CERTIFICATION TEST REPORT

Report Number. : 4790558569-E6V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-A236V
FCC ID	:	A3LSMA236V
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

Date Of Issue:
2022-11-23

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IAS ACCREDITED Testing Laboratory TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-11-11	Initial issue	Minju Cha
V2	2022-11-23	Updated to address TCB's question	Minju Cha

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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-A236V
SERIAL NUMBER:	664a0edc42347ece, 664a125001347ece (CONDUCTED); 664a1250e6347ece, 664a124c06347ece (RADIATED);
DATE TESTED:	2022-09-06 ~ 2022-11-11;

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.

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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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

AC Corrected Reading (dBuV) = Measured Voltage (dBuV) + Extension Cord Loss (dB) + Cable Loss (dB)
44.72 dBuV = 34.72 dBuV + 9.9 dB + 0.1 dB

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	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 115:2021.

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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.

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	15.45	35.08
		802.11n(HT20)	15.46	35.16
	5190 - 5230	802.11n(HT40)	14.40	27.54
	5210	802.11ac(VHT80)	12.26	16.83
UNII-2A	5260 - 5320	802.11a	15.28	33.73
		802.11n(HT20)	15.48	35.32
	5190 - 5230	802.11n(HT40)	14.12	25.82
	5270 - 5310	802.11ac(VHT80)	12.42	17.46
UNII-2C	5500 - 5720	802.11a	15.40	34.67
		802.11n(HT20)	15.65	36.73
	5510 - 5710	802.11n(HT40)	14.27	26.73
	5530 - 5690	802.11ac(VHT80)	12.37	17.26
UNII-3	5745 - 5825	802.11a	15.41	34.75
		802.11n(HT20)	15.18	32.96
	5755 - 5795	802.11n(HT40)	14.33	27.10
	5775	802.11ac(VHT80)	12.58	18.11

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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	-3.38
UNII 2A 5250 - 5350	-2.16
UNII 2C 5470 - 5725	-2.27
UNII 3 5725 - 5850	-3.08

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.

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5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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

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

802.11a mode: 6 Mbps 1Tx

802.11n HT20 mode: MCS0 1Tx
802.11n HT40 mode: MCS0 1Tx
802.11ac VHT80 mode: MCS0 1Tx

Note : All radiated and power line conducted tests were performed connected with charger for evaluation of worst case mode.

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	15	15	15
	UNII-2A	15	15	15
	UNII-2C	15	15	15
	UNII-3	15	15	15
5GHz (40 MHz)	UNII-1		14	14
	UNII-2A		14	14
	UNII-2C		14	14
	UNII-3		14	14
5GHz (80 MHz)	UNII-1			12
	UNII-2A			12
	UNII-2C			12
	UNII-3			12

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
Earphone	SAMSUNG	GH59-15055A	EHS64AVFWE	N/A

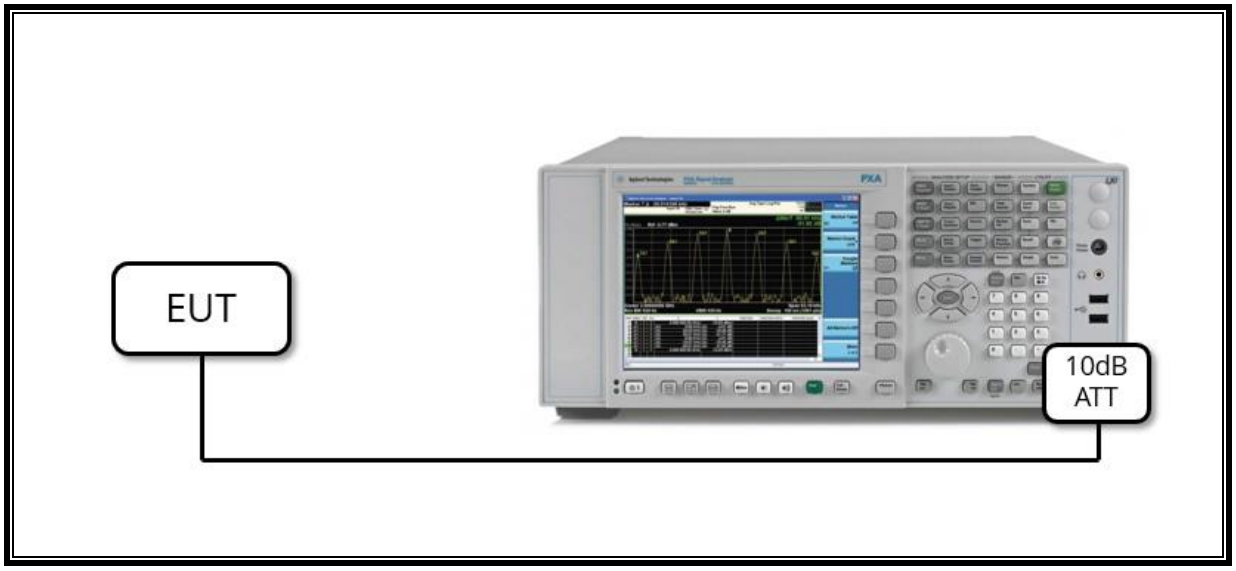
I/O CABLE

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

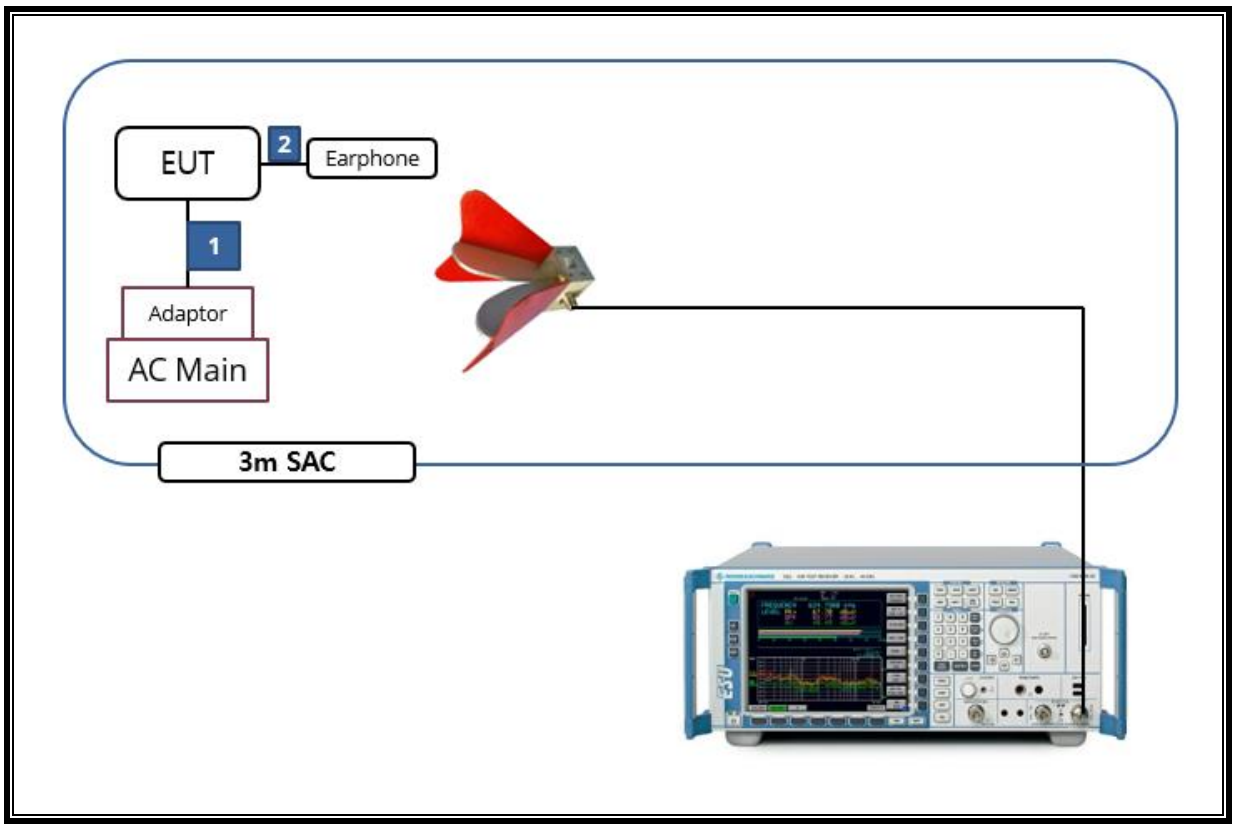
TEST SETUP

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	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	2024-08-04
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00168724	2024-08-04
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00218957	2023-01-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2024-08-02
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2023-10-13
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2023-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2023-08-01
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	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNACK	PE7004-10	2	2023-08-01
Attenuator	PASTERNACK	PE7087-10	A009	2023-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2023-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2023-08-01
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2023-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2023-08-01
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2023-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2023-08-01
LISN	R&S	ENV-216	101837	2023-08-04
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Termination	WEINSCHEL	M1406A	T09	2023-08-03
Attenuator	WEINSCHEL	WA76-30-21	A015	2023-08-03
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.

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9. REFERENCE MEASUREMENTS RESULTS

9.1. ON TIME AND DUTY CYCLE RESULTS

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]
802.11a	2.801	2.837	0.987	98.731	-
802.11n(HT20)	2.599	2.639	0.985	98.484	-
802.11n(HT40)	2.484	2.524	0.984	98.415	-
802.11ac(VHT80)	2.234	2.269	0.985	98.457	-

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

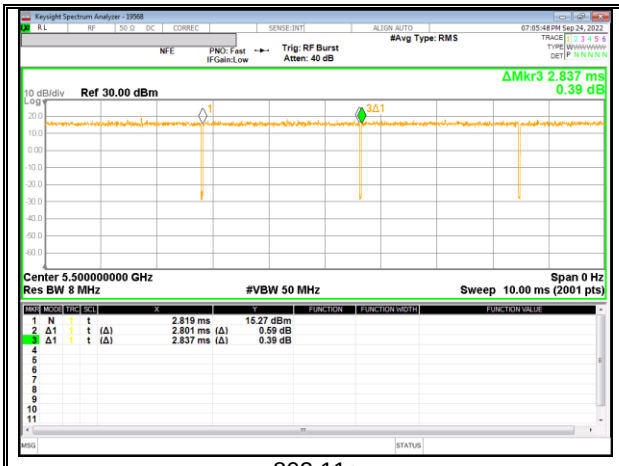
LIMITS

None; for reporting purposes only.

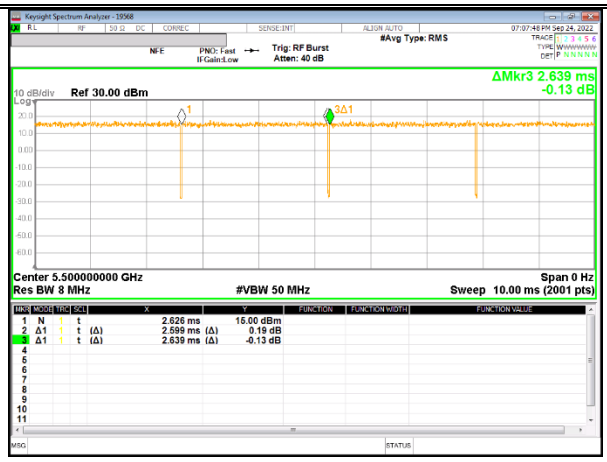
PROCEDURE

KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

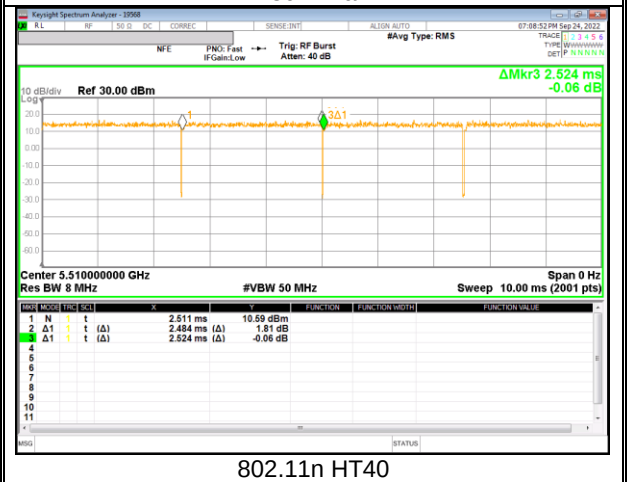
9.2. DUTY CYCLE PLOTS



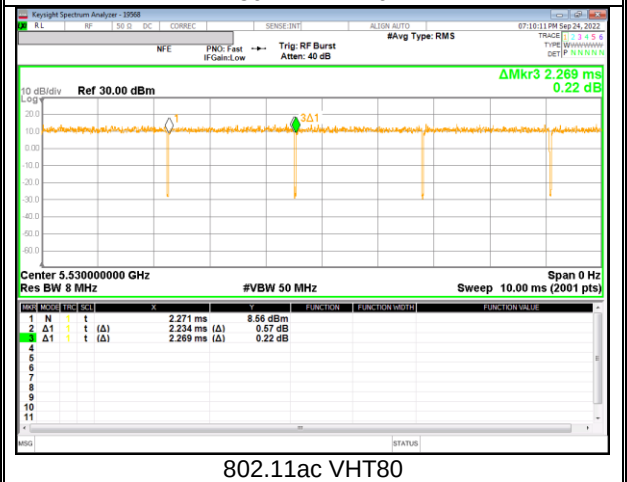
802.11a



802.11n HT20



802.11n HT40



802.11ac VHT80

9.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

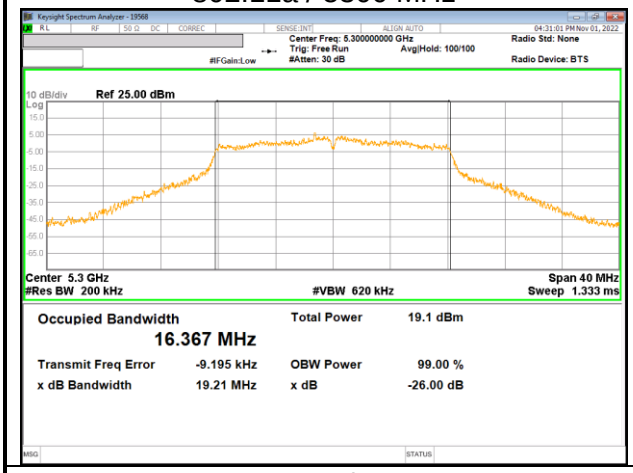
Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

