



CERTIFICATION TEST REPORT

Report Number. : 4790360891-E6V3

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

Model : SM-A137F/DSN

FCC ID : A3LSMA137F

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

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

Date Of Issue:

2022-04-27

Prepared by:

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-04-22	Initial issue	Yeonhee Lim
V2	2022-04-25	Updated to address TCB's question	Yeonhee Lim
V3	2022-04-27	Updated to address TCB's question	Yeonhee Lim

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. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION	6
4.3. MEASUREMENT UNCERTAINTY	7
4.4. DECISION RULE	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT	8
5.2. DESCRIPTION OF AVAILABLE ANTENNAS	9
5.3. List of test reduction and modes covering other modes:	9
5.4. WORST-CASE CONFIGURATION AND MODE	10
5.5. DESCRIPTION OF TEST SETUP	12
6. TEST AND MEASUREMENT EQUIPMENT	14
7. SUMMARY TABLE	15
8. MEASUREMENT METHODS	16
9. REFERENCE MEASUREMENTS RESULTS	17
9.1. ON TIME AND DUTY CYCLE RESULTS	17
9.2. DUTY CYCLE PLOTS	17
9.3. 26 dB BANDWIDTH	18
9.3.1. 802.11a	19
9.3.2. 802.11n HT20	19
9.3.3. 802.11n HT40	19
9.3.4. 802.11ac VHT80	20
9.3.5. STRADDLE CHANNEL	20
10. ANTENNA PORT TEST RESULTS	21
10.1. 6 dB BANDWIDTH	21
10.1.1. UNII-3 BAND	22
10.2. OUTPUT POWER AND PPSD	23
10.2.1. 802.11a MODE	24
10.2.2. 802.11n HT20 MODE	25

10.2.3.	802.11n HT40 MODE	26
10.2.4.	802.11ac VHT80 MODE	27
10.2.5.	STRADDLE CHANNEL.....	28
10.2.6.	OUTPUT POWER AND PPSD PLOTS (WORST CASE).....	29
11.	TRANSMITTER ABOVE 1 GHz.....	32
11.1.	TX ABOVE 1GHz 1Tx MODE IN THE 5.2GHz BAND.....	35
11.2.	TX ABOVE 1GHz 1Tx MODE IN THE 5.3GHz BAND.....	39
11.3.	TX ABOVE 1GHz 1Tx MODE IN THE 5.5 GHz BAND.....	43
11.4.	TX ABOVE 1GHz 1Tx MODE IN THE 5.8 GHz BAND.....	47
12.	WORST-CASE BELOW 1 GHz	51
13.	AC POWER LINE CONDUCTED EMISSIONS	52
14.	DYNAMIC FREQUENCY SELECTION.....	55
14.1.	OVERVIEW.....	55
14.1.1.	LIMITS.....	55
14.1.2.	TEST AND MEASUREMENT SYSTEM	58
14.1.3.	SETUP OF EUT.....	61
14.1.4.	DESCRIPTION OF EUT	62
14.2.	RESULTS FOR 80 MHz BANDWIDTH (UNII-2A BAND)	63
14.2.1.	TEST CHANNEL	63
14.2.2.	RADAR WAVEFORM AND TRAFFIC	63
14.2.3.	OVERLAPPING CHANNEL TESTS.....	64
14.2.4.	MOVE AND CLOSING TIME	64
14.3.	RESULTS FOR 80 MHz BANDWIDTH (UNII-2C BAND).....	67
14.3.1.	TEST CHANNEL	67
14.3.2.	RADAR WAVEFORM AND TRAFFIC	67
14.3.3.	OVERLAPPING CHANNEL TESTS.....	68
14.3.4.	MOVE AND CLOSING TIME	68

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL NUMBER: SM-A137F/DSN

SERIAL NUMBER: R38T300AJTP (CONDUCTED);
R38T4001XEV (RADIATED);

DATE TESTED: 2022-04-08 ~ 2022-04-22;

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:



Yeonhee Lim
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. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro	
☒	Chamber 1(3m semi-anechoic chamber)
☒	Chamber 2(3m semi-anechoic chamber)
☒	Chamber 3(3m semi-anechoic chamber)
☐	Chamber 4(3m Full-anechoic chamber)
☐	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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac and NFC.
This test report addresses the NII (WLAN) operational mode.

WiFi operating mode

Frequency rage	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	14.04	25.35
		802.11n(HT20)	14.86	30.62
	5190 - 5230	802.11n(HT40)	14.80	30.20
		802.11ac(VHT80)	12.83	19.19
UNII-2A	5260 - 5320	802.11a	14.87	30.69
		802.11n(HT20)	14.84	30.48
	5190 - 5230	802.11n(HT40)	14.75	29.85
		802.11ac(VHT80)	12.72	18.71
UNII-2C	5500 - 5720	802.11a	14.03	25.29
		802.11n(HT20)	13.93	24.72
	5510 - 5710	802.11n(HT40)	13.81	24.04
		802.11ac(VHT80)	13.95	24.83
UNII-3	5745 - 5825	802.11a	13.73	23.60
		802.11n(HT20)	13.57	22.75
	5755 - 5795	802.11n(HT40)	13.54	22.59
		802.11ac(VHT80)	12.40	17.38

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	-5.24
UNII 2A 5250 - 5350	-4.92
UNII 2C 5470 - 5725	-4.88
UNII 3 5725 - 5850	-5.24

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	

Note1. Full test was performed in 11a mode.

Note2. 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	14	14	14
	UNII-2A	14	14	14
	UNII-2C	14 140ch: 13	14 100ch: 13.5 140ch: 13	14 100ch: 13.5 140ch: 13
	UNII-3	13	13	13
5GHz (40 MHz)	UNII-1		14	14
	UNII-2A		14	14
	UNII-2C		14 102ch: 12.5	14 102ch: 12.5
	UNII-3		13	13
5GHz (80 MHz)	UNII-1			13.5
	UNII-2A			13.5
	UNII-2C			14 106ch: 11.5
	UNII-3			12

	Band-Edge & Spurious Emission
	Band-Edge & Spurious Emission 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
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

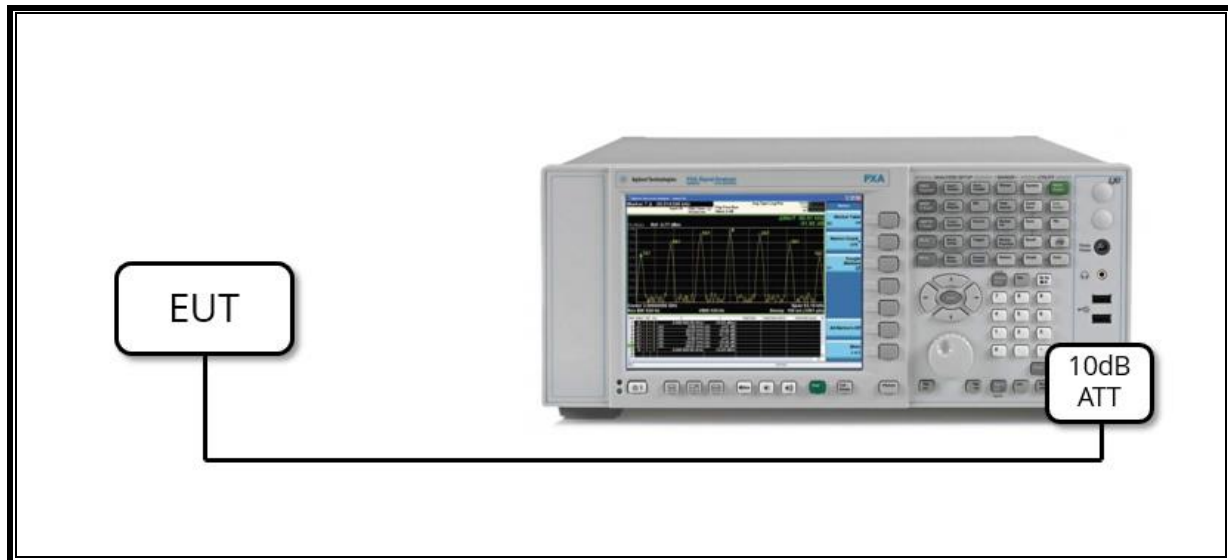
I/O CABLE

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

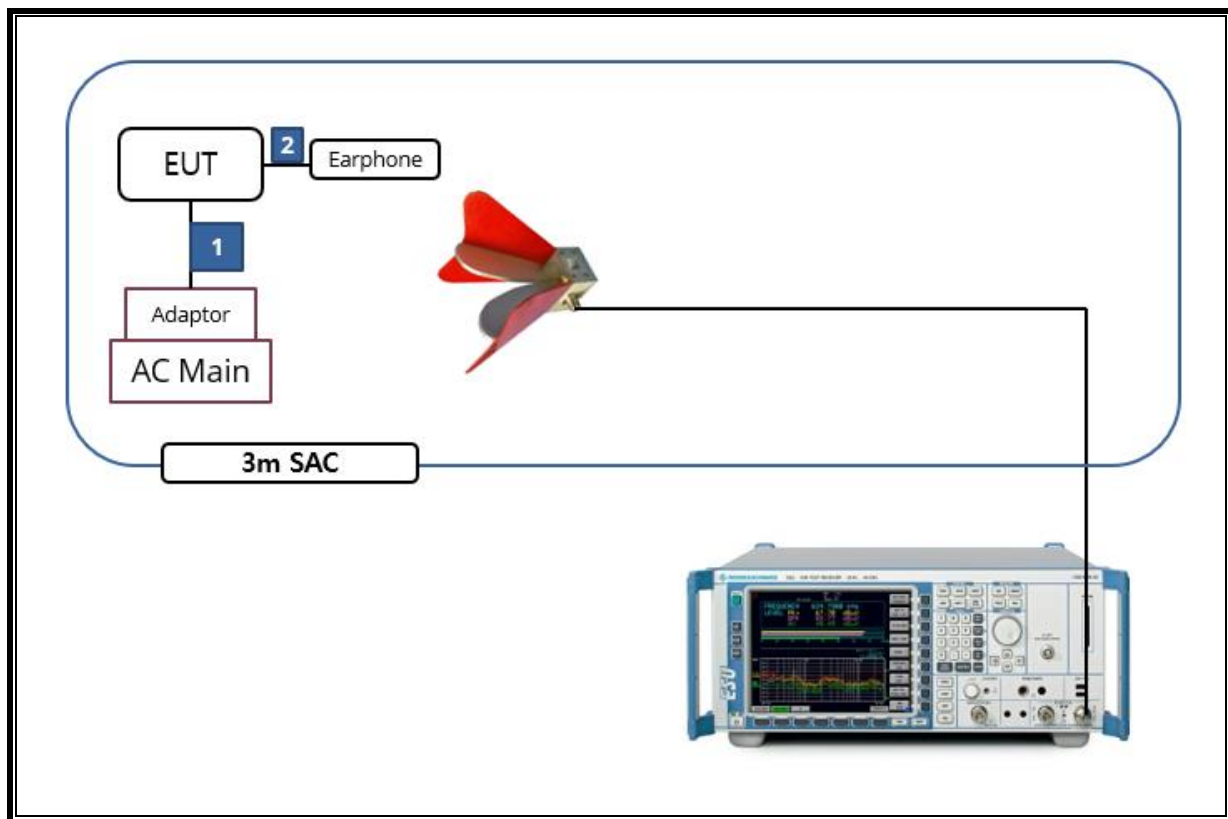
TEST SETUP

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
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2023/01/18
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2023/01/19
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	WEINSCHEL	M1406A	T09	2022/08/03
Attenuator	WEINSCHEL	WA76-30-21	A015	2022/08/03
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	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.(Method SA-2)

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	2.756	2.794	0.986	98.640	-
802.11n(HT20)	2.553	2.598	0.983	98.268	-
802.11n(HT40)	2.406	2.449	0.982	98.244	-
802.11ac(VHT80)	1.134	1.179	0.962	96.183	0.17

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

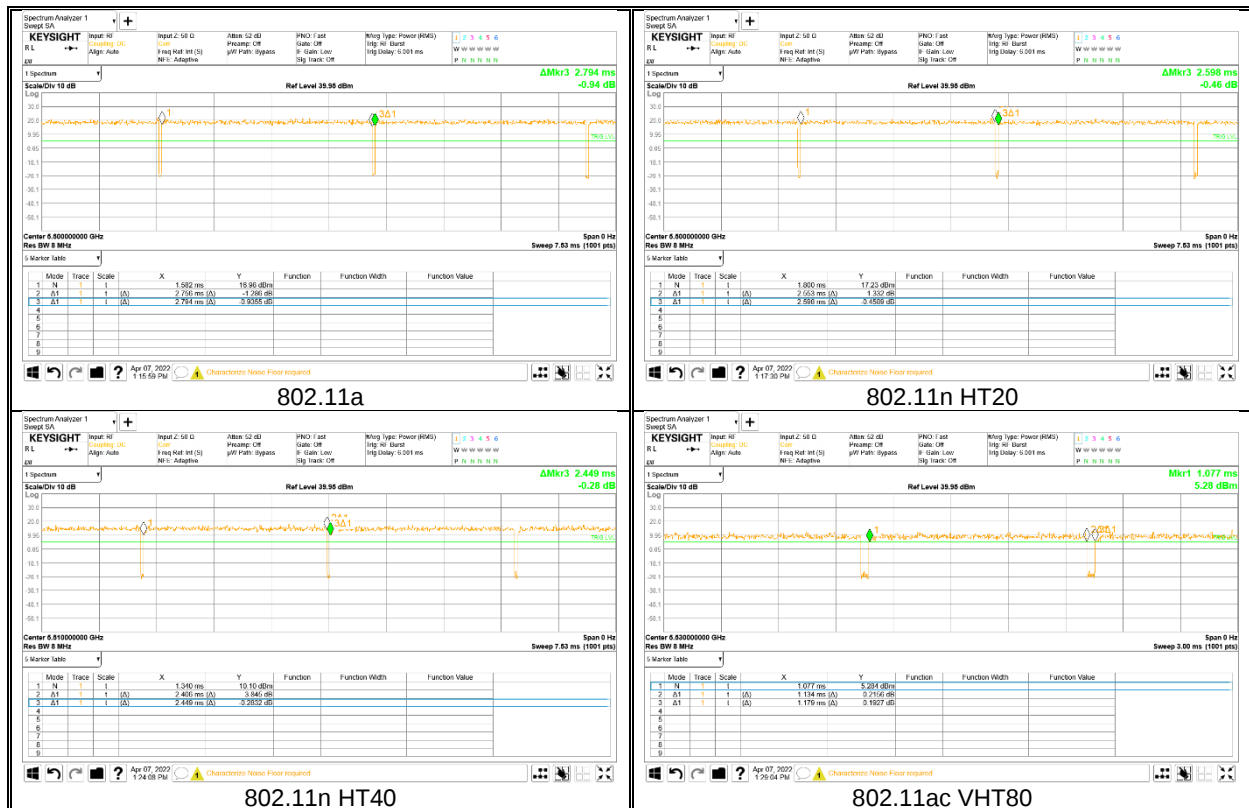
LIMITS

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.

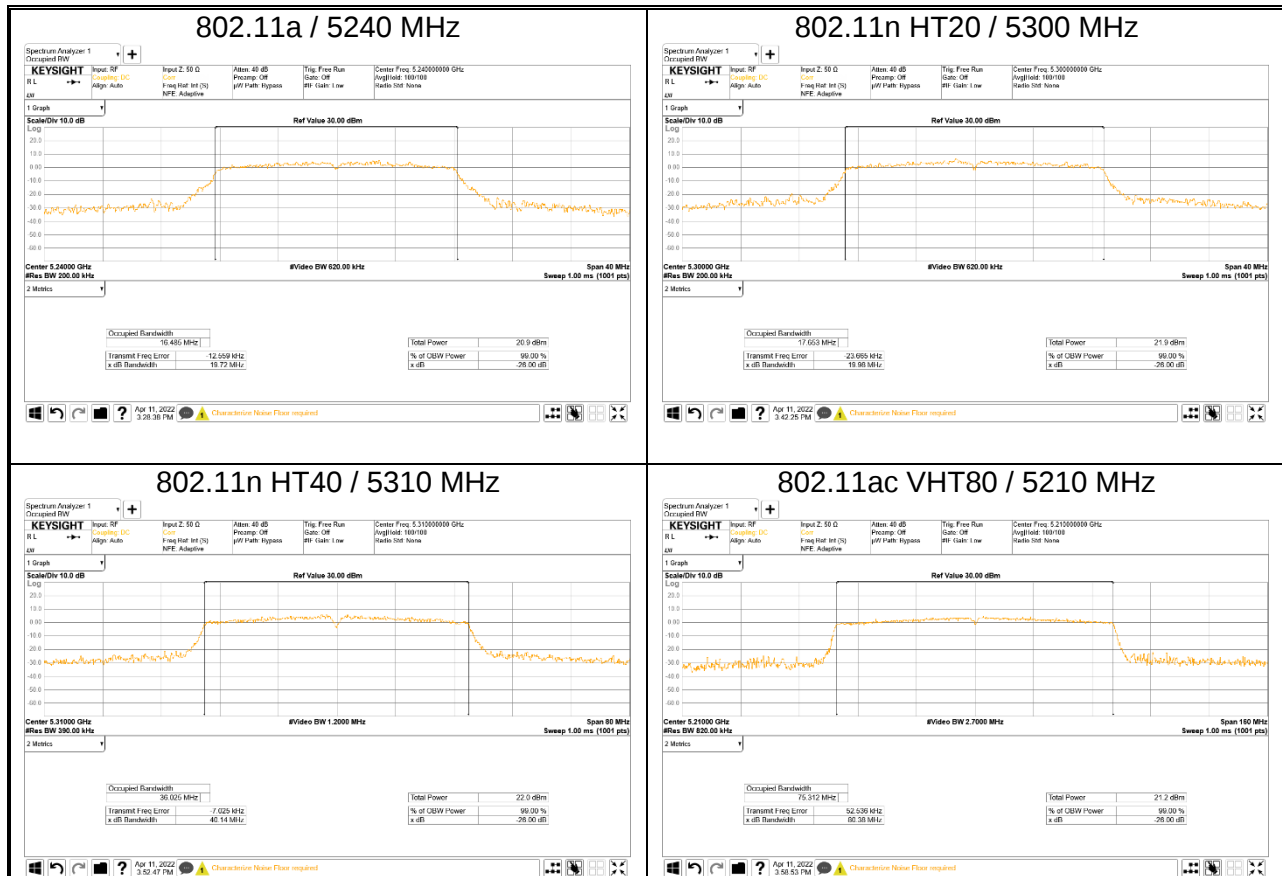
TEST PROCEDURE

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 ^{Note}	36	5180	19.85	19.72	16.43
	40	5200	20.02		16.45
	48	5240	19.72		16.49
UNII-2A ^{Note}	52	5260	19.91	19.91	16.57
	60	5300	20.51		16.53
	64	5320	19.97		16.46
UNII-2C	100	5500	23.93	20.68	
	116	5580	21.70		
	140	5700	20.68		

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 ^{Note}	36	5180	23.73	22.41	17.62
	40	5200	23.08		17.58
	48	5240	22.41		17.67
UNII-2A ^{Note}	52	5260	21.01	19.98	17.63
	60	5300	19.98		17.65
	64	5320	22.43		17.63
UNII-2C	100	5500	23.23	22.74	
	116	5580	22.91		
	140	5700	22.74		

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 ^{Note}	38	5190	40.75	40.75	36.11
	46	5230	41.01		36.11
UNII-2A ^{Note}	54	5270	44.94	40.14	36.07
	62	5310	40.14		36.03
UNII-2C	102	5510	49.54	40.84	
	118	5590	40.84		
	134	5670	41.98		

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	80.38	80.38	75.31
UNII-2A ^{Note}	58	5290	106.50	106.50	75.39
UNII-2C	106	5530	93.87	91.43	
	122	5610	91.43		

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	19.05	7.66
802.11n HT20	Straddle	5720	17.47	5.73
802.11n HT40	Straddle	5710	36.70	5.18
802.11ac VHT80	Straddle	5690	75.25	5.06

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.

