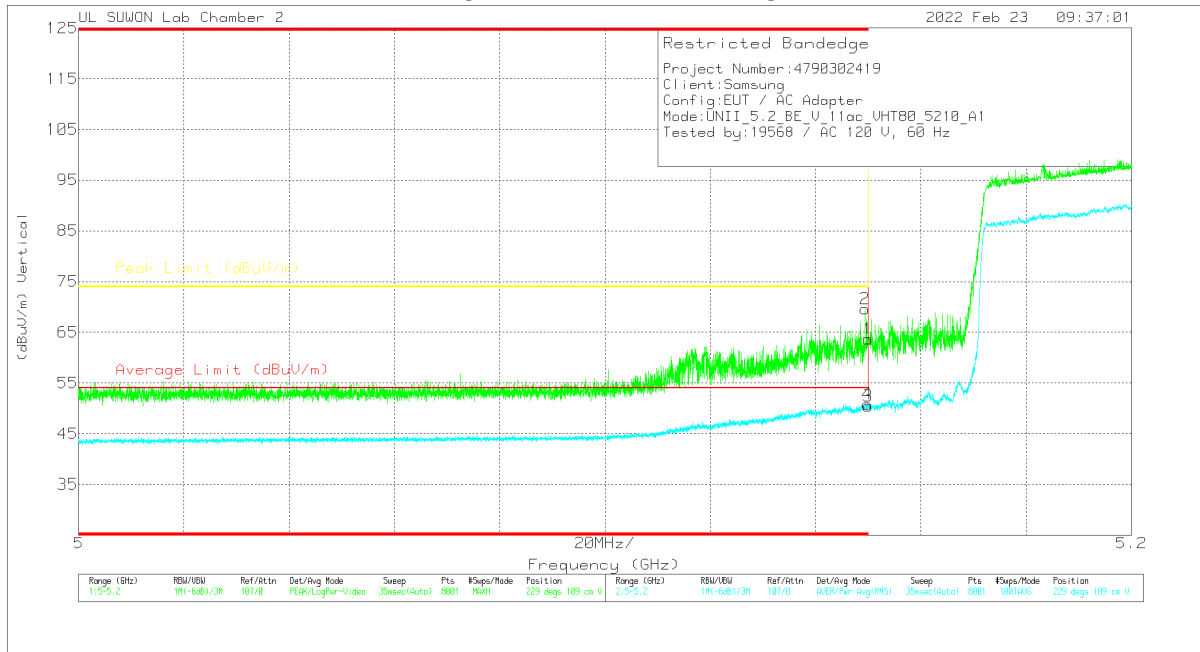
Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open area 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.

11.1. TX ABOVE 1GHz 1Tx MODE IN THE 5.2GHz BAND

BANDEDGE (WORST CASE: 802.11ac VHT80 / 5210 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimath (Degs)	Height (cm)	Polarity
1	* 5.15	47.32	Pk	34.4	-18	0	63.72	-	-	74	-10.28	229	109	V
2	* 5.14935	53.24	Pk	34.4	-18	0	69.64	-	-	74	-4.36	229	109	V
3	* 5.15	33.62	RMS	34.4	-18	45	50.47	54	-3.53	-	-	229	109	V
4	* 5.14988	34.03	RMS	34.4	-18	45	50.88	54	-3.12	-	-	229	109	V

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

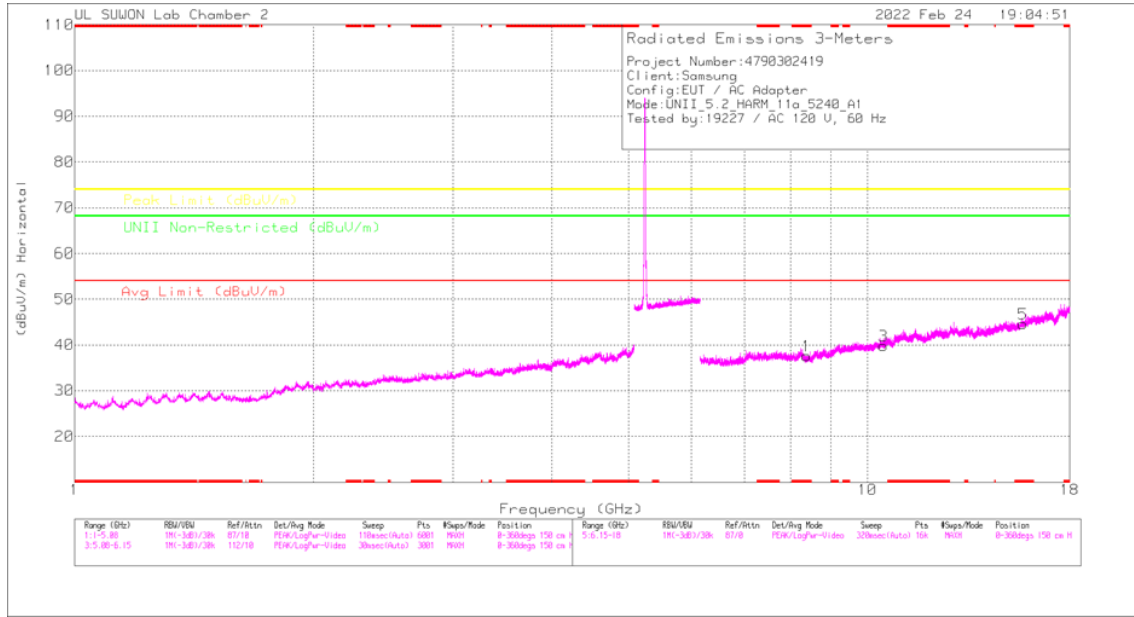
BANDEDGE TEST DATA

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	ANT1	* 5.15	39.62	Pk	34.40	-18.00	0.00	56.02	-	-	74.00	-17.98	108	381	H
			* 5.14753	42.19	Pk	34.40	-18.10	0.00	58.49	-	-	74.00	-15.51	108	381	H
			* 5.15	28.53	RMS	34.40	-18.00	0.00	44.93	54.00	-9.07	-	-	108	381	H
			* 5.14935	29.01	RMS	34.40	-18.00	0.00	45.41	54.00	-8.59	-	-	108	381	H
			* 5.15	46.17	Pk	34.40	-18.00	0.00	62.57	-	-	74.00	-11.43	188	104	V
			* 5.14993	51.34	Pk	34.40	-18.00	0.00	67.74	-	-	74.00	-6.26	188	104	V
			* 5.15	32.20	RMS	34.40	-18.00	0.00	48.60	54.00	-5.40	-	-	188	104	V
* 5.14963	33.27	RMS	34.40	-18.00	0.00	49.67	54.00	-4.33	-	-	188	104	V			
802.11n (HT20)	5180	ANT1	* 5.15	38.07	Pk	34.40	-18.00	0.00	54.47	-	-	74.00	-19.53	207	100	H
			* 5.14985	40.14	Pk	34.40	-18.00	0.00	56.54	-	-	74.00	-17.46	207	100	H
			* 5.15	27.44	RMS	34.40	-18.00	0.00	43.84	54.00	-10.16	-	-	207	100	H
			* 5.14988	28.02	RMS	34.40	-18.00	0.00	44.42	54.00	-9.58	-	-	207	100	H
			* 5.15	44.30	Pk	34.40	-18.00	0.00	60.70	-	-	74.00	-13.30	188	104	V
			* 5.1463	46.36	Pk	34.40	-18.10	0.00	62.66	-	-	74.00	-11.34	188	104	V
			* 5.15	30.02	RMS	34.40	-18.00	0.00	46.42	54.00	-7.58	-	-	188	104	V
* 5.14948	30.57	RMS	34.40	-18.00	0.00	46.97	54.00	-7.03	-	-	188	104	V			
802.11n (HT40)	5190	ANT1	* 5.15	40.39	Pk	34.40	-18.00	0.00	56.79	-	-	74.00	-17.21	202	101	H
			* 5.14935	40.81	Pk	34.40	-18.00	0.00	57.21	-	-	74.00	-16.79	202	101	H
			* 5.15	27.12	RMS	34.40	-18.00	0.34	43.86	54.00	-10.14	-	-	202	101	H
			* 5.14878	27.76	RMS	34.40	-18.00	0.34	44.50	54.00	-9.50	-	-	202	101	H
			* 5.15	50.32	Pk	34.40	-18.00	0.00	66.72	-	-	74.00	-7.28	197	100	V
			* 5.14995	50.95	Pk	34.40	-18.00	0.00	67.35	-	-	74.00	-6.65	197	100	V
			* 5.15	32.40	RMS	34.40	-18.00	0.00	48.80	54.00	-5.20	-	-	197	100	V
* 5.14995	33.09	RMS	34.40	-18.00	0.00	49.49	54.00	-4.51	-	-	197	100	V			
802.11ac (VHT80)	5210	ANT1	* 5.15	37.83	Pk	34.40	-18.00	0.00	54.23	-	-	74.00	-19.77	26	100	H
			* 5.1459	41.47	Pk	34.40	-18.10	0.00	57.77	-	-	74.00	-16.23	26	100	H
			* 5.15	28.18	RMS	34.40	-18.00	0.45	45.03	54.00	-8.97	-	-	26	100	H
			* 5.1485	28.50	RMS	34.40	-18.00	0.45	45.35	54.00	-8.65	-	-	26	100	H
			* 5.15	47.32	Pk	34.40	-18.00	0.00	63.72	-	-	74.00	-10.28	229	109	V
			* 5.14935	53.24	Pk	34.40	-18.00	0.00	69.64	-	-	74.00	-4.36	229	109	V
			* 5.15	33.62	RMS	34.40	-18.00	0.45	50.47	54.00	-3.53	-	-	229	109	V
* 5.14988	34.03	RMS	34.40	-18.00	0.45	50.88	54.00	-3.12	-	-	229	109	V			

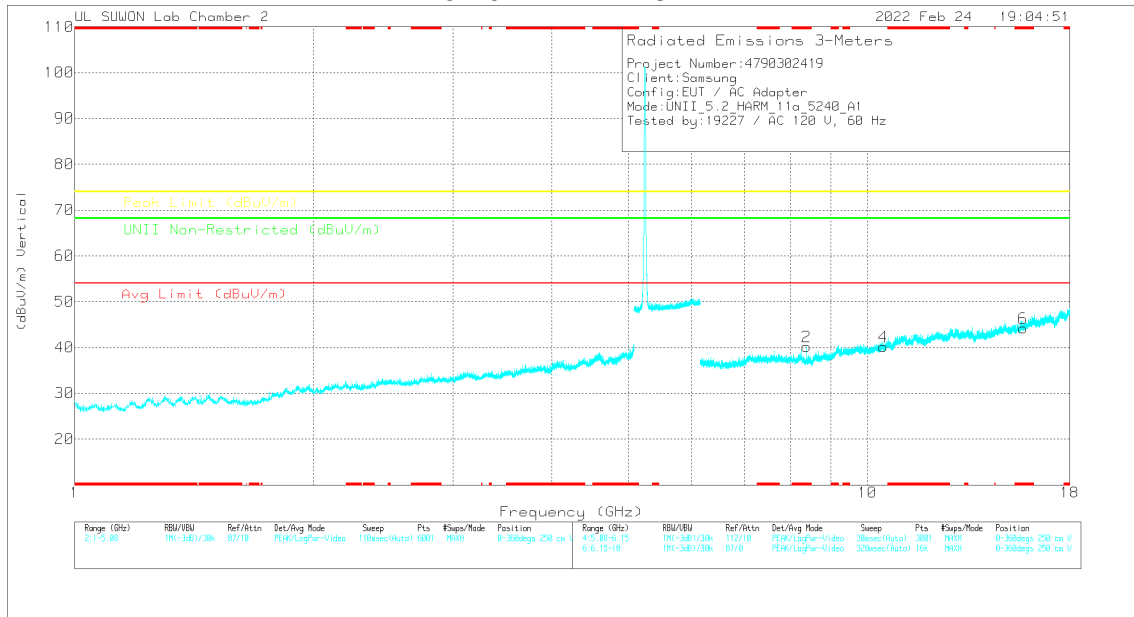
Note1. Pk - Peak detector, RMS - RMS detector

Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 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.

Radiated Emissions

Frequency (GHz)	Max Reading (dBuV)	Det	317_0016924	6GHz_HPSSE	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Height) (m)	Height (m)	Polarity
* 8.38455	36.11	PK-U	36	-23.6	0	49.51	-	-17.05	74	-25.49	-	-	218	284	H
* 8.38393	24.55	ADR	36	-23.6	0	36.95	54	-	-	-	-	-	218	284	H
* 8.38385	37	PK-U	36	-23.6	0	49.4	-	-	74	-24.6	-	-	199	241	V
* 8.38401	27.58	ADR	36	-23.6	0	39.98	54	-14.02	-	-	-	-	199	241	V
10.48236	33.75	PK-U	37.8	-20.7	0	50.85	-	-	-	-	68.2	-17.35	0	100	H
10.47122	33.7	PK-U	37.8	-20.7	0	50.8	-	-	-	-	68.2	-17.4	0	100	V
* 15.71607	34.59	PK-U	40.2	-19.6	0	55.19	-	-	74	-18.81	-	-	0	100	H
* 15.71878	34.5	PK-U	40.2	-19.6	0	55.1	-	-	74	-18.9	-	-	0	100	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 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	ANT1	* 8.28798	36.66	PK-U	35.90	-22.80	0.00	49.76	-	-	74.00	-24.24	-	-	237	240	H	
			* 8.28788	25.79	ADR	35.90	-22.80	0.00	38.89	54.00	-15.11	-	-	-	-	-	237	240	H
			* 8.2881	36.97	PK-U	35.90	-22.80	0.00	50.07	-	-	-	74.00	-23.93	-	-	192	100	V
			* 8.2879	26.70	ADR	35.90	-22.80	0.00	39.80	54.00	-14.20	-	-	-	-	-	192	100	V
			10.358	33.69	PK-U	37.70	-20.90	0.00	50.49	-	-	-	-	-	68.20	-17.71	0	100	H
			10.360	33.48	PK-U	37.70	-20.90	0.00	50.28	-	-	-	-	-	68.20	-17.92	0	100	V
	* 15.53199	33.86	PK-U	40.00	-19.60	0.00	54.26	-	-	-	-	74.00	-19.74	-	-	0	100	H	
	* 15.52274	34.24	PK-U	39.90	-19.60	0.00	54.54	-	-	-	-	74.00	-19.46	-	-	0	100	V	
	* 8.32034	35.70	PK-U	36.00	-22.90	0.00	48.80	-	-	-	-	74.00	-25.20	-	-	192	123	H	
	* 8.31988	24.72	ADR	36.00	-22.90	0.00	37.82	54.00	-16.18	-	-	-	-	-	-	192	123	H	
	* 8.3198	36.36	PK-U	36.00	-22.90	0.00	49.46	-	-	-	-	74.00	-24.54	-	-	189	100	V	
	* 8.31998	26.73	ADR	36.00	-22.90	0.00	39.83	54.00	-14.17	-	-	-	-	-	-	189	100	V	
	10.408	33.59	PK-U	37.70	-20.90	0.00	50.39	-	-	-	-	-	-	68.20	-17.81	0	100	H	
	10.392	33.56	PK-U	37.70	-21.00	0.00	50.26	-	-	-	-	-	-	68.20	-17.94	0	100	V	
	* 15.6073	34.50	PK-U	40.00	-19.90	0.00	54.60	-	-	-	-	74.00	-19.40	-	-	0	100	H	
* 15.60136	34.81	PK-U	40.00	-19.90	0.00	54.91	-	-	-	-	74.00	-19.09	-	-	0	100	V		
* 8.38455	36.11	PK-U	36.00	-23.60	0.00	48.51	-	-	-	-	74.00	-25.49	-	-	218	284	H		
* 8.38393	24.55	ADR	36.00	-23.60	0.00	36.95	54.00	-17.05	-	-	-	-	-	-	218	284	H		
* 8.38385	37.00	PK-U	36.00	-23.60	0.00	49.40	-	-	-	-	74.00	-24.60	-	-	199	241	V		
* 8.38401	27.58	ADR	36.00	-23.60	0.00	39.98	54.00	-14.02	-	-	-	-	-	-	199	241	V		
10.482	33.75	PK-U	37.80	-20.70	0.00	50.85	-	-	-	-	-	-	68.20	-17.35	0	100	H		
10.471	33.70	PK-U	37.80	-20.70	0.00	50.80	-	-	-	-	-	-	68.20	-17.40	0	100	V		
* 15.71607	34.59	PK-U	40.20	-19.60	0.00	55.19	-	-	-	-	74.00	-18.81	-	-	0	100	H		
* 15.71878	34.50	PK-U	40.20	-19.60	0.00	55.10	-	-	-	-	74.00	-18.90	-	-	0	100	V		