RESULTS

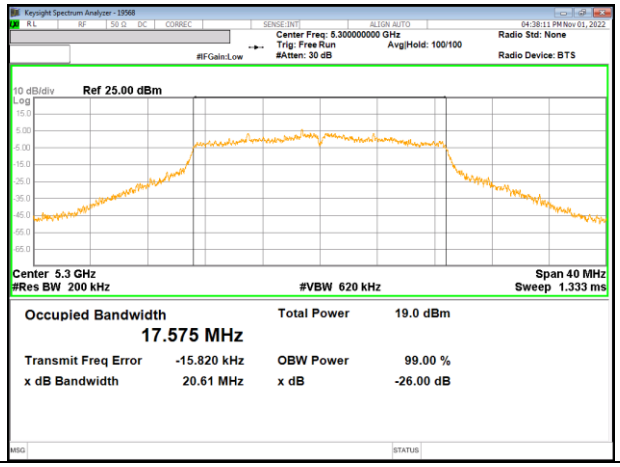
- Please refer to the next page

WORST CASE TEST PLOTS

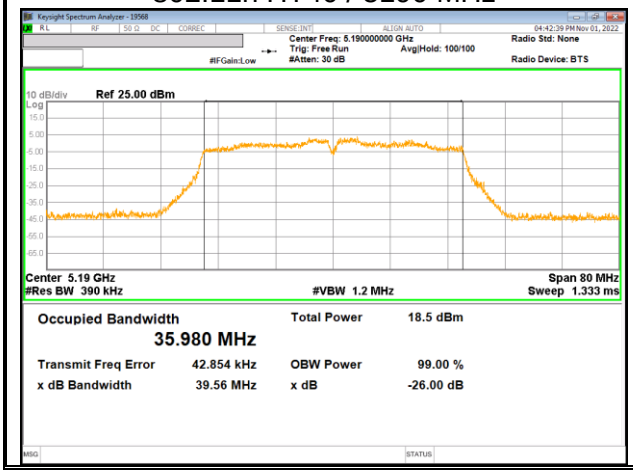
802.11a / 5300 MHz



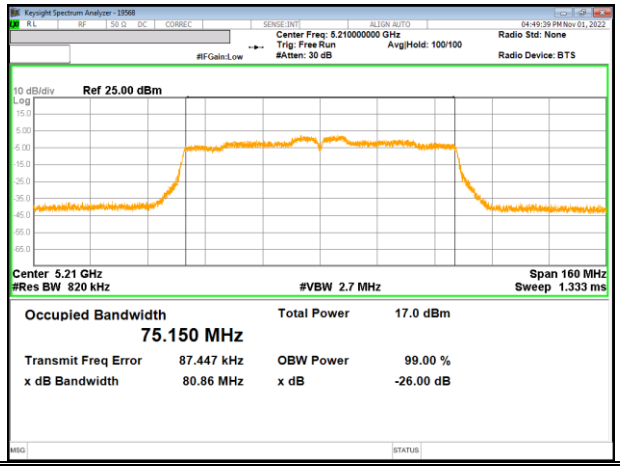
802.11n HT20 / 5300 MHz



802.11n HT40 / 5190 MHz



802.11ac VHT80 / 5210 MHz



9.3.1. 802.11a

Band	Channel	Center Freq. [MHz]	26 dB BW [MHz]	Worst	99% BW [MHz]
UNII-1 Note	**36**	**5180**	**19.520**	**19.520**	16.369
	40	5200	19.940		16.367
	48	5240	19.710		16.364
UNII-2A Note	52	5260	19.770	**19.210**	16.400
	60	**5300**	**19.210**		16.367
	64	5320	21.240		16.351
UNII-2C	**100**	**5500**	**20.470**	**20.470**	
	116	5580	20.540		
	140	5700	20.510		

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	21.620	**21.580**	17.581
	40	5200	22.080		17.587
	48	**5240**	**21.580**		17.561
UNII-2A Note	52	5260	21.410	**20.610**	17.578
	60	**5300**	**20.610**		17.575
	64	5320	21.570		17.582
UNII-2C	100	5500	21.140	**20.900**	
	116	5580	21.330		
	140	**5700**	**20.900**		

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**	**39.560**	**39.560**	35.980
	46	5230	39.620		35.933
UNII-2A Note	54	5270	40.140	**39.620**	35.921
	62	**5310**	**39.620**		35.943
UNII-2C	**102**	**5510**	**39.830**	**39.830**	
	118	5590	40.300		
	134	5670	39.850		

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**	**80.860**	**80.860**	75.150
UNII-2A Note	**58**	**5290**	**81.390**	**81.390**	75.139
UNII-2C	106	5530	81.360	**81.300**	
	122	**5610**	**81.300**		

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	15.380	5.620
802.11n HT20	Straddle	5720	15.260	6.100
802.11n HT40	Straddle	5710	34.820	5.220
802.11ac VHT80	Straddle	5690	75.140	5.540

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

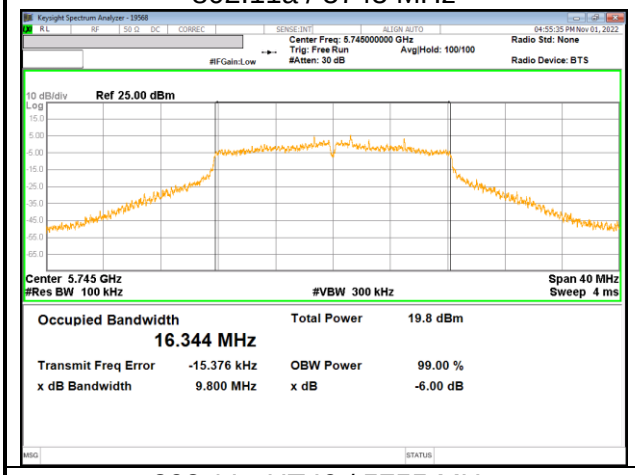
Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

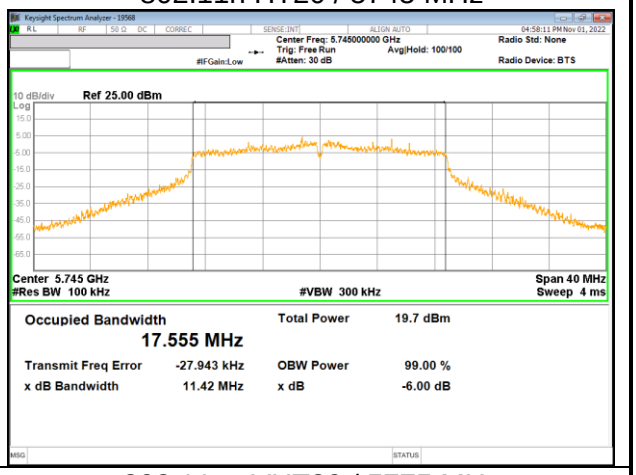
- Please refer to the next page

WORST CASE TEST PLOTS

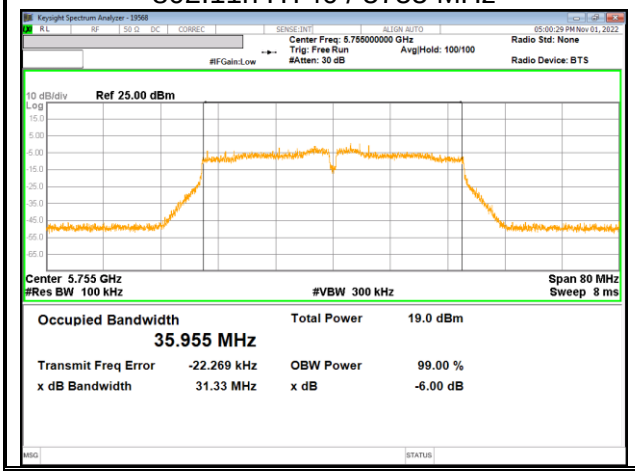
802.11a / 5745 MHz



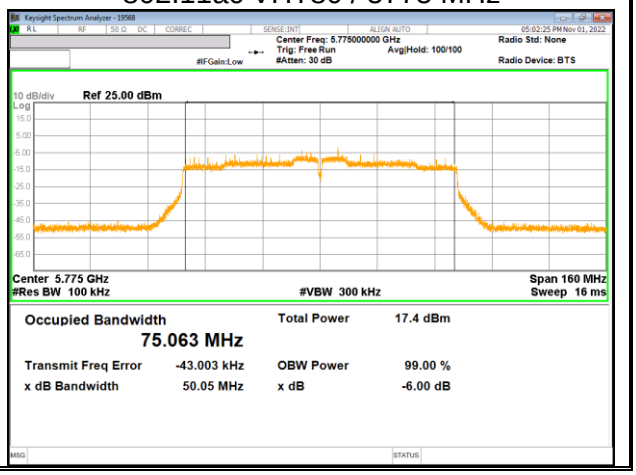
802.11n HT20 / 5745 MHz



802.11n HT40 / 5755 MHz



802.11ac VHT80 / 5775 MHz



10.1.1. UNII-3 BAND

Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]	Worst	Minimum Limit [MHz]
802.11a	**149**	**5745**	**9.800**	**9.800**	0.5
	157	5785	13.150		
	165	5825	13.770		
802.11n HT20	**149**	**5745**	**11.420**	**11.420**	
	157	5785	16.230		
	165	5825	13.130		
802.11n HT40	**151**	**5755**	**31.330**	**31.330**	
	159	5795	33.770		
802.11ac VHT80	**155**	**5775**	**50.050**	**50.050**	

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 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.

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TEST PROCEDURE

KDB 789033 Method PM is used for output power.

KDB 789033 Method SA-2 is used for only power of straddle Ch. and PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD. 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	-3.38
UNII 2A 5250 - 5350	-2.16
UNII 2C 5470 - 5725	-2.27
UNII 3 5725 - 5850	-3.08

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	15.34	15.34	23.98
	40	5200	15.36	15.36	
	48	5240	15.45	15.45	
UNII-2A	52	5260	15.28	15.28	23.84
	60	5300	15.13	15.13	
	64	5320	15.18	15.18	
UNII-2C	100	5500	15.09	15.09	23.98
	116	5580	15.23	15.23	
	140	5700	15.40	15.40	
UNII-3	149	5745	15.34	15.34	30.00
	157	5785	15.33	15.33	
	165	5825	15.41	15.41	

* 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	4.510	-	4.510	11.00
	40	5200	4.445	-	4.445	
	48	5240	4.818	-	4.818	
UNII-2A	52	5260	4.293	-	4.293	11.00
	60	5300	3.941	-	3.941	
	64	5320	3.995	-	3.995	
UNII-2C	100	5500	4.316	-	4.316	11.00
	116	5580	4.450	-	4.450	
	140	5700	5.064	-	5.064	
UNII-3	149	5745	5.356	-	5.356	30.00/500kHz
	157	**5785**	**5.771**	**-**	**5.771**	
	165	5825	5.727	-	5.727	

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

10.2.2. 02.11n HT20 MODE

Output Power Results

Band	Channel	Center Freq. [MHz]	Average Power [dBm]	Corr'd Power [dBm]	Limit [dBm]
UNII-1	36	5180	15.14	15.14	23.98
	40	5200	15.15	15.15	
	48	5240	15.22	15.22	
UNII-2A	52	5260	15.07	15.07	23.98
	60	5300	15.40	15.40	
	64	5320	15.37	15.37	
UNII-2C	100	5500	15.48	15.48	23.98
	116	5580	15.62	15.62	
	140	5700	15.65	15.65	
UNII-3	149	5745	15.18	15.18	30.00
	157	5785	15.11	15.11	
	165	5825	15.17	15.17	

* 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	4.549	-	4.549	11.00
	40	5200	4.690	-	4.690	
	48	5240	4.333	-	4.333	
UNII-2A	52	5260	4.500	-	4.500	11.00
	60	5300	3.978	-	3.978	
	64	5320	4.358	-	4.358	
UNII-2C	100	5500	4.340	-	4.340	11.00
	116	5580	5.105	-	5.105	
	140	5700	5.579	-	5.579	
UNII-3	149	5745	5.862	-	5.862	30.00/500kHz
	157	5785	5.771	-	5.771	
	165	**5825**	**6.086**	**-**	**6.086**	

* 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	14.40	14.40	23.98
	46	5230	14.27	14.27	
UNII-2A	54	5270	14.12	14.12	23.98
	62	5310	14.11	14.11	
UNII-2C	102	5510	14.09	14.09	23.98
	118	5590	14.27	14.27	
	134	5670	14.27	14.27	
UNII-3	151	5755	14.30	14.30	30.00
	159	5795	14.33	14.33	

* 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	1.016	-	1.016	11.00
	46	5230	0.664	-	0.664	
UNII-2A	54	5270	0.359	-	0.359	11.00
	62	5310	0.508	-	0.508	
UNII-2C	102	5510	0.628	-	0.628	11.00
	118	5590	0.800	-	0.800	
	134	5670	1.103	-	1.103	
UNII-3	151	5755	1.796	-	1.796	30.00/500kHz
	159	**5795**	**1.873**	**-**	**1.873**	

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

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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	12.26	12.26	23.98
UNII-2A	58	5290	12.42	12.42	23.98
UNII-2C	106	5530	12.29	12.29	23.98
	122	5610	12.37	12.37	
UNII-3	155	5775	12.58	12.58	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	-4.143	**-**	-4.143	11.00
UNII-2A	58	5290	-4.162	-	-4.162	11.00
UNII-2C	106	5530	-4.378	-	-4.378	11.00
	122	5610	-4.194	-	-4.194	
UNII-3	**155**	**5775**	**-3.162**	**-**	**-3.162**	30.00/500kHz

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

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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	14.917	-	14.917	22.87
	UNII-3		6.693	-	6.693	30.00
802.11n HT20	UNII-2C	5720	15.158	-	15.158	22.84
	UNII-3		7.543	-	7.543	30.00
802.11n HT40	UNII-2C	5710	14.573	-	14.573	23.98
	UNII-3		2.312	-	2.312	30.00
802.11ac VHT80	UNII-2C	5690	12.213	-	12.213	23.98
	UNII-3		-3.006	-	-3.006	30.00