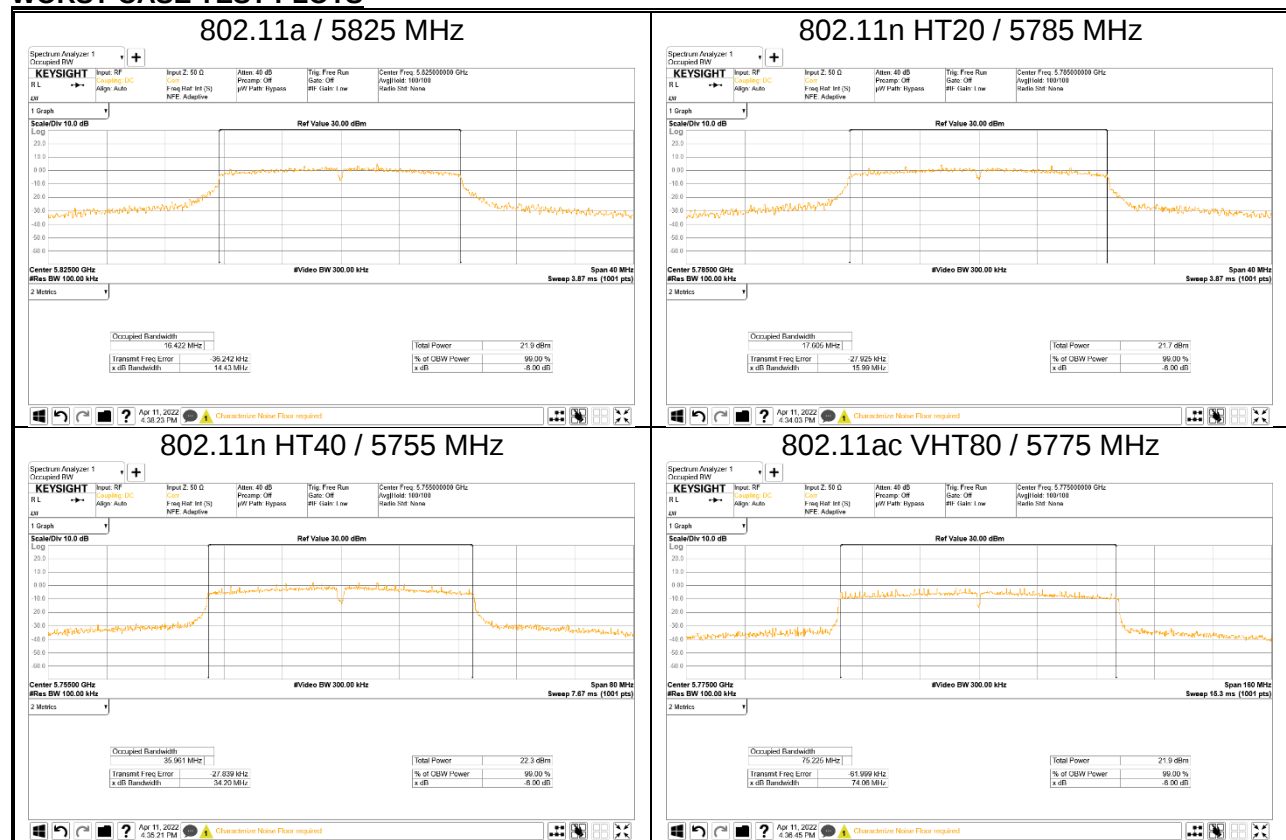
TEST PROCEDURE

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.

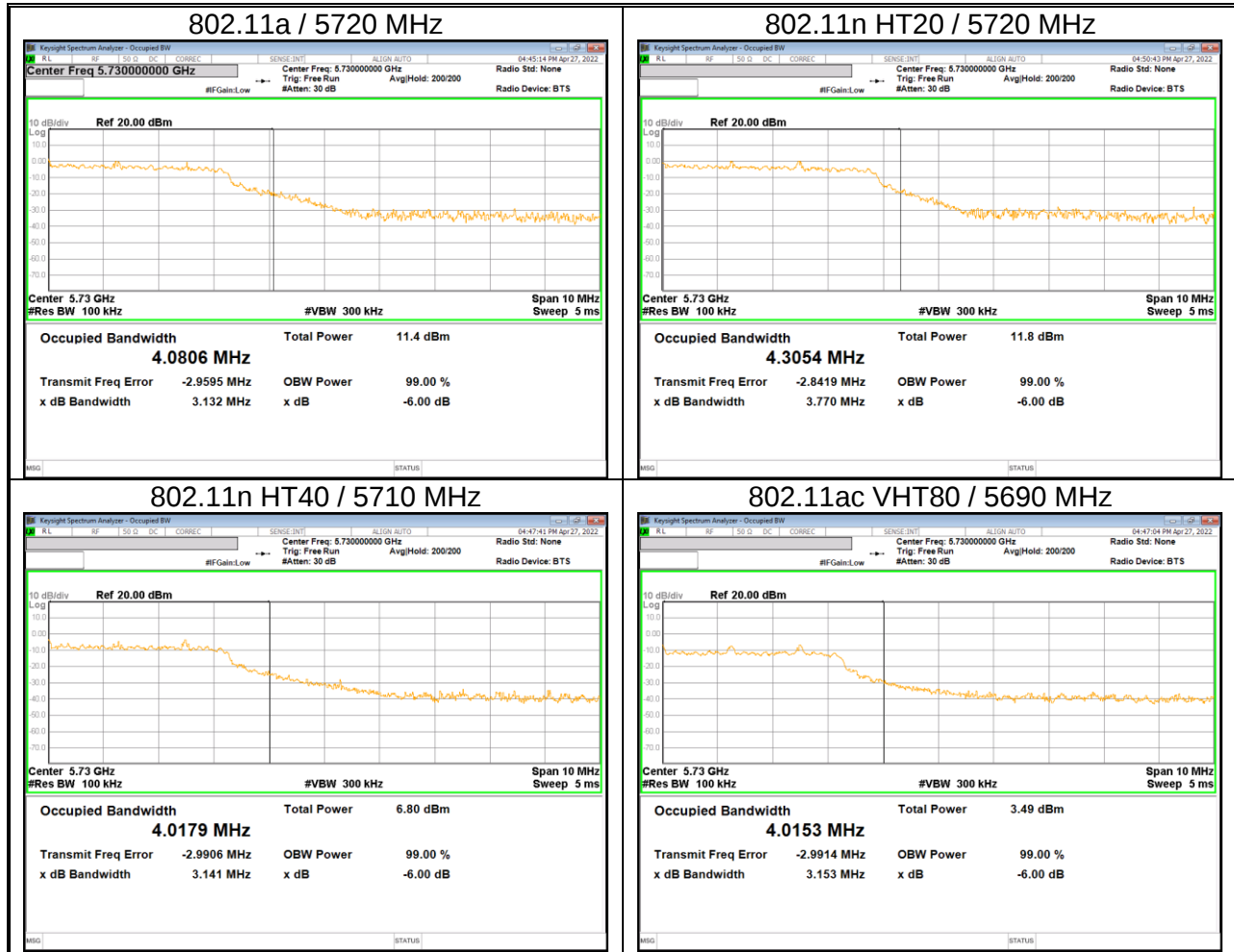
RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS



Straddle Channel



10.1.1. UNII-3 BAND

Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]	Worst	Minimum Limit [MHz]
802.11a	144	5720	3.13	3.13	0.5
	149	5745	15.04		
	157	5785	15.36		
	165	5825	14.43		
802.11n HT20	144	5720	3.77	3.77	
	149	5745	16.14		
	157	5785	15.99		
	165	5825	17.34		
802.11n HT40	142	5710	3.14	3.14	
	151	5755	34.20		
	159	5795	35.18		
802.11ac VHT80	138	5690	3.15	3.15	
	155	5775	74.06		

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.

10.2.1. 802.11a MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Limit [dBm]
UNII-1	36	5180	14.04	23.98
	40	5200	14.03	
	48	5240	14.00	
UNII-2A	52	5260	14.87	23.98
	60	5300	14.83	
	64	5320	14.80	
UNII-2C	100	5500	13.72	23.98
	116	5580	13.84	
	140	5700	11.59	
UNII-3	149	5745	13.67	30.00
	157	5785	13.73	
	165	5825	13.61	

* 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	5.93	0.00	5.93	11.00
	40	5200	5.40	0.00	5.40	
	48	5240	5.40	0.00	5.40	
UNII-2A	52	5260	6.35	0.00	6.35	11.00
	60	5300	6.20	0.00	6.20	
	64	5320	5.36	0.00	5.36	
UNII-2C	100	5500	4.05	0.00	4.05	11.00
	116	5580	5.04	0.00	5.04	
	140	5700	2.06	0.00	2.06	
UNII-3	149	5745	1.42	0.00	1.42	30.00/500kHz
	157	5785	1.41	0.00	1.41	
	165	5825	1.49	0.00	1.49	

* 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]	Limit [dBm]
UNII-1	36	5180	14.74	23.98
	40	5200	14.86	
	48	5240	14.83	
UNII-2A	52	5260	14.79	23.98
	60	5300	14.84	
	64	5320	14.69	
UNII-2C	100	5500	12.57	23.98
	116	5580	13.84	
	140	5700	11.58	
UNII-3	149	5745	13.54	30.00
	157	5785	13.57	
	165	5825	13.55	

* 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	5.06	0.00	5.06	11.00
	40	5200	6.34	0.00	6.34	
	48	5240	6.16	0.00	6.16	
UNII-2A	52	5260	6.34	0.00	6.34	11.00
	60	5300	6.00	0.00	6.00	
	64	5320	5.01	0.00	5.01	
UNII-2C	100	5500	2.82	0.00	2.82	11.00
	116	5580	4.67	0.00	4.67	
	140	5700	1.49	0.00	1.49	
UNII-3	149	5745	1.39	0.00	1.39	30.00/500kHz
	157	5785	1.12	0.00	1.12	
	165	5825	1.10	0.00	1.10	

* 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]	Limit [dBm]
UNII-1	38	5190	13.85	23.98
	46	5230	14.80	
UNII-2A	54	5270	14.75	23.98
	62	5310	13.71	
UNII-2C	102	5510	11.47	23.98
	118	5590	13.63	
	134	5670	13.71	
UNII-3	151	5755	13.54	30.00
	159	5795	13.52	

* 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	1.27	0.00	1.27	11.00
	46	5230	3.21	0.00	3.21	
UNII-2A	54	5270	3.24	0.00	3.24	11.00
	62	5310	1.44	0.00	1.44	
UNII-2C	102	5510	0.91	0.00	0.91	11.00
	118	5590	1.82	0.00	1.82	
	134	5670	2.13	0.00	2.13	
UNII-3	151	5755	-1.85	0.00	-1.85	30.00/500kHz
	159	5795	-1.89	0.00	-1.89	

* 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]	Limit [dBm]
UNII-1	42	5210	12.83	23.98
UNII-2A	58	5290	12.72	23.98
UNII-2C	106	5530	10.46	23.98
	122	5610	13.91	
UNII-3	155	5775	12.40	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	-3.11	0.17	-2.94	11.00
UNII-2A	58	5290	-3.26	0.17	-3.09	11.00
UNII-2C	106	5530	-5.23	0.17	-5.06	11.00
	122	5610	-0.91	0.17	-0.74	
UNII-3	155	5775	-6.03	0.17	-5.86	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	13.23	0.00	13.23	23.80
	UNII-3		5.47	0.00	5.47	30.00
802.11n HT20	UNII-2C	5720	13.12	0.00	13.12	23.42
	UNII-3		5.88	0.00	5.88	30.00
802.11n HT40	UNII-2C	5710	13.43	0.00	13.43	23.98
	UNII-3		0.64	0.00	0.64	30.00
802.11ac VHT80	UNII-2C	5690	13.47	0.17	13.64	23.98
	UNII-3		-2.88	0.17	-2.71	30.00

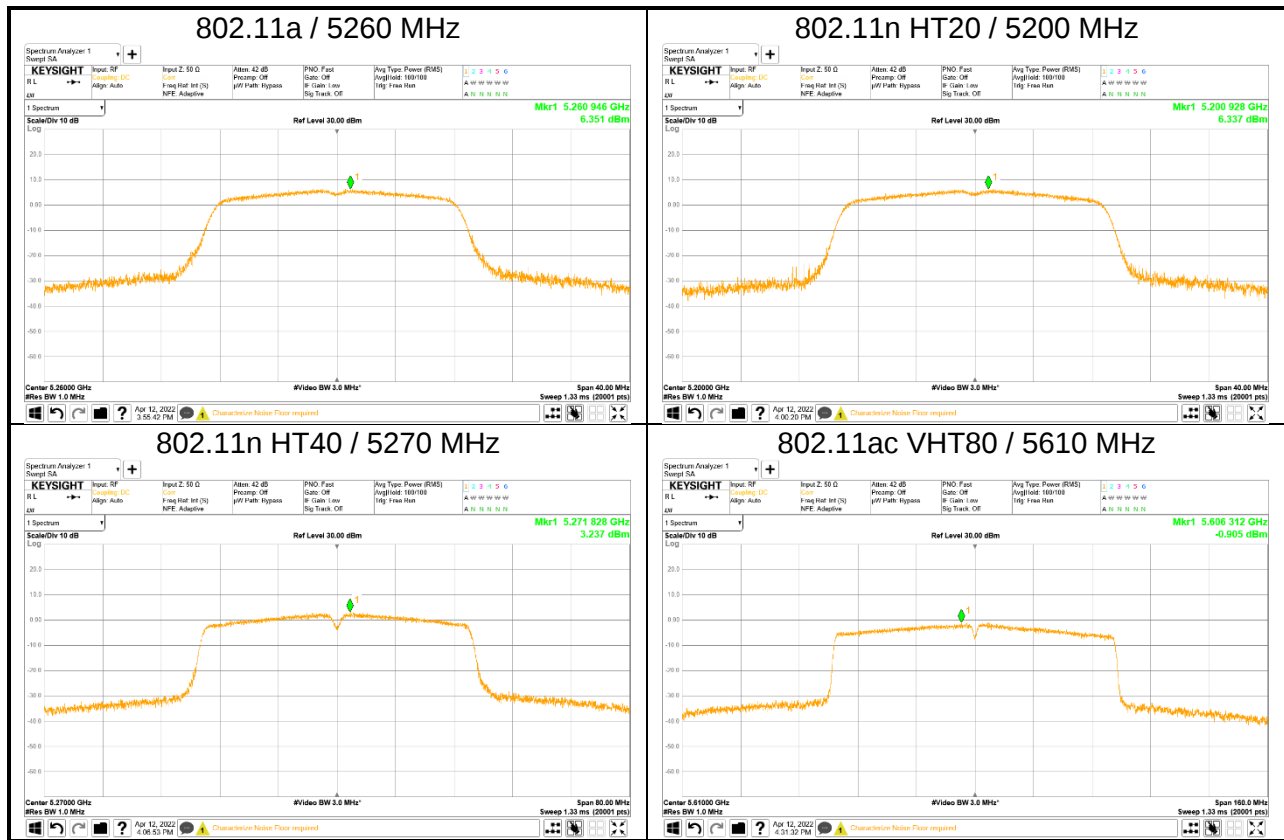
* Calculation of Output Power : Corr'd Power = Meas. Power + Duty CF [dB]