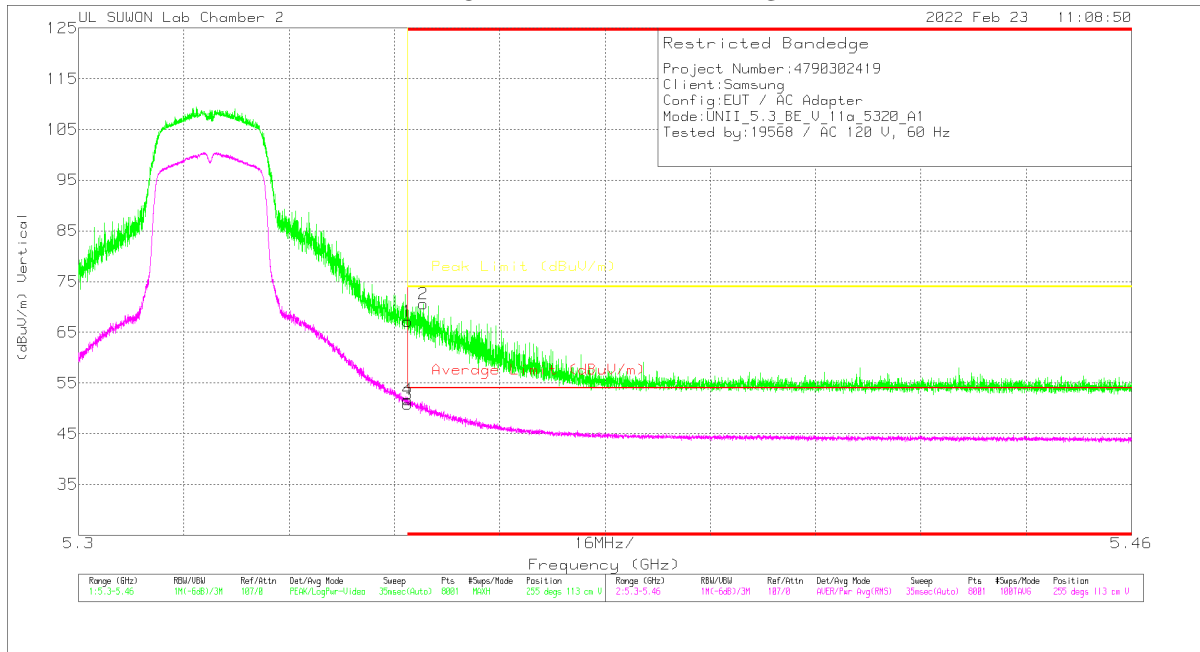
Note1. PK-U - U-NII: Maximum Peak

Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

11.2. TX ABOVE 1GHz 1Tx MODE IN THE 5.3GHz BAND

BANDEDGE (WORST CASE: 802.11a / 5320 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168/24	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimath (Degs)	Height (cm)	Polarity
1	* 5.35002	50.65	PK	34.5	-18	0	67.15	-	-	74	-6.85	255	113	V
2	* 5.35234	54.13	PK	34.5	-18	0	70.63	-	-	74	-3.37	255	113	V
3	* 5.35002	34.38	RMS	34.5	-18	0	50.88	54	-3.12	-	-	255	113	V
4	* 5.35004	35.21	RMS	34.5	-18	0	51.71	54	-2.29	-	-	255	113	V

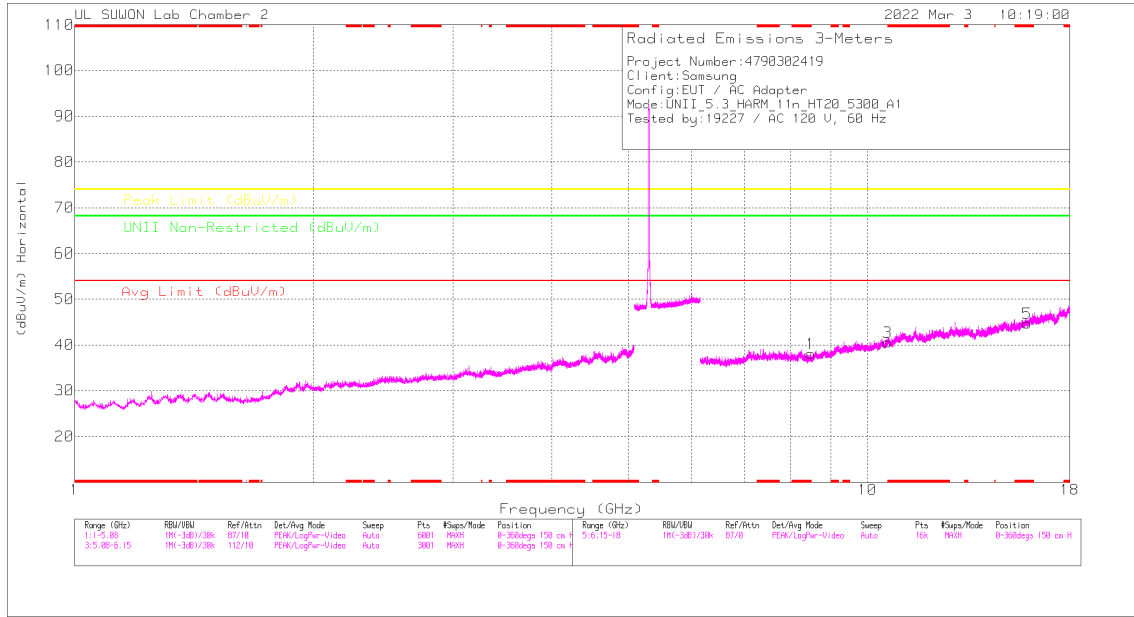
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

BANDEDGE TEST DATA

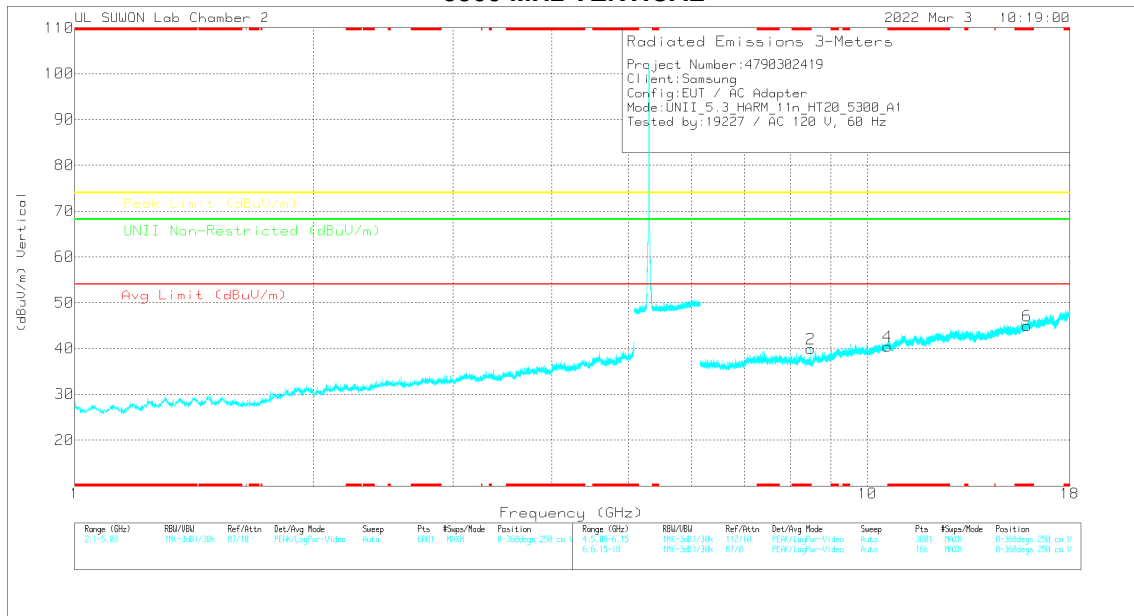
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity	
802.11a	5320	ANT1	* 5.35002	43.17	Pk	34.50	-18.00	0.00	59.67	-	-	74.00	-14.33	161	103	H	
			* 5.35268	46.70	Pk	34.50	-18.00	0.00	63.20	-	-	74.00	-10.80	-	161	103	H
			* 5.35002	30.36	RMS	34.50	-18.00	0.00	46.86	54.00	-7.14	-	-	-	161	103	H
			* 5.35004	30.51	RMS	34.50	-18.00	0.00	47.01	54.00	-6.99	-	-	-	161	103	H
			* 5.35002	50.65	Pk	34.50	-18.00	0.00	67.15	-	-	74.00	-6.85	-	255	113	V
			* 5.35234	54.13	Pk	34.50	-18.00	0.00	70.63	-	-	74.00	-3.37	-	255	113	V
			* 5.35002	34.38	RMS	34.50	-18.00	0.00	50.88	54.00	-3.12	-	-	-	255	113	V
802.11n (HT20)	5320	ANT1	* 5.35004	35.21	RMS	34.50	-18.00	0.00	51.71	54.00	-2.29	-	-	255	113	V	
			* 5.35002	41.32	Pk	34.50	-18.00	0.00	57.82	-	-	74.00	-16.18	180	100	H	
			* 5.354	45.73	Pk	34.50	-18.00	0.00	62.23	-	-	74.00	-11.77	180	100	H	
			* 5.35002	28.92	RMS	34.50	-18.00	0.00	45.42	54.00	-8.58	-	-	-	180	100	H
			* 5.35006	29.21	RMS	34.50	-18.00	0.00	45.71	54.00	-8.29	-	-	-	180	100	H
			* 5.35002	48.77	Pk	34.50	-18.00	0.00	65.27	-	-	74.00	-8.73	-	259	106	V
			* 5.35096	52.29	Pk	34.50	-18.00	0.00	68.79	-	-	74.00	-5.21	-	259	106	V
802.11n (HT40)	5310	ANT1	* 5.35002	33.15	RMS	34.50	-18.00	0.00	49.65	54.00	-4.35	-	-	259	106	V	
			* 5.35003	34.03	RMS	34.50	-18.00	0.00	50.53	54.00	-3.47	-	-	259	106	V	
			* 5.35002	37.45	Pk	34.50	-18.00	0.00	53.95	-	-	74.00	-20.05	196	107	H	
			* 5.35106	42.66	Pk	34.50	-18.00	0.00	59.16	-	-	74.00	-14.84	196	107	H	
			* 5.35002	26.88	RMS	34.50	-18.00	0.34	43.72	54.00	-10.28	-	-	-	196	107	H
			* 5.4494	27.55	RMS	34.60	-18.10	0.34	44.39	54.00	-9.61	-	-	-	196	107	H
			* 5.35002	52.45	Pk	34.50	-18.00	0.00	68.95	-	-	74.00	-5.05	-	193	100	V
802.11ac (VHT80)	5290	ANT1	* 5.35022	52.94	Pk	34.50	-18.00	0.00	69.44	-	-	74.00	-4.56	193	100	V	
			* 5.35002	30.61	RMS	34.50	-18.00	0.34	47.45	54.00	-6.55	-	-	193	100	V	
			* 5.35048	32.50	RMS	34.50	-18.00	0.34	49.34	54.00	-4.66	-	-	-	193	100	V
			* 5.35002	40.09	Pk	34.50	-18.00	0.00	56.59	-	-	74.00	-17.41	161	102	H	
			* 5.36476	43.64	Pk	34.50	-18.00	0.00	60.14	-	-	74.00	-13.86	161	102	H	
			* 5.35002	28.18	RMS	34.50	-18.00	0.45	45.13	54.00	-8.87	-	-	-	161	102	H
			* 5.35126	28.58	RMS	34.50	-18.00	0.45	45.53	54.00	-8.47	-	-	-	161	102	H
802.11ac (VHT80)	5290	ANT1	* 5.35002	43.38	Pk	34.50	-18.00	0.00	59.88	-	-	74.00	-14.12	260	109	V	
			* 5.35286	49.67	Pk	34.50	-18.00	0.00	66.17	-	-	74.00	-7.83	260	109	V	
			* 5.35002	31.90	RMS	34.50	-18.00	0.45	48.85	54.00	-5.15	-	-	-	260	109	V
			* 5.35004	32.78	RMS	34.50	-18.00	0.45	49.73	54.00	-4.27	-	-	-	260	109	V

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

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11n HT20 / 5300 MHz)
5300 MHz HORIZONTAL



5300 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.