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

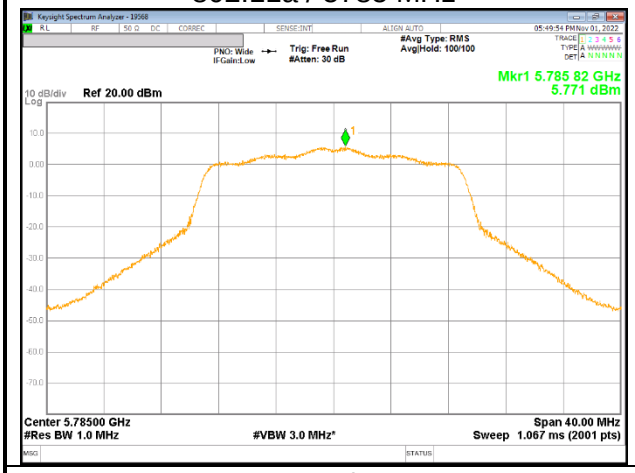
PSD Results

Mode	Band	Center Freq. [MHz]	Meas PSD [dBm/MHz]	DCCF.	Corr'd PSD [dBm]	Limit [dBm/ MHz]
802.11a	UNII-2C	5720	6.311	-	6.311	11.00
	UNII-3		0.330	-	0.330	30.00/500kHz
802.11n HT20	UNII-2C	5720	6.382	-	6.382	11.00
	UNII-3		0.532	-	0.532	30.00/500kHz
802.11n HT40	UNII-2C	5710	2.930	-	2.930	11.00
	UNII-3		-5.650	-	-5.650	30.00/500kHz
802.11ac VHT80	UNII-2C	5690	-2.434	-	-2.434	11.00
	UNII-3		-10.557	-	-10.557	30.00/500kHz

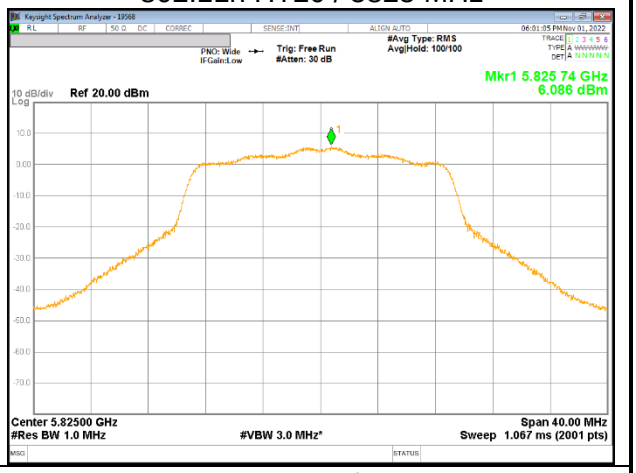
* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