PSD Results

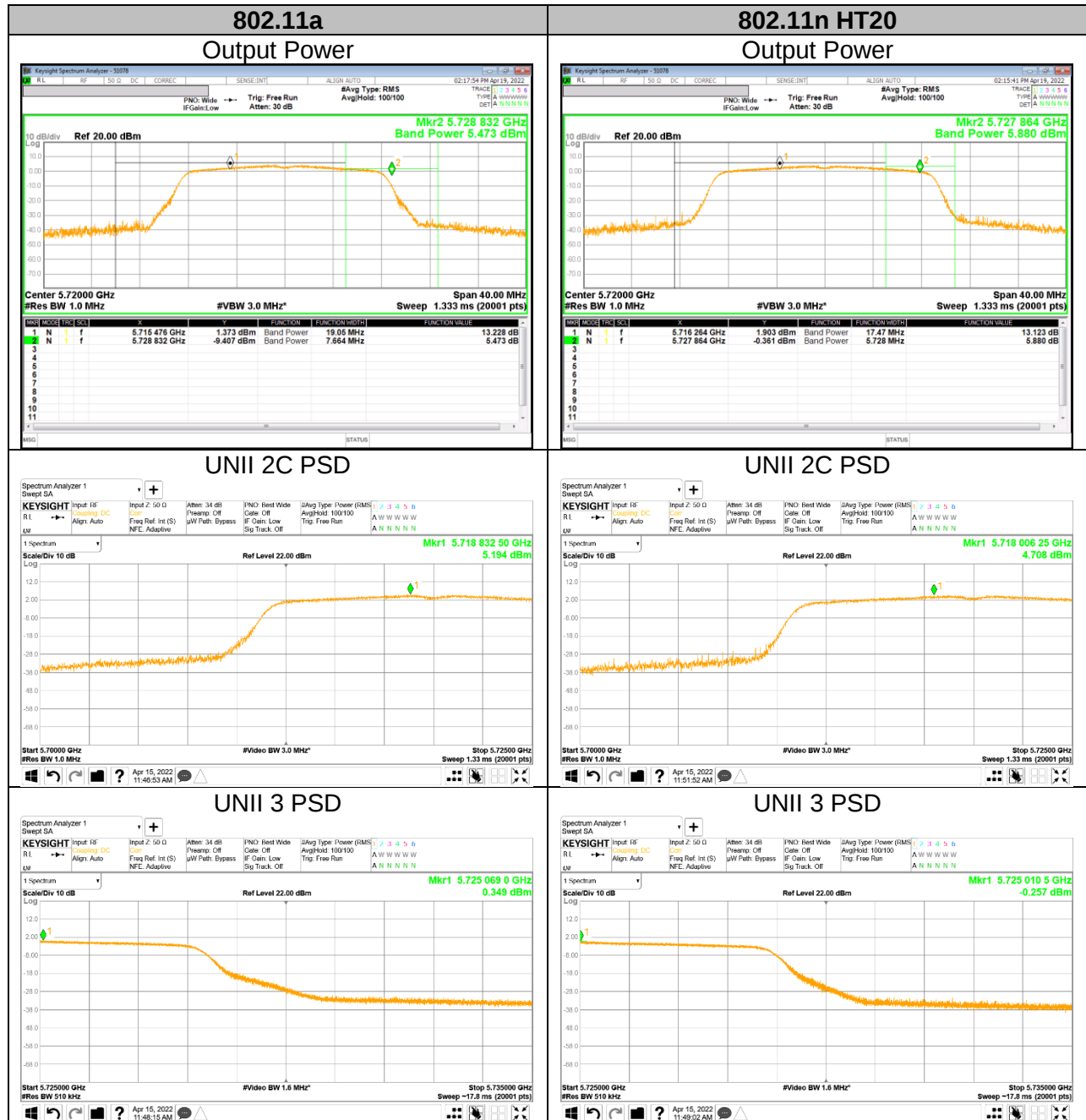
Mode	Band	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/MHz]
802.11a	UNII-2C	5720	5.19	0.00	5.19	11.00
	UNII-3		0.35	0.00	0.35	30.00/500kHz
802.11n HT20	UNII-2C	5720	4.71	0.00	4.71	11.00
	UNII-3		-0.26	0.00	-0.26	30.00/500kHz
802.11n HT40	UNII-2C	5710	2.02	0.00	2.02	11.00
	UNII-3		-4.90	0.00	-4.90	30.00/500kHz
802.11ac VHT80	UNII-2C	5690	-1.80	0.17	-1.63	11.00
	UNII-3		-9.18	0.17	-9.01	30.00/500kHz

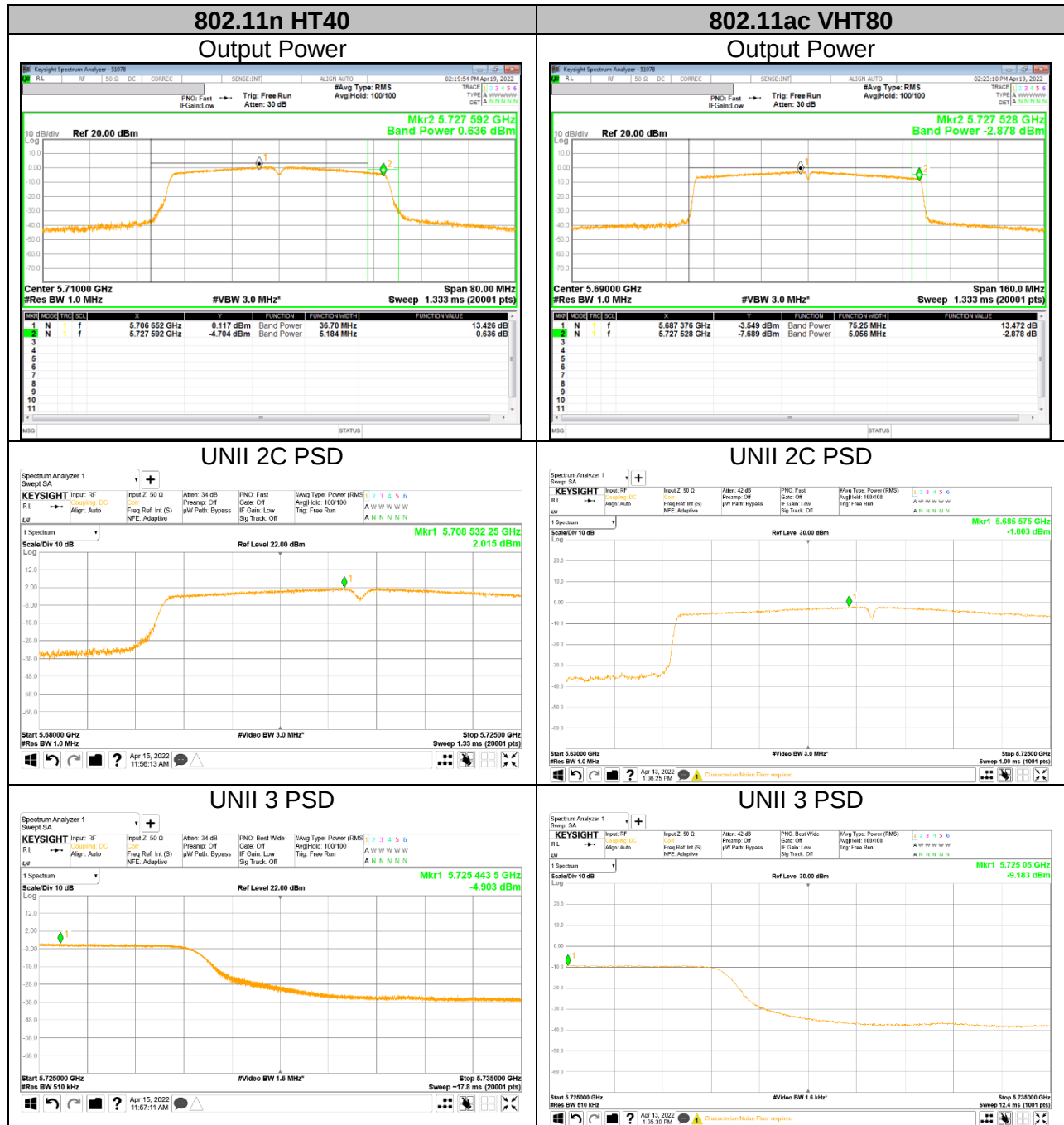
* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.6. OUTPUT POWER AND PPSD PLOTS (WORST CASE)



UNII Straddle Ch. 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.

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.

Reference to §2.947 the EUT was confirmed that the measured emissions of the composite system did not exceed the highest levels allowed for the individual components.

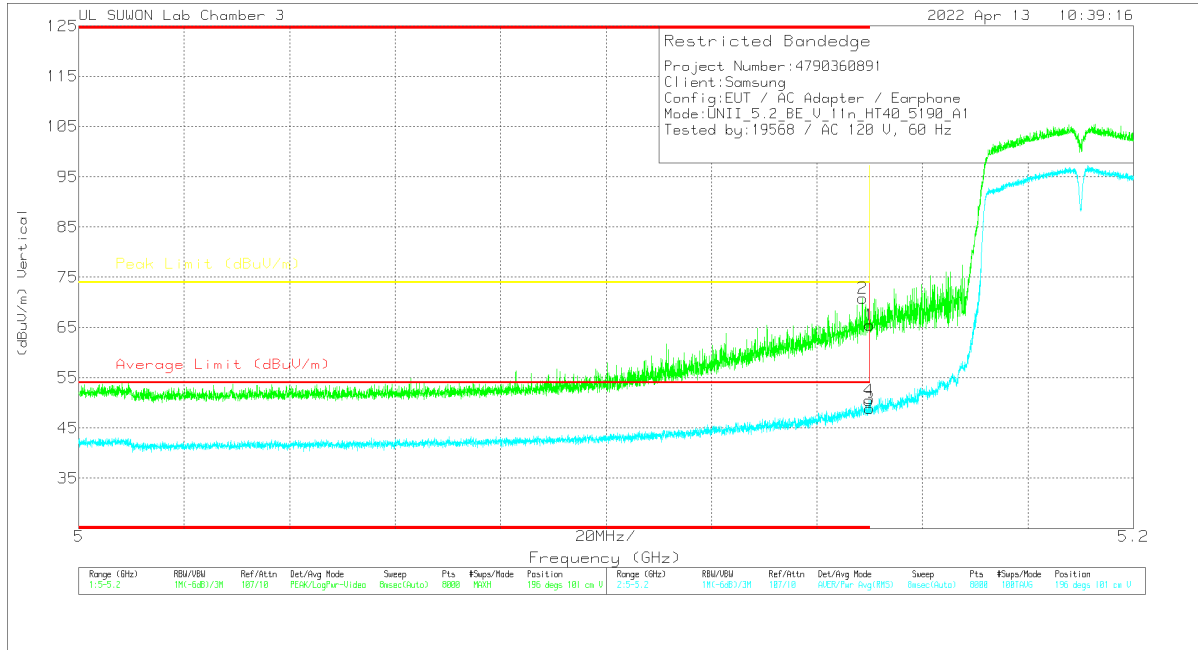
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.

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: 802.11n HT40 / 5190 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	S117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 5.14999	51.82	PK		-21.2	0	65.42	-	-	74	-8.58	196	101	V
2	* 5.14864	57.11	PK		-21.1	0	70.81	-	-	74	-3.19	196	101	V
3	* 5.14999	35.33	RMS		-21.2	0	48.93	54	-5.07	-	-	196	101	V
4	* 5.14989	36.93	RMS		-21.2	0	50.53	54	-3.47	-	-	196	101	V

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

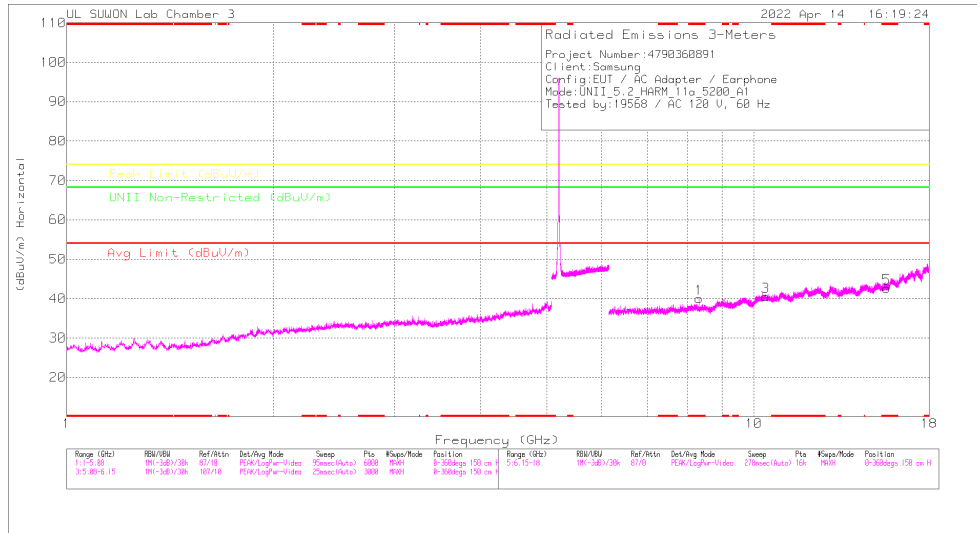
BANDEDGE TEST DATA

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	* 5.14999	48.09	Pk	34.80	-21.20	0.00	61.69	-	-	74.00	-12.31	136	100	H
			* 5.14872	51.12	Pk	34.80	-21.10	0.00	64.82	-	-	74.00	-9.18	136	100	H
			* 5.14999	32.93	RMS	34.80	-21.20	0.00	46.53	54.00	-7.47	-	-	136	100	H
			* 5.14994	33.58	RMS	34.80	-21.20	0.00	47.18	54.00	-6.82	-	-	136	100	H
			* 5.14999	52.58	Pk	34.80	-21.20	0.00	66.18	-	-	74.00	-7.82	198	100	V
			* 5.14864	56.74	Pk	34.80	-21.10	0.00	70.44	-	-	74.00	-3.56	198	100	V
			* 5.14999	35.56	RMS	34.80	-21.20	0.00	49.16	54.00	-4.84	-	-	198	100	V
			* 5.14974	36.86	RMS	34.80	-21.20	0.00	50.46	54.00	-3.54	-	-	198	100	V
802.11n (HT20)	5180	ANT1	* 5.14999	52.97	Pk	34.80	-21.20	0.00	66.57	-	-	74.00	-7.43	128	100	H
			* 5.14524	52.24	Pk	34.80	-21.20	0.00	65.84	-	-	74.00	-8.16	128	100	H
			* 5.14999	31.46	RMS	34.80	-21.20	0.00	45.06	54.00	-8.94	-	-	128	100	H
			* 5.14922	33.95	RMS	34.80	-21.10	0.00	47.65	54.00	-6.35	-	-	128	100	H
			* 5.14989	55.63	Pk	34.80	-21.20	0.00	69.23	-	-	74.00	-4.77	198	100	V
			* 5.14989	57.06	Pk	34.80	-21.20	0.00	70.66	-	-	74.00	-3.34	198	100	V
			* 5.14999	34.69	RMS	34.80	-21.20	0.00	48.29	54.00	-5.71	-	-	198	100	V
			* 5.14742	36.99	RMS	34.80	-21.10	0.00	50.69	54.00	-3.31	-	-	198	100	V
802.11n (HT40)	5190	ANT1	* 5.14999	46.99	Pk	34.80	-21.20	0.00	60.59	-	-	74.00	-13.41	128	105	H
			* 5.14917	50.41	Pk	34.80	-21.10	0.00	64.11	-	-	74.00	-9.89	128	105	H
			* 5.14999	32.17	RMS	34.80	-21.20	0.00	45.77	54.00	-8.23	-	-	128	105	H
			* 5.14722	32.19	RMS	34.80	-21.10	0.00	45.89	54.00	-8.11	-	-	128	105	H
			* 5.14999	51.82	Pk	34.80	-21.20	0.00	65.42	-	-	74.00	-8.58	196	101	V
			* 5.14864	57.11	Pk	34.80	-21.10	0.00	70.81	-	-	74.00	-3.19	196	101	V
			* 5.14999	35.33	RMS	34.80	-21.20	0.00	48.93	54.00	-5.07	-	-	196	101	V
			* 5.14989	36.93	RMS	34.80	-21.20	0.00	50.53	54.00	-3.47	-	-	196	101	V
802.11ac (VHT80)	5210	ANT1	* 5.14999	44.48	Pk	34.80	-21.20	0.00	58.08	-	-	74.00	-15.92	154	106	H
			* 5.14789	48.63	Pk	34.80	-21.10	0.00	62.33	-	-	74.00	-11.67	154	106	H
			* 5.14999	31.60	RMS	34.80	-21.20	0.17	45.37	54.00	-8.63	-	-	154	106	H
			* 5.14954	32.32	RMS	34.80	-21.20	0.17	46.09	54.00	-7.91	-	-	154	106	H
			* 5.14999	49.92	Pk	34.80	-21.20	0.00	63.52	-	-	74.00	-10.48	195	100	V
			* 5.14104	54.11	Pk	34.80	-21.10	0.00	67.81	-	-	74.00	-6.19	195	100	V
			* 5.14999	35.52	RMS	34.80	-21.20	0.17	49.29	54.00	-4.71	-	-	195	100	V
			* 5.14947	36.33	RMS	34.80	-21.20	0.17	50.10	54.00	-3.90	-	-	195	100	V

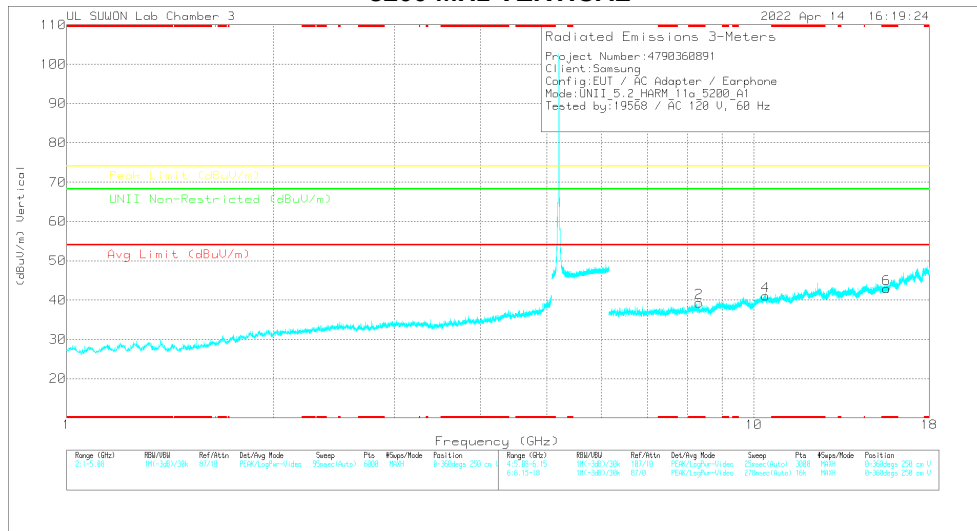
Note1. Pk - Peak detector, RMS - RMS detector