Radiated Emissions

Frequency (GHz)	Meas Reading (dBm)	Det	317_00168724	6GHz_HPS(B)	DC Corr (dB)	Corrected Reading (dBm)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Altitude (m)	Height (m)	Polarity
* 8.48021	36.6	PK-U	36	-23.2	0	49.4	-	-	74	-24.6	-	-	242	223	H
* 8.47991	25.84	ADR	36	-23.3	0	38.54	54	-15.46	-	-	-	-	242	223	H
* 8.47982	37.04	PK-U	36	-23.3	0	49.74	-	-	74	-24.26	-	-	183	100	V
* 8.47989	28.08	ADR	36	-23.3	0	40.78	54	-13.22	-	-	-	-	183	100	V
10.59112	33.01	PK-U	37.9	-19.6	0	51.31	-	-	-	-	68.2	-16.89	0	100	H
10.59066	33.16	PK-U	37.9	-19.6	0	51.46	-	-	-	-	68.2	-16.74	0	100	V
* 15.9027	34.42	PK-U	40.5	-19.2	0	55.72	-	-	74	-18.28	-	-	0	100	H
* 15.89755	34.47	PK-U	40.5	-19.3	0	55.67	-	-	74	-18.33	-	-	0	100	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 TEST DATA

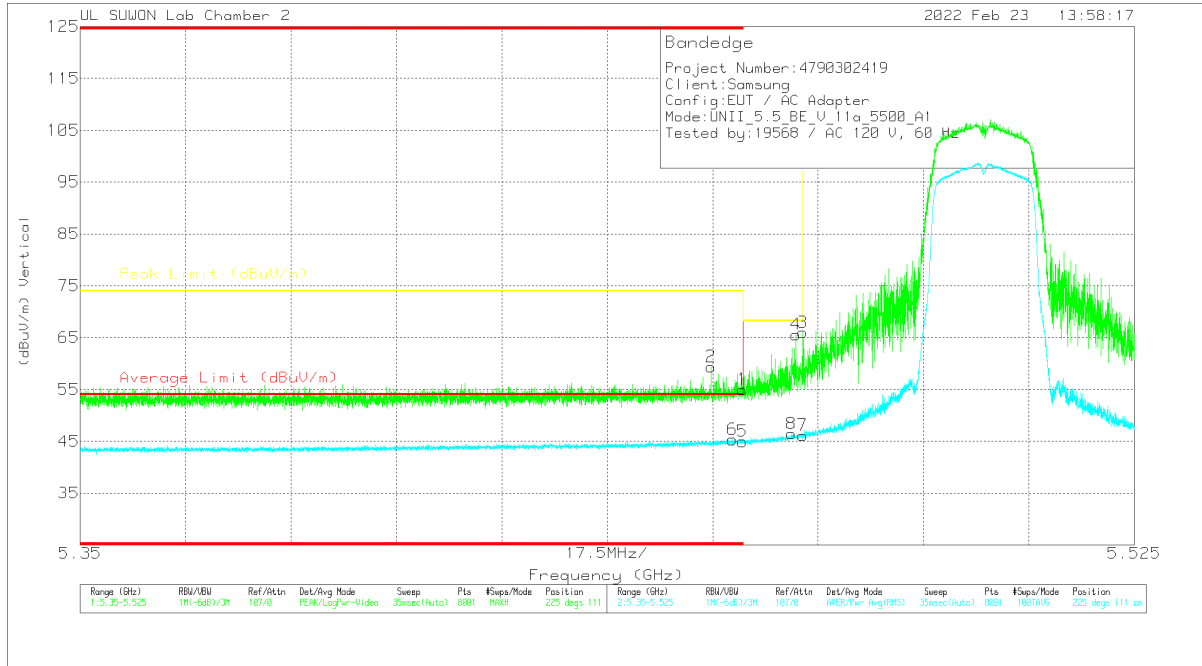
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity		
802.11a	5260	ANT1	* 8.41599	37.26	PK-U	36.00	-23.40	0.00	49.86	-	-	74.00	-24.14	-	-	215	113	H		
			* 8.41602	25.85	ADR	36.00	-23.40	0.00	38.45	54.00	-15.55	-	-	-	-	-	215	113	H	
			* 8.41554	36.80	PK-U	36.00	-23.40	0.00	49.40	-	-	-	74.00	-24.60	-	-	179	100	V	
			* 8.41592	27.03	ADR	36.00	-23.40	0.00	39.63	54.00	-14.37	-	-	-	-	-	179	100	V	
			* 10.517	33.73	PK-U	37.80	-20.60	0.00	50.93	-	-	-	-	-	68.20	-17.27	0	100	H	
			* 10.516	33.32	PK-U	37.80	-20.60	0.00	50.52	-	-	-	-	-	68.20	-17.68	0	100	V	
			* 15.77652	34.62	PK-U	40.30	-19.70	0.00	55.22	-	-	-	-	74.00	-18.78	-	0	100	H	
	* 15.77783	34.71	PK-U	40.30	-19.80	0.00	55.21	-	-	-	-	74.00	-18.79	-	0	100	V			
	* 8.47985	36.29	PK-U	36.00	-23.30	0.00	48.99	-	-	-	-	74.00	-25.01	-	-	216	109	H		
	* 8.47998	25.27	ADR	36.00	-23.20	0.00	38.07	54.00	-15.93	-	-	-	-	-	216	109	H			
	* 8.48	36.84	PK-U	36.00	-23.20	0.00	49.64	-	-	-	-	74.00	-24.36	-	-	202	234	V		
	* 8.47994	27.38	ADR	36.00	-23.20	0.00	40.18	54.00	-13.82	-	-	-	-	-	202	234	V			
	* 10.599	32.83	PK-U	37.90	-19.50	0.00	51.23	-	-	-	-	-	68.20	-16.97	0	100	H			
	* 10.596	33.40	PK-U	37.90	-19.60	0.00	51.70	-	-	-	-	-	68.20	-16.50	0	100	V			
	* 15.89635	34.15	PK-U	40.50	-19.30	0.00	55.35	-	-	-	-	74.00	-18.65	-	0	100	H			
	* 15.89373	34.48	PK-U	40.50	-19.30	0.00	55.68	-	-	-	-	74.00	-18.32	-	0	100	V			
	* 8.512	36.43	PK-U	36.00	-23.10	0.00	49.33	-	-	-	-	-	68.20	-18.87	215	106	H			
	* 8.512	37.61	PK-U	36.00	-23.10	0.00	50.51	-	-	-	-	-	68.20	-17.69	201	232	V			
	* 10.63822	33.44	PK-U	37.90	-19.60	0.00	51.74	-	-	-	-	74.00	-22.26	-	0	100	H			
	* 10.64061	33.54	PK-U	37.90	-19.60	0.00	51.84	-	-	-	-	74.00	-22.16	-	0	100	V			
	* 15.9697	35.02	PK-U	40.60	-19.30	0.00	56.32	-	-	-	-	74.00	-17.68	-	0	100	H			
* 15.95467	34.77	PK-U	40.60	-19.30	0.00	56.07	-	-	-	-	74.00	-17.93	-	0	100	V				
802.11n (HT20) Spot-Check	5300	ANT1	* 8.48021	36.60	PK-U	36.00	-23.20	0.00	49.40	-	-	74.00	-24.60	-	-	242	223	H		
			* 8.47991	25.84	ADR	36.00	-23.30	0.00	38.54	54.00	-15.46	-	-	-	-	242	223	H		
			* 8.47962	37.04	PK-U	36.00	-23.30	0.00	49.74	-	-	-	74.00	-24.26	-	-	183	100	V	
			* 8.47989	28.08	ADR	36.00	-23.30	0.00	40.78	54.00	-13.22	-	-	-	-	183	100	V		
			* 10.591	33.01	PK-U	37.90	-19.60	0.00	51.31	-	-	-	-	-	68.20	-16.89	0	100	H	
			* 10.591	33.16	PK-U	37.90	-19.60	0.00	51.46	-	-	-	-	-	68.20	-16.74	0	100	V	
			* 15.9027	34.42	PK-U	40.50	-19.20	0.00	55.72	-	-	-	-	74.00	-18.28	-	0	100	H	
			* 15.89755	34.47	PK-U	40.50	-19.30	0.00	55.67	-	-	-	-	74.00	-18.33	-	0	100	V	
			* 8.49399	36.12	PK-U	36.00	-23.30	0.00	48.82	-	-	-	-	74.00	-25.18	-	-	242	231	H
			* 8.49601	25.20	ADR	36.00	-23.30	0.34	38.24	54.00	-15.76	-	-	-	-	-	242	231	H	
802.11n (HT40) Spot-Check	5310	ANT1	* 8.504	35.30	PK-U	36.00	-23.20	0.00	48.10	-	-	-	-	68.20	-20.10	184	104	V		
			* 8.503	22.78	ADR	36.00	-23.20	0.34	35.92	-	-	-	-	-	-	184	104	V		
			* 10.62563	33.58	PK-U	37.90	-19.50	0.00	51.98	-	-	-	74.00	-22.02	-	0	100	H		
			* 10.6209	33.01	PK-U	37.90	-19.40	0.00	51.51	-	-	-	74.00	-22.49	-	0	100	V		
			* 15.93782	34.02	PK-U	40.60	-19.40	0.00	55.22	-	-	-	74.00	-18.78	-	0	100	H		
			* 15.92235	34.31	PK-U	40.60	-19.20	0.00	55.71	-	-	-	-	74.00	-18.29	-	0	100	V	
			* 8.4636	36.43	PK-U	36.00	-23.10	0.00	49.33	-	-	-	-	74.00	-24.67	-	240	234	H	
			* 8.46406	24.97	ADR	36.00	-23.10	0.44	38.31	54.00	-15.69	-	-	-	-	-	240	234	H	
			* 8.46397	37.01	PK-U	36.00	-23.10	0.00	49.91	-	-	-	-	74.00	-24.09	-	184	100	V	
			* 8.46401	27.07	ADR	36.00	-23.10	0.44	40.41	54.00	-13.59	-	-	-	-	-	184	100	V	
802.11ac (VHT80) Spot-Check	5290	ANT1	* 10.571	33.66	PK-U	37.90	-19.90	0.00	51.66	-	-	-	-	68.20	-16.54	0	100	H		
			* 10.582	33.39	PK-U	37.90	-19.70	0.00	51.59	-	-	-	-	68.20	-16.61	0	100	V		
			* 15.87415	34.69	PK-U	40.50	-19.40	0.00	55.79	-	-	-	-	74.00	-18.21	-	0	100	H	
			* 15.86421	34.49	PK-U	40.50	-19.60	0.00	55.39	-	-	-	-	74.00	-18.61	-	0	100	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 1Tx MODE IN THE 5.5 GHz BAND

BANDEDGE (WORST CASE: 802.11a / 5500 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

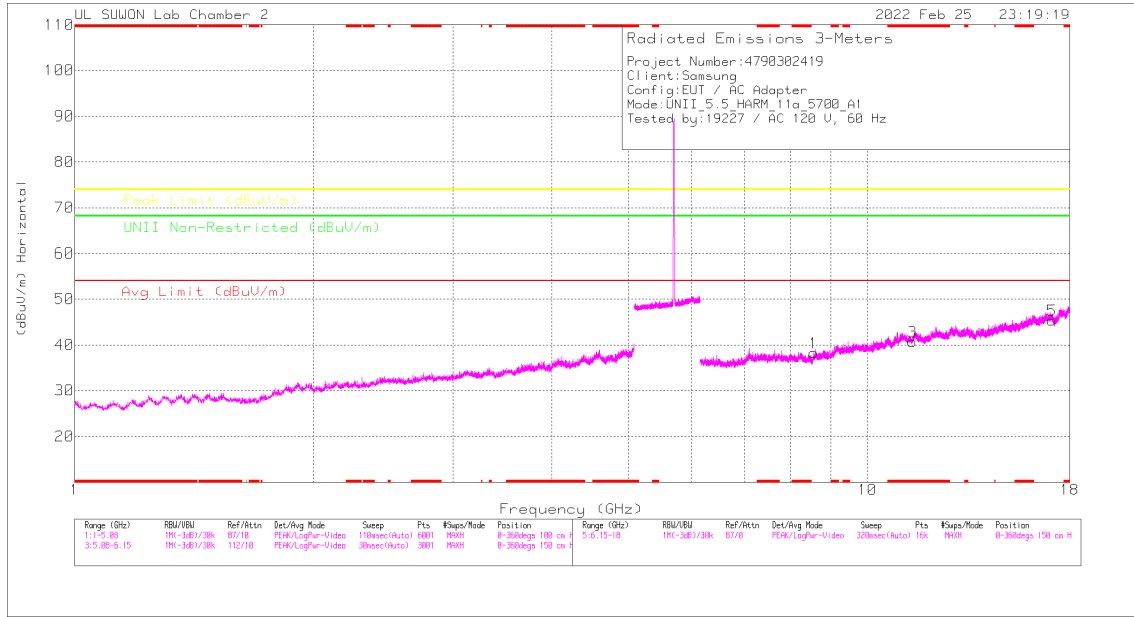
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45999	38.38	Pk	34.6	-18	0	54.98	-	-	74	-19.02	225	111	V
2	* 5.45472	42.87	Pk	34.6	-18.1	0	59.37	-	-	74	-14.63	225	111	V
3	* 5.46998	49.35	Pk	34.6	-18	0	65.99	-	-	68.2	-2.21	225	111	V
4	* 5.4688	48.98	Pk	34.6	-18	0	65.58	-	-	68.2	-2.62	225	111	V
5	* 5.45999	28.37	RMS	34.6	-18	0	44.97	54	-9.03	-	-	225	111	V
6	* 5.45826	28.84	RMS	34.6	-18.1	0	45.34	54	-8.66	-	-	225	111	V
7	* 5.46998	29.55	RMS	34.6	-18	0	46.15	-	-	-	-	225	111	V
8	* 5.46808	29.85	RMS	34.6	-18	0	46.45	-	-	-	-	225	111	V