10.2.6. OUTPUT POWER AND PPSD PLOTS (WORST CASE)

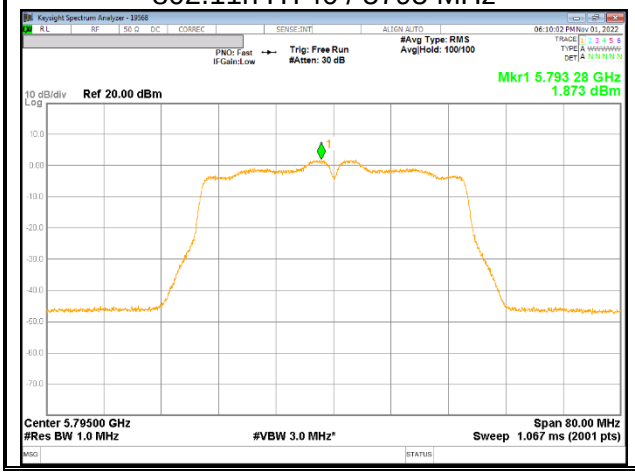
802.11a / 5785 MHz



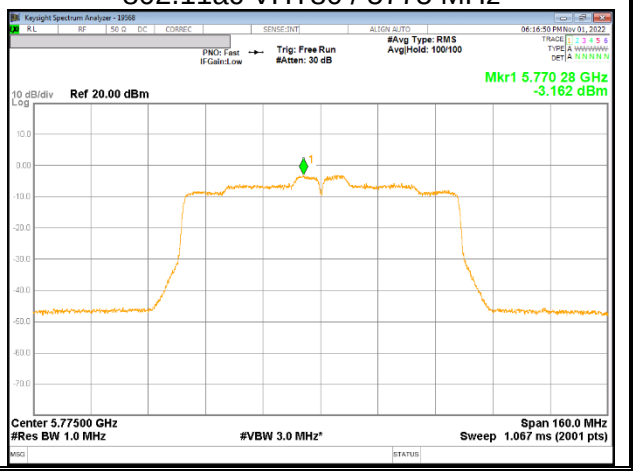
802.11n HT20 / 5825 MHz



802.11n HT40 / 5795 MHz

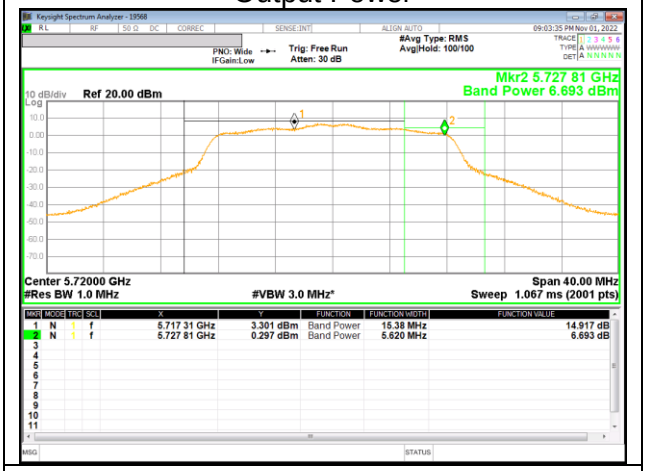


802.11ac VHT80 / 5775 MHz

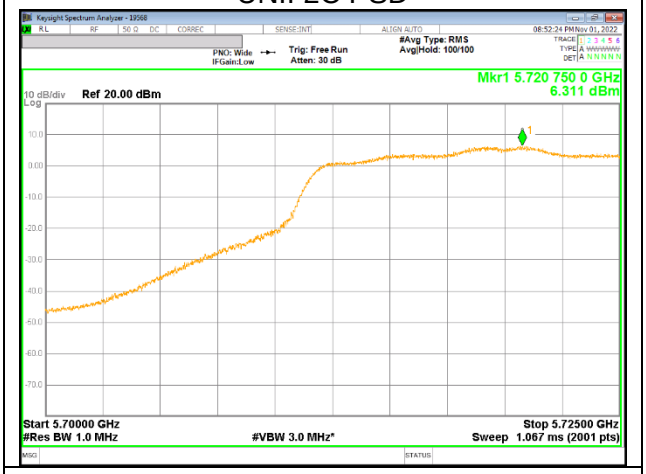


UNII Straddle Ch. IEEE 802.11a mode Output Power and PSD

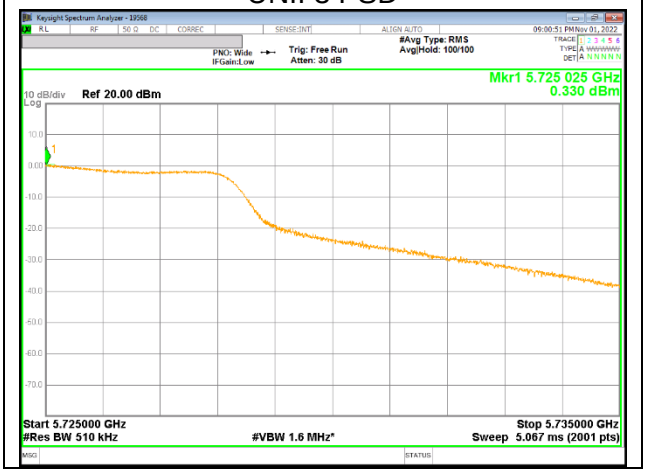
Output Power



UNII 2C PSD

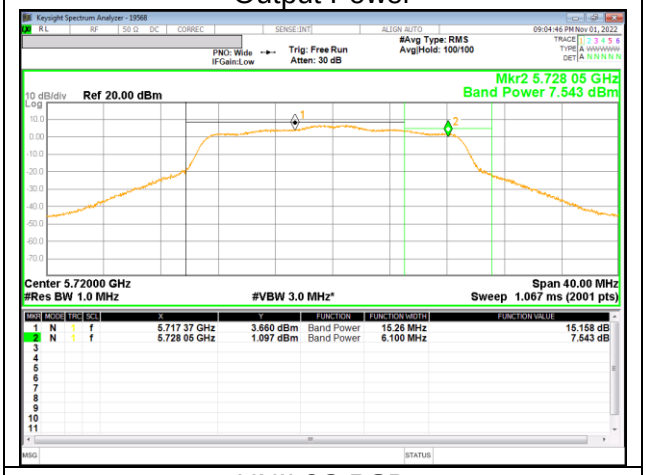


UNII 3 PSD

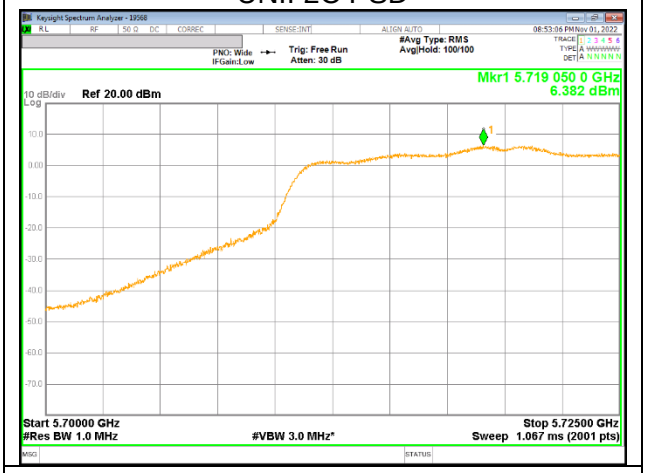


UNII Straddle Ch. IEEE 802.11n HT20 mode Output Power and PSD

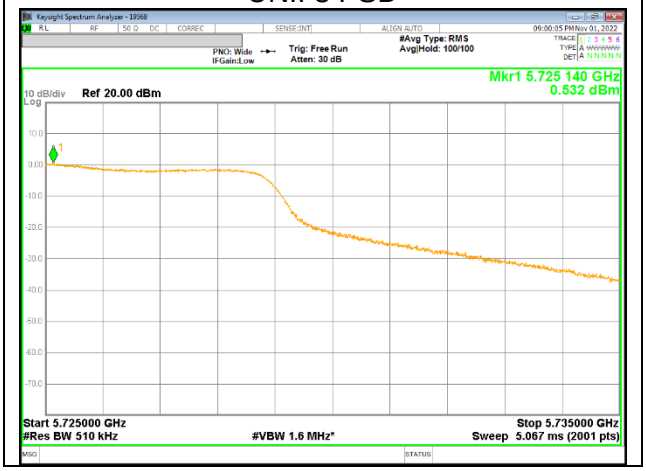
Output Power



UNII 2C PSD

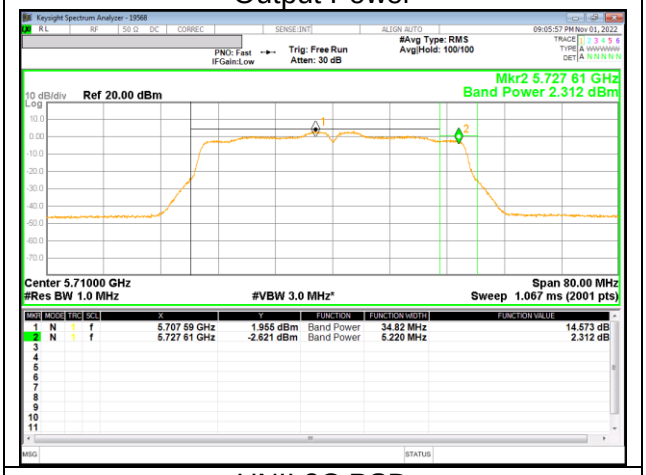


UNII 3 PSD

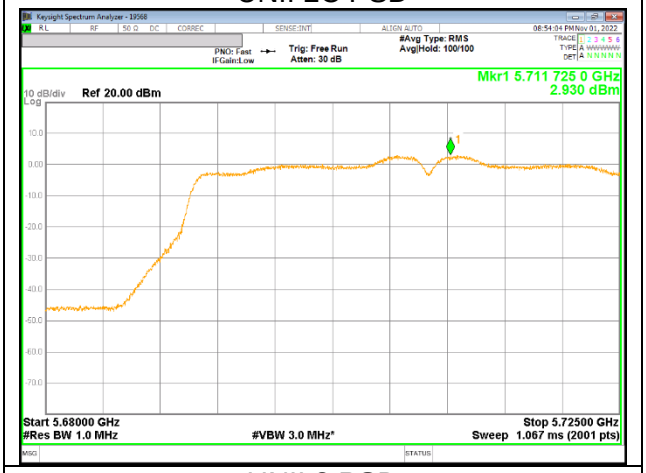


UNII Straddle Ch. IEEE 802.11n HT40 mode Output Power and PSD

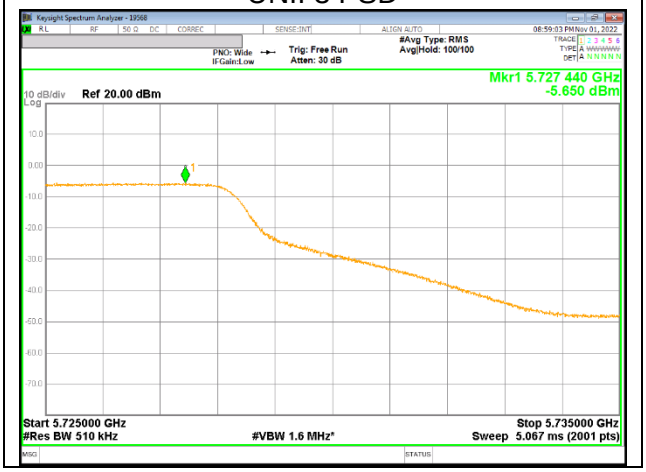
Output Power



UNII 2C PSD

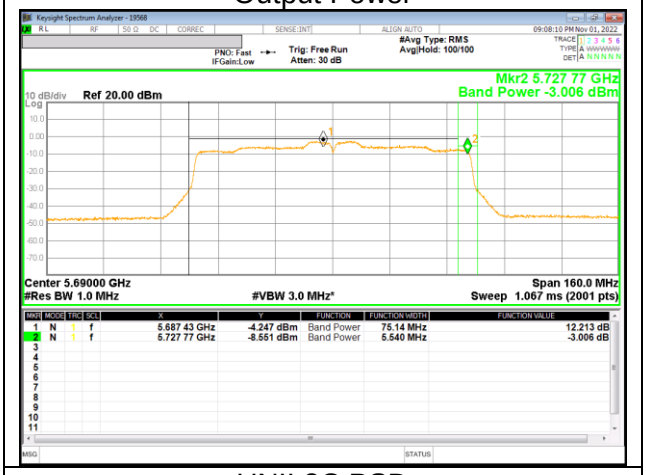


UNII 3 PSD

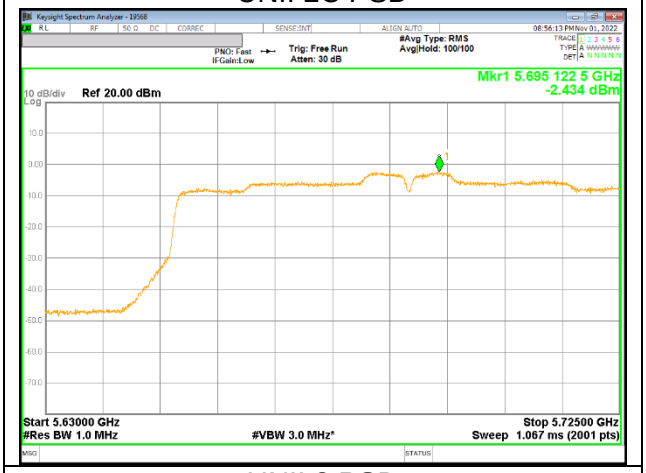


UNII Straddle Ch. IEEE 802.11ac VHT80 mode Output Power and PSD

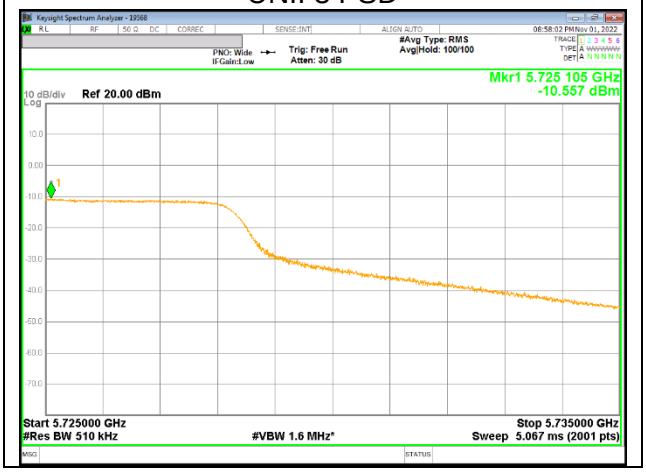
Output Power



UNII 2C PSD



UNII 3 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[dBuV/m] = EIRP[dBm] + 95.2 = -27dBm + 95.2 = 68.2dBuV/m

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

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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 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.

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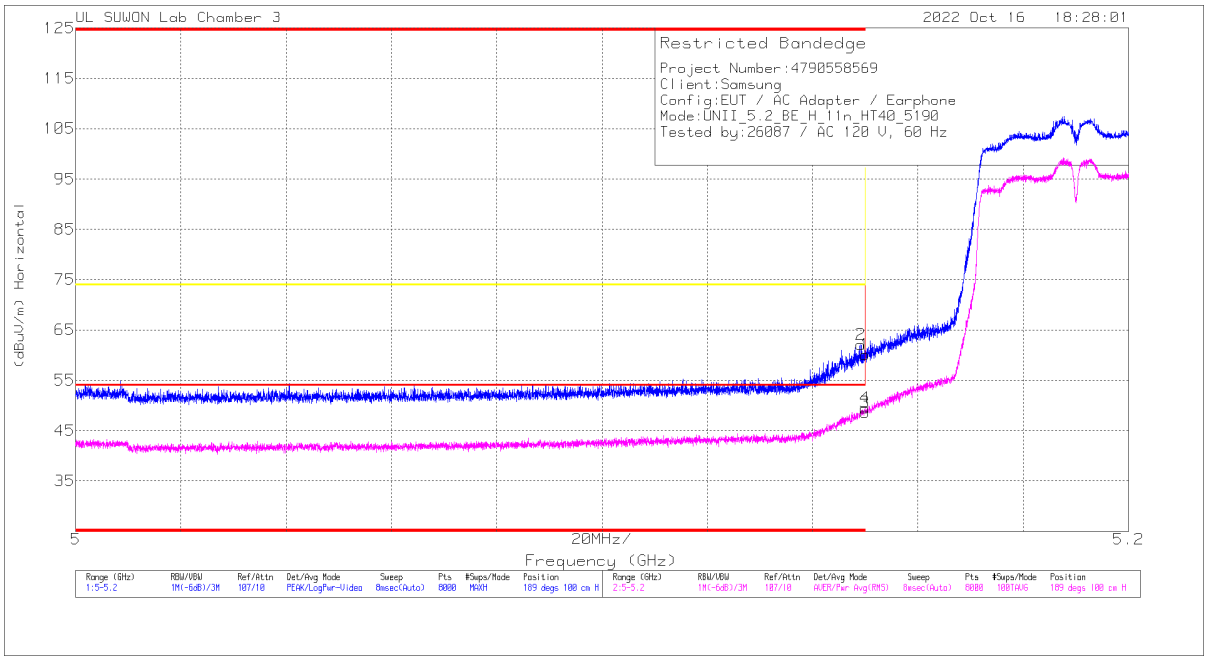
11.1. TX ABOVE 1GHz 1Tx MODE IN THE 5.2GHz BAND

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

HORIZONTAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.14999	45.86	Pk	34.8	-20.6	0	60.06	-	-	74	-13.94	189	100	H
2	* 5.14917	47.91	Pk	34.8	-20.6	0	62.11	-	-	74	-11.89	189	100	H
3	* 5.14999	34.43	RMS	34.8	-20.6	0	48.63	54	-5.37	-	-	189	100	H
4	* 5.14997	35.31	RMS	34.8	-20.6	0	49.51	54	-4.49	-	-	189	100	H

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

BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5180	ANT1	* 5.14999	40.87	Pk	34.80	-20.60	0.00	55.07	-	-	74.00	-18.93	174	100	H
			* 5.14124	43.38	Pk	34.80	-20.60	0.00	57.58	-	-	74.00	-16.42	174	100	H
			* 5.14999	29.67	RMS	34.80	-20.60	0.00	43.87	54.00	-10.13	-	-	174	100	H
			* 5.14552	31.13	RMS	34.80	-20.60	0.00	45.33	54.00	-8.67	-	-	174	100	H
			* 5.14999	38.07	Pk	34.80	-20.60	0.00	52.27	-	-	74.00	-21.73	250	107	V
			* 5.00873	40.86	Pk	34.70	-20.70	0.00	54.86	-	-	74.00	-19.14	250	107	V
			* 5.14999	27.98	RMS	34.80	-20.60	0.00	42.18	54.00	-11.82	-	-	250	107	V
			* 5.0087	29.23	RMS	34.70	-20.70	0.00	43.23	54.00	-10.77	-	-	250	107	V
802.11n (HT20)	5180	ANT1	* 5.14999	40.52	Pk	34.80	-20.60	0.00	54.72	-	-	74.00	-19.28	182	100	H
			* 5.14232	42.98	Pk	34.80	-20.60	0.00	57.18	-	-	74.00	-16.82	182	100	H
			* 5.14999	30.39	RMS	34.80	-20.60	0.00	44.59	54.00	-9.41	-	-	182	100	H
			* 5.14567	31.25	RMS	34.80	-20.60	0.00	45.45	54.00	-8.55	-	-	182	100	H
			* 5.14999	37.55	Pk	34.80	-20.60	0.00	51.75	-	-	74.00	-22.25	256	106	V
			* 5.00648	40.85	Pk	34.70	-20.70	0.00	54.85	-	-	74.00	-19.15	256	106	V
			* 5.14999	27.49	RMS	34.80	-20.60	0.00	41.69	54.00	-12.31	-	-	256	106	V
			* 5.00593	29.39	RMS	34.70	-20.70	0.00	43.39	54.00	-10.61	-	-	256	106	V
802.11n (HT40)	5190	ANT1	* 5.14999	45.86	Pk	34.80	-20.60	0.00	60.06	-	-	74.00	-13.94	189	100	H
			* 5.14917	47.91	Pk	34.80	-20.60	0.00	62.11	-	-	74.00	**-11.89**	189	100	H
			* 5.14999	34.43	RMS	34.80	-20.60	0.00	48.63	54.00	-5.37	-	-	189	100	H
			* 5.14997	35.31	RMS	34.80	-20.60	0.00	49.51	54.00	**-4.49**	-	-	189	100	H
			* 5.14999	38.77	Pk	34.80	-20.60	0.00	52.97	-	-	74.00	-21.03	250	108	V
			* 5.0073	40.24	Pk	34.70	-20.70	0.00	54.24	-	-	74.00	-19.76	250	108	V
			* 5.14999	28.85	RMS	34.80	-20.60	0.00	43.05	54.00	-10.95	-	-	250	108	V
			* 5.0044	29.43	RMS	34.70	-20.60	0.00	43.53	54.00	-10.47	-	-	250	108	V
802.11ac (VHT80)	5210	ANT1	* 5.14999	43.11	Pk	34.80	-20.60	0.00	57.31	-	-	74.00	-16.69	185	109	H
			* 5.14974	45.68	Pk	34.80	-20.60	0.00	59.88	-	-	74.00	-14.12	185	109	H
			* 5.14999	33.63	RMS	34.80	-20.60	0.00	47.83	54.00	-6.17	-	-	185	109	H
			* 5.14914	34.94	RMS	34.80	-20.60	0.00	49.14	54.00	-4.86	-	-	185	109	H
			* 5.14999	36.65	Pk	34.80	-20.60	0.00	50.85	-	-	74.00	-23.15	255	103	V
			* 5.13699	40.14	Pk	34.80	-20.60	0.00	54.34	-	-	74.00	-19.66	255	103	V
			* 5.14999	28.06	RMS	34.80	-20.60	0.00	42.26	54.00	-11.74	-	-	255	103	V
			* 5.13364	29.00	RMS	34.80	-20.60	0.00	43.20	54.00	-10.80	-	-	255	103	V

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

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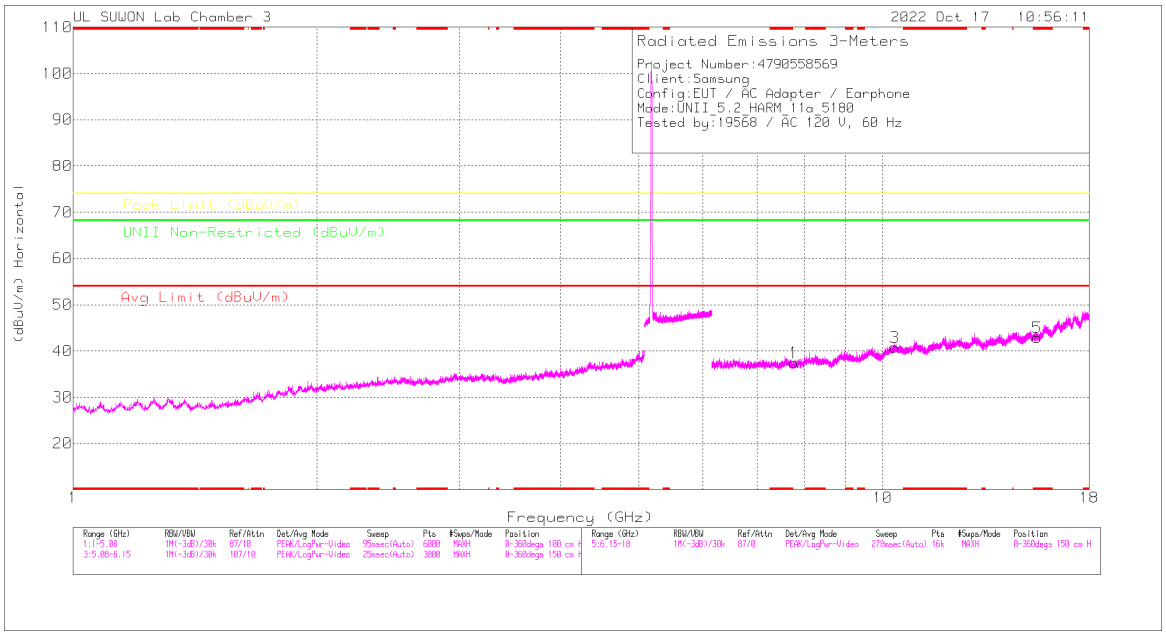
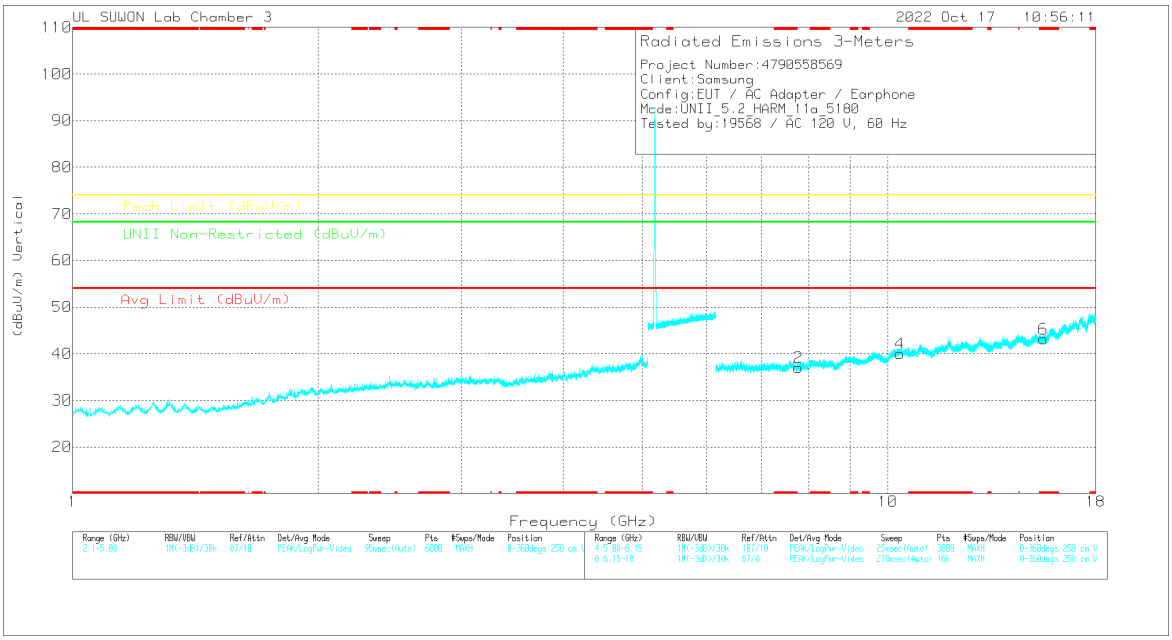
HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5180 MHz)