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

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5200 MHz)
5200 MHz HORIZONTAL



5200 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	3127_0021957	6GHz_HF95dB	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
* 8.31935	36.63	PK-U	36.2	-23.9	0	48.93	-	-	74	-25.07	-	-	125	105	H
* 8.31979	27.38	ADR	36.2	-23.9	0	39.68	54	-14.32	-	-	-	-	125	105	H
* 15.59633	33.27	PK-U	40.3	-21.8	0	51.77	-	-	74	-22.23	-	-	0	100	V
10.40315	34	PK-U	38.1	-21.5	0	50.3	-	-	-	-	68.2	-17.6	0	100	V
10.39096	33.6	PK-U	38.1	-21.4	0	50.3	-	-	-	-	68.2	-17.9	0	100	H
* 8.31993	35.53	PK-U	36.2	-23.9	0	47.83	-	-	74	-26.17	-	-	202	100	V
* 15.6065	34.51	PK-U	40.3	-21.7	0	53.11	-	-	74	-20.89	-	-	0	100	H
* 8.32005	25.89	ADR	36.2	-23.9	0	38.19	54	-15.81	-	-	-	-	202	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	* 8.30744	35.52	PK-U	36.20	-23.90	0.00	47.82	-	-	74.00	-26.18	-	-	360	100	H
			* 8.28936	35.50	PK-U	36.20	-23.90	0.00	47.80	-	-	74.00	-26.20	-	-	0	100	V
			10.351	33.68	PK-U	38.10	-21.40	0.00	50.38	-	-	-	-	68.20	-17.82	0	100	H
			10.367	34.42	PK-U	38.10	-21.30	0.00	51.22	-	-	-	-	68.20	-16.98	0	100	V
			* 15.53715	34.76	PK-U	40.20	-22.00	0.00	52.96	-	-	74.00	-21.04	-	-	0	100	H
			* 15.53879	34.08	PK-U	40.20	-21.90	0.00	52.38	-	-	74.00	-21.62	-	-	0	100	V
	5200	ANT1	* 8.31935	36.63	PK-U	36.20	-23.90	0.00	48.93	-	-	74.00	-25.07	-	-	125	105	H
			* 8.31979	27.38	ADR	36.20	-23.90	0.00	39.68	54.00	-14.32	-	-	-	-	125	105	H
			* 15.59633	33.27	PK-U	40.30	-21.80	0.00	51.77	-	-	74.00	-22.23	-	-	0	100	V
			10.403	34.00	PK-U	38.10	-21.50	0.00	50.60	-	-	-	-	68.20	-17.60	0	100	V
			10.391	33.60	PK-U	38.10	-21.40	0.00	50.30	-	-	-	-	68.20	-17.90	0	100	H
			* 8.31993	35.53	PK-U	36.20	-23.90	0.00	47.83	-	-	74.00	-26.17	-	-	202	100	V
	5240	ANT1	* 15.6065	34.51	PK-U	40.30	-21.70	0.00	53.11	-	-	74.00	-20.89	-	-	0	100	H
			* 8.32005	25.89	ADR	36.20	-23.90	0.00	38.19	54.00	-15.81	-	-	-	-	202	100	V
			* 8.38186	35.27	PK-U	36.30	-23.90	0.00	47.67	-	-	74.00	-26.33	-	-	360	100	H
			* 8.37513	35.57	PK-U	36.30	-24.00	0.00	47.87	-	-	74.00	-26.13	-	-	360	100	V
			10.484	33.64	PK-U	38.20	-21.50	0.00	50.34	-	-	-	-	68.20	-17.86	360	100	H
			10.477	33.41	PK-U	38.20	-21.50	0.00	50.11	-	-	-	-	68.20	-18.09	360	100	V
802.11n (HT20) Spot-Check	5200	ANT1	* 15.73004	34.35	PK-U	40.50	-21.50	0.00	53.35	-	-	74.00	-20.65	-	-	360	100	H
			* 15.72348	34.20	PK-U	40.50	-21.50	0.00	53.20	-	-	74.00	-20.80	-	-	360	100	V
			7.806	35.49	PK-U	36.30	-24.70	0.00	47.09	-	-	-	-	68.20	-21.11	0	100	H
			7.807	35.50	PK-U	36.30	-24.70	0.00	47.10	-	-	-	-	68.20	-21.10	0	100	V
			10.401	35.99	PK-U	38.10	-21.40	0.00	52.69	-	-	-	-	68.20	-15.51	121	107	H
			10.399	37.93	PK-U	38.10	-21.40	0.00	54.63	-	-	-	-	68.20	-13.57	120	100	V
802.11n (HT40) Spot-Check	5190	ANT1	* 15.59866	34.18	PK-U	40.30	-21.80	0.00	52.68	-	-	74.00	-21.32	-	-	0	100	H
			* 15.59947	34.45	PK-U	40.30	-21.80	0.00	52.95	-	-	74.00	-21.05	-	-	0	100	V
			7.787	35.69	PK-U	36.30	-24.80	0.00	47.19	-	-	-	-	68.20	-21.01	0	100	H
			7.774	35.87	PK-U	36.30	-25.00	0.00	47.17	-	-	-	-	68.20	-21.03	0	100	V
			10.373	34.00	PK-U	38.10	-21.40	0.00	50.70	-	-	-	-	68.20	-17.50	0	100	H
			10.375	34.27	PK-U	38.10	-21.30	0.00	51.07	-	-	-	-	68.20	-17.13	0	100	V
802.11ac (VHT80) Spot-Check	5210	ANT1	* 15.56652	33.91	PK-U	40.30	-21.80	0.00	52.41	-	-	74.00	-21.59	-	-	0	100	H
			* 15.56546	33.74	PK-U	40.30	-21.80	0.00	52.24	-	-	74.00	-21.76	-	-	0	100	V
			7.821	36.20	PK-U	36.30	-24.60	0.00	47.90	-	-	-	-	68.20	-20.30	0	100	H
			7.822	36.02	PK-U	36.30	-24.60	0.00	47.72	-	-	-	-	68.20	-20.48	0	100	V
			10.415	33.58	PK-U	38.10	-21.50	0.00	50.18	-	-	-	-	68.20	-18.02	0	100	H
			10.425	33.69	PK-U	38.10	-21.50	0.00	50.29	-	-	-	-	68.20	-17.91	0	100	V
			* 15.63869	34.14	PK-U	40.40	-21.70	0.00	52.84	-	-	74.00	-21.16	-	-	0	100	H
			* 15.62144	34.19	PK-U	40.30	-21.60	0.00	52.89	-	-	74.00	-21.11	-	-	0	100	V

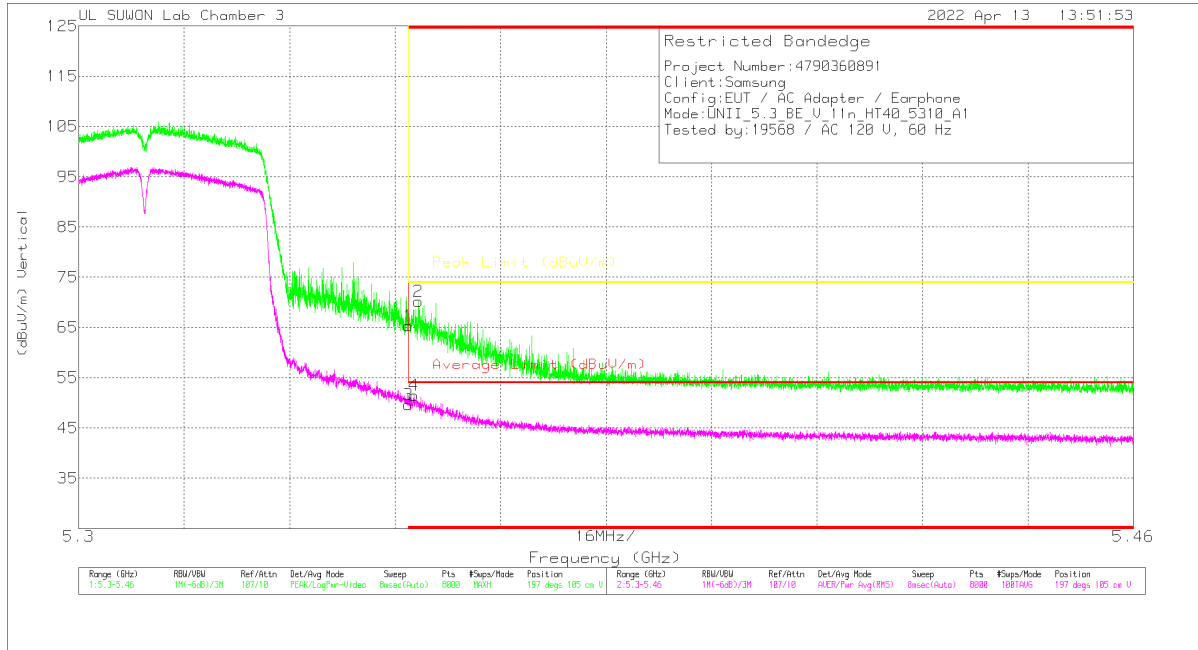
Note1. PK-U - U-NII: Maximum Peak

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: 802.11n HT40 / 5310 MHz)

VERTICAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	2117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	50.97	PK		-20.7	0	65.37	-	-	74	-8.63	197	105	V
2	* 5.35153	55.85	PK		-20.8	0	70.15	-	-	74	-3.85	197	105	V
3	* 5.35001	35.28	RMS		-20.7	0	49.68	54	-4.32	-	-	197	105	V
4	* 5.35081	37.13	RMS		-20.7	0	51.53	54	-2.47	-	-	197	105	V

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

PK - Peak detector

RMS - RMS detection

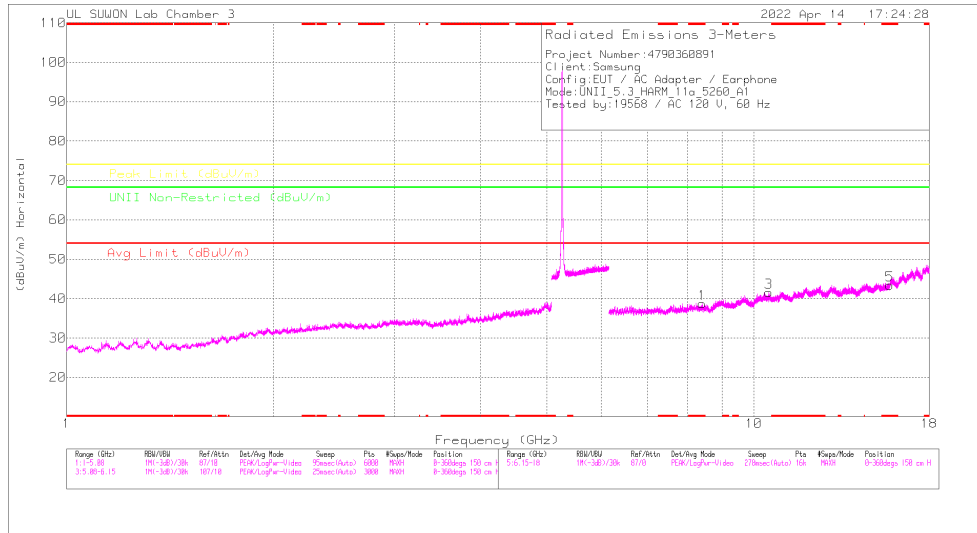
BANDEDGE TEST DATA

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	* 5.35001	49.75	Pk	35.10	-20.70	0.00	64.15	-	-	74.00	-9.85	156	100	H
			* 5.35159	50.46	Pk	35.10	-20.80	0.00	64.76	-	-	74.00	-9.24	156	100	H
			* 5.35001	33.06	RMS	35.10	-20.70	0.00	47.46	54.00	-6.54	-	-	156	100	H
			* 5.35017	33.46	RMS	35.10	-20.70	0.00	47.86	54.00	-6.14	-	-	156	100	H
			* 5.35001	49.35	Pk	35.10	-20.70	0.00	63.75	-	-	74.00	-10.25	194	100	V
			* 5.35375	53.49	Pk	35.10	-20.70	0.00	67.89	-	-	74.00	-6.11	194	100	V
			* 5.35001	34.45	RMS	35.10	-20.70	0.00	48.85	54.00	-5.15	-	-	194	100	V
			* 5.35037	35.93	RMS	35.10	-20.70	0.00	50.33	54.00	-3.67	-	-	194	100	V
802.11n (HT20)	5320	ANT1	* 5.35001	46.25	Pk	35.10	-20.70	0.00	60.65	-	-	74.00	-13.35	174	109	H
			* 5.35023	49.15	Pk	35.10	-20.70	0.00	63.55	-	-	74.00	-10.45	174	109	H
			* 5.35001	31.64	RMS	35.10	-20.70	0.00	46.04	54.00	-7.96	-	-	174	109	H
			* 5.35039	31.81	RMS	35.10	-20.70	0.00	46.21	54.00	-7.79	-	-	174	109	H
			* 5.35001	50.55	Pk	35.10	-20.70	0.00	64.95	-	-	74.00	-9.05	198	106	V
			* 5.35081	54.93	Pk	35.10	-20.70	0.00	69.33	-	-	74.00	-4.67	198	106	V
			* 5.35001	33.25	RMS	35.10	-20.70	0.00	47.65	54.00	-6.35	-	-	198	106	V
			* 5.35009	35.25	RMS	35.10	-20.70	0.00	49.65	54.00	-4.35	-	-	198	106	V
802.11n (HT40)	5310	ANT1	* 5.35001	46.05	Pk	35.10	-20.70	0.00	60.45	-	-	74.00	-13.55	155	100	H
			* 5.35215	54.10	Pk	35.10	-20.80	0.00	68.40	-	-	74.00	-5.60	155	100	H
			* 5.35001	32.68	RMS	35.10	-20.70	0.00	47.08	54.00	-6.92	-	-	155	100	H
			* 5.35031	33.97	RMS	35.10	-20.70	0.00	48.37	54.00	-5.63	-	-	155	100	H
			* 5.35001	50.97	Pk	35.10	-20.70	0.00	65.37	-	-	74.00	-8.63	197	105	V
			* 5.35153	55.85	Pk	35.10	-20.80	0.00	70.15	-	-	74.00	-3.85	197	105	V
			* 5.35001	35.28	RMS	35.10	-20.70	0.00	49.68	54.00	-4.32	-	-	197	105	V
			* 5.35081	37.13	RMS	35.10	-20.70	0.00	51.53	54.00	-2.47	-	-	197	105	V
802.11ac (VHT80)	5290	ANT1	* 5.35001	45.66	Pk	35.10	-20.70	0.00	60.06	-	-	74.00	-13.94	159	100	H
			* 5.35453	53.39	Pk	35.10	-20.70	0.00	67.79	-	-	74.00	-6.21	159	100	H
			* 5.35001	31.64	RMS	35.10	-20.70	0.17	46.21	54.00	-7.79	-	-	159	100	H
			* 5.35035	33.10	RMS	35.10	-20.70	0.17	47.67	54.00	-6.33	-	-	159	100	H
			* 5.35001	52.60	Pk	35.10	-20.70	0.00	67.00	-	-	74.00	-7.00	200	105	V
			* 5.35151	55.20	Pk	35.10	-20.80	0.00	69.50	-	-	74.00	-4.50	200	105	V
			* 5.35001	35.01	RMS	35.10	-20.70	0.17	49.58	54.00	-4.42	-	-	200	105	V
			* 5.35431	36.88	RMS	35.10	-20.70	0.17	51.45	54.00	-2.55	-	-	200	105	V

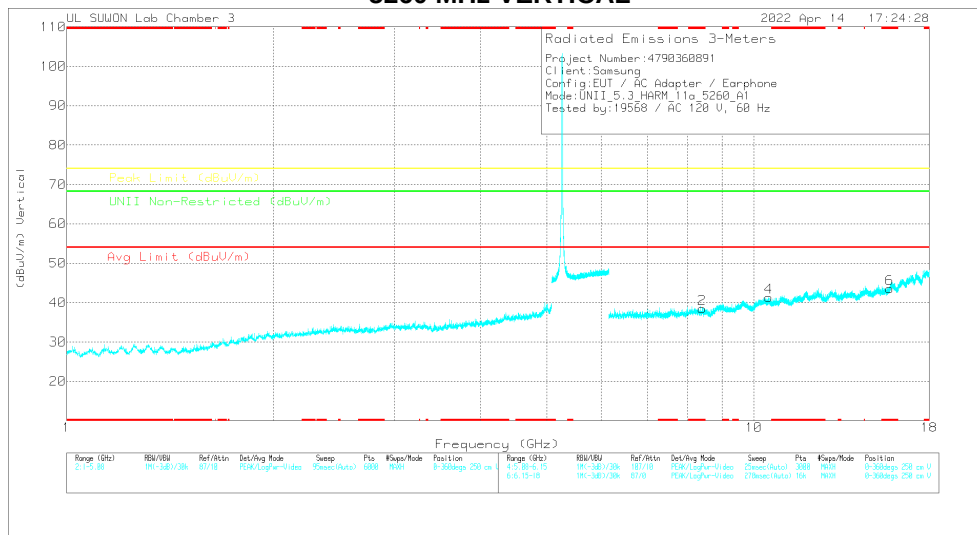
Note1. Pk - Peak detector, RMS - RMS detector

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

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5260 MHz)
5260 MHz HORIZONTAL