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

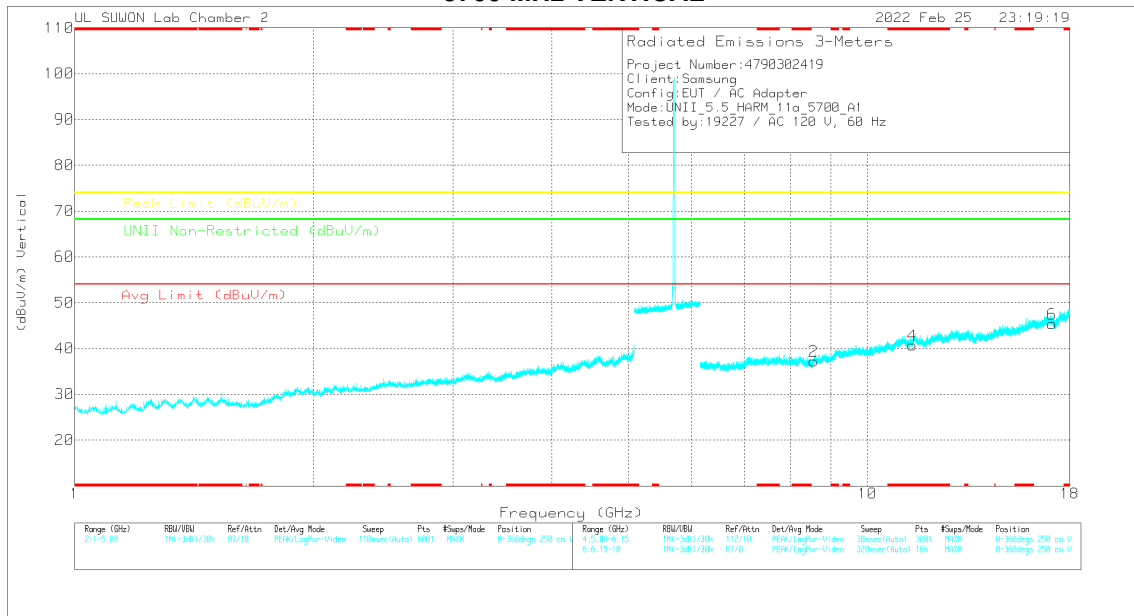
BANDEDGE TEST DATA

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	5500	ANT1	* 5.45999	35.82	Pk	34.60	-18.00	0.00	52.42	-	-	74.00	-21.58	162	137	H			
			* 5.39683	40.08	Pk	34.50	-18.10	0.00	56.48	-	-	74.00	-17.52	162	137	H			
			5.46998	36.96	Pk	34.60	-18.00	0.00	53.56	-	-	68.20	-14.64	162	137	H			
			5.46931	40.27	Pk	34.60	-18.00	0.00	56.87	-	-	68.20	-11.33	162	137	H			
			* 5.45999	26.86	RMS	34.60	-18.00	0.00	43.46	54.00	-10.54	-	-	-	-	162	137	H	
			* 5.45994	27.62	RMS	34.60	-18.00	0.00	44.22	54.00	-9.78	-	-	-	-	162	137	H	
			5.46998	27.29	RMS	34.60	-18.00	0.00	43.89	-	-	-	-	-	-	162	137	H	
			5.46935	27.74	RMS	34.60	-18.00	0.00	44.34	-	-	-	-	-	-	162	137	H	
			* 5.45999	38.38	Pk	34.60	-18.00	0.00	54.98	-	-	74.00	-	-	-	225	111	V	
			* 5.45472	42.87	Pk	34.60	-18.10	0.00	59.37	-	-	74.00	-14.63	-	-	225	111	V	
			5.46998	49.39	Pk	34.60	-18.00	0.00	65.99	-	-	68.20	-2.21	-	-	225	111	V	
			5.46880	48.98	Pk	34.60	-18.00	0.00	65.58	-	-	68.20	-2.62	-	-	225	111	V	
			* 5.45999	28.37	RMS	34.60	-18.00	0.00	44.97	54.00	-9.03	-	-	-	-	225	111	V	
			* 5.45826	28.84	RMS	34.60	-18.10	0.00	45.34	54.00	-8.66	-	-	-	-	225	111	V	
			5.46998	29.55	RMS	34.60	-18.00	0.00	46.15	-	-	-	-	-	-	225	111	V	
			5.46808	29.85	RMS	34.60	-18.00	0.00	46.45	-	-	-	-	-	-	225	111	V	
			802.11a	5700	ANT1	5.72502	37.65	Pk	34.70	-17.40	0.00	54.95	-	-	68.20	-13.25	36	101	H
						5.72517	43.07	Pk	34.70	-17.40	0.00	60.37	-	-	68.20	-7.83	36	101	H
						5.72502	43.13	Pk	34.70	-17.40	0.00	60.43	-	-	68.20	-7.77	260	103	V
						5.72564	46.83	Pk	34.70	-17.40	0.00	64.13	-	-	68.20	-4.07	260	103	V
802.11n (HT20)	5500	ANT1	* 5.45999	36.06	Pk	34.60	-18.00	0.00	52.66	-	-	74.00	-21.34	161	135	H			
			* 5.45542	41.17	Pk	34.60	-18.10	0.00	57.67	-	-	74.00	-16.33	161	135	H			
			5.46998	38.88	Pk	34.60	-18.00	0.00	55.48	-	-	68.20	-12.72	161	135	H			
			5.46924	41.78	Pk	34.60	-18.00	0.00	58.38	-	-	68.20	-9.82	161	135	H			
			* 5.45999	27.23	RMS	34.60	-18.00	0.00	43.83	54.00	-10.17	-	-	-	-	161	135	H	
			* 5.44277	27.88	RMS	34.60	-18.10	0.00	44.38	54.00	-9.62	-	-	-	-	161	135	H	
			5.46998	27.70	RMS	34.60	-18.00	0.00	44.30	-	-	-	-	-	-	161	135	H	
			5.46977	28.12	RMS	34.60	-18.00	0.00	44.72	-	-	-	-	-	-	161	135	H	
			* 5.45999	38.46	Pk	34.60	-18.00	0.00	56.06	-	-	74.00	-17.94	-	-	232	108	V	
			* 5.45955	43.61	Pk	34.60	-18.10	0.00	60.11	-	-	74.00	-13.89	-	-	232	108	V	
			5.46998	43.50	Pk	34.60	-18.00	0.00	60.10	-	-	68.20	-8.10	-	-	232	108	V	
			5.46990	48.27	Pk	34.60	-18.00	0.00	64.87	-	-	68.20	-3.33	-	-	232	108	V	
			* 5.45999	28.71	RMS	34.60	-18.00	0.00	45.31	54.00	-8.69	-	-	-	-	232	108	V	
			* 5.45966	29.41	RMS	34.60	-18.10	0.00	45.91	54.00	-8.09	-	-	-	-	232	108	V	
			5.46998	30.32	RMS	34.60	-18.00	0.00	46.92	-	-	-	-	-	-	232	108	V	
			5.46990	31.26	RMS	34.60	-18.00	0.00	47.86	-	-	-	-	-	-	232	108	V	
			802.11n (HT20)	5700	ANT1	5.72502	35.69	Pk	34.70	-17.40	0.00	52.99	-	-	68.20	-15.21	38	100	H
						5.76053	40.58	Pk	34.70	-17.30	0.00	57.98	-	-	68.20	-10.22	38	100	H
						5.72502	38.98	Pk	34.70	-17.40	0.00	56.28	-	-	68.20	-11.92	257	100	V
						5.72519	48.13	Pk	34.70	-17.40	0.00	65.43	-	-	68.20	-2.77	257	100	V
802.11n (HT40)	5510	ANT1	* 5.45999	35.93	Pk	34.60	-18.00	0.00	52.53	-	-	74.00	-21.47	182	103	H			
			* 5.37236	39.35	Pk	34.50	-18.00	0.00	55.85	-	-	74.00	-18.15	182	103	H			
			5.46998	39.26	Pk	34.60	-18.00	0.00	55.86	-	-	68.20	-12.34	182	103	H			
			5.46876	40.14	Pk	34.60	-18.00	0.00	56.74	-	-	68.20	-11.46	182	103	H			
			* 5.45999	26.92	RMS	34.60	-18.00	0.34	43.86	54.00	-10.14	-	-	-	-	182	103	H	
			* 5.45014	27.59	RMS	34.60	-18.10	0.34	44.43	54.00	-9.57	-	-	-	-	182	103	H	
			5.46998	27.40	RMS	34.60	-18.00	0.34	44.34	-	-	-	-	-	-	182	103	H	
			5.46697	27.74	RMS	34.60	-18.10	0.34	44.58	-	-	-	-	-	-	182	103	H	
			* 5.45999	39.06	Pk	34.60	-18.00	0.00	55.66	-	-	74.00	-18.34	-	-	231	111	V	
			* 5.45163	44.74	Pk	34.60	-18.10	0.00	61.24	-	-	74.00	-12.76	-	-	231	111	V	
			5.46998	38.80	Pk	34.60	-18.00	0.00	55.40	-	-	68.20	-12.80	-	-	231	111	V	
			5.46994	49.03	Pk	34.60	-18.00	0.00	65.63	-	-	68.20	-2.57	-	-	231	111	V	
			* 5.45999	28.26	RMS	34.60	-18.00	0.34	45.20	54.00	-8.80	-	-	-	-	231	111	V	
			* 5.45581	28.99	RMS	34.60	-18.10	0.34	45.83	54.00	-8.17	-	-	-	-	231	111	V	
			5.46998	29.57	RMS	34.60	-18.00	0.34	46.51	-	-	-	-	-	-	231	111	V	
			5.46928	31.13	RMS	34.60	-18.00	0.34	48.07	-	-	-	-	-	-	231	111	V	
			802.11n (HT40)	5670	ANT1	5.72502	36.45	Pk	34.70	-17.40	0.00	53.75	-	-	68.20	-14.45	66	104	H
						5.80670	39.53	Pk	34.80	-17.30	0.00	57.03	-	-	68.20	-11.17	66	104	H
						5.72502	37.31	Pk	34.70	-17.40	0.00	54.61	-	-	68.20	-13.59	261	109	V
						5.72823	41.01	Pk	34.70	-17.40	0.00	58.31	-	-	68.20	-9.89	261	109	V
802.11ac (VHT80)	5530	ANT1	* 5.45999	36.95	Pk	34.60	-18.00	0.00	53.55	-	-	74.00	-20.45	155	137	H			
			* 5.45697	40.52	Pk	34.60	-18.10	0.00	57.02	-	-	74.00	-16.98	155	137	H			
			5.46998	37.61	Pk	34.60	-18.00	0.00	54.21	-	-	68.20	-13.99	155	137	H			
			5.46403	41.60	Pk	34.60	-18.10	0.00	58.10	-	-	68.20	-10.10	155	137	H			
			* 5.45999	27.23	RMS	34.60	-18.00	0.44	44.27	54.00	-9.73	-	-	-	-	155	137	H	
			* 5.45979	27.73	RMS	34.60	-18.00	0.44	44.77	54.00	-9.23	-	-	-	-	155	137	H	
			5.46998	27.46	RMS	34.60	-18.00	0.44	44.50	-	-	-	-	-	-	155	137	H	
			5.46915	28.05	RMS	34.60	-18.00	0.44	45.09	-	-	-	-	-	-	155	137	H	
			* 5.45999	42.48	Pk	34.60	-18.00	0.00	59.08	-	-	74.00	-14.92	-	-	201	107	V	
			* 5.45708	45.49	Pk	34.60	-18.00	0.00	62.09	-	-	74.00	-11.91	-	-	201	107	V	
			5.46998	41.48	Pk	34.60	-18.00	0.00	58.08	-	-	68.20	-10.12	-	-	201	107	V	
			5.46417	47.78	Pk	34.60	-18.10	0.00	64.28	-	-	68.20	-3.92	-	-	201	107	V	
			* 5.45999	29.87	RMS	34.60	-18.00	0.44	46.91	54.00	-7.09	-	-	-	-	201	107	V	
			* 5.45846	30.90	RMS	34.60	-18.10	0.44	47.84	54.00	-6.16	-	-	-	-	201	107	V	
			5.46998	31.66	RMS	34.60	-18.00	0.44	48.70	-	-	-	-	-	-	201	107	V	
			5.46955	32.30	RMS	34.60	-18.00	0.44	49.34	-	-	-	-	-	-	201	107	V	
			802.11ac (VHT80)	5610	ANT1	5.72502	35.49	Pk	34.70	-17.40	0.00	52.79	-	-	68.20	-15.41	37	106	H
						5.81133	39.79	Pk	34.80	-17.30	0.00	57.29	-	-	68.20	-10.91	37	106	H
						5.72502	38.42	Pk	34.70	-17.40	0.00	55.72	-	-	68.20	-12.48	199	107	

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5700 MHz)
5700 MHz HORIZONTAL



5700 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.

Radiated Emissions

Frequency (GHz)	Meas Reading (dBuV)	Det	317_00168724	6GHz_HPS(S)	DC Corr (dB)	Corrected Reading (dBuV)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Deg)	Height (m)	Polarity
8.56147	34.54	PK-U	36.1	-22.1	0	48.54	-	-	-	-	68.2	-19.66	0	100	H
8.55144	34.7	PK-U	36.1	-22.3	0	48.5	-	-	-	-	68.2	-19.7	0	100	V
*11.39772	34.25	PK-U	38.3	-20.2	0	52.35	-	-	74	-21.65	-	-	0	100	H
*11.40063	33.79	PK-U	38.3	-20.2	0	51.89	-	-	74	-22.12	-	-	0	100	V
17.10756	34.23	PK-U	41	-18.5	0	56.73	-	-	-	-	68.2	-11.47	0	100	H
17.09274	34.48	PK-U	41	-18.5	0	56.98	-	-	-	-	68.2	-11.22	0	100	V

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

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	ANT1	* 8.25333	35.52	PK-U	35.90	-23.00	0.00	48.42	-	-	74.00	-25.58	-	-	0	100	H	
			8.800	36.89	PK-U	36.30	-22.60	0.00	50.59	-	-	-	-	68.20	-17.61	154	100	V	
			* 10.99941	34.16	PK-U	38.20	-20.40	0.00	51.96	-	-	-	-	74.00	-22.04	-	0	100	H
			* 11.00505	34.05	PK-U	38.20	-20.40	0.00	51.85	-	-	-	-	74.00	-22.15	-	0	100	V
			16.509	34.84	PK-U	40.90	-19.60	0.00	56.14	-	-	-	-	-	68.20	-12.06	0	100	H
			16.500	34.65	PK-U	40.80	-19.60	0.00	55.85	-	-	-	-	-	68.20	-12.35	0	100	V
	5580	ANT1	* 8.36575	35.11	PK-U	36.00	-23.60	0.00	47.51	-	-	74.00	-26.49	-	-	0	100	H	
			* 11.16173	34.44	PK-U	38.30	-19.60	0.00	53.14	-	-	74.00	-20.86	-	-	0	100	H	
			16.744	34.83	PK-U	41.10	-19.10	0.00	56.83	-	-	-	-	-	68.20	-11.37	0	100	H
			* 8.3719	34.89	PK-U	36.00	-23.60	0.00	47.29	-	-	74.00	-26.71	-	-	0	100	V	
			* 11.15631	33.97	PK-U	38.30	-19.50	0.00	52.77	-	-	74.00	-21.23	-	-	0	100	V	
			16.738	34.53	PK-U	41.10	-19.00	0.00	56.63	-	-	-	-	-	68.20	-11.57	0	100	V
	5700	ANT1	8.561	34.54	PK-U	36.10	-22.10	0.00	48.54	-	-	-	-	68.20	-19.66	0	100	H	
			8.551	34.70	PK-U	36.10	-22.30	0.00	48.50	-	-	-	-	68.20	-19.70	0	100	V	
			* 11.39772	34.25	PK-U	38.30	-20.20	0.00	52.35	-	-	74.00	-21.65	-	-	0	100	H	
			* 11.40663	33.78	PK-U	38.30	-20.20	0.00	51.88	-	-	74.00	-22.12	-	-	0	100	V	
			17.108	34.23	PK-U	41.00	-18.50	0.00	56.73	-	-	-	-	-	68.20	-11.47	0	100	H
			17.093	34.48	PK-U	41.00	-18.50	0.00	56.98	-	-	-	-	-	68.20	-11.22	0	100	V
	5720	ANT1	8.589	34.31	PK-U	36.10	-21.80	0.00	48.61	-	-	-	-	68.20	-19.59	0	100	H	
			8.586	34.50	PK-U	36.10	-21.80	0.00	48.80	-	-	-	-	68.20	-19.40	0	100	V	
			* 11.44719	34.14	PK-U	38.30	-20.10	0.00	52.34	-	-	74.00	-21.66	-	-	0	100	H	
			* 11.43161	33.86	PK-U	38.30	-20.10	0.00	52.06	-	-	74.00	-21.94	-	-	0	100	V	
			17.151	33.84	PK-U	40.90	-18.30	0.00	56.44	-	-	-	-	-	68.20	-11.76	0	100	H
			17.151	33.43	PK-U	40.90	-18.40	0.00	55.93	-	-	-	-	-	68.20	-12.27	0	100	V