5180 MHz HORIZONTAL



5180 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)	Meter Reading (dBuV)	Det	3117_00218957	6GHz_HP(dB)	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)	Azimuth (Degs)	Height (cm)	Polarity
7.76226	36.76	PK-U	36.3	-24.6	0	48.46	-	-	-	-	68.2	-19.74	0	100	H
7.76222	35.77	PK-U	36.3	-24.6	0	47.47	-	-	-	-	68.2	-20.73	0	100	V
10.36275	34.03	PK-U	38.1	-21	0	51.13	-	-	-	-	68.2	-17.07	0	100	H
10.35212	34.14	PK-U	38.1	-21	0	51.24	-	-	-	-	68.2	-16.96	0	100	V
* 15.53844	34.8	PK-U	40.2	-21.4	0	53.6	-	-	74	-20.4	-	-	0	100	H
* 15.5457	34.6	PK-U	40.2	-21.4	0	53.4	-	-	74	-20.6	-	-	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

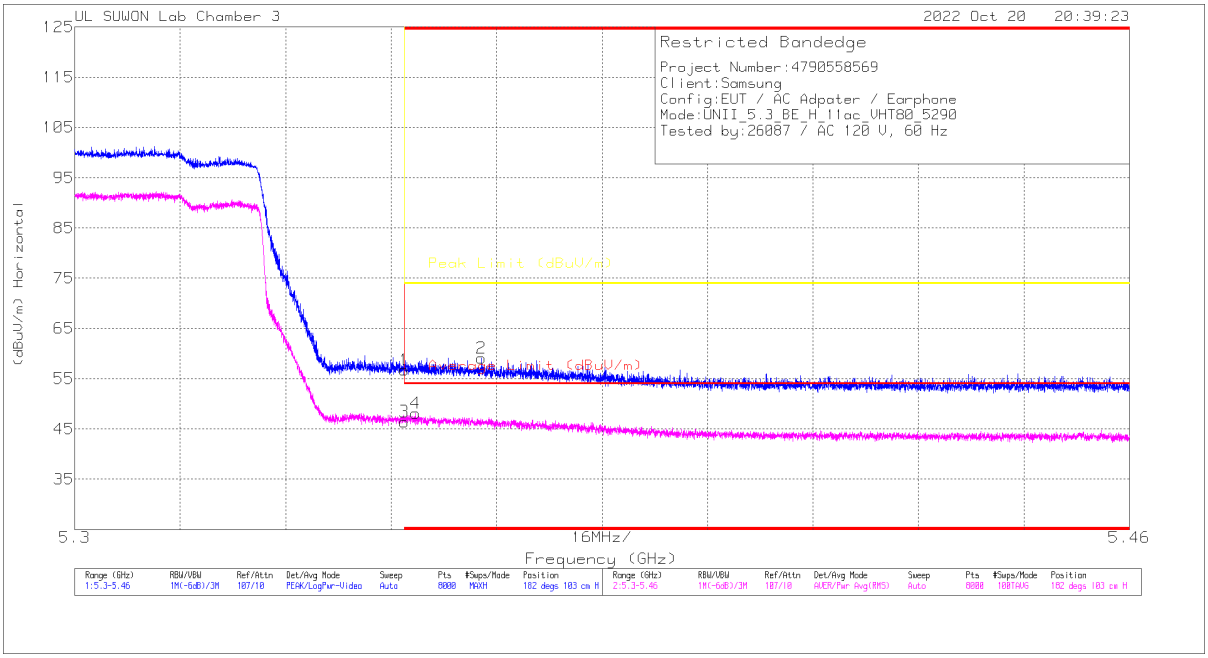
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result dBuV/m]	AV Limit dBuV/m]	AV Margin [dB]	PK Limit dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5180	ANT1	7.762	36.76	PK-U	36.30	-24.60	0.00	48.46	-	-	-	-	68.20	-19.74	0	100	H
			7.762	35.77	PK-U	36.30	-24.60	0.00	47.47	-	-	-	-	68.20	-20.73	0	100	V
			10.363	34.03	PK-U	38.10	-21.00	0.00	51.13	-	-	-	-	68.20	-17.07	0	100	H
			10.352	34.14	PK-U	38.10	-21.00	0.00	51.24	-	-	-	-	68.20	**-16.96**	0	100	V
			* 15.53844	34.80	PK-U	40.20	-21.40	0.00	53.60	-	-	74.00	-20.40	-	-	0	100	H
			* 15.5457	34.60	PK-U	40.20	-21.40	0.00	53.40	-	-	74.00	-20.60	-	-	0	100	V
	5220	ANT1	7.833	35.91	PK-U	36.30	-24.20	0.00	48.01	-	-	-	-	68.20	-20.19	360	100	H
			7.830	35.60	PK-U	36.30	-24.20	0.00	47.70	-	-	-	-	68.20	-20.50	360	100	V
			10.447	33.02	PK-U	38.10	-21.20	0.00	49.92	-	-	-	-	68.20	-18.28	360	100	H
			10.443	33.23	PK-U	38.10	-21.20	0.00	50.13	-	-	-	-	68.20	-18.07	360	100	V
			* 15.6599	33.36	PK-U	40.40	-21.10	0.00	52.66	-	-	74.00	-21.34	-	-	360	100	H
			* 15.65489	34.24	PK-U	40.40	-21.10	0.00	53.54	-	-	74.00	-20.46	-	-	360	100	V
	5240	ANT1	7.867	36.01	PK-U	36.30	-24.00	0.00	48.31	-	-	-	-	68.20	-19.89	0	100	H
			7.867	35.89	PK-U	36.30	-24.00	0.00	48.19	-	-	-	-	68.20	-20.01	0	100	V
			10.477	32.96	PK-U	38.20	-21.20	0.00	49.96	-	-	-	-	68.20	-18.24	0	100	H
			10.488	33.19	PK-U	38.20	-21.10	0.00	50.29	-	-	-	-	68.20	-17.91	0	100	V
			* 15.71681	33.99	PK-U	40.50	-21.00	0.00	53.49	-	-	74.00	-20.51	-	-	0	100	H
			* 15.72172	34.15	PK-U	40.50	-20.90	0.00	53.75	-	-	74.00	**-20.25**	-	-	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: 802.11ac VHT80 / 5290 MHz)

HORIZONTAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	41.79	Pk	35.1	-20.2	0	56.69	-	-	74	-17.31	182	103	H
2	* 5.36173	44.26	Pk	35.1	-20.2	0	59.16	-	-	74	-14.84	182	103	H
3	* 5.35001	31.55	RMS	35.1	-20.2	0	46.45	54	-7.55	-	-	182	103	H
4	* 5.35167	33.25	RMS	35.1	-20.2	0	48.15	54	-5.85	-	-	182	103	H

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

BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5320	ANT1	* 5.35001	42.25	Pk	35.10	-20.20	0.00	57.15	-	-	74.00	-16.85	185	104	H
			* 5.36413	44.93	Pk	35.10	-20.20	0.00	59.83	-	-	74.00	-14.17	185	104	H
			* 5.35001	30.58	RMS	35.10	-20.20	0.00	45.48	54.00	-8.52	-	-	185	104	H
			* 5.36053	31.97	RMS	35.10	-20.20	0.00	46.87	54.00	-7.13	-	-	185	104	H
			* 5.35001	37.78	Pk	35.10	-20.20	0.00	52.68	-	-	74.00	-21.32	277	107	V
			* 5.41488	40.45	Pk	35.20	-20.20	0.00	55.45	-	-	74.00	-18.55	277	107	V
			* 5.35001	27.52	RMS	35.10	-20.20	0.00	42.42	54.00	-11.58	-	-	277	107	V
			* 5.35941	29.00	RMS	35.10	-20.20	0.00	43.90	54.00	-10.10	-	-	277	107	V
802.11n (HT20)	5320	ANT1	* 5.35001	41.56	Pk	35.10	-20.20	0.00	56.46	-	-	74.00	-17.54	183	105	H
			* 5.36613	45.38	Pk	35.10	-20.20	0.00	60.28	-	-	74.00	**-13.72**	183	105	H
			* 5.35001	31.01	RMS	35.10	-20.20	0.00	45.91	54.00	-8.09	-	-	183	105	H
			* 5.36519	32.03	RMS	35.10	-20.20	0.00	46.93	54.00	-7.07	-	-	183	105	H
			* 5.35001	38.58	Pk	35.10	-20.20	0.00	53.48	-	-	74.00	-20.52	267	374	V
			* 5.37711	40.99	Pk	35.20	-20.20	0.00	55.99	-	-	74.00	-18.01	267	374	V
			* 5.35001	27.98	RMS	35.10	-20.20	0.00	42.88	54.00	-11.12	-	-	267	374	V
			* 5.37129	29.08	RMS	35.10	-20.20	0.00	43.98	54.00	-10.02	-	-	267	374	V
802.11n (HT40)	5310	ANT1	* 5.35001	43.07	Pk	35.10	-20.20	0.00	57.97	-	-	74.00	-16.03	190	103	H
			* 5.35019	43.71	Pk	35.10	-20.20	0.00	58.61	-	-	74.00	-15.39	190	103	H
			* 5.35001	31.44	RMS	35.10	-20.20	0.00	46.34	54.00	-7.66	-	-	190	103	H
			* 5.35053	32.16	RMS	35.10	-20.20	0.00	47.06	54.00	-6.94	-	-	190	103	H
			* 5.35001	37.72	Pk	35.10	-20.20	0.00	52.62	-	-	74.00	-21.38	268	108	V
			* 5.35361	40.57	Pk	35.10	-20.20	0.00	55.47	-	-	74.00	-18.53	268	108	V
			* 5.35001	27.96	RMS	35.10	-20.20	0.00	42.86	54.00	-11.14	-	-	268	108	V
			* 5.40636	28.76	RMS	35.20	-20.10	0.00	43.86	54.00	-10.14	-	-	268	108	V
802.11ac (VHT80)	5290	ANT1	* 5.35001	41.79	Pk	35.10	-20.20	0.00	56.69	-	-	74.00	-17.31	182	103	H
			* 5.36173	44.26	Pk	35.10	-20.20	0.00	59.16	-	-	74.00	-14.84	182	103	H
			* 5.35001	31.55	RMS	35.10	-20.20	0.00	46.45	54.00	-7.55	-	-	182	103	H
			* 5.35167	33.25	RMS	35.10	-20.20	0.00	48.15	54.00	**-5.85**	-	-	182	103	H
			* 5.35001	38.16	Pk	35.10	-20.20	0.00	53.06	-	-	74.00	-20.94	264	103	V
			* 5.42066	40.17	Pk	35.20	-20.10	0.00	55.27	-	-	74.00	-18.73	264	103	V
			* 5.35001	27.87	RMS	35.10	-20.20	0.00	42.77	54.00	-11.23	-	-	264	103	V
			* 5.37121	28.88	RMS	35.10	-20.20	0.00	43.78	54.00	-10.22	-	-	264	103	V

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

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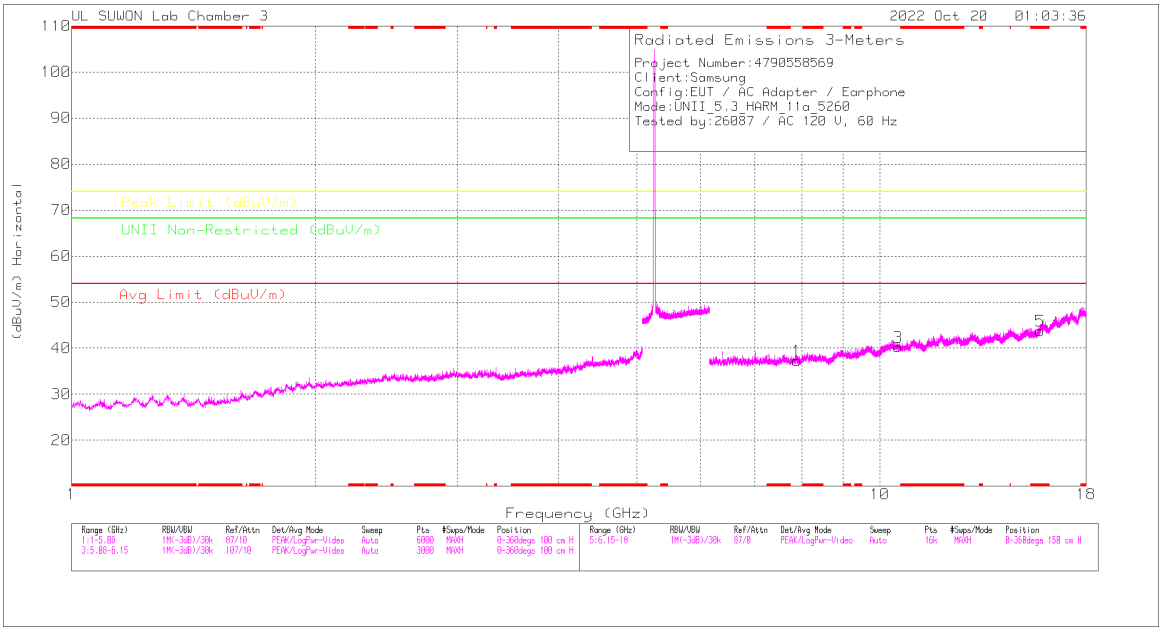
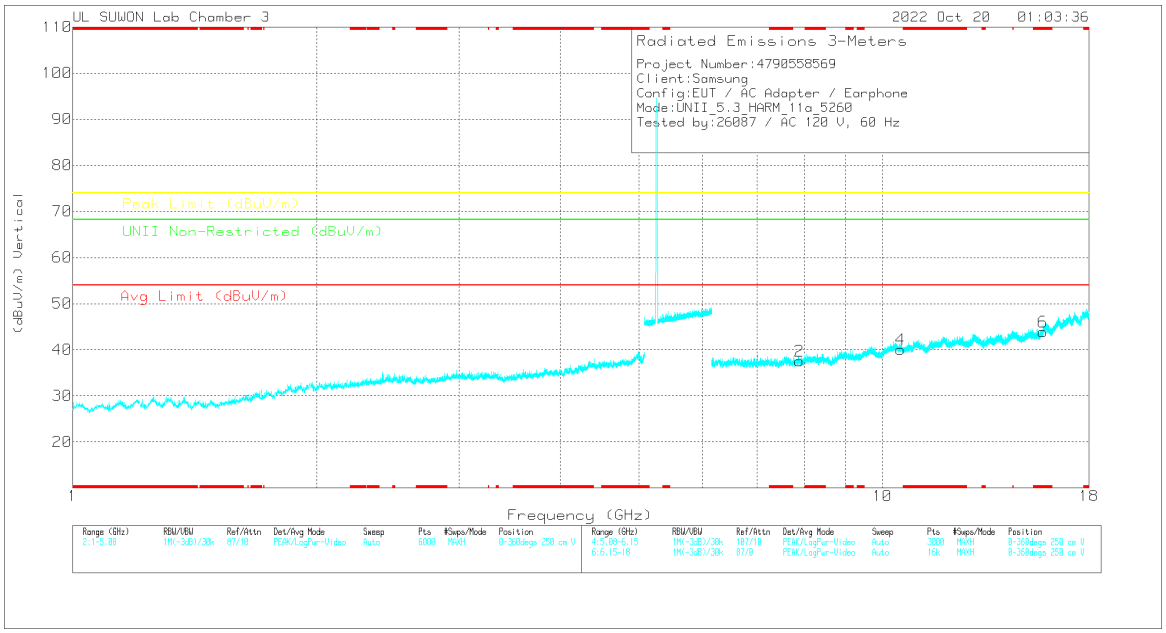
HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5260 MHz)