5260 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	3117_00218957	6GHz_HFpsdB	DC Cor (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 (Degs)	Height (cm)	Polarity
* 8.42779	35.49	PK-U	36.3	-23.5	0	48.29	-	-	74	-25.71	-	-	360	100	H
* 10.51732	33.23	PK-U	38.2	-21.4	0	50.03	-	-	74	-23.97	68.2	-18.17	360	100	H
* 15.75561	34.61	PK-U	40.6	-21.4	0	53.81	-	-	74	-20.19	-	-	360	100	H
* 15.75561	22.54	ADR	40.6	-21.4	0	41.74	54	-12.26	-	-	-	-	360	100	H
* 8.40306	35.23	PK-U	36.3	-23.8	0	47.73	-	-	74	-26.27	-	-	360	100	V
* 10.51229	33.49	PK-U	38.2	-21.5	0	50.19	-	-	74	-23.81	68.2	-18.01	360	100	V
* 15.7854	34.8	PK-U	40.6	-21.3	0	54.1	-	-	74	-19.9	-	-	360	100	V
* 15.7854	22.97	ADR	40.6	-21.3	0	42.27	54	-11.73	-	-	-	-	360	100	V

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

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

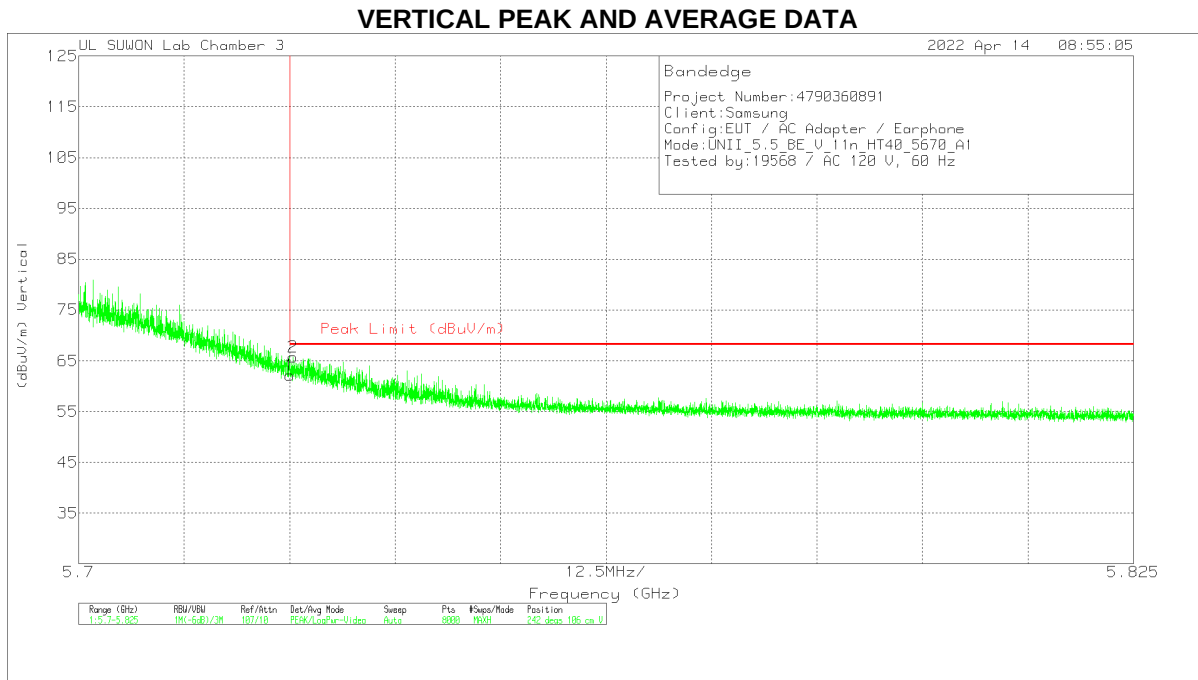
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
5260	ANT1	* 8.42779	35.49	PK-U	36.30	-23.50	0.00	48.29	-	-	74.00	-25.71	-	-	360	100	H
		10.517	33.23	PK-U	38.20	-21.40	0.00	50.03	-	-	-	-	68.20	-18.17	360	100	H
		* 15.75561	34.61	PK-U	40.60	-21.40	0.00	53.81	-	-	74.00	-20.19	-	-	360	100	H
		* 15.75561	22.54	ADR	40.60	-21.40	0.00	41.74	54.00	-12.26	-	-	-	-	360	100	H
		* 8.40306	35.23	PK-U	36.30	-23.80	0.00	47.73	-	-	74.00	-26.27	-	-	360	100	V
		10.512	33.49	PK-U	38.20	-21.50	0.00	50.19	-	-	-	-	68.20	-18.01	360	100	V
		* 15.7854	34.80	PK-U	40.60	-21.30	0.00	54.10	-	-	74.00	-19.90	-	-	360	100	V
		* 15.7854	22.97	ADR	40.60	-21.30	0.00	42.27	54.00	-11.73	-	-	-	-	360	100	V
		* 8.4891	34.97	PK-U	36.40	-23.30	0.00	48.07	-	-	74.00	-25.93	-	-	360	100	H
		* 8.48398	35.09	PK-U	36.40	-23.30	0.00	48.19	-	-	74.00	-25.81	-	-	360	100	V
5300	ANT1	10.433	33.36	PK-U	38.10	-21.60	0.00	49.86	-	-	-	-	68.20	-18.34	360	100	H
		10.597	32.67	PK-U	38.30	-21.50	0.00	49.47	-	-	-	-	68.20	-18.73	360	100	V
		* 15.89775	34.08	PK-U	40.80	-21.00	0.00	53.88	-	-	74.00	-20.12	-	-	360	100	H
		* 15.89775	21.92	ADR	40.80	-21.00	0.00	41.72	54.00	-12.28	-	-	-	-	360	100	H
		* 15.9073	34.61	PK-U	40.80	-21.00	0.00	54.41	-	-	74.00	-19.59	-	-	360	100	V
		* 15.9073	22.02	ADR	40.80	-21.00	0.00	41.82	54.00	-12.18	-	-	-	-	360	100	V
		7.989	35.66	PK-U	36.30	-24.60	0.00	47.36	-	-	-	-	68.20	-20.84	360	100	H
		7.989	35.55	PK-U	36.30	-24.60	0.00	47.25	-	-	-	-	68.20	-20.95	360	100	V
		* 10.64201	32.87	PK-U	38.30	-21.50	0.00	49.67	-	-	74.00	-24.33	-	-	360	100	H
		* 10.64224	33.57	PK-U	38.30	-21.50	0.00	50.37	-	-	74.00	-23.63	-	-	360	100	V
5320	ANT1	* 15.96214	34.48	PK-U	40.90	-20.90	0.00	54.48	-	-	74.00	-19.52	-	-	360	100	H
		* 15.96214	22.25	ADR	40.90	-20.90	0.00	42.25	54.00	-11.75	-	-	-	-	360	100	H
		* 15.95763	33.99	PK-U	40.90	-20.90	0.00	53.99	-	-	74.00	-20.01	-	-	360	100	V
		* 15.95763	21.74	ADR	40.90	-20.90	0.00	41.74	54.00	-12.26	-	-	-	-	360	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: 802.11n HT40 / 5670 MHz)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	46.43	Pk	35.7	-20	0	62.13	68.2	-6.07	242	106	V
2	5.72538	50.04	Pk	35.7	-20	0	65.74	68.2	-2.46	242	106	V

Pk - Peak detector

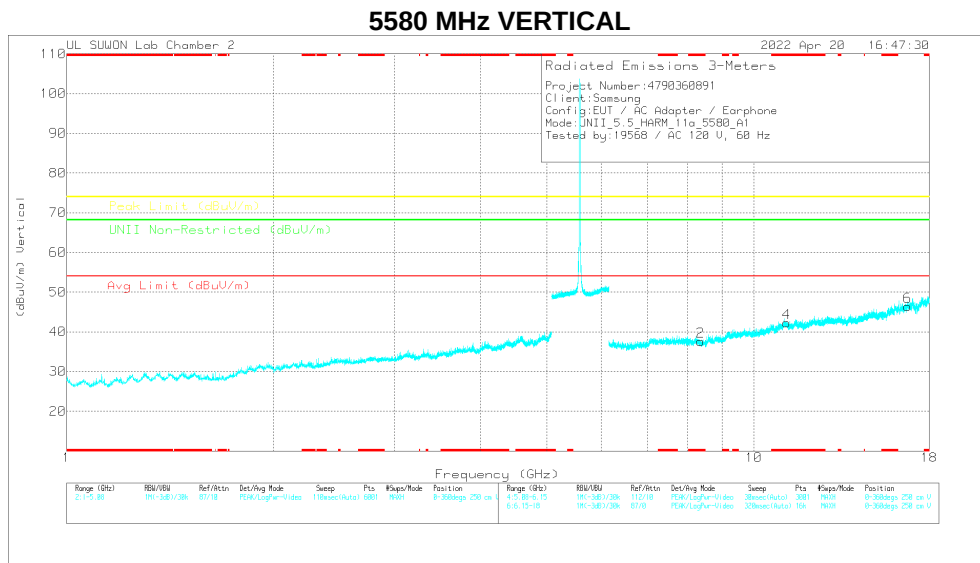
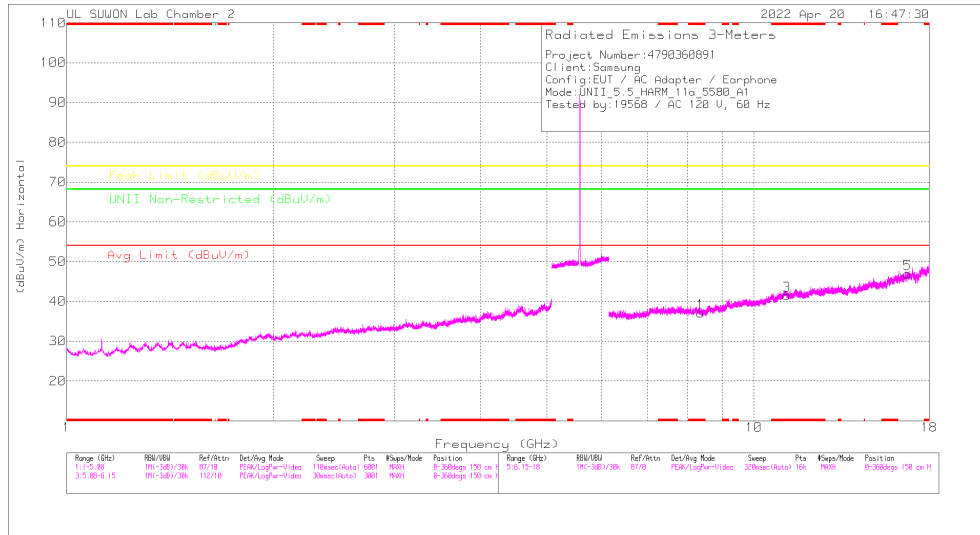
BANDEDGE TEST DATA

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	* 5.45998	38.70	Pk	35.30	-20.60	0.00	53.40	-	-	74.00	-20.60	150	104	H
			* 5.45554	41.05	Pk	35.30	-20.60	0.00	55.75	-	-	74.00	-18.25	150	104	H
			5.46998	40.71	Pk	35.30	-20.60	0.00	55.41	-	-	68.20	-12.79	150	104	H
			5.46875	44.88	Pk	35.30	-20.60	0.00	59.58	-	-	68.20	-8.62	150	104	H
			* 5.45998	28.21	RMS	35.30	-20.60	0.00	42.91	54.00	-11.09	-	-	150	104	H
			* 5.44913	29.85	RMS	35.30	-20.60	0.00	44.55	54.00	-9.45	-	-	150	104	H
			5.46998	29.54	RMS	35.30	-20.60	0.00	44.24	-	-	-	-	150	104	H
			5.46937	29.90	RMS	35.30	-20.60	0.00	44.60	-	-	-	-	150	104	H
			* 5.45998	40.50	Pk	35.30	-20.60	0.00	55.20	-	-	74.00	-18.80	201	119	V
			* 5.45806	43.13	Pk	35.30	-20.60	0.00	57.83	-	-	74.00	-16.17	201	119	V
			5.46998	46.39	Pk	35.30	-20.60	0.00	61.09	-	-	68.20	-7.11	201	119	V
			5.46816	50.74	Pk	35.30	-20.60	0.00	65.44	-	-	68.20	-2.76	201	119	V
			* 5.45998	31.08	RMS	35.30	-20.60	0.00	45.78	54.00	-8.22	-	-	201	119	V
			* 5.45388	31.79	RMS	35.30	-20.60	0.00	46.49	54.00	-7.51	-	-	201	119	V
			5.46998	32.07	RMS	35.30	-20.60	0.00	46.77	-	-	-	-	201	119	V
			5.46628	32.67	RMS	35.30	-20.60	0.00	47.37	-	-	-	-	201	119	V
	5700	ANT1	5.72500	37.26	Pk	35.70	-20.00	0.00	52.96	-	-	68.20	-15.24	154	100	H
			5.72666	40.58	Pk	35.70	-20.00	0.00	56.28	-	-	68.20	-11.92	154	100	H
			5.72500	43.52	Pk	35.70	-20.00	0.00	59.22	-	-	68.20	-8.98	240	100	V
			5.72802	48.71	Pk	35.70	-20.00	0.00	64.41	-	-	68.20	-3.79	240	100	V
802.11n (HT20)	5500	ANT1	* 5.45998	39.52	Pk	35.30	-20.60	0.00	54.22	-	-	74.00	-19.78	152	101	H
			* 5.43548	40.50	Pk	35.30	-20.60	0.00	55.20	-	-	74.00	-18.80	152	101	H
			5.46998	40.34	Pk	35.30	-20.60	0.00	55.04	-	-	68.20	-13.16	152	101	H
			5.46532	44.20	Pk	35.30	-20.60	0.00	58.90	-	-	68.20	-9.30	152	101	H
			* 5.45998	28.04	RMS	35.30	-20.60	0.00	42.74	54.00	-11.26	-	-	152	101	H
			* 5.45827	29.26	RMS	35.30	-20.60	0.00	43.96	54.00	-10.04	-	-	152	101	H
			5.46998	28.76	RMS	35.30	-20.60	0.00	43.46	-	-	-	-	152	101	H
			5.46904	29.56	RMS	35.30	-20.60	0.00	44.26	-	-	-	-	152	101	H
			* 5.45998	40.31	Pk	35.30	-20.60	0.00	55.01	-	-	74.00	-18.99	201	114	V
			* 5.45843	43.41	Pk	35.30	-20.60	0.00	58.11	-	-	74.00	-15.89	201	114	V
			5.46998	48.18	Pk	35.30	-20.60	0.00	62.88	-	-	68.20	-5.32	201	114	V
			5.46963	49.60	Pk	35.30	-20.60	0.00	64.30	-	-	68.20	-3.90	201	114	V
			* 5.45998	30.07	RMS	35.30	-20.60	0.00	44.77	54.00	-9.23	-	-	201	114	V
			* 5.45972	31.13	RMS	35.30	-20.60	0.00	45.83	54.00	-8.17	-	-	201	114	V
			5.46998	31.03	RMS	35.30	-20.60	0.00	45.73	-	-	-	-	201	114	V
			5.46915	31.89	RMS	35.30	-20.60	0.00	46.59	-	-	-	-	201	114	V
	5700	ANT1	5.72500	37.11	Pk	35.70	-20.00	0.00	52.81	-	-	68.20	-15.39	152	100	H
			5.72552	41.55	Pk	35.70	-20.00	0.00	57.25	-	-	68.20	-10.95	152	100	H
			5.72500	43.92	Pk	35.70	-20.00	0.00	59.62	-	-	68.20	-8.58	239	101	V
			5.72530	49.69	Pk	35.70	-20.00	0.00	65.39	-	-	68.20	-2.81	239	101	V
802.11n (HT40)	5510	ANT1	* 5.45998	37.46	Pk	35.30	-20.60	0.00	52.16	-	-	74.00	-21.84	151	101	H
			* 5.44847	40.68	Pk	35.30	-20.60	0.00	55.38	-	-	74.00	-18.62	151	101	H
			5.46998	39.21	Pk	35.30	-20.60	0.00	53.91	-	-	68.20	-14.29	151	101	H
			5.46908	44.35	Pk	35.30	-20.60	0.00	59.05	-	-	68.20	-9.15	151	101	H
			* 5.45998	28.49	RMS	35.30	-20.60	0.00	43.19	54.00	-10.81	-	-	151	101	H
			* 5.45764	29.20	RMS	35.30	-20.60	0.00	43.90	54.00	-10.10	-	-	151	101	H
			5.46998	28.73	RMS	35.30	-20.60	0.00	43.43	-	-	-	-	151	101	H
			5.46188	29.39	RMS	35.30	-20.60	0.00	44.09	-	-	-	-	151	101	H
			* 5.45998	41.11	Pk	35.30	-20.60	0.00	55.81	-	-	74.00	-18.19	198	120	V
			* 5.45913	44.46	Pk	35.30	-20.50	0.00	59.26	-	-	74.00	-14.74	198	120	V
			5.46998	42.13	Pk	35.30	-20.60	0.00	56.83	-	-	68.20	-11.37	198	120	V
			5.46803	50.10	Pk	35.30	-20.60	0.00	64.80	-	-	68.20	-3.40	198	120	V
			* 5.45998	29.54	RMS	35.30	-20.60	0.00	44.24	54.00	-9.76	-	-	198	120	V
			* 5.45827	30.97	RMS	35.30	-20.60	0.00	45.67	54.00	-8.33	-	-	198	120	V
			5.46998	31.35	RMS	35.30	-20.60	0.00	46.05	-	-	-	-	198	120	V
			5.46934	32.50	RMS	35.30	-20.60	0.00	47.20	-	-	-	-	198	120	V
	5670	ANT1	5.72500	38.24	Pk	35.70	-20.00	0.00	53.94	-	-	68.20	-14.26	314	100	H
			5.72588	41.13	Pk	35.70	-20.00	0.00	56.83	-	-	68.20	-11.37	314	100	H
			5.72500	46.43	Pk	35.70	-20.00	0.00	62.13	-	-	68.20	-6.07	242	106	V
			5.72538	50.04	Pk	35.70	-20.00	0.00	65.74	-	-	68.20	-2.46	242	106	V
802.11ac (VHT80)	5530	ANT1	* 5.45998	38.18	Pk	35.30	-20.60	0.00	52.88	-	-	74.00	-21.12	153	100	H
			* 5.45536	40.79	Pk	35.30	-20.60	0.00	55.49	-	-	74.00	-18.51	153	100	H
			5.46998	39.56	Pk	35.30	-20.60	0.00	54.26	-	-	68.20	-13.94	153	100	H
			5.46383	42.96	Pk	35.30	-20.50	0.00	57.76	-	-	68.20	-10.44	153	100	H
			* 5.45998	27.68	RMS	35.30	-20.60	0.17	42.55	54.00	-11.45	-	-	153	100	H
			* 5.4546	29.33	RMS	35.30	-20.60	0.17	44.20	54.00	-9.80	-	-	153	100	H
			5.46998	29.24	RMS	35.30	-20.60	0.17	44.11	-	-	-	-	153	100	H
			5.46930	30.24	RMS	35.30	-20.60	0.17	45.11	-	-	-	-	153	100	H
			* 5.45998	40.64	Pk	35.30	-20.60	0.00	55.34	-	-	74.00	-18.66	200	115	V
			* 5.45906	48.16	Pk	35.30	-20.50	0.00	62.96	-	-	74.00	-11.04	200	115	V
			5.46998	43.42	Pk	35.30	-20.60	0.00	58.12	-	-	68.20	-10.08	200	115	V
			5.46352	47.60	Pk	35.30	-20.60	0.00	62.30	-	-	68.20	-5.90	200	115	V
			* 5.45998	30.70	RMS	35.30	-20.60	0.17	45.57	54.00	-8.43	-	-	200	115	V
			* 5.45777	32.26	RMS	35.30	-20.60	0.17	47.13	54.00	-6.87	-	-	200	115	V
			5.46998	33.01	RMS	35.30	-20.60	0.17	47.88	-	-	-	-	200	115	V
			5.46985	34.00	RMS	35.30	-20.60	0.17	48.87	-	-	-	-	200	115	V
	5610	ANT1	5.72500	37.04	Pk	35.70	-20.00	0.00	52.74	-	-	68.20	-15.46	0	100	H
			5.76527	39.29	Pk	35.70	-19.80	0.00	55.19	-	-	68.20	-13.01	0	100	H
			5.72500	46.27	Pk	35.70	-20.00	0.00	61.97	-	-	68.20	-6.23	244	107	V
			5.72896	48.49	Pk	35.70	-20.00	0.00	64.19	-	-	68.20	-4.01	244	107	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 / 5580 MHz)
5580 MHz HORIZONTAL