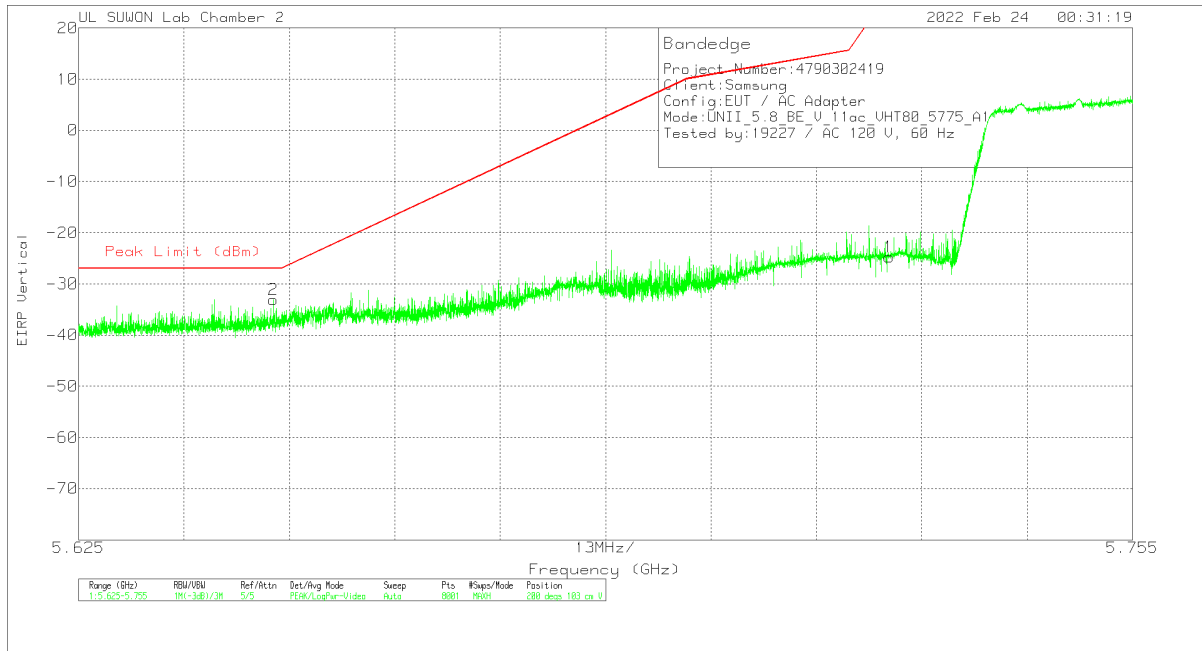
Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average

Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

11.4. TX ABOVE 1GHz 1Tx MODE IN THE 5.8 GHz BAND

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

VERTICAL PEAK DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	10dB_ATT[dB]	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.72499	-53.83	Pk		-17.4	11.8	0	-24.73	26.97	-51.7	200	103	V
2	5.64903	-61.99	Pk		-17.5	11.8	0	-33.09	-27	-6.09	200	103	V

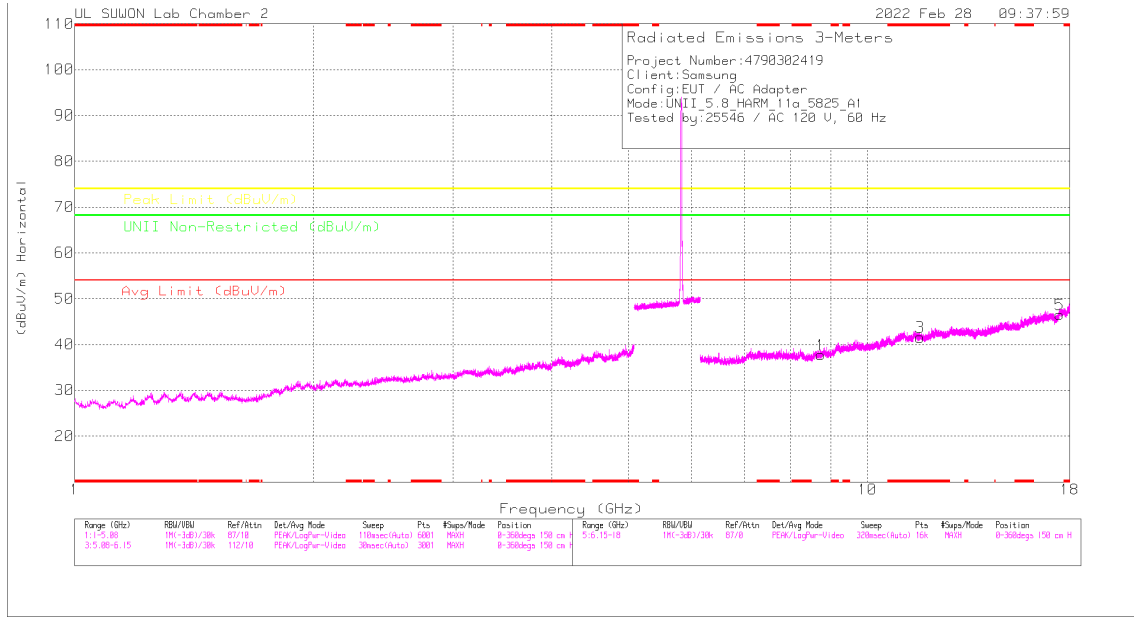
Pk - Peak detector

BANDEDGE TEST DATA

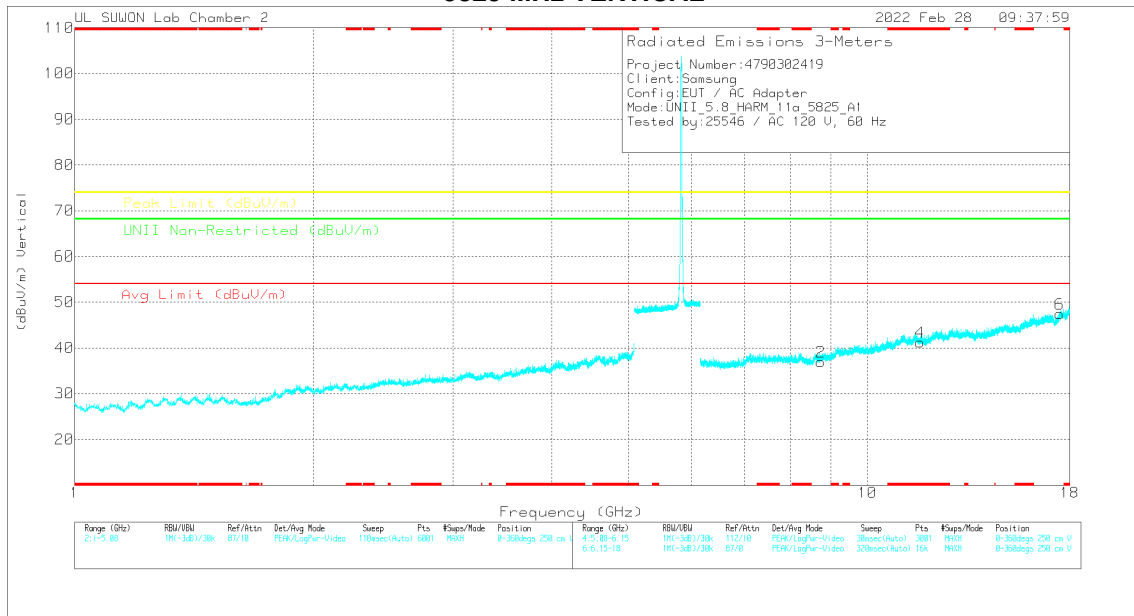
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBm]	Detector Mode	ANT Factor	Loss [dB]	Conv. F [dB]	DC Corr [dB]	Result [dBm]	PK Limit [dBm]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5745	ANT1	5.72499	-53.94	Pk	34.70	-17.40	11.80	0.00	-24.84	26.97	-51.81	35	104	H
			5.62927	-66.60	Pk	34.60	-17.60	11.80	0.00	-37.80	-27.00	-10.80	35	104	H
			5.72499	-41.73	Pk	34.70	-17.40	11.80	0.00	-12.63	26.97	-39.60	201	103	V
			5.63956	-65.29	Pk	34.60	-17.50	11.80	0.00	-36.39	-27.00	-9.39	201	103	V
			5.85003	-64.50	Pk	34.90	-17.30	11.80	0.00	-35.10	26.94	-62.04	61	106	H
	5825	ANT1	5.97823	-67.05	Pk	35.10	-17.20	11.80	0.00	-37.35	-27.00	-10.35	61	106	H
			5.85003	-54.40	Pk	34.90	-17.30	11.80	0.00	-25.00	26.94	-51.94	201	100	V
			5.96088	-66.25	Pk	35.10	-17.10	11.80	0.00	-36.45	-27.00	-9.45	201	100	V
			5.72499	-55.20	Pk	34.70	-17.40	11.80	0.00	-26.10	26.97	-53.07	32	105	H
			5.63537	-66.96	Pk	34.60	-17.50	11.80	0.00	-38.06	-27.00	-11.06	32	105	H
802.11n (HT20)	5745	ANT1	5.72499	-46.37	Pk	34.70	-17.40	11.80	0.00	-17.27	26.97	-44.24	201	101	V
			5.63319	-65.65	Pk	34.60	-17.50	11.80	0.00	-36.75	-27.00	-9.75	201	101	V
			5.85003	-60.00	Pk	34.90	-17.30	11.80	0.00	-30.60	26.94	-57.54	59	106	H
			5.99843	-66.72	Pk	35.20	-17.10	11.80	0.00	-36.82	-27.00	-9.82	59	106	H
			5.85003	-53.11	Pk	34.90	-17.30	11.80	0.00	-23.71	26.94	-50.65	198	100	V
	5825	ANT1	5.93350	-66.73	Pk	35.10	-17.20	11.80	0.00	-37.03	-27.00	-10.03	198	100	V
			5.72499	-51.12	Pk	34.70	-17.40	11.80	0.00	-22.02	26.97	-48.99	59	104	H
			5.63207	-66.51	Pk	34.60	-17.60	11.80	0.00	-37.71	-27.00	-10.71	59	104	H
			5.72499	-40.91	Pk	34.70	-17.40	11.80	0.00	-11.81	26.97	-38.78	200	100	V
			5.65363	-62.40	Pk	34.60	-17.50	11.80	0.00	-33.50	-24.31	-9.19	200	100	V
802.11n (HT40)	5755	ANT1	5.85003	-63.63	Pk	34.90	-17.30	11.80	0.00	-34.23	26.94	-61.17	61	111	H
			5.95340	-66.49	Pk	35.10	-17.20	11.80	0.00	-36.79	-27.00	-9.79	61	111	H
			5.85003	-53.44	Pk	34.90	-17.30	11.80	0.00	-24.04	26.94	-50.98	200	103	V
			5.99573	-67.09	Pk	35.20	-17.10	11.80	0.00	-37.19	-27.00	-10.19	200	103	V
			5.72499	-63.73	Pk	34.70	-17.40	11.80	0.00	-34.63	26.97	-61.60	61	101	H
	5775 (Lower side)	ANT1	5.63140	-66.28	Pk	34.60	-17.50	11.80	0.00	-37.38	-27.00	-10.38	61	101	H
			5.72499	-53.83	Pk	34.70	-17.40	11.80	0.00	-24.73	26.97	-51.70	200	103	V
			5.64903	-61.99	Pk	34.60	-17.50	11.80	0.00	-33.09	-27.00	-6.09	200	103	V
			5.85003	-67.75	Pk	34.90	-17.30	11.80	0.00	-38.35	26.94	-65.29	60	100	H
			5.96373	-67.20	Pk	35.10	-17.20	11.80	0.00	-37.50	-27.00	-10.50	60	100	H
802.11ac (VHT80)	5775 (Upper Side)	ANT1	5.85003	-60.31	Pk	34.90	-17.30	11.80	0.00	-30.91	26.94	-57.85	191	100	V
			5.93713	-66.83	Pk	35.10	-17.20	11.80	0.00	-37.13	-27.00	-10.13	191	100	V

Note. Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5825 MHz)
5825 MHz HORIZONTAL



5825 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.

Radiated Emissions

Frequency (GHz)	Max Reading (dBm)	Det	3117_00168724	6GHz_HPF[dB]	DC Corr (dB)	Corrected Reading (dBm)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	UNII Non-Restricted (dBuV/m)	Margin (dB)	Azimuth (Deg)	Height (cm)	Polarity
8.73039	35.76	PK-U	36.2	-23.3	0	48.66	-	-	-	-	68.2	-19.54	0	100	H
8.74545	35.43	PK-U	36.3	-23.3	0	48.43	-	-	-	-	68.2	-19.77	0	100	V
* 11.8532	33.5	PK-U	38.4	-19.8	0	52.1	-	-	74	-21.9	-	-	0	100	H
* 11.8483	34.15	PK-U	38.4	-19.8	0	52.75	-	-	74	-21.25	-	-	0	100	V
17.4729	34.38	PK-U	41.1	-17.8	0	57.68	-	-	-	-	68.2	-10.52	0	100	H
17.46665	34.29	PK-U	41.1	-17.9	0	57.49	-	-	-	-	68.2	-10.71	0	100	V

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

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	ANT1	8.624	33.88	PK-U	36.10	-21.80	0.00	48.18	-	-	-	-	68.20	-20.02	0	100	H		
			8.611	34.67	PK-U	36.10	-21.70	0.00	49.07	-	-	-	-	-	68.20	-19.13	0	100	V	
			* 11.48926	33.86	PK-U	38.30	-19.80	0.00	52.36	-	-	74.00	-21.64	-	-	-	0	100	H	
			* 11.48992	33.92	PK-U	38.30	-19.80	0.00	52.42	-	-	74.00	-21.58	-	-	-	0	100	V	
			17.227	33.97	PK-U	40.90	-18.60	0.00	56.27	-	-	-	-	-	-	68.20	-11.93	0	100	H
			17.241	33.96	PK-U	40.90	-18.70	0.00	56.16	-	-	-	-	-	-	68.20	-12.04	0	100	V
	5785	ANT1	8.682	35.55	PK-U	36.20	-22.80	0.00	48.95	-	-	-	-	-	68.20	-19.25	0	100	H	
			8.686	35.19	PK-U	36.20	-22.90	0.00	48.49	-	-	-	-	-	68.20	-19.71	0	100	V	
			* 11.57219	33.88	PK-U	38.30	-19.90	0.00	52.28	-	-	74.00	-21.72	-	-	-	0	100	H	
			* 11.57378	34.00	PK-U	38.30	-20.00	0.00	52.30	-	-	74.00	-21.70	-	-	-	0	100	V	
			17.356	34.99	PK-U	41.00	-18.60	0.00	57.39	-	-	-	-	-	-	68.20	-10.81	0	100	H
			17.348	34.63	PK-U	41.00	-18.60	0.00	57.03	-	-	-	-	-	-	68.20	-11.17	0	100	V
	5825	ANT1	8.730	35.76	PK-U	36.20	-23.30	0.00	48.66	-	-	-	-	-	68.20	-19.54	0	100	H	
			8.745	35.43	PK-U	36.30	-23.30	0.00	48.43	-	-	-	-	-	68.20	-19.77	0	100	V	
			* 11.6532	33.50	PK-U	38.40	-19.80	0.00	52.10	-	-	74.00	-21.90	-	-	-	0	100	H	
			* 11.6483	34.15	PK-U	38.40	-19.80	0.00	52.75	-	-	74.00	-21.25	-	-	-	0	100	V	
			17.473	34.38	PK-U	41.10	-17.80	0.00	57.68	-	-	-	-	-	-	68.20	-10.52	0	100	H
			17.467	34.29	PK-U	41.10	-17.90	0.00	57.49	-	-	-	-	-	-	68.20	-10.71	0	100	V