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)	Meter Reading (dBuV)	Det	3117_00218957	6GHz_HP[dB]	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)	Azimuth (Degs)	Height (cm)	Polarity
7.8905	36.09	PK-U	36.3	-23.9	0	48.49	-	-	-	-	68.2	-19.71	0	100	H
7.89065	35.42	PK-U	36.3	-23.9	0	47.82	-	-	-	-	68.2	-20.38	0	100	V
10.52049	33.79	PK-U	38.2	-21.1	0	50.89	-	-	-	-	68.2	-17.31	0	100	H
10.5209	33.34	PK-U	38.2	-21.1	0	50.44	-	-	-	-	68.2	-17.76	0	100	V
* 15.78043	34.26	PK-U	40.6	-20.8	0	54.06	-	-	74	-19.94	-	-	0	100	H
* 15.78023	35.07	PK-U	40.6	-20.8	0	54.87	-	-	74	-19.13	-	-	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	5260	ANT1	7.891	36.09	PK-U	36.30	-23.90	0.00	48.49	-	-	-	-	68.20	-19.71	0	100	H
			7.891	35.42	PK-U	36.30	-23.90	0.00	47.82	-	-	-	-	68.20	-20.38	0	100	V
			10.520	33.79	PK-U	38.20	-21.10	0.00	50.89	-	-	-	-	68.20	**-17.31**	0	100	H
			10.521	33.34	PK-U	38.20	-21.10	0.00	50.44	-	-	-	-	68.20	-17.76	0	100	V
			* 15.78043	34.26	PK-U	40.60	-20.80	0.00	54.06	-	-	74.00	-19.94	-	-	0	100	H
			* 15.78023	35.07	PK-U	40.60	-20.80	0.00	54.87	-	-	74.00	**-19.13**	-	-	0	100	V
	5300	ANT1	7.066	38.52	PK-U	36.20	-25.90	0.00	48.82	-	-	-	-	68.20	-19.38	201	101	H
			7.067	38.14	PK-U	36.20	-25.90	0.00	48.44	-	-	-	-	68.20	-19.76	188	155	V
			10.507	32.93	PK-U	38.20	-21.00	0.00	50.13	-	-	-	-	68.20	-18.07	0	100	H
			10.428	33.09	PK-U	38.10	-21.20	0.00	49.99	-	-	-	-	68.20	-18.21	0	100	V
			* 15.91448	33.89	PK-U	40.80	-20.30	0.00	54.39	-	-	74.00	-19.61	-	-	0	100	H
			* 15.90099	33.65	PK-U	40.80	-20.30	0.00	54.15	-	-	74.00	-19.85	-	-	0	100	V
	5320	ANT1	7.987	35.59	PK-U	36.30	-24.30	0.00	47.59	-	-	-	-	68.20	-20.61	0	100	H
			7.919	35.66	PK-U	36.30	-24.10	0.00	47.86	-	-	-	-	68.20	-20.34	0	100	V
			* 10.63767	32.68	PK-U	38.30	-21.10	0.00	49.88	-	-	74.00	-24.12	-	-	0	100	H
			* 10.63152	32.96	PK-U	38.30	-21.10	0.00	50.16	-	-	74.00	-23.84	-	-	0	100	V
			* 15.96953	33.63	PK-U	40.90	-20.40	0.00	54.13	-	-	74.00	-19.87	-	-	0	100	H
			* 15.96845	33.62	PK-U	40.90	-20.40	0.00	54.12	-	-	74.00	-19.88	-	-	0	100	V
802.11n (HT20) Spot-Check	5300	ANT1	7.067	38.43	PK-U	36.20	-25.90	0.00	48.73	-	-	-	-	68.20	-19.47	197	101	H
			7.067	38.18	PK-U	36.20	-25.90	0.00	48.48	-	-	-	-	68.20	-19.72	203	101	V
			10.519	33.64	PK-U	38.20	-21.10	0.00	50.74	-	-	-	-	68.20	-17.46	0	100	H
			* 10.61518	32.96	PK-U	38.30	-21.10	0.00	50.16	-	-	74.00	-23.84	-	-	0	100	V
			* 15.91251	33.75	PK-U	40.80	-20.30	0.00	54.25	-	-	74.00	-19.75	-	-	0	100	H
			* 15.92415	33.67	PK-U	40.80	-20.30	0.00	54.17	-	-	74.00	-19.83	-	-	0	100	V
802.11n (HT40) Spot-Check	5310	ANT1	7.080	37.85	PK-U	36.20	-26.00	0.00	48.05	-	-	-	-	68.20	-20.15	198	101	H
			7.080	38.15	PK-U	36.20	-26.00	0.00	48.35	-	-	-	-	68.20	-19.85	185	162	V
			* 10.62462	32.87	PK-U	38.30	-21.10	0.00	50.07	-	-	74.00	-23.93	-	-	0	100	H
			* 10.73368	33.46	PK-U	38.40	-21.30	0.00	50.56	-	-	74.00	-23.44	-	-	0	100	V
			* 15.93237	33.86	PK-U	40.90	-20.30	0.00	54.46	-	-	74.00	-19.54	-	-	0	100	H
			* 15.92593	33.90	PK-U	40.90	-20.30	0.00	54.50	-	-	74.00	-19.50	-	-	0	100	V
802.11ac (VHT80) Spot-Check	5290	ANT1	7.053	37.84	PK-U	36.20	-25.90	0.00	48.14	-	-	-	-	68.20	-20.06	202	101	H
			7.053	38.22	PK-U	36.20	-25.90	0.00	48.52	-	-	-	-	68.20	-19.68	204	108	V
			10.524	32.41	PK-U	38.20	-21.10	0.00	49.51	-	-	-	-	68.20	-18.69	0	100	H
			10.586	32.68	PK-U	38.30	-21.20	0.00	49.78	-	-	-	-	68.20	-18.42	0	100	V
			* 15.88032	33.04	PK-U	40.80	-20.40	0.00	53.44	-	-	74.00	-20.56	-	-	0	100	H
			* 15.87552	34.15	PK-U	40.80	-20.40	0.00	54.55	-	-	74.00	-19.45	-	-	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

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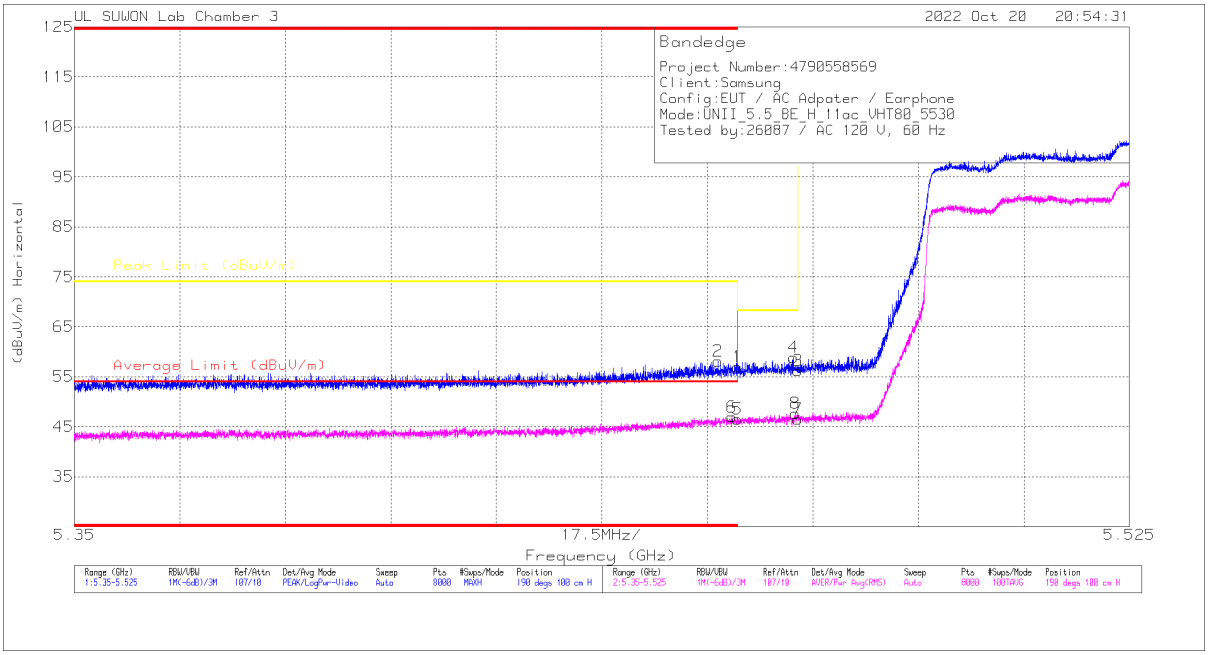
11.3. TX ABOVE 1GHz 1Tx MODE IN THE 5.5 GHz BAND

BANDEDGE (WORST CASE: 802.11ac VHT80 / 5530 MHz)

HORIZONTAL PEAK AND AVERAGE DATA



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45998	41.8	Pk	35.3	-20.1	0	57	-	-	74	-17	190	100	H
2	* 5.45679	42.9	Pk	35.3	-20.1	0	58.1	-	-	74	-15.9	190	100	H
3	5.46998	41.08	Pk	35.3	-20.1	0	56.28	-	-	68.2	-11.92	190	100	H
4	5.4693	43.72	Pk	35.3	-20.1	0	58.92	-	-	68.2	-9.28	190	100	H
5	* 5.45998	31.32	RMS	35.3	-20.1	0	46.52	54	-7.48	-	-	190	100	H
6	* 5.45906	31.79	RMS	35.3	-20.1	0	46.99	54	-7.01	-	-	190	100	H
7	5.46998	31.38	RMS	35.3	-20.1	0	46.58	-	-	-	-	190	100	H
8	5.46954	32.52	RMS	35.3	-20.1	0	47.72	-	-	-	-	190	100	H