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.	3117_00168724	dBuV_HF(95)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unit Non-Restricted (dBuV/m)	Margin (dB)	Altitude (Degs)	Height (cm)	Priority
* 8.37086	35.41	PK-U	36	-23.3	0	48.11	-	-	74	-25.89	-	-	0	100	H
* 8.36992	35.3	PK-U	36	-23.3	0	48	-	-	74	-26	-	-	0	100	V
* 11.15112	33.41	PK-U	38.3	-19.5	0	52.91	-	-	74	-21.79	-	-	0	100	H
* 11.15845	33.94	PK-U	38.3	-19.4	0	52.84	-	-	74	-21.16	-	-	0	100	V
16.73837	34.84	PK-U	41.1	-18.2	0	57.74	-	-	-	-	68.2	-10.46	0	100	H
16.7388	34.41	PK-U	41.1	-18.2	0	57.31	-	-	-	-	68.2	-10.89	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

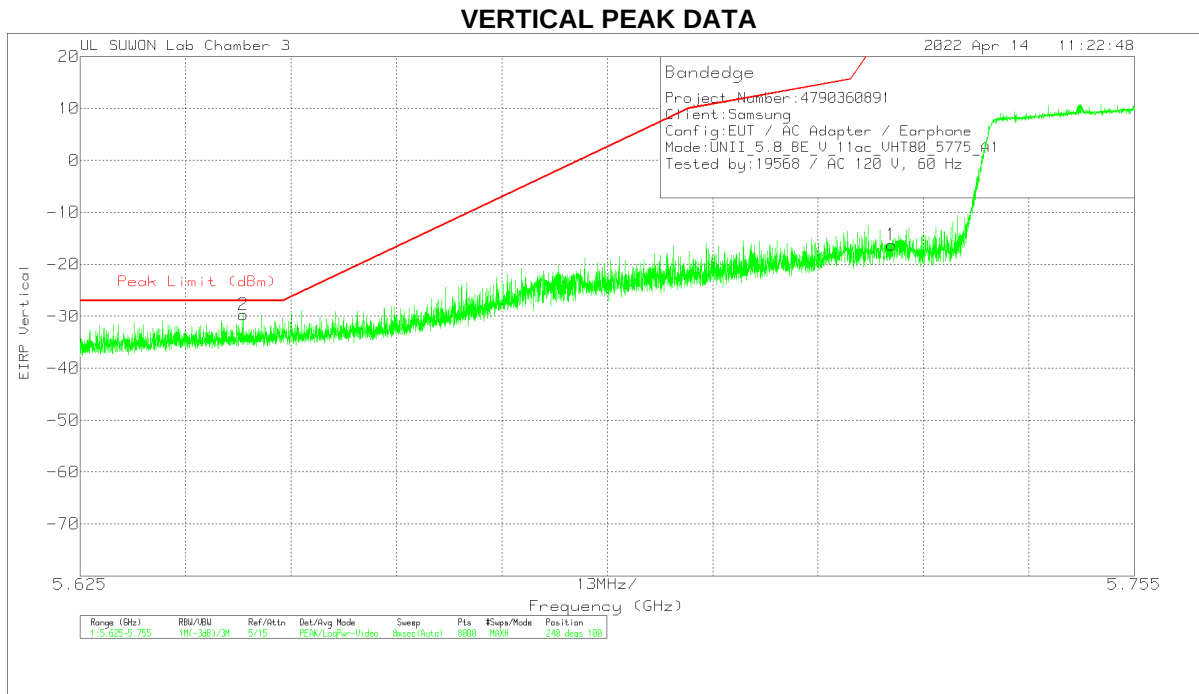
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5500	ANT1	* 8.24189	36.55	PK-U	36.20	-23.90	0.00	48.85	-	-	74.00	-25.15	-	-	360	100	H
			* 8.25223	36.37	PK-U	36.20	-24.00	0.00	48.57	-	-	74.00	-25.43	-	-	360	100	V
			* 11.00104	33.83	PK-U	38.50	-21.70	0.00	50.63	-	-	74.00	-23.37	-	-	360	100	H
			* 10.99709	33.44	PK-U	38.50	-21.60	0.00	50.34	-	-	74.00	-23.66	-	-	360	100	V
			16.510	33.34	PK-U	42.00	-19.60	0.00	55.74	-	-	-	-	68.20	-12.46	360	100	H
			16.492	33.23	PK-U	42.00	-19.80	0.00	55.43	-	-	-	-	68.20	-12.77	360	100	V
	5580	ANT1	* 8.37086	35.41	PK-U	36.00	-23.30	0.00	48.11	-	-	74.00	-25.89	-	-	0	100	H
			* 8.36992	35.30	PK-U	36.00	-23.30	0.00	48.00	-	-	74.00	-26.00	-	-	0	100	V
			* 11.1612	33.41	PK-U	38.30	-19.50	0.00	52.21	-	-	74.00	-21.79	-	-	0	100	H
			* 11.15845	33.94	PK-U	38.30	-19.40	0.00	52.84	-	-	74.00	-21.16	-	-	0	100	V
			16.738	34.84	PK-U	41.10	-18.20	0.00	57.74	-	-	-	-	68.20	-10.46	0	100	H
			16.739	34.41	PK-U	41.10	-18.20	0.00	57.31	-	-	-	-	68.20	-10.89	0	100	V
	5700	ANT1	8.558	34.61	PK-U	36.50	-23.20	0.00	47.91	-	-	-	-	68.20	-20.29	360	100	H
			8.559	34.72	PK-U	36.50	-23.20	0.00	48.02	-	-	-	-	68.20	-20.18	360	100	V
			* 11.39556	32.82	PK-U	38.60	-21.70	0.00	49.72	-	-	74.00	-24.28	-	-	360	100	H
			* 11.40152	32.76	PK-U	38.60	-21.70	0.00	49.66	-	-	74.00	-24.34	-	-	360	100	V
			17.108	32.35	PK-U	42.30	-18.50	0.00	56.15	-	-	-	-	68.20	-12.05	360	100	H
			17.099	31.97	PK-U	42.30	-18.40	0.00	55.87	-	-	-	-	68.20	-12.33	360	100	V
	5720	ANT1	8.590	34.47	PK-U	36.50	-23.40	0.00	47.57	-	-	-	-	68.20	-20.63	360	100	H
			8.575	34.69	PK-U	36.50	-23.30	0.00	47.89	-	-	-	-	68.20	-20.31	360	100	V
			* 11.44668	32.47	PK-U	38.60	-21.80	0.00	49.27	-	-	74.00	-24.73	-	-	360	100	H
			* 11.44811	32.95	PK-U	38.60	-21.70	0.00	49.85	-	-	74.00	-24.15	-	-	360	100	V
			17.167	32.58	PK-U	42.20	-18.30	0.00	56.48	-	-	-	-	68.20	-11.72	360	100	H
			17.154	32.33	PK-U	42.20	-18.40	0.00	56.13	-	-	-	-	68.20	-12.07	360	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)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00218957	10dB_ATT[dB]	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-43.67	PK	35.6	-20	11.8	0	-16.27	27	-43.27	240	100	V
2	5.64512	-56.69	PK	35.5	-20.3	11.8	0	-29.69	-27	-2.69	240	100	V

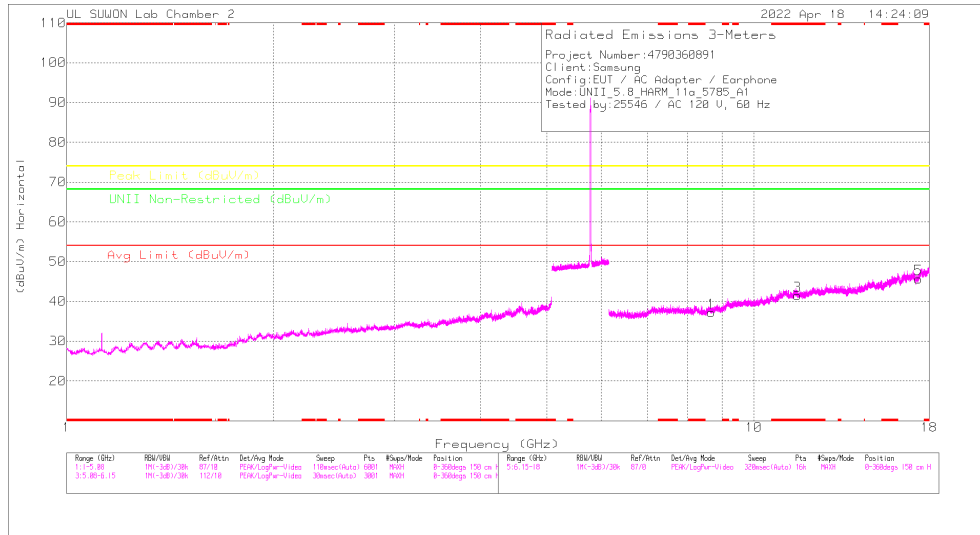
Pk - Peak detector

BANDEDGE TEST DATA

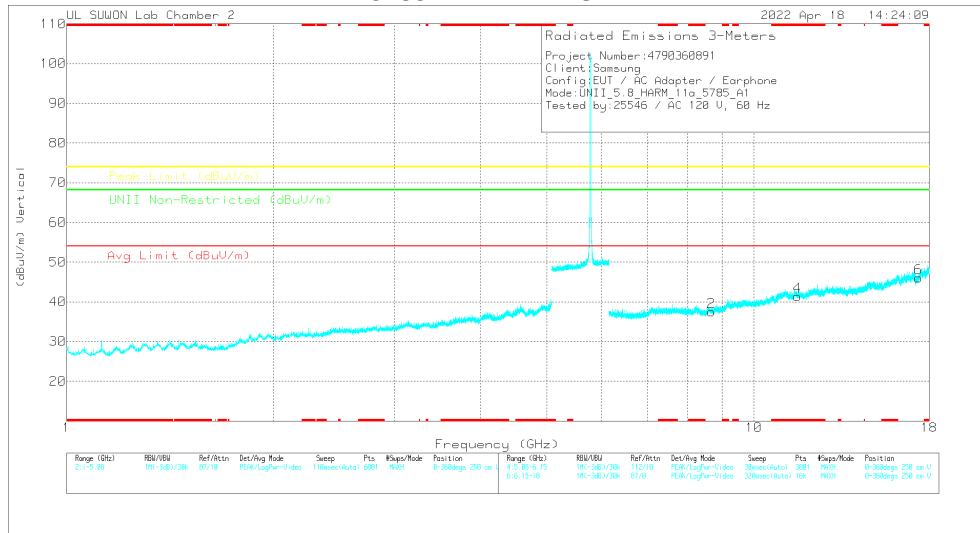
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBm]	Detector Mode	ANT Factor	Loss [dB]	Conv. F [dB]	DC Corr [dB]	Result [dBm]	PK Limit [dBm]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5745	ANT1	5.72500	-52.52	Pk	35.60	-20.00	11.80	0.00	-25.12	27.00	-52.12	134	383	H
			5.63766	-64.01	Pk	35.50	-20.30	11.80	0.00	-37.01	-27.00	-10.01	134	383	H
			5.72500	-43.46	Pk	35.60	-20.00	11.80	0.00	-16.06	27.00	-43.06	243	101	V
			5.64057	-61.18	Pk	35.50	-20.30	11.80	0.00	-34.18	-27.00	-7.18	243	101	V
			5.85001	-57.96	Pk	35.90	-19.80	11.80	0.00	-30.06	26.99	-57.05	113	100	H
	5825	ANT1	5.99307	-63.83	Pk	36.00	-19.70	11.80	0.00	-35.73	-27.00	-8.73	113	100	H
			5.85001	-47.30	Pk	35.90	-19.80	11.80	0.00	-19.40	26.99	-46.39	244	103	V
			5.93772	-62.99	Pk	36.00	-19.80	11.80	0.00	-34.99	-27.00	-7.99	244	103	V
			5.72500	-52.21	Pk	35.60	-20.00	11.80	0.00	-24.81	27.00	-51.81	314	101	H
			5.62770	-63.00	Pk	35.50	-20.40	11.80	0.00	-36.10	-27.00	-9.10	314	101	H
802.11n (HT20)	5745	ANT1	5.72500	-39.94	Pk	35.60	-20.00	11.80	0.00	-12.54	27.00	-39.54	242	100	V
			5.64062	-61.79	Pk	35.50	-20.30	11.80	0.00	-34.79	-27.00	-7.79	242	100	V
			5.85001	-59.09	Pk	35.90	-19.80	11.80	0.00	-31.19	26.99	-58.18	109	100	H
			5.99842	-64.01	Pk	36.00	-19.60	11.80	0.00	-35.81	-27.00	-8.81	109	100	H
			5.85001	-46.94	Pk	35.90	-19.80	11.80	0.00	-19.04	26.99	-46.03	241	101	V
	5825	ANT1	5.93842	-62.72	Pk	36.00	-19.80	11.80	0.00	-34.72	-27.00	-7.72	241	101	V
			5.72500	-49.72	Pk	35.60	-20.00	11.80	0.00	-22.32	27.00	-49.32	144	295	H
			5.63969	-63.70	Pk	35.50	-20.30	11.80	0.00	-36.70	-27.00	-9.70	144	295	H
			5.72500	-40.92	Pk	35.60	-20.00	11.80	0.00	-13.52	27.00	-40.52	244	112	V
			5.64221	-60.89	Pk	35.50	-20.30	11.80	0.00	-33.89	-27.00	-6.89	244	112	V
802.11n (HT40)	5755	ANT1	5.85001	-63.51	Pk	35.90	-19.80	11.80	0.00	-35.61	26.99	-62.60	144	336	H
			5.93377	-63.45	Pk	36.00	-19.80	11.80	0.00	-35.45	-27.00	-8.45	144	336	H
			5.85001	-54.82	Pk	35.90	-19.80	11.80	0.00	-26.92	26.99	-53.91	242	106	V
			5.94209	-63.53	Pk	36.00	-19.80	11.80	0.00	-35.53	-27.00	-8.53	242	106	V
			5.72500	-55.44	Pk	35.60	-20.00	11.80	0.00	-28.04	27.00	-55.04	144	297	H
	5775 (Lower side)	ANT1	5.62783	-63.05	Pk	35.50	-20.40	11.80	0.00	-36.15	-27.00	-9.15	144	297	H
			5.72500	-43.67	Pk	35.60	-20.00	11.80	0.00	-16.27	27.00	-43.27	240	100	V
			5.64512	-56.69	Pk	35.50	-20.30	11.80	0.00	-29.69	-27.00	-2.69	240	100	V
			5.85001	-62.87	Pk	35.90	-19.80	11.80	0.00	-34.97	26.99	-61.96	142	337	H
			5.94912	-63.93	Pk	36.00	-19.80	11.80	0.00	-35.93	-27.00	-8.93	142	337	H
802.11ac (VHT80)	5775 (Upper Side)	ANT1	5.85001	-51.97	Pk	35.90	-19.80	11.80	0.00	-24.07	26.99	-51.06	244	106	V
			5.93402	-61.48	Pk	36.00	-19.80	11.80	0.00	-33.48	-27.00	-6.48	244	106	V

Note. Pk - Peak detector

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



5785 MHz VERTICAL



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

Radiated Emissions

Frequency (GHz)	Meas. Reading (dBuV)	Det	3117_00368724	dBHz_HFdB	DC Corr (dB)	Corrected Reading (dBuV)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Unit Non-Restricted (dBuV/m)	Margin (dB)	Altitude (m)	Height (m)	Priority
8.67789	35.92	PK-U	36.2	-22.8	0	49.32	-	-	-	-	68.2	-18.88	360	100	H
8.6788	35.98	PK-U	36.2	-22.8	0	49.38	-	-	-	-	68.2	-18.82	360	100	V
*11.56943	33.65	PK-U	38.3	-19.9	0	52.05	-	-	74	-21.95	-	-	360	100	H
*11.57188	33.61	PK-U	38.3	-19.9	0	52.01	-	-	74	-21.99	-	-	360	100	V
*17.36153	34.88	PK-U	41	-18.6	0	57.28	-	-	-	-	68.2	-10.92	360	100	H
17.35843	34.23	PK-U	41	-18.6	0	56.63	-	-	-	-	68.2	-11.57	360	100	V