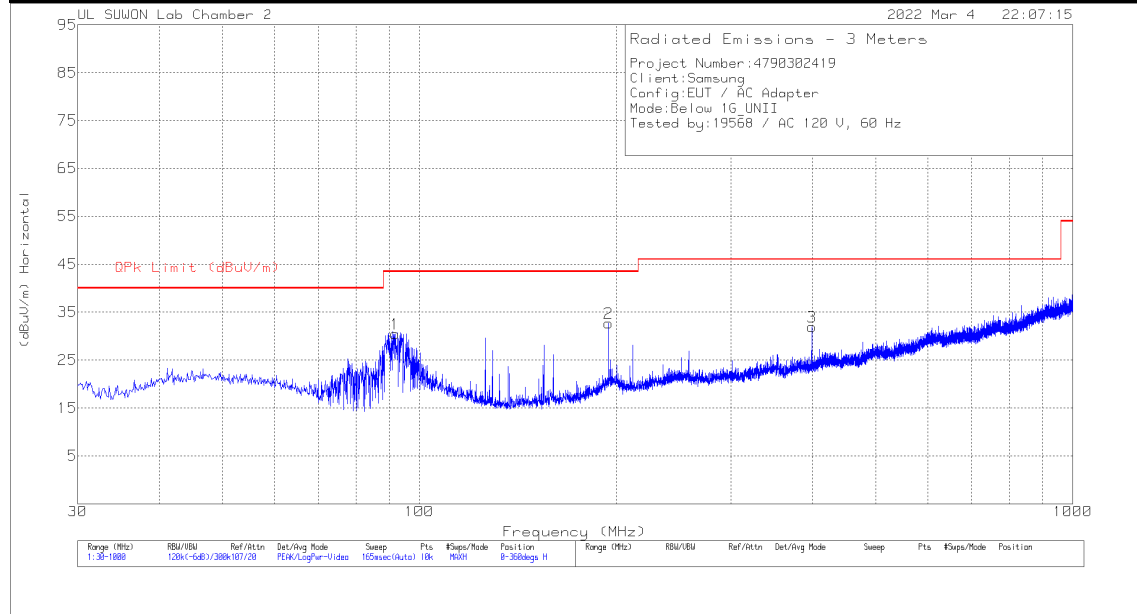
Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average

Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

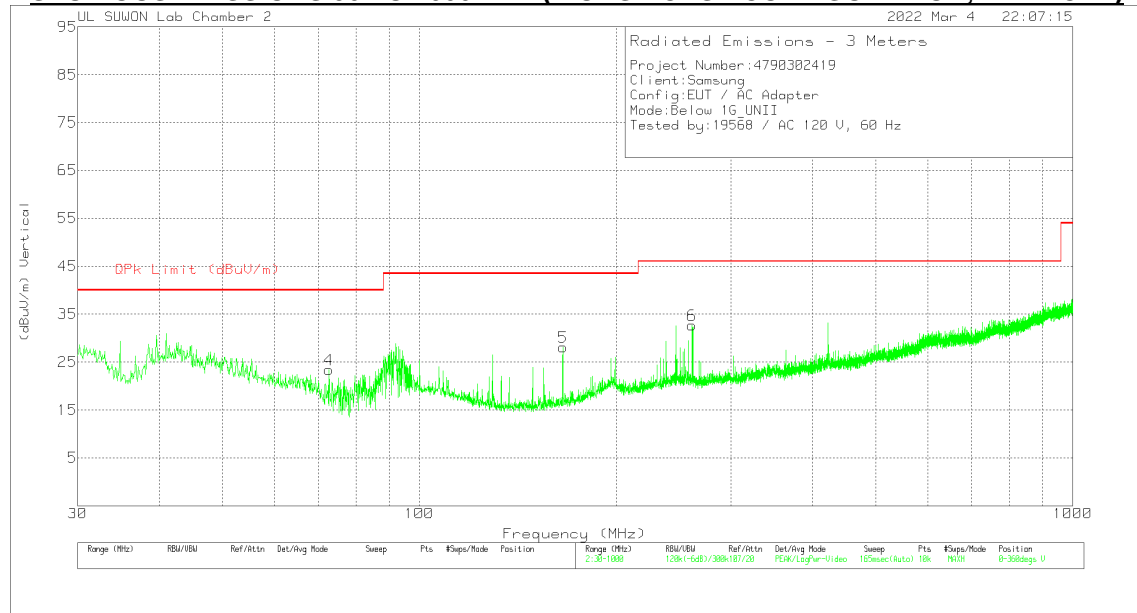
12. WORST-CASE BELOW 1 GHz

12.1. USB C to C cable

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

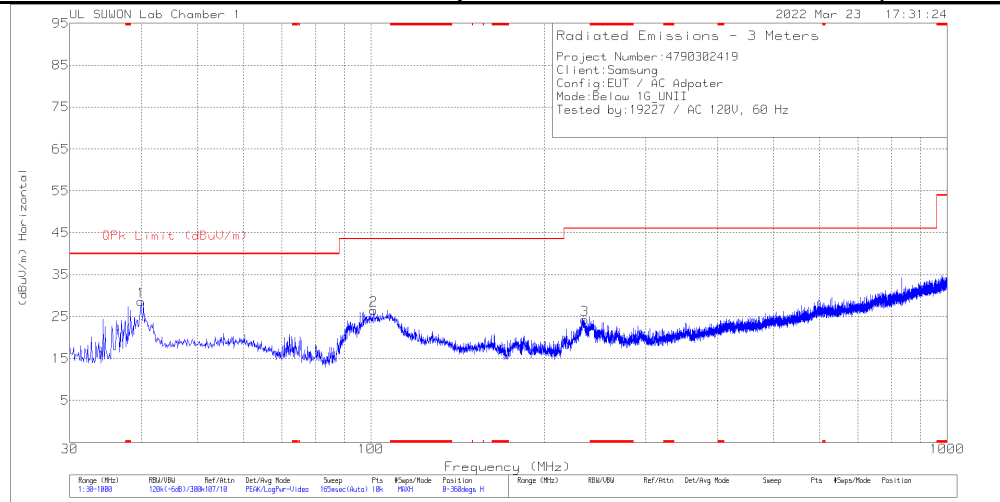


Trace Markers

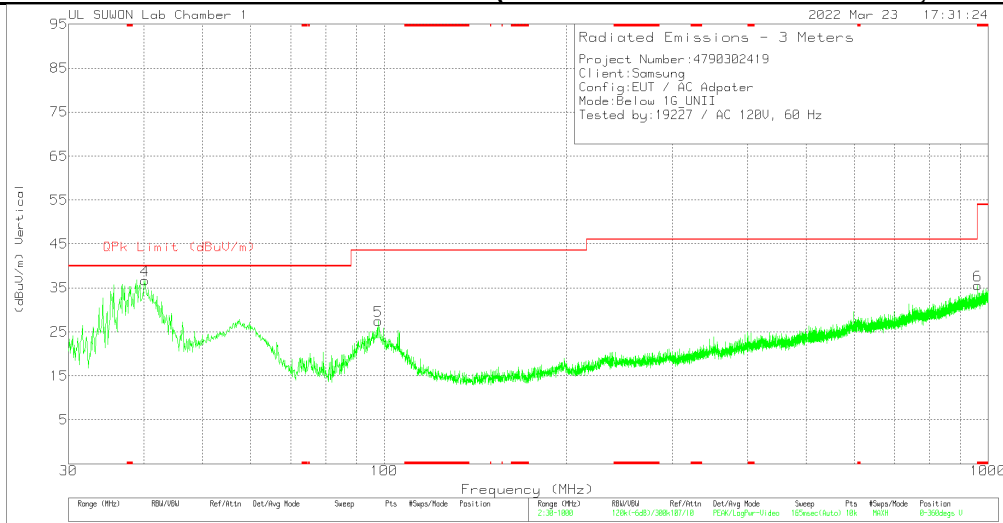
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below 1G[dB]	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	91.789	45.52	Pk	16.3	-31.3	30.52	43.52	-13	0-360	200	H
2	194.706	45.37	Pk	18	-30.7	32.67	43.52	-10.85	0-360	100	H
3	398.697	40.73	Pk	21.2	-30	31.93	46.02	-14.09	0-360	100	H
4	72.777	40.57	Pk	14.4	-31.6	23.37	40	-16.63	0-360	100	V
5	165.8	44.31	Pk	14.8	-31	28.11	43.52	-15.41	0-360	100	V
6	261.442	44.28	Pk	18.8	-30.4	32.68	46.02	-13.34	0-360	100	V

Pk - Peak detector

12.2. USB A to C cable SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



Trace Markers

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	41.1	Pk	18.7	-31.2	28.6	40	-11.4	0-360	300	H
2	101.101	38.94	Pk	17.7	-30.1	26.54	43.52	-16.98	0-360	300	H
3	234.864	35.48	Pk	17.9	-29.1	24.28	46.02	-21.74	0-360	100	H
4	40.185	49.17	Pk	18.7	-31.2	36.67	40	-3.33	0-360	200	V
5	97.803	40.34	Pk	17.3	-30.1	27.54	43.52	-15.98	0-360	200	V
6	* 961.782	31.84	Pk	28.3	-24.5	35.64	53.97	-18.33	0-360	400	V

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

Radiated Emissions

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
40.185	42.38	Qp	18.7	-31.2	29.88	40	-10.12	229	100	V

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

13. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
IC RSS-GEN Clause 8.8

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.

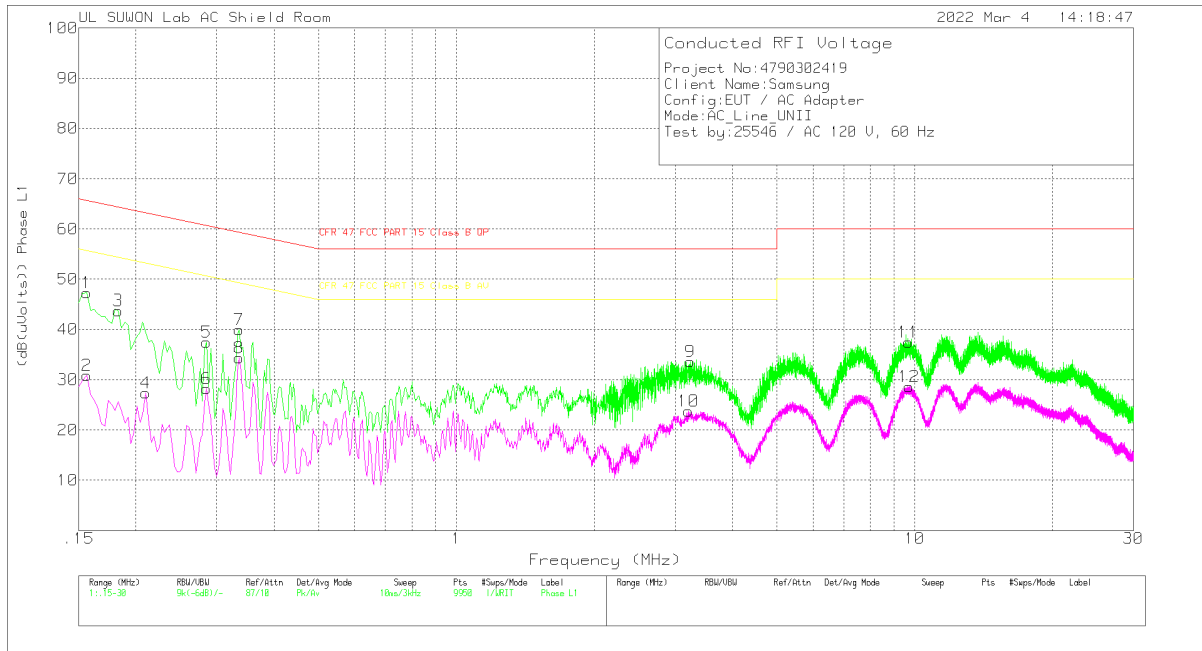
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

WORST EMISSIONS (USB C to C Cable)

LINE 1 DATA



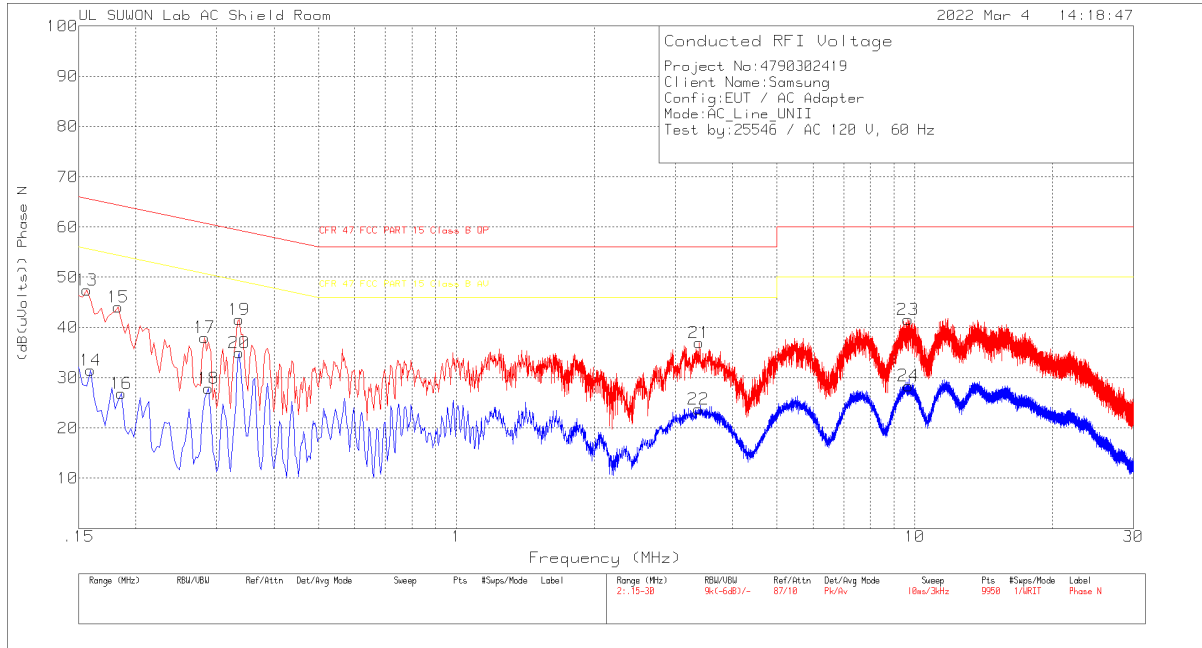
Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.156	37.43	Pk	9.8	.1	47.33	65.67	-18.34	-	-
2	.156	20.92	Av	9.8	.1	30.82	-	-	55.67	-24.85
3	.183	33.66	Pk	9.9	.2	43.76	64.35	-20.59	-	-
4	.21	17.38	Av	9.8	.2	27.38	-	-	53.21	-25.83
5	.285	27.52	Pk	9.7	.2	37.42	60.67	-23.25	-	-
6	.285	18.36	Av	9.7	.2	28.26	-	-	50.67	-22.41
7	.336	29.93	Pk	9.8	.2	39.93	59.3	-19.37	-	-
8	.336	24.39	Av	9.8	.2	34.39	-	-	49.3	-14.91
9	3.243	23.59	Pk	9.7	.3	33.59	56	-22.41	-	-
10	3.207	13.76	Av	9.7	.3	23.76	-	-	46	-22.24
11	9.693	27.26	Pk	9.8	.4	37.46	60	-22.54	-	-
12	9.705	18.42	Av	9.8	.4	28.62	-	-	50	-21.38