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

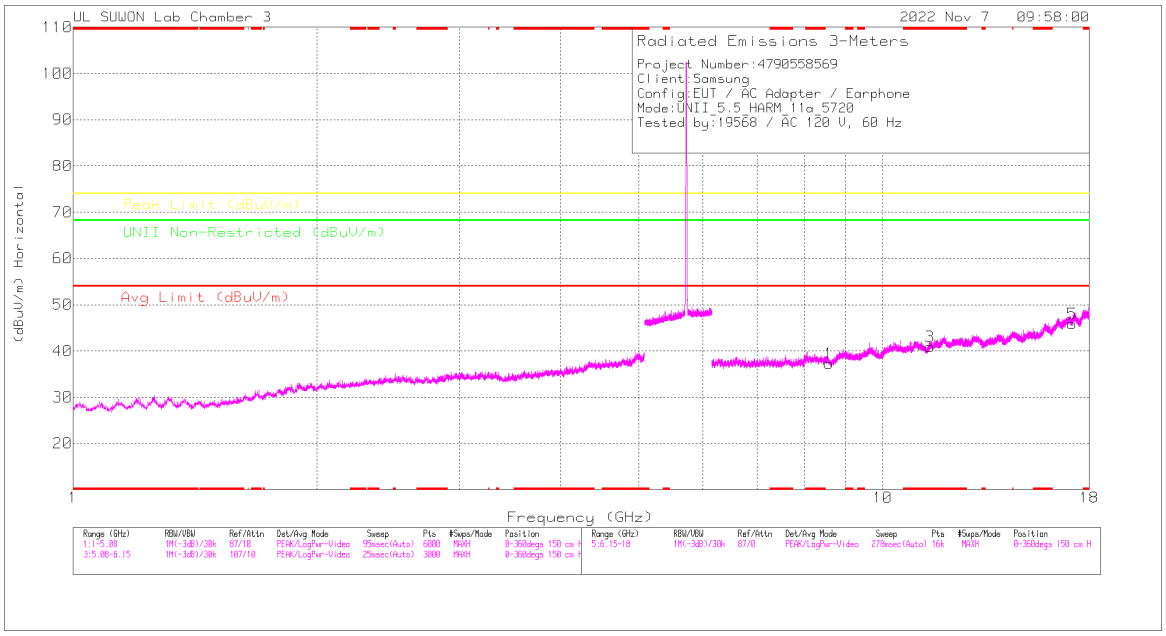
BANDEDGE TEST DATA

Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5500	ANT1	* 5.45998	38.64	Pk	35.30	-20.10	0.00	53.84	-	-	74.00	-20.16	177	126	H
			* 5.45676	42.08	Pk	35.30	-20.10	0.00	57.28	-	-	74.00	-16.72	177	126	H
			5.46998	39.99	Pk	35.30	-20.10	0.00	55.19	-	-	68.20	-13.01	177	126	H
			5.46116	42.61	Pk	35.30	-20.10	0.00	57.81	-	-	68.20	-10.39	177	126	H
			* 5.45998	29.16	RMS	35.30	-20.10	0.00	44.36	54.00	-9.64	-	-	177	126	H
			* 5.45694	30.15	RMS	35.30	-20.10	0.00	45.35	54.00	-8.65	-	-	177	126	H
			5.46998	29.16	RMS	35.30	-20.10	0.00	44.36	-	-	-	-	177	126	H
			5.46503	30.21	RMS	35.30	-20.10	0.00	45.41	-	-	-	-	177	126	H
			* 5.45998	37.26	Pk	35.30	-20.10	0.00	52.46	-	-	74.00	-21.54	102	100	V
			* 5.45241	40.03	Pk	35.30	-20.10	0.00	55.23	-	-	74.00	-18.77	102	100	V
			5.46998	37.44	Pk	35.30	-20.10	0.00	52.64	-	-	68.20	-15.56	102	100	V
			5.46136	40.21	Pk	35.30	-20.10	0.00	55.41	-	-	68.20	-12.79	102	100	V
			* 5.45998	27.30	RMS	35.30	-20.10	0.00	42.50	54.00	-11.50	-	-	102	100	V
			* 5.45996	28.67	RMS	35.30	-20.10	0.00	43.87	54.00	-10.13	-	-	102	100	V
			5.46998	27.36	RMS	35.30	-20.10	0.00	42.56	-	-	-	-	102	100	V
			5.46967	28.77	RMS	35.30	-20.10	0.00	43.97	-	-	-	-	102	100	V
	5700	ANT1	5.72500	38.02	Pk	35.70	-19.50	0.00	54.22	-	-	68.20	-13.98	180	119	H
			5.75227	41.17	Pk	35.70	-19.40	0.00	57.47	-	-	68.20	-10.73	180	119	H
			5.72500	37.41	Pk	35.70	-19.50	0.00	53.61	-	-	68.20	-14.59	202	107	V
			5.72980	39.95	Pk	35.70	-19.50	0.00	56.15	-	-	68.20	-12.05	202	107	V
802.11n (HT20)	5500	ANT1	* 5.45998	41.53	Pk	35.30	-20.10	0.00	56.73	-	-	74.00	-17.27	187	105	H
			* 5.45687	43.68	Pk	35.30	-20.10	0.00	58.88	-	-	74.00	-15.12	187	105	H
			5.46998	40.52	Pk	35.30	-20.10	0.00	55.72	-	-	68.20	-12.48	187	105	H
			5.46313	44.65	Pk	35.30	-20.10	0.00	59.85	-	-	68.20	**-8.35**	187	105	H
			* 5.45998	29.83	RMS	35.30	-20.10	0.00	45.03	54.00	-8.97	-	-	187	105	H
			* 5.45278	31.67	RMS	35.30	-20.10	0.00	46.87	54.00	-7.13	-	-	187	105	H
			5.46998	30.43	RMS	35.30	-20.10	0.00	45.63	-	-	-	-	187	105	H
			5.46007	31.37	RMS	35.30	-20.10	0.00	46.57	-	-	-	-	187	105	H
			* 5.45998	37.96	Pk	35.30	-20.10	0.00	53.16	-	-	74.00	-20.84	101	100	V
			* 5.40494	40.60	Pk	35.20	-20.20	0.00	55.60	-	-	74.00	-18.40	101	100	V
			5.46998	38.85	Pk	35.30	-20.10	0.00	54.05	-	-	68.20	-14.15	101	100	V
			5.46372	40.20	Pk	35.30	-20.10	0.00	55.40	-	-	68.20	-12.80	101	100	V
			* 5.45998	27.88	RMS	35.30	-20.10	0.00	43.08	54.00	-10.92	-	-	101	100	V
			* 5.44902	28.96	RMS	35.30	-20.10	0.00	44.16	54.00	-9.84	-	-	101	100	V
			5.46998	27.92	RMS	35.30	-20.10	0.00	43.12	-	-	-	-	101	100	V
			5.46549	29.18	RMS	35.30	-20.10	0.00	44.38	-	-	-	-	101	100	V
	5700	ANT1	5.72500	39.55	Pk	35.70	-19.50	0.00	55.75	-	-	68.20	-12.45	180	110	H
			5.72883	40.75	Pk	35.70	-19.50	0.00	56.95	-	-	68.20	-11.25	180	110	H
			5.72500	37.24	Pk	35.70	-19.50	0.00	53.44	-	-	68.20	-14.76	206	107	V
			5.73182	40.08	Pk	35.70	-19.50	0.00	56.28	-	-	68.20	-11.92	206	107	V
802.11n (HT40)	5510	ANT1	* 5.45998	40.49	Pk	35.30	-20.10	0.00	55.69	-	-	74.00	-18.31	187	104	H
			* 5.3791	42.71	Pk	35.20	-20.20	0.00	57.71	-	-	74.00	-16.29	187	104	H
			5.46998	42.47	Pk	35.30	-20.10	0.00	57.67	-	-	68.20	-10.53	187	104	H
			5.46698	43.07	Pk	35.30	-20.10	0.00	58.27	-	-	68.20	-9.93	187	104	H
			* 5.45998	29.79	RMS	35.30	-20.10	0.00	44.99	54.00	-9.01	-	-	187	104	H
			* 5.45259	30.58	RMS	35.30	-20.10	0.00	45.78	54.00	-8.22	-	-	187	104	H
			5.46998	30.89	RMS	35.30	-20.10	0.00	46.09	-	-	-	-	187	104	H
			5.46945	31.61	RMS	35.30	-20.10	0.00	46.81	-	-	-	-	187	104	H
			* 5.45998	36.74	Pk	35.30	-20.10	0.00	51.94	-	-	74.00	-22.06	191	107	V
			* 5.43482	40.13	Pk	35.30	-20.10	0.00	55.33	-	-	74.00	-18.67	191	107	V
			5.46998	37.43	Pk	35.30	-20.10	0.00	52.63	-	-	68.20	-15.57	191	107	V
			5.46169	39.30	Pk	35.30	-20.10	0.00	54.50	-	-	68.20	-13.70	191	107	V
			* 5.45998	26.93	RMS	35.30	-20.10	0.00	42.13	54.00	-11.87	-	-	191	107	V
			* 5.43237	28.28	RMS	35.30	-20.10	0.00	43.48	54.00	-10.52	-	-	191	107	V
			5.46998	27.38	RMS	35.30	-20.10	0.00	42.58	-	-	-	-	191	107	V
			5.46770	28.02	RMS	35.30	-20.10	0.00	43.22	-	-	-	-	191	107	V
	5670	ANT1	5.72500	38.04	Pk	35.70	-19.50	0.00	54.24	-	-	68.20	-13.96	188	121	H
			5.77973	40.25	Pk	35.80	-19.30	0.00	56.75	-	-	68.20	-11.45	188	121	H
			5.72500	37.96	Pk	35.70	-19.50	0.00	54.16	-	-	68.20	-14.04	215	106	V
			5.75133	40.04	Pk	35.70	-19.40	0.00	56.34	-	-	68.20	-11.86	215	106	V
802.11ac (VHT80)	5530	ANT1	* 5.45998	41.80	Pk	35.30	-20.10	0.00	57.00	-	-	74.00	-17.00	190	100	H
			* 5.45679	42.90	Pk	35.30	-20.10	0.00	58.10	-	-	74.00	-15.90	190	100	H
			5.46998	41.08	Pk	35.30	-20.10	0.00	56.28	-	-	68.20	-11.92	190	100	H
			5.46930	43.72	Pk	35.30	-20.10	0.00	58.92	-	-	68.20	-9.28	190	100	H
			* 5.45998	31.32	RMS	35.30	-20.10	0.00	46.52	54.00	-7.48	-	-	190	100	H
			* 5.45906	31.79	RMS	35.30	-20.10	0.00	46.99	54.00	**-7.01**	-	-	190	100	H
			5.46998	31.38	RMS	35.30	-20.10	0.00	46.58	-	-	-	-	190	100	H
			5.46954	32.52	RMS	35.30	-20.10	0.00	47.72	-	-	-	-	190	100	H
			* 5.45998	37.51	Pk	35.30	-20.10	0.00	52.71	-	-	74.00	-21.29	70	106	V
			* 5.43745	40.10	Pk	35.30	-20.10	0.00	55.30	-	-	74.00	-18.70	70	106	V
			5.46998	38.37	Pk	35.30	-20.10	0.00	53.57	-	-	68.20	-14.63	70	106	V
			5.46464	40.08	Pk	35.30	-20.10	0.00	55.28	-	-	68.20	-12.92	70	106	V
			* 5.45998	27.46	RMS	35.30	-20.10	0.00	42.66	54.00	-11.34	-	-	70	106	V
			* 5.45989	29.12	RMS	35.30	-20.10	0.00	44.32	54.00	-9.68	-	-	70	106	V
			5.46998	28.31	RMS	35.30	-20.10	0.00	43.51	-	-	-	-	70	106	V
			5.46552	28.89	RMS	35.30	-20.10	0.00	44.09	-	-	-	-	70	106	V
	5610	ANT1	5.72500	36.37	Pk	35.70	-19.50	0.00	52.57	-	-	68.20	-15.63	189	101	H
			5.74322	39.94	Pk	35.70	-19.50	0.00	56.14	-	-	68.20	-12.06	189	101	H
			5.72500	37.32	Pk	35.70	-19.50	0.00	53.52	-	-	68.20	-14.68	218	108	V
			5.78078	39.24	Pk	35.80	-19.40	0.00	55.64	-	-	68.20	-12.56	218	108	V

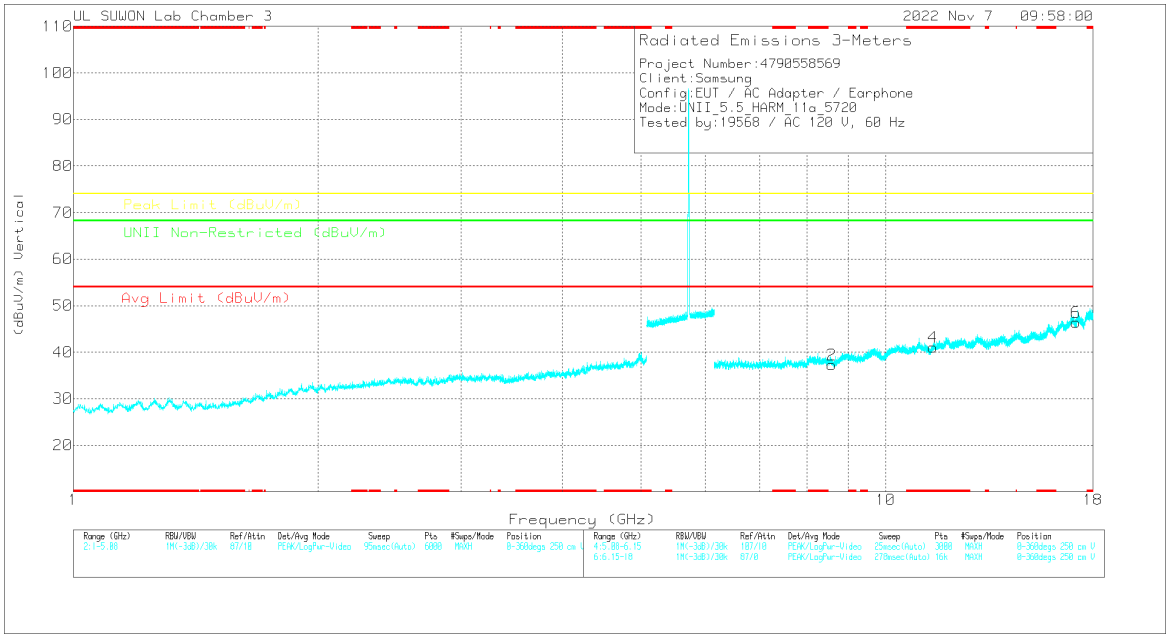
Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5720 MHz)

5720 MHz HORIZONTAL



5720 MHz VERTICAL



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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	6GHz_HPF(dB)	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)	Azimuth (Degs)	Height (cm)	Polarity
8.57742	34.39	PK-U	36.5	-23	0	47.89	-	-	-	-	68.2	-20.31	0	100	H
8.58168	34.06	PK-U	36.5	-23	0	47.56	-	-	-	-	68.2	-20.64	0	100	V
* 11.43675	32.74	PK-U	38.6	-21.3	0	50.04	-	-	74	-23.96	-	-	0	100	H
* 11.43119	32.63	PK-U	38.6	-21.3	0	49.93	-	-	74	-24.07	-	-	0	100	V
17.15127	32.59	PK-U	42.2	-18	0	56.79	-	-	-	-	68.2	-11.41	0	100	H
17.16649	32.49	PK-U	42.2	-17.9	0	56.79	-	-	-	-	68.2	-11.41	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