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

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

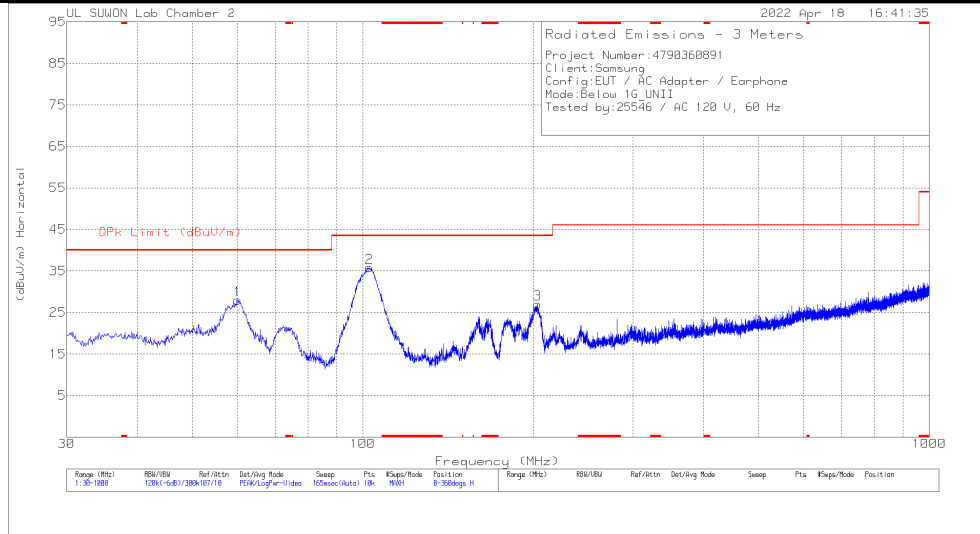
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5745	ANT1	8.619	35.47	PK-U	36.50	-23.40	0.00	48.57	-	-	-	-	68.20	-19.63	0	100	H
			8.619	34.52	PK-U	36.50	-23.50	0.00	47.52	-	-	-	-	68.20	-20.68	0	100	V
			* 11.49564	32.95	PK-U	38.70	-21.70	0.00	49.95	-	-	74.00	-24.05	-	-	0	100	H
			* 11.48673	32.55	PK-U	38.70	-21.70	0.00	49.55	-	-	74.00	-24.45	-	-	0	100	V
			17.233	32.15	PK-U	42.10	-17.70	0.00	56.55	-	-	-	-	68.20	-11.65	0	100	H
			17.233	32.16	PK-U	42.10	-17.70	0.00	56.56	-	-	-	-	68.20	-11.64	0	100	V
			8.678	35.92	PK-U	36.20	-22.80	0.00	49.32	-	-	-	-	68.20	-18.88	360	100	H
			8.679	35.98	PK-U	36.20	-22.80	0.00	49.38	-	-	-	-	68.20	-18.82	360	100	V
	5785	ANT1	* 11.56843	33.65	PK-U	38.30	-19.90	0.00	52.05	-	-	74.00	-21.95	-	-	360	100	H
			* 11.57188	33.61	PK-U	38.30	-19.90	0.00	52.01	-	-	74.00	-21.99	-	-	360	100	V
			17.362	34.88	PK-U	41.00	-18.60	0.00	57.28	-	-	-	-	68.20	-10.92	360	100	H
			17.358	34.23	PK-U	41.00	-18.60	0.00	56.63	-	-	-	-	68.20	-11.57	360	100	V
			8.737	34.61	PK-U	36.50	-23.10	0.00	48.01	-	-	-	-	68.20	-20.19	0	100	H
			* 9.31981	35.07	PK-U	37.10	-22.30	0.00	49.87	-	-	74.00	-24.13	-	-	172	103	V
			* 9.32005	26.46	ADR	37.10	-22.30	0.00	41.26	54.00	-12.74	-	-	-	-	172	103	V
			* 11.65004	34.56	PK-U	38.90	-21.70	0.00	51.76	-	-	74.00	-22.24	-	-	0	100	H
	5825	ANT1	* 11.65009	35.24	PK-U	38.90	-21.70	0.00	52.44	-	-	74.00	-21.56	-	-	0	100	V
			17.476	30.91	PK-U	42.00	-17.40	0.00	55.51	-	-	-	-	68.20	-12.69	0	100	H

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

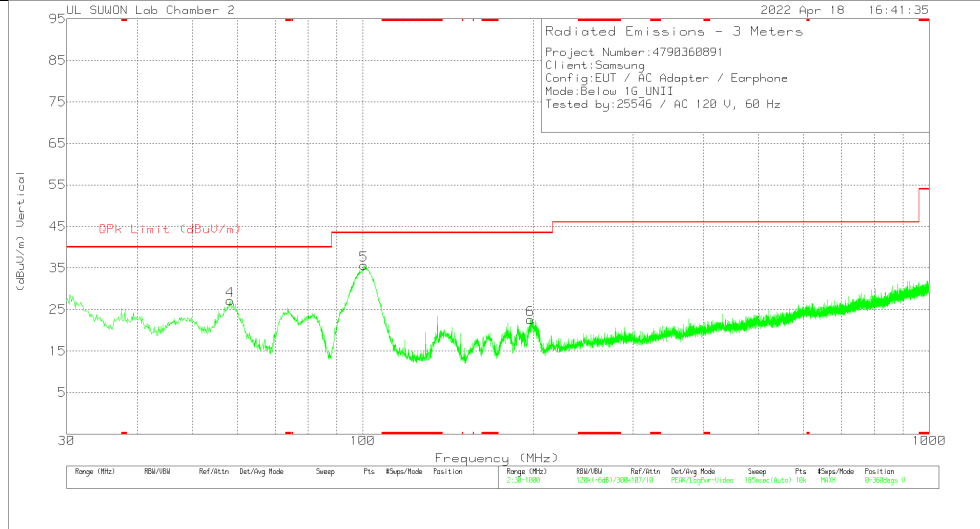
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

12. WORST-CASE BELOW 1 GHz

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]	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.167	41.17	Pk	18.5	-31.7	0	27.97	40	-12.03	0-360	300	H
2	102.847	49.36	Pk	17.6	-31.2	0	35.76	43.52	-7.76	0-360	200	H
3	203.436	40.85	Pk	16.9	-30.8	0	26.95	43.52	-16.57	0-360	100	H
4	58.324	39.88	Pk	18.8	-31.6	0	27.08	40	-12.92	0-360	200	V
5	100.519	49.44	Pk	17.5	-31.3	0	35.64	43.52	-7.88	0-360	100	V
6	197.616	35.81	Pk	17.4	-30.7	0	22.51	43.52	-21.01	0-360	100	V

Pk - 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.

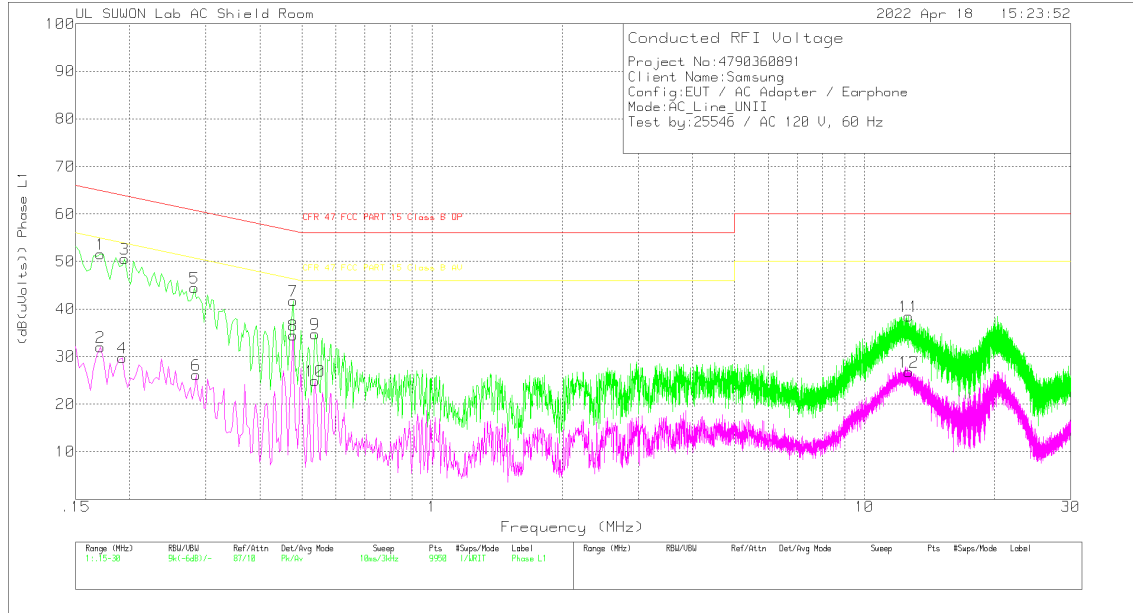
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

WORST EMISSIONS

LINE 1 DATA



Trace Markers

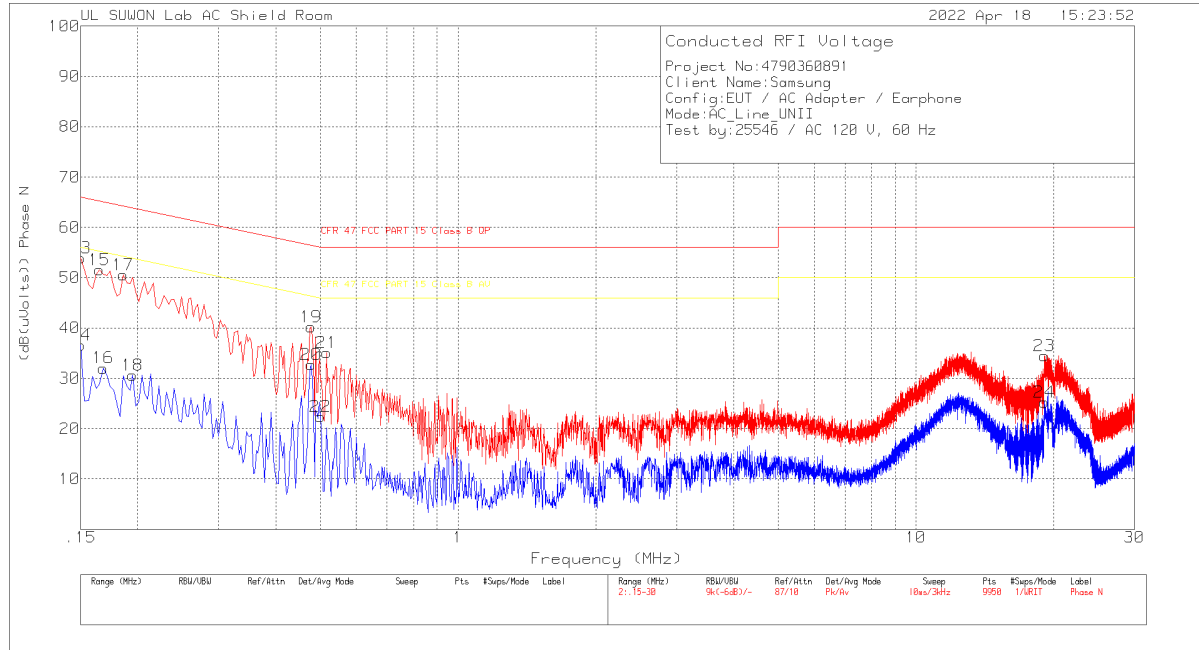
Range 1: Phase L1 0.15 - 30MHz

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	.171	41.4	Pk	10	.2	51.6	64.91	-13.31	-	-
2	.171	21.77	Av	10	.2	31.97	-	-	54.91	-22.94
3	.195	40.47	Pk	9.9	.2	50.57	63.82	-13.25	-	-
4	.192	19.6	Av	9.9	.2	29.7	-	-	53.95	-24.25
5	.282	34.57	Pk	9.7	.2	44.47	60.76	-16.29	-	-
6	.285	16.2	Av	9.7	.2	26.1	-	-	50.67	-24.57
7	.477	31.64	Pk	9.9	.2	41.74	56.39	-14.65	-	-
8	.477	24.36	Av	9.9	.2	34.46	-	-	46.39	-11.93
9	.537	24.68	Pk	9.9	.2	34.78	56	-21.22	-	-
10	.537	14.78	Av	9.9	.2	24.88	-	-	46	-21.12
11	12.651	28.25	Pk	9.9	.3	38.45	60	-21.55	-	-
12	12.669	16.56	Av	9.9	.3	26.76	-	-	50	-23.24

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_Wit h EX_N[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)
13	.15	44.17	Pk	9.7	.1	53.97	66	-12.03	-	-
14	.15	26.75	Av	9.7	.1	36.55	-	-	56	-19.45
15	.165	41.5	Pk	9.9	.1	51.5	65.21	-13.71	-	-
16	.168	21.95	Av	10	.1	32.05	-	-	55.06	-23.01
17	.186	40.41	Pk	9.9	.2	50.51	64.21	-13.7	-	-
18	.195	20.57	Av	9.9	.2	30.67	-	-	53.82	-23.15
19	.477	30.13	Pk	9.9	.2	40.23	56.39	-16.16	-	-
20	.477	22.59	Av	9.9	.2	32.69	-	-	46.39	-13.7
21	.516	25.02	Pk	9.9	.2	35.12	56	-20.88	-	-
22	.501	12.33	Av	9.9	.2	22.43	-	-	46	-23.57
23	19.08	23.87	Pk	10.2	.4	24.47	60	-25.53	-	-
24	19.08	14.69	Av	10.2	.4	25.29	-	-	50	-24.71

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
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.	

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)
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.	

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

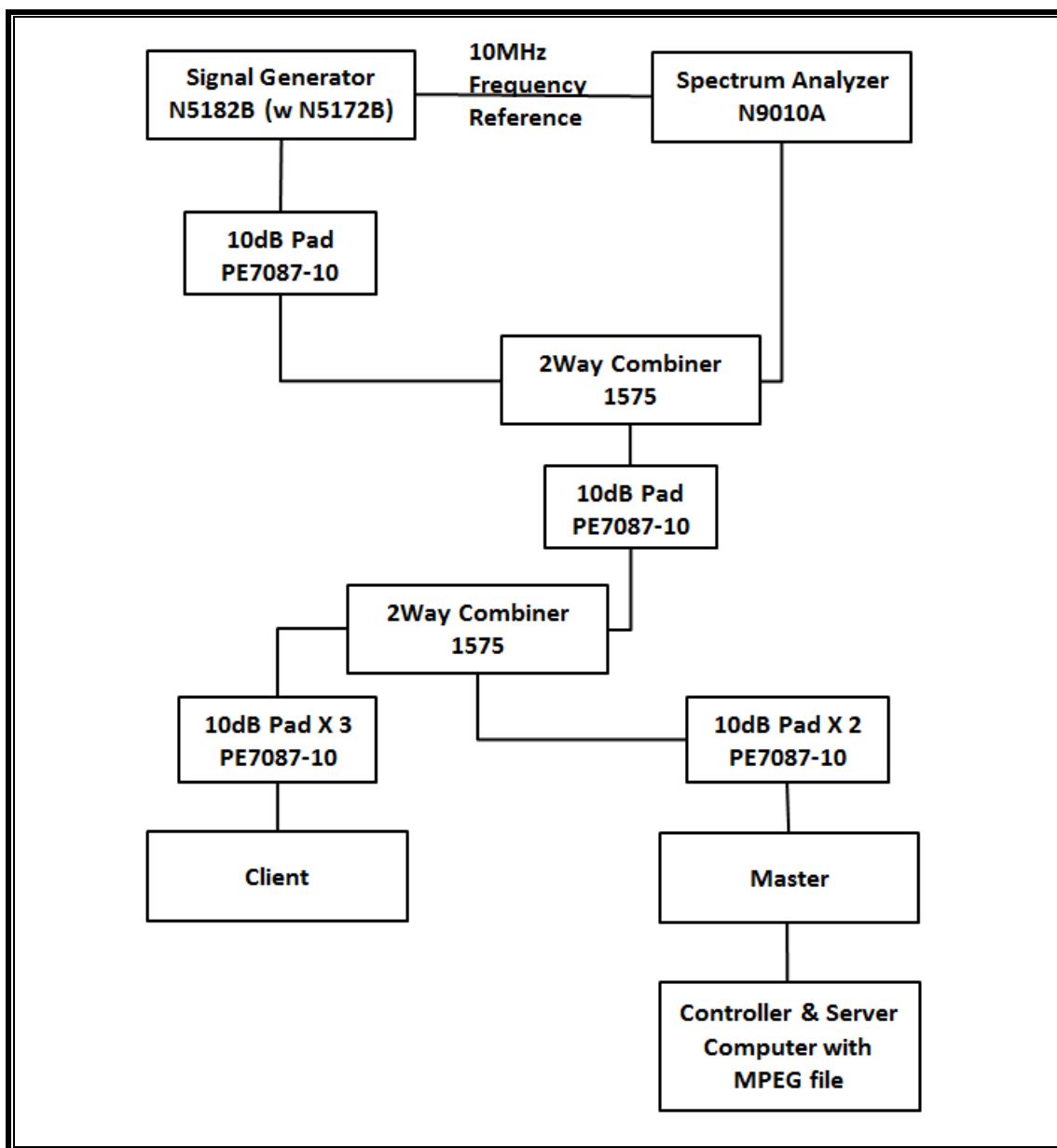
Radar Waveform Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

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.