Pk - Peak detector
 Av - Average detection

LINE 2 DATA



Trace Markers

Range 2: Phase N .15 - 30MHz

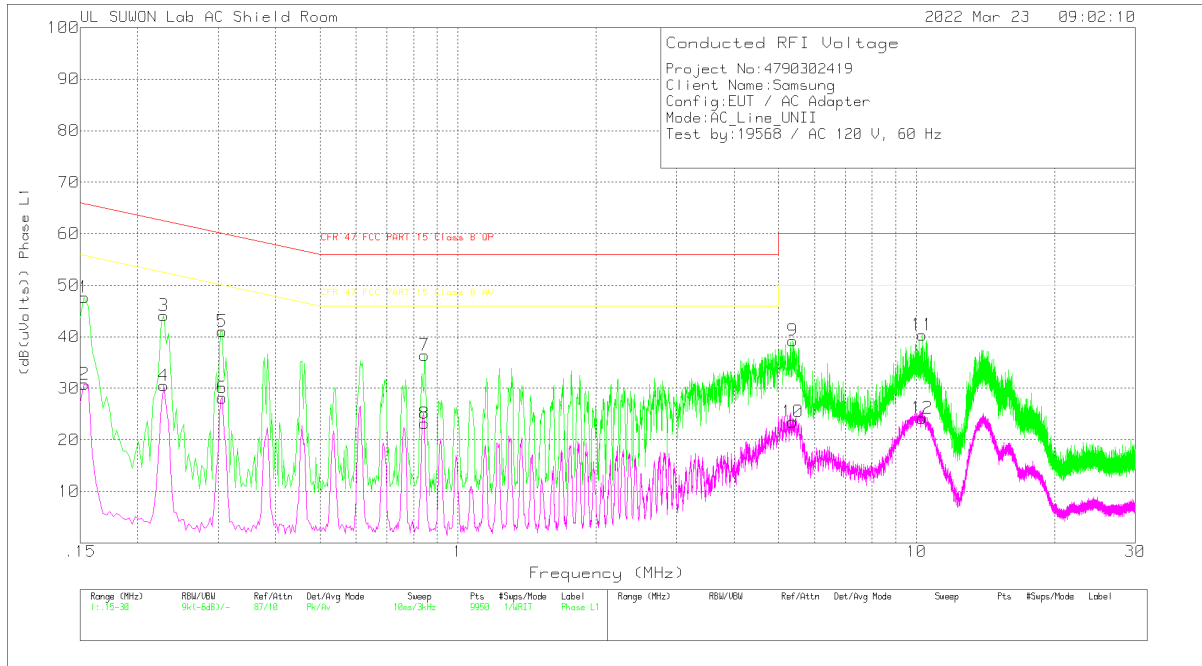
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.156	37.58	Pk	9.8	.1	47.48	65.67	-18.19	-	-
14	.159	21.6	Av	9.8	.1	31.5	-	-	55.52	-24.02
15	.183	34.02	Pk	9.9	.2	44.12	64.35	-20.23	-	-
16	.186	16.81	Av	9.9	.2	26.91	-	-	54.21	-27.3
17	.282	28.13	Pk	9.7	.2	38.03	60.76	-22.73	-	-
18	.288	17.96	Av	9.7	.2	27.86	-	-	50.58	-22.72
19	.336	31.61	Pk	9.8	.2	41.61	59.3	-17.69	-	-
20	.336	24.99	Av	9.8	.2	34.99	-	-	49.3	-14.31
21	3.381	26.98	Pk	9.7	.3	36.98	56	-19.02	-	-
22	3.378	13.72	Av	9.7	.3	23.72	-	-	46	-22.28
23	9.672	31.23	Pk	9.9	.4	41.53	60	-18.47	-	-
24	9.681	18.13	Av	9.9	.4	28.43	-	-	50	-21.57

Pk - Peak detector

Av - Average detection

WORST EMISSIONS (USB A to C Cable)

LINE 1 DATA



Trace Markers

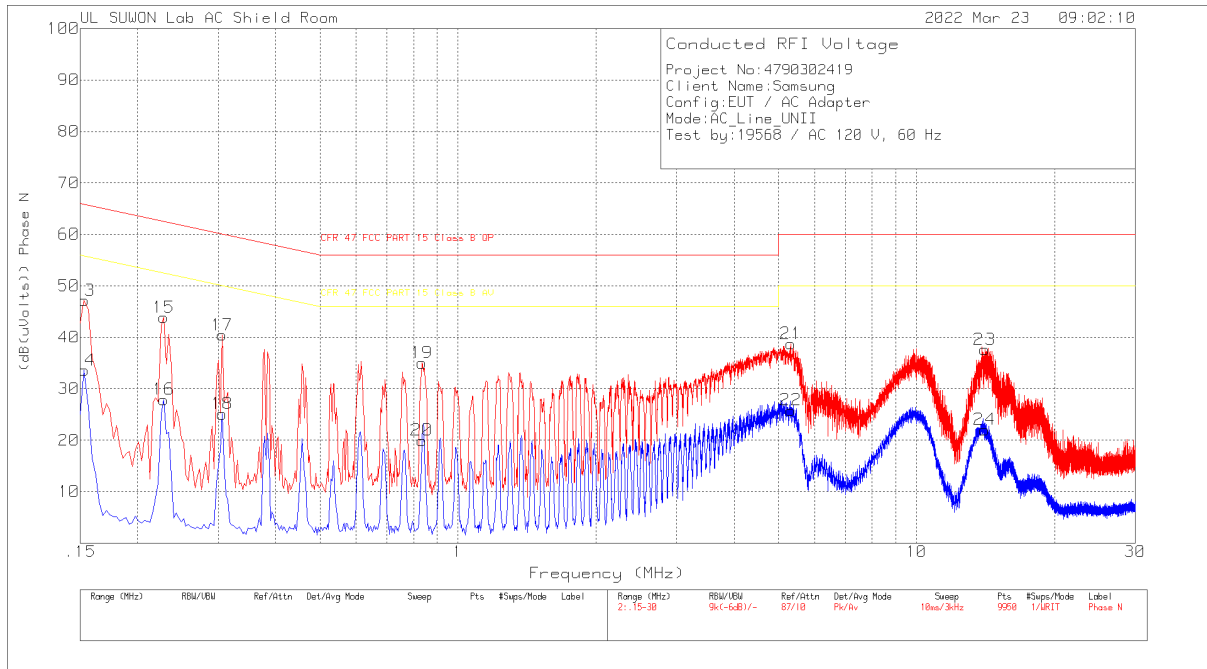
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.153	37.77	Pk	9.8	.1	47.67	65.84	-18.17	-	-
2	.153	20.92	Av	9.8	.1	30.82	-	-	55.84	-25.02
3	.228	34.23	Pk	9.7	.2	44.13	62.52	-18.39	-	-
4	.228	20.64	Av	9.7	.2	30.54	-	-	52.52	-21.98
5	.306	31.16	Pk	9.7	.2	41.06	60.08	-19.02	-	-
6	.306	18.28	Av	9.7	.2	28.18	-	-	50.08	-21.9
7	.846	26.34	Pk	9.8	.3	36.44	56	-19.56	-	-
8	.846	13.09	Av	9.8	.3	23.19	-	-	46	-22.81
9	5.37	29.28	Pk	9.7	.3	39.28	60	-20.72	-	-
10	5.37	13.52	Av	9.7	.3	23.52	-	-	50	-26.48
11	10.284	30.06	Pk	9.9	.4	40.36	60	-19.64	-	-
12	10.284	13.93	Av	9.9	.4	24.23	-	-	50	-25.77

Pk - Peak detector

Av - Average detection

LINE 2 DATA



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.153	37.24	Pk	9.8	.1	47.14	65.84	-18.7	-	-
14	.153	23.67	Av	9.8	.1	33.57	-	-	55.84	-22.27
15	.228	33.96	Pk	9.7	.2	43.86	62.52	-18.66	-	-
16	.228	18.01	Av	9.7	.2	27.91	-	-	52.52	-24.61
17	.306	30.54	Pk	9.7	.2	40.44	60.08	-19.64	-	-
18	.306	15.21	Av	9.7	.2	25.11	-	-	50.08	-24.97
19	.834	24.93	Pk	9.8	.3	35.03	56	-20.97	-	-
20	.834	9.86	Av	9.8	.3	19.96	-	-	46	-26.04
21	5.319	28.74	Pk	9.7	.3	38.74	60	-21.26	-	-
22	5.319	15.83	Av	9.7	.3	25.83	-	-	50	-24.17
23	14.085	27.21	Pk	10	.4	37.61	60	-22.39	-	-
24	14.085	11.64	Av	10	.4	22.04	-	-	50	-27.96

Pk - Peak detector
 Av - Average detection

14. DYNAMIC FREQUENCY SELECTION

14.1. OVERVIEW

14.1.1. LIMITS

FCC

§15.407 (h), FCC KDB 905462 D02 “COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION” and KDB 905462 D03 “U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY”.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client (without DFS)	Client (with DFS)
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar DFS	Client (without DFS)
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in all 20 MHz channel blocks and a null frequency between the bonded 20 MHz channel blocks.

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see notes)
E.I.R.P. \geq 200 mill watt	-64 dBm
E.I.R.P. < 200 mill watt and power spectral density < 10 dBm/MHz	-62 dBm
E.I.R.P. < 200 mill watt that do not meet power spectral density requirement	-64 dBm
<p>Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB publication 662911 D01.</p>	

Table 4: DFS Response requirement values

Parameter	Value
<i>Non-occupancy period</i>	30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds (See Note 1)
<i>Channel Closing Transmission Time</i>	200 milliseconds + approx. 60 milliseconds over remaining 10 second period. (See Notes 1 and 2)
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U- NII 99% transmission power bandwidth. (See Note 3)
<p>Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel</i> move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the <i>U-NII Detection Bandwidth</i> detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.</p>	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (usec)	PRI (usec)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in table 5a	Roundup: $\{(1/360) \times (19 \times 10^6 \text{ PRI}_{\text{usec}})\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 usec. With a minimum increment of 1 usec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the <i>Detection Bandwidth</i> test, <i>Channel Move Time</i> , and <i>Channel Closing Time</i> tests.					

Table 6 – Long Pulse Radar Test Signal

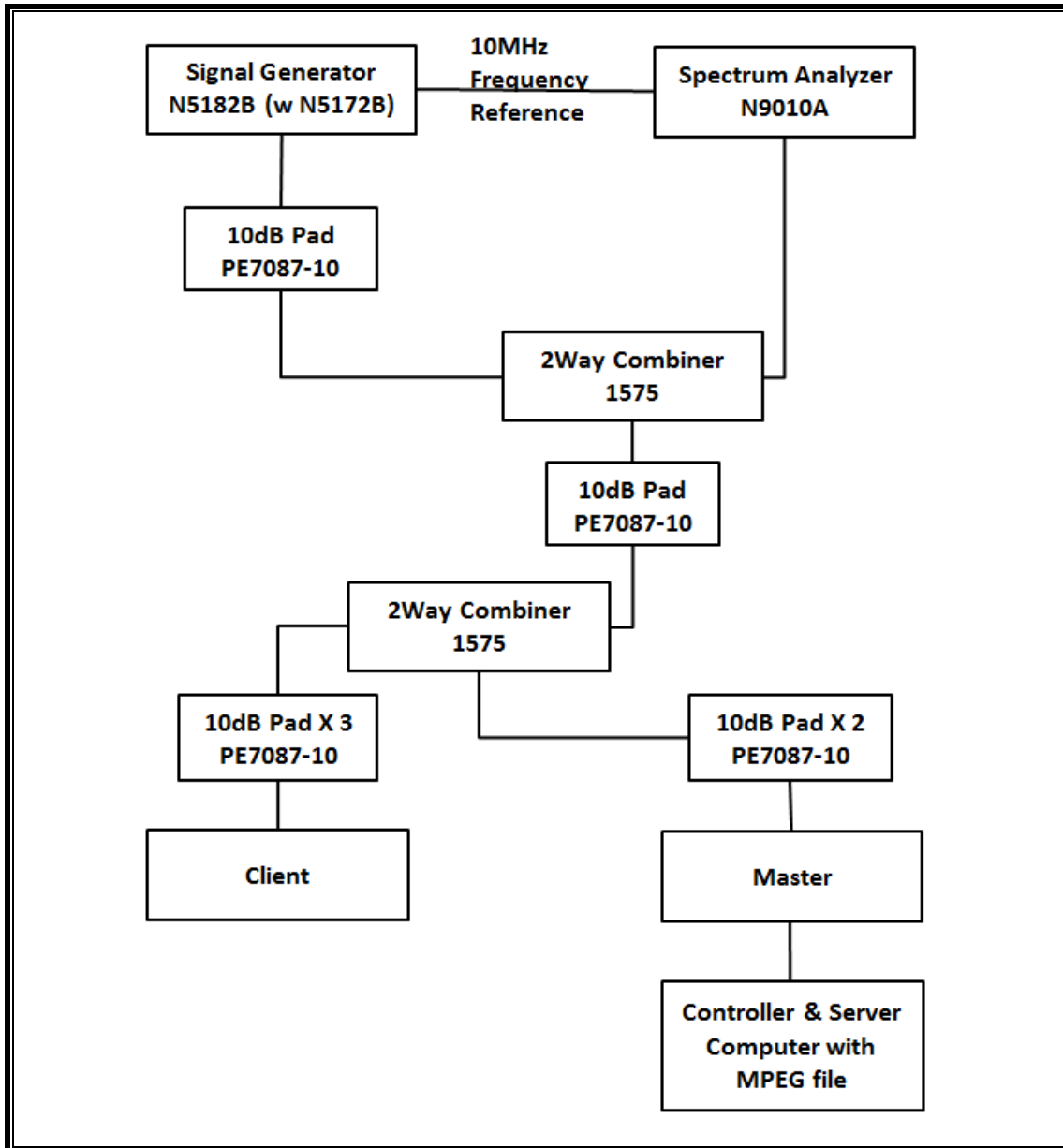
Radar Waveform Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	0.333	300	70%	30

14.1.2. TEST AND MEASUREMENT SYSTEM

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the Keysite Signal Studio for Pulse Building as N5172B. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 1, 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of KDB 905462 D02. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

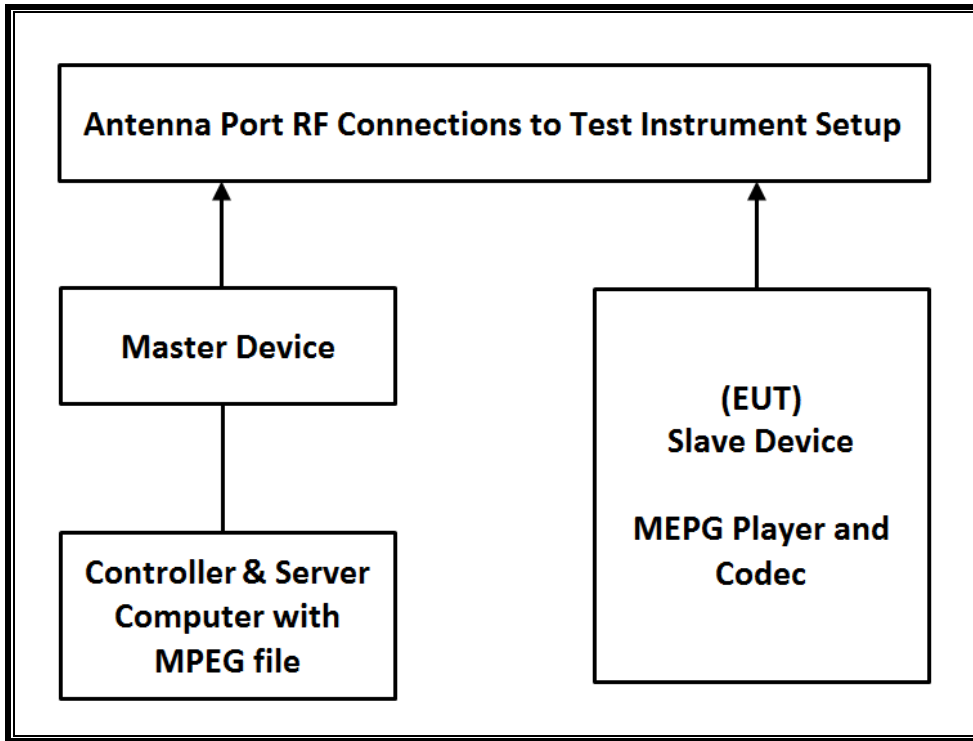
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	S/N	Next Cal Due
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	08-02-22
Vector Signal Generator, 6GHz	Agilent / HP	N5182B	MY53051241	08-02-22
Combiner	WEINSCHTEL	WA1534	UL003	01-11-23
Combiner	WEINSCHTEL	WA1535	UL004	01-11-23

14.1.3. SETUP OF EUT

CONDUCTED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Wireless Access Point	Cisco	AIR-CAP3702E-A-K9	FTX182276QX	LDK102087
Notebook PC (Controller/Server)	HP	HP EliteDesk 800 G1 TWR	CZC4125J25	DoC

14.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level of the widest bandwidth (802.11ac VHT80) within these bands is 13.73 dBm in the 5250-5350 MHz band and 13.08 dBm in the 5470-5725 MHz band.