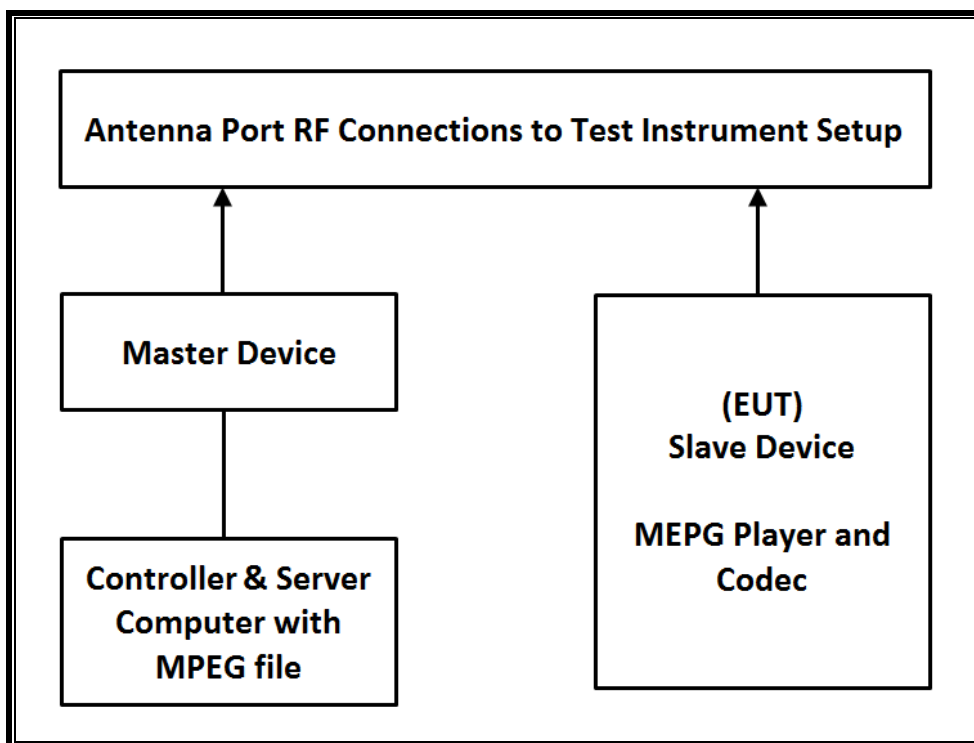
TEST AND MEASUREMENT EQUIPMENT

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 12.72 dBm in the 5250-5350 MHz band and 13.95 dBm in the 5470-5725 MHz band.

The antenna assembly utilized two antenna.

Gain of ANT: -4.92 dBi for UNII 2A and -4.88 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

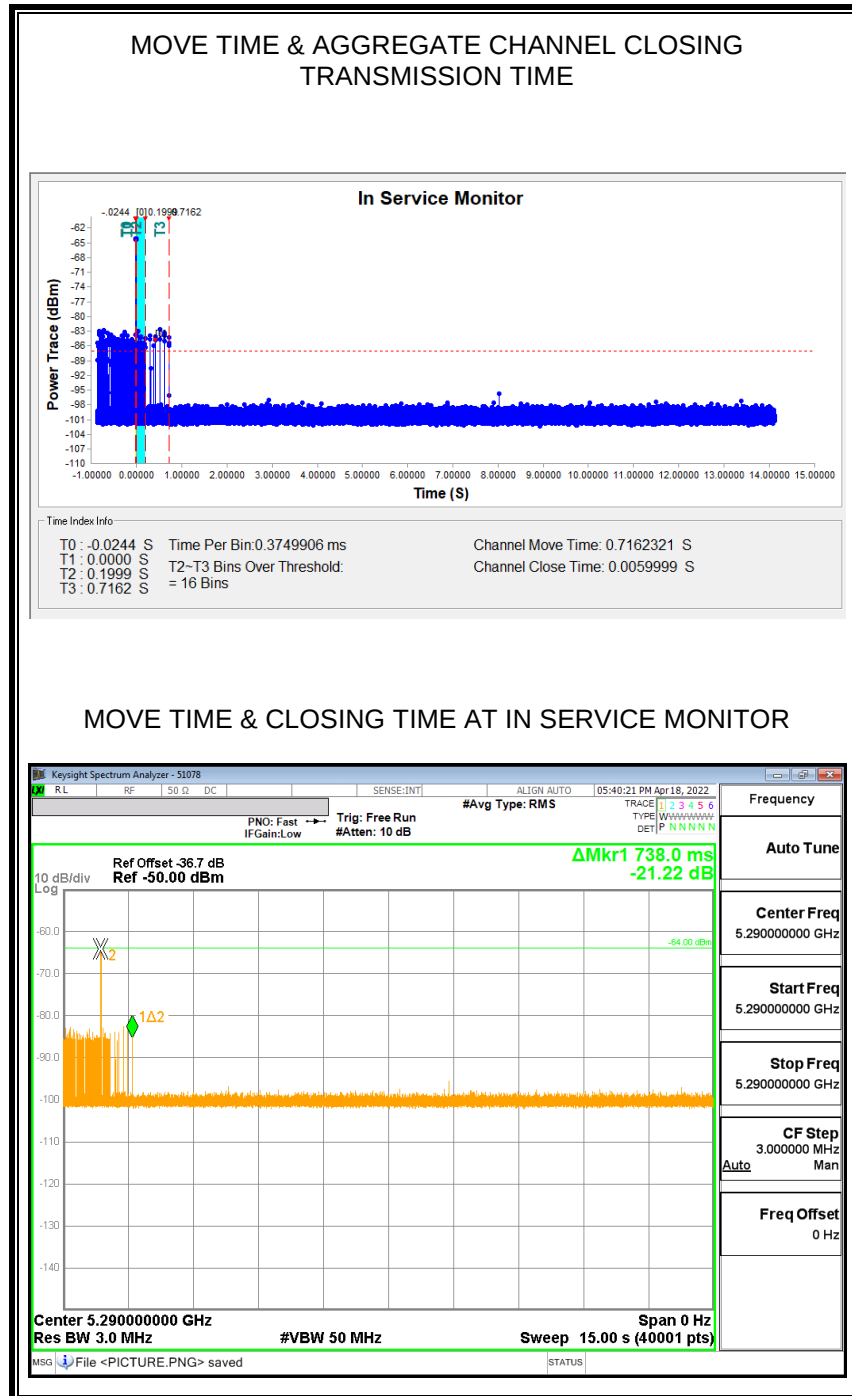
Channel Move Time (sec)	Limit (sec)
0.716	10

Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
6.000	60

MOVE TIME & CHANNEL CLOSING TIME

AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

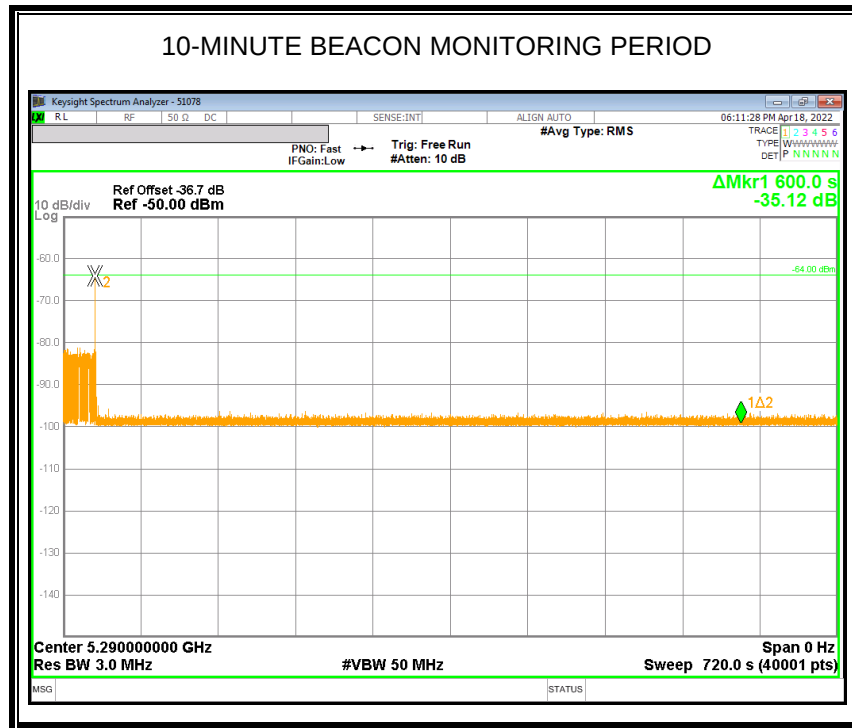
No transmissions are observed during the aggregate monitoring period.



NON-OCCUPANCY PERIOD

RESULTS

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



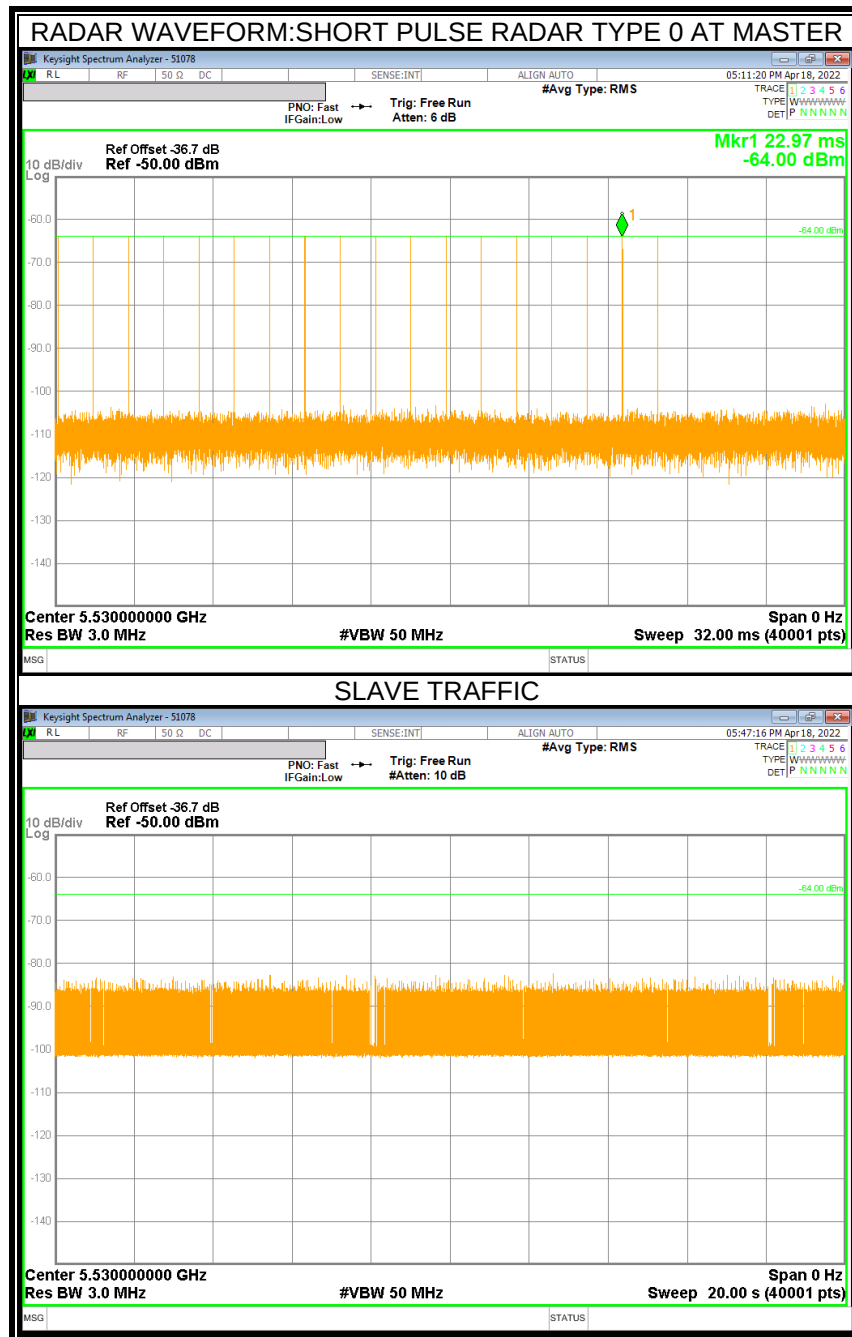
14.3. RESULTS FOR 80 MHz BANDWIDTH (UNII-2C BAND)

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

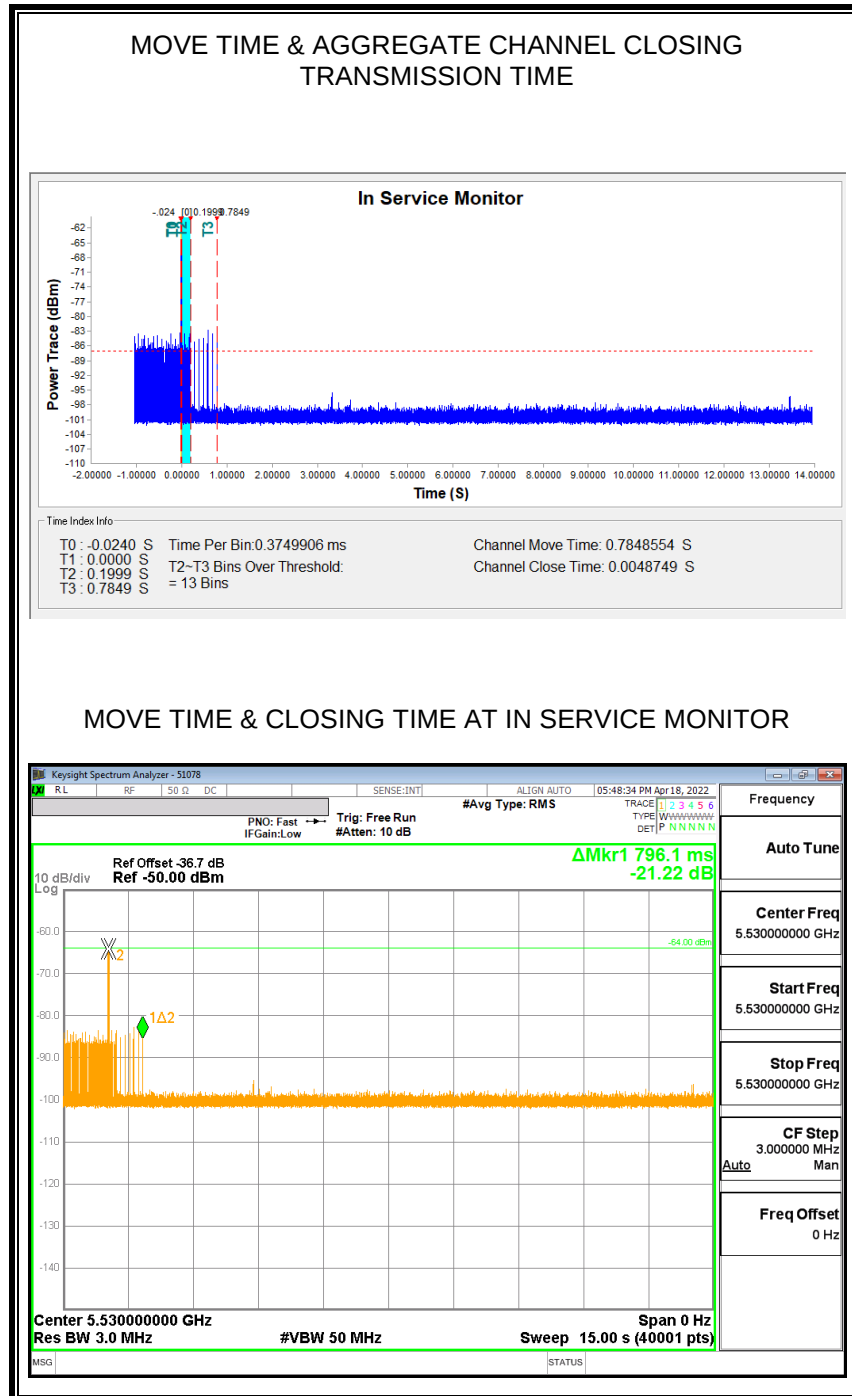
Channel Move Time (sec)	Limit (sec)
0.785	10

Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
4.875	60

MOVE TIME & CHANNEL CLOSING TIME

AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

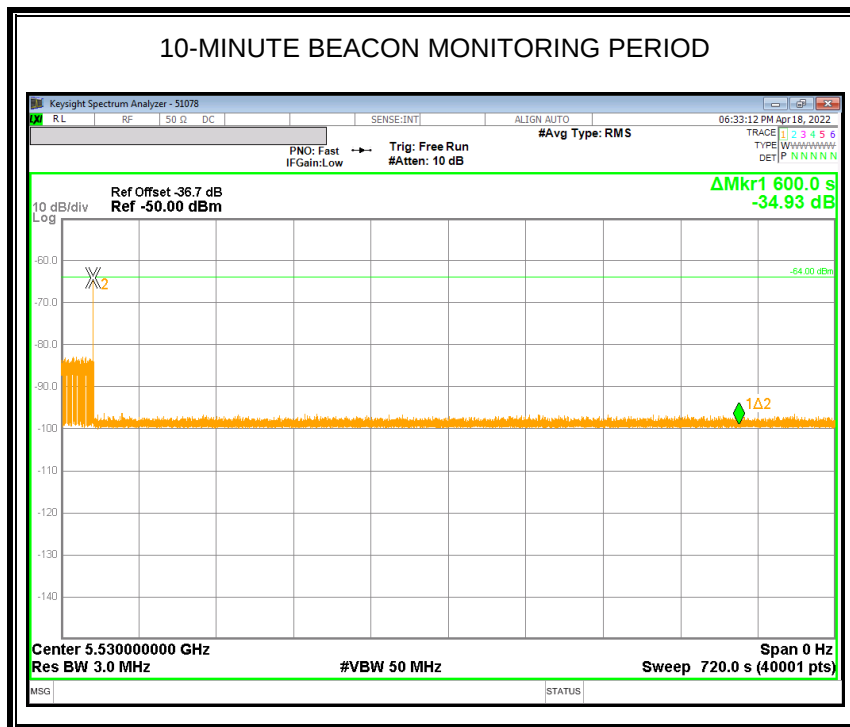
No transmissions are observed during the aggregate monitoring period.



NON-OCCUPANCY PERIOD

RESULTS

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



END OF TEST REPORT