The antenna assembly utilized two antenna.

Gain of ANT: -4.01 dBi for UNII 2A and -4.77 dBi for UNII 2C.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required conducted threshold at the antenna port is $-64 + 1 = -63$ dBm.

The calibrated radiated DFS Detection Threshold level is set to -64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests. WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the controller/server PC to the EUT using iPerf version 2.0.5 software package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11 architecture. Three nominal channel bandwidths are implemented: 20 MHz, 40 MHz and 80 MHz.

The software installed in the access point is 12.4(25d)JA1.

UNIFORM CHANNEL SPREADING

This requirement is not applicable to Slave radio devices.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102087. The minimum antenna gain for the Master Device is 6 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is $-64 + 1 = -63$ dBm.

The calibrated radiated DFS Detection Threshold level is set to -64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

14.2. RESULTS FOR 80 MHz BANDWIDTH (UNII-2A BAND)

14.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5290 MHz.

14.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



14.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

14.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

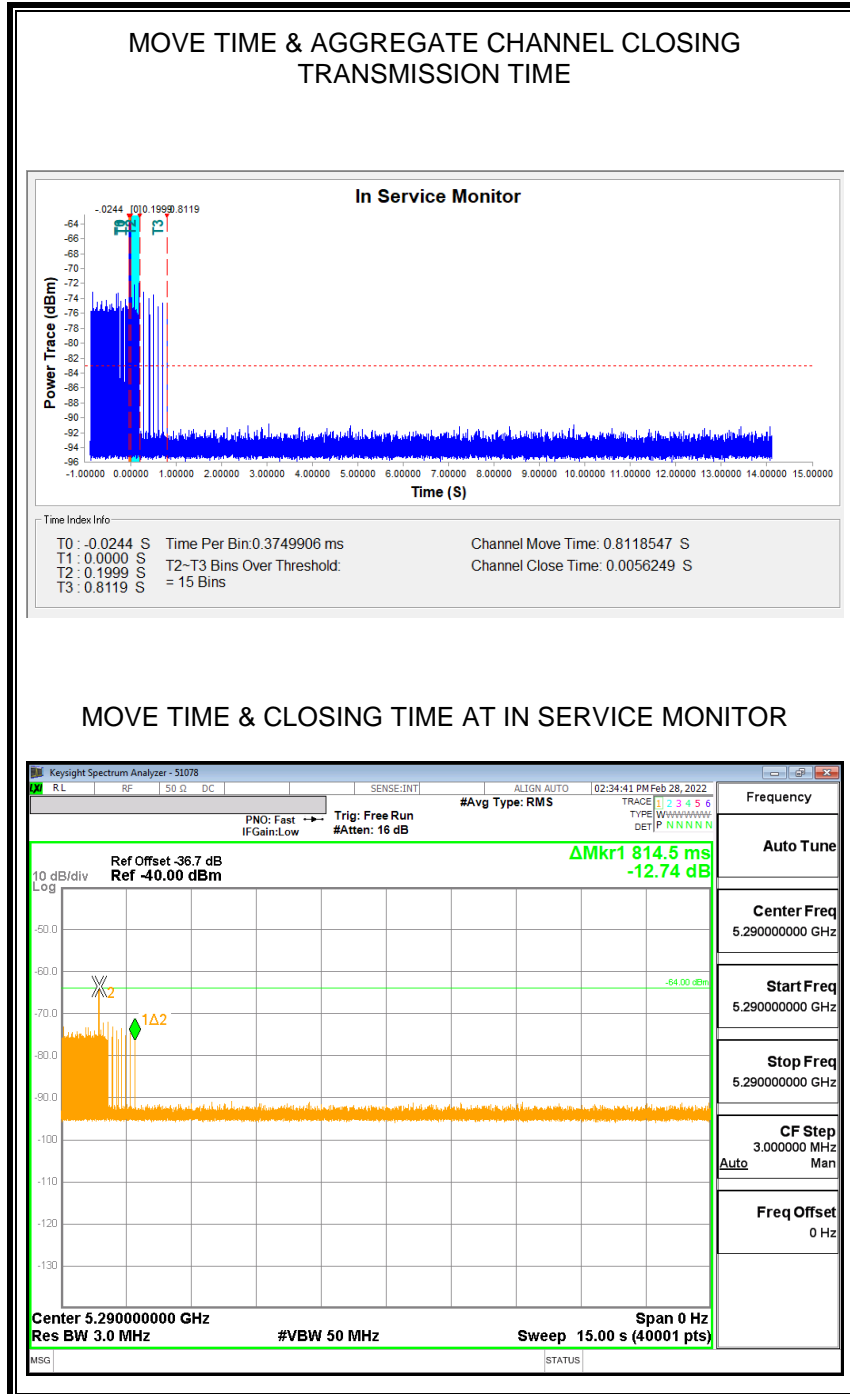
Channel Move Time (sec)	Limit (sec)
0.812	10

Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
5.625	60

MOVE TIME & CHANNEL CLOSING TIME

AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

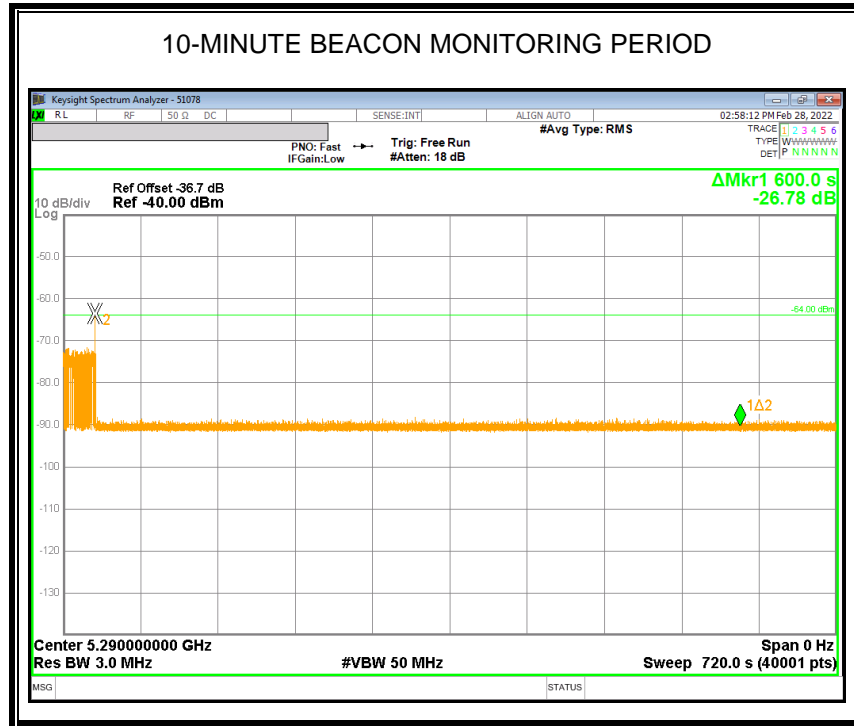
No transmissions are observed during the aggregate monitoring period.



NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 10-minute observation time.



14.3. RESULTS FOR 80 MHz BANDWIDTH (UNII-2C BAND)

14.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5530 MHz.

14.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



14.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

14.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

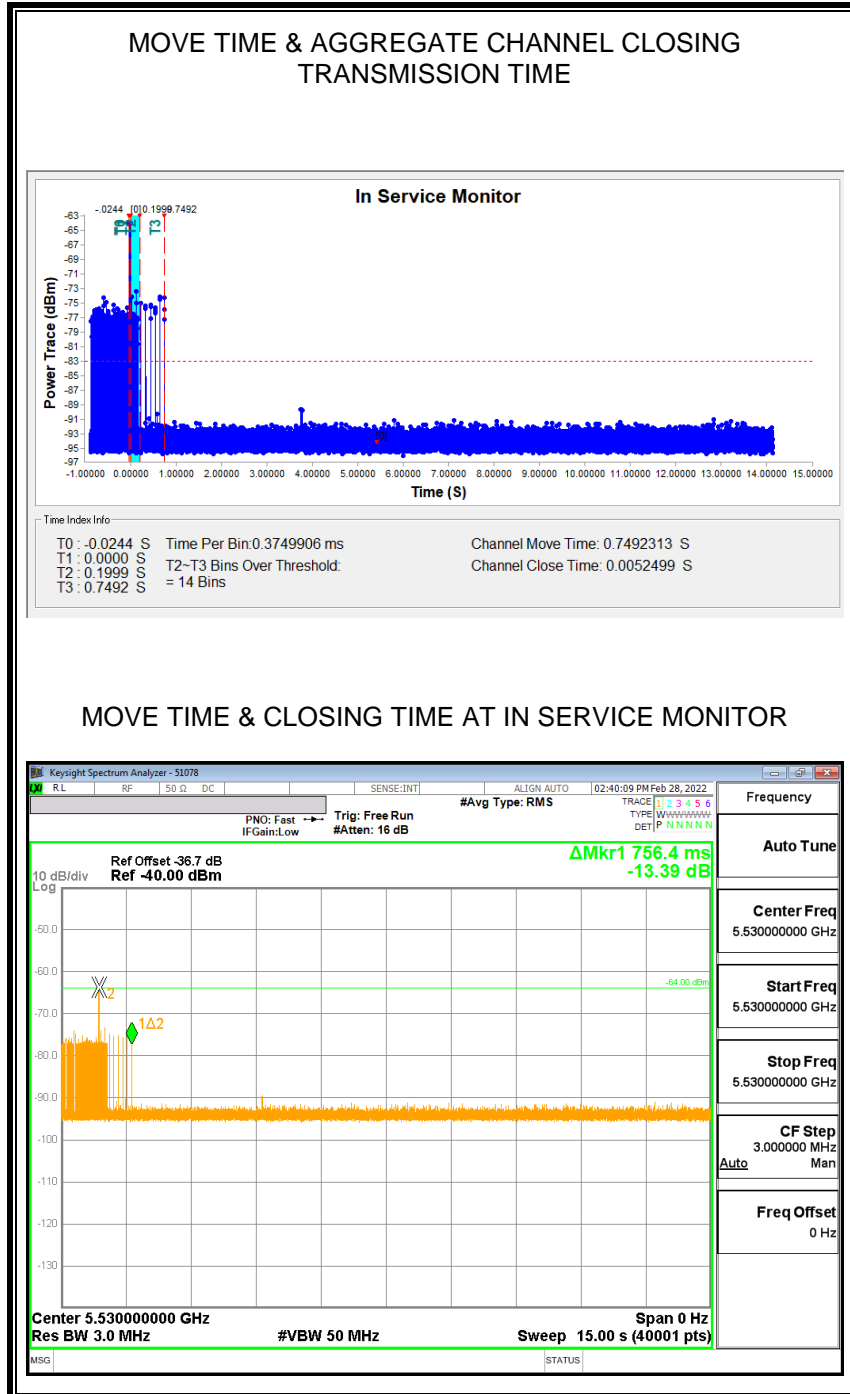
Channel Move Time (sec)	Limit (sec)
0.749	10

Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
5.250	60

MOVE TIME & CHANNEL CLOSING TIME

AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

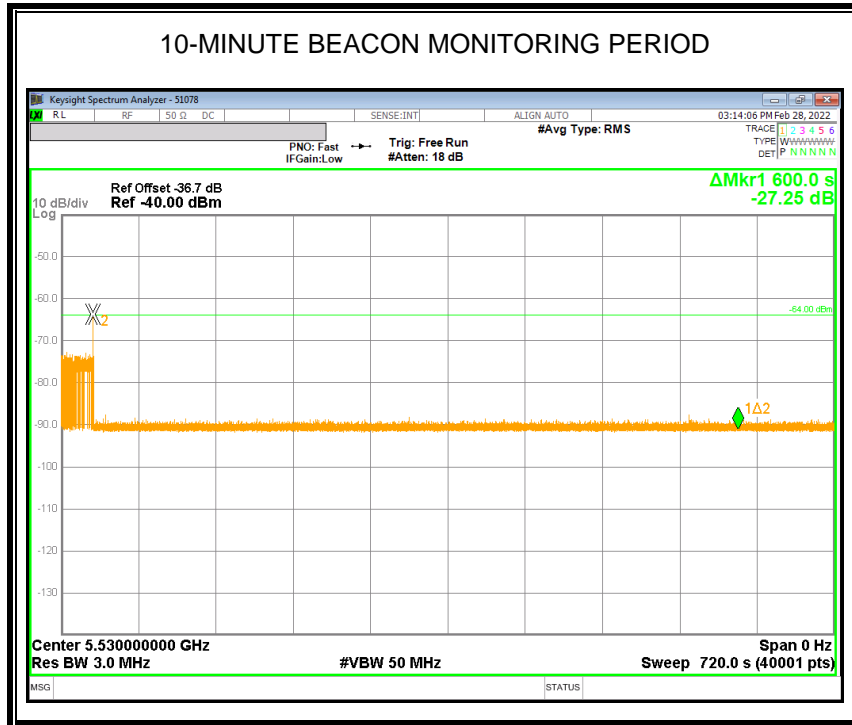
No transmissions are observed during the aggregate monitoring period.



NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 10-minute observation time.



END OF TEST REPORT