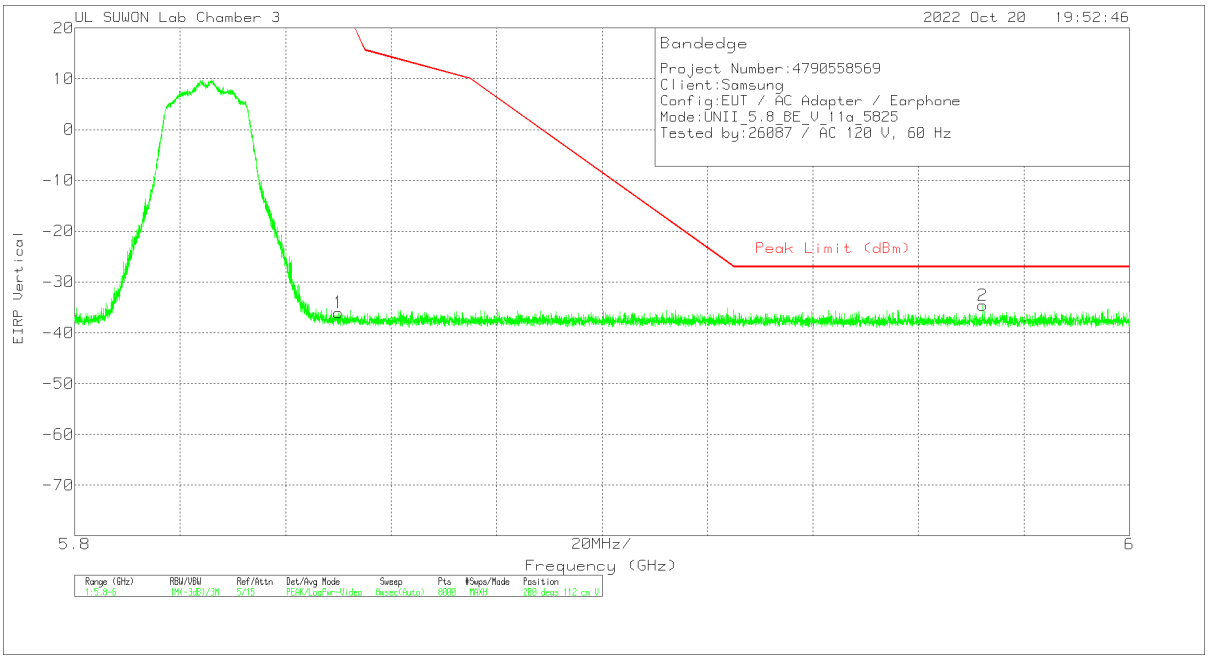
Mode	Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Non-Restricted [dBuV/m]	Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
802.11a	5500	ANT1	* 8.25038	35.68	PK-U	36.20	-23.70	0.00	48.18	-	-	74.00	-25.82	-	-	0	100	H
			* 8.25036	35.81	PK-U	36.20	-23.70	0.00	48.31	-	-	74.00	-25.69	-	-	0	100	V
			* 11.00086	34.21	PK-U	38.50	-21.20	0.00	51.51	-	-	74.00	**-22.49**	-	-	0	100	H
			* 11.0007	33.32	PK-U	38.50	-21.20	0.00	50.62	-	-	74.00	-23.38	-	-	0	100	V
			16.501	33.03	PK-U	42.00	-19.20	0.00	55.83	-	-	-	-	68.20	-12.37	0	100	H
			16.501	32.88	PK-U	42.00	-19.20	0.00	55.68	-	-	-	-	68.20	-12.52	0	100	V
	5580	ANT1	* 8.37052	35.76	PK-U	36.20	-23.60	0.00	48.36	-	-	74.00	-25.64	-	-	0	100	H
			* 8.37054	36.13	PK-U	36.20	-23.60	0.00	48.73	-	-	74.00	-25.27	-	-	0	100	V
			* 11.16043	34.13	PK-U	38.60	-21.50	0.00	51.23	-	-	74.00	-22.77	-	-	0	100	H
			* 11.16044	33.82	PK-U	38.60	-21.50	0.00	50.92	-	-	74.00	-23.08	-	-	0	100	V
			16.740	32.42	PK-U	42.30	-18.80	0.00	55.92	-	-	-	-	68.20	-12.28	0	100	H
			16.740	31.90	PK-U	42.30	-18.80	0.00	55.40	-	-	-	-	68.20	-12.80	0	100	V
	5700	ANT1	8.550	36.13	PK-U	36.50	-22.90	0.00	49.73	-	-	-	-	68.20	-18.47	0	100	H
			8.551	35.11	PK-U	36.50	-22.90	0.00	48.71	-	-	-	-	68.20	-19.49	0	100	V
			* 11.40038	32.60	PK-U	38.60	-21.40	0.00	49.80	-	-	74.00	-24.20	-	-	0	100	H
			* 11.40056	32.80	PK-U	38.60	-21.40	0.00	50.00	-	-	74.00	-24.00	-	-	0	100	V
			17.100	32.18	PK-U	42.30	-17.90	0.00	56.58	-	-	-	-	68.20	-11.62	0	100	H
			17.100	32.10	PK-U	42.30	-17.90	0.00	56.50	-	-	-	-	68.20	-11.70	0	100	V
	5720	ANT1	8.577	34.39	PK-U	36.50	-23.00	0.00	47.89	-	-	-	-	68.20	-20.31	0	100	H
			8.582	34.06	PK-U	36.50	-23.00	0.00	47.56	-	-	-	-	68.20	-20.64	0	100	V
			* 11.43675	32.74	PK-U	38.60	-21.30	0.00	50.04	-	-	74.00	-23.96	-	-	0	100	H
			* 11.43119	32.63	PK-U	38.60	-21.30	0.00	49.93	-	-	74.00	-24.07	-	-	0	100	V
			17.151	32.59	PK-U	42.20	-18.00	0.00	56.79	-	-	-	-	68.20	**-11.41**	0	100	H
			17.166	32.49	PK-U	42.20	-17.90	0.00	56.79	-	-	-	-	68.20	**-11.41**	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: 802.11a / 5825 MHz)

VERTICAL PEAK DATA



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	5.85001	-64.4	Pk	35.9	-19.3	11.8	0	-36	26.99	-62.99	200	112	V
2	5.97215	-63.23	Pk	36	-19.2	11.8	0	-34.63	-27	-7.63	200	112	V

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

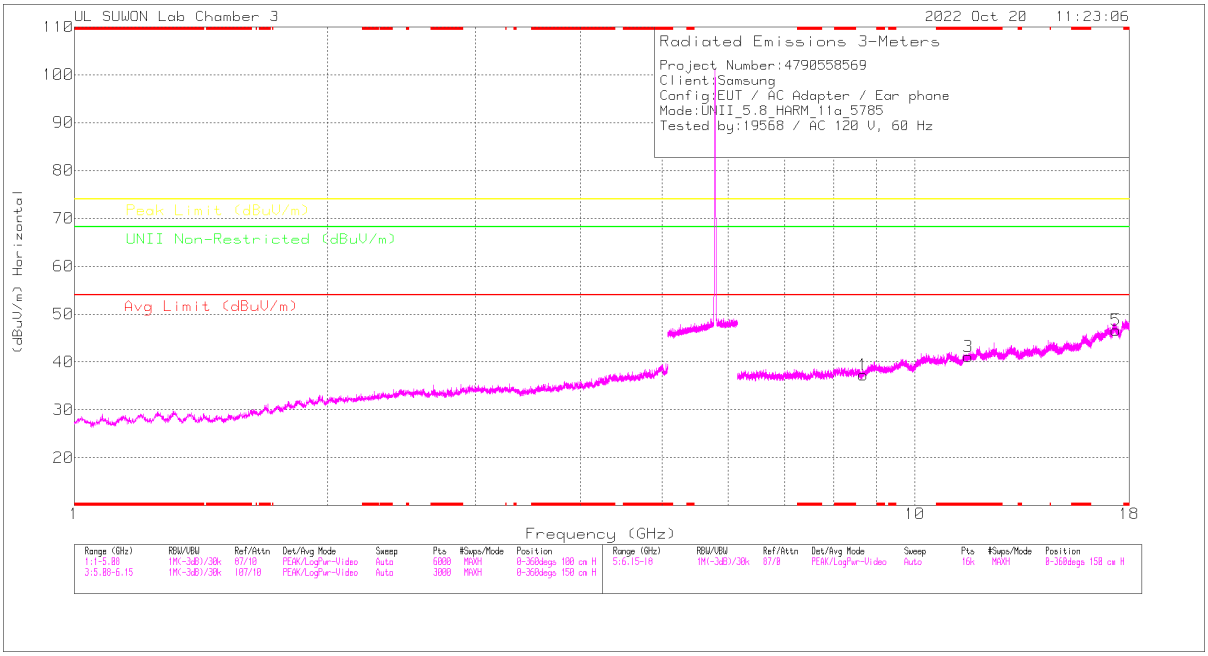
BANDEDGE TEST DATA

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	-63.21	Pk	35.60	-19.50	11.80	0.00	-35.31	27.00	-62.31	175	119	H
			5.63919	-63.74	Pk	35.50	-19.80	11.80	0.00	-36.24	-27.00	-9.24	175	119	H
			5.72500	-65.31	Pk	35.60	-19.50	11.80	0.00	-37.41	27.00	-64.41	205	107	V
			5.62650	-63.09	Pk	35.50	-19.90	11.80	0.00	-35.69	-27.00	-8.69	205	107	V
	5825	ANT1	5.85001	-65.49	Pk	35.90	-19.30	11.80	0.00	-37.09	26.99	-64.08	48	114	H
			5.98682	-63.97	Pk	36.00	-19.20	11.80	0.00	-35.37	-27.00	-8.37	48	114	H
			5.85001	-64.40	Pk	35.90	-19.30	11.80	0.00	-36.00	26.99	-62.99	200	112	V
			5.97215	-63.23	Pk	36.00	-19.20	11.80	0.00	-34.63	-27.00	**-7.63**	200	112	V
802.11n (HT20)	5745	ANT1	5.72500	-63.51	Pk	35.60	-19.50	11.80	0.00	-35.61	27.00	-62.61	191	119	H
			5.63122	-63.17	Pk	35.50	-19.90	11.80	0.00	-35.77	-27.00	-8.77	191	119	H
			5.72500	-65.66	Pk	35.60	-19.50	11.80	0.00	-37.76	27.00	-64.76	206	107	V
			5.63205	-63.58	Pk	35.50	-19.90	11.80	0.00	-36.18	-27.00	-9.18	206	107	V
	5825	ANT1	5.85001	-66.06	Pk	35.90	-19.30	11.80	0.00	-37.66	26.99	-64.65	45	119	H
			5.92564	-63.50	Pk	36.00	-19.30	11.80	0.00	-35.00	-27.00	-8.00	45	119	H
			5.85001	-65.03	Pk	35.90	-19.30	11.80	0.00	-36.63	26.99	-63.62	206	115	V
			5.93144	-63.78	Pk	36.00	-19.30	11.80	0.00	-35.28	-27.00	-8.28	206	115	V
802.11n (HT40)	5755	ANT1	5.72500	-63.51	Pk	35.60	-19.50	11.80	0.00	-35.61	27.00	-62.61	191	106	H
			5.64944	-63.02	Pk	35.50	-19.80	11.80	0.00	-35.52	-27.00	-8.52	191	106	H
			5.72500	-64.71	Pk	35.60	-19.50	11.80	0.00	-36.81	27.00	-63.81	223	114	V
			5.63101	-63.22	Pk	35.50	-19.90	11.80	0.00	-35.82	-27.00	-8.82	223	114	V
	5795	ANT1	5.85001	-66.67	Pk	35.90	-19.30	11.80	0.00	-38.27	26.99	-65.26	1	141	H
			5.96522	-63.75	Pk	36.00	-19.30	11.80	0.00	-35.25	-27.00	-8.25	1	141	H
			5.85001	-66.50	Pk	35.90	-19.30	11.80	0.00	-38.10	26.99	-65.09	197	112	V
			5.97482	-63.83	Pk	36.00	-19.20	11.80	0.00	-35.23	-27.00	-8.23	197	112	V
802.11ac (VHT80)	5775 (Lower side)	ANT1	5.72500	-63.59	Pk	35.60	-19.50	11.80	0.00	-35.69	27.00	-62.69	13	114	H
			5.64297	-63.15	Pk	35.50	-19.80	11.80	0.00	-35.65	-27.00	-8.65	13	114	H
			5.72500	-64.98	Pk	35.60	-19.50	11.80	0.00	-37.08	27.00	-64.08	216	120	V
			5.64920	-63.30	Pk	35.50	-19.80	11.80	0.00	-35.80	-27.00	-8.80	216	120	V
	5775 (Upper Side)	ANT1	5.85001	-64.56	Pk	35.90	-19.30	11.80	0.00	-36.16	26.99	-63.15	2	140	H
			5.98482	-63.73	Pk	36.00	-19.20	11.80	0.00	-35.13	-27.00	-8.13	2	140	H
			5.85001	-66.39	Pk	35.90	-19.30	11.80	0.00	-37.99	26.99	-64.98	206	103	V
			5.97572	-64.15	Pk	36.00	-19.20	11.80	0.00	-35.55	-27.00	-8.55	206	103	V

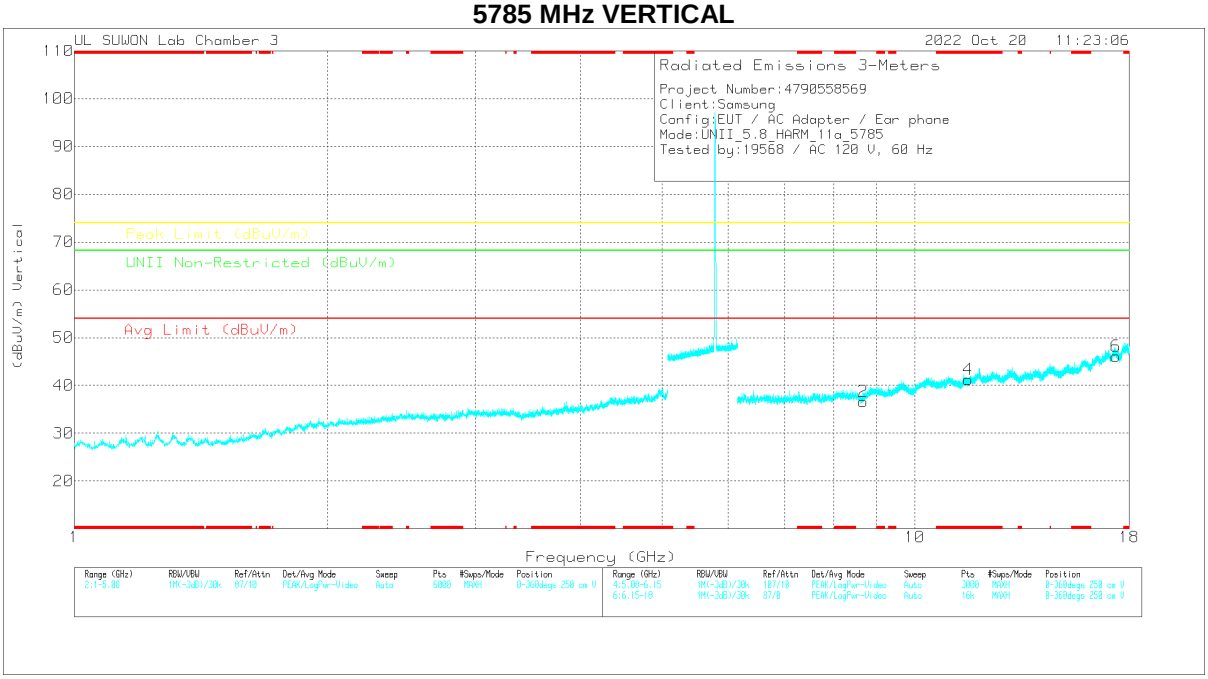
Note. Pk - Peak detector

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)	Meter Reading (dBuV)	Det	3117_00218957	6GHz_HP(dB)	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)	Azimuth (Degs)	Height (cm)	Polarity
8.68445	34.17	PK-U	36.5	-22.9	0	47.77	-	-	-	-	68.2	-20.43	0	100	H
8.66967	34.4	PK-U	36.5	-23	0	47.9	-	-	-	-	68.2	-20.3	0	100	V
* 11.57912	33.91	PK-U	38.8	-21.6	0	51.11	-	-	74	-22.89	-	-	0	100	H
* 11.57566	33.7	PK-U	38.8	-21.6	0	50.9	-	-	74	-23.1	-	-	0	100	V
17.35334	32.6	PK-U	42	-17.2	0	57.4	-	-	-	-	68.2	-10.8	0	100	H
17.36386	31.79	PK-U	42	-17.3	0	56.49	-	-	-	-	68.2	-11.71	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	8.623	34.29	PK-U	36.50	-23.10	0.00	47.69	-	-	-	-	68.20	-20.51	0	100	H
			8.608	33.95	PK-U	36.50	-23.20	0.00	47.25	-	-	-	-	68.20	-20.95	0	100	V
			* 11.49227	33.59	PK-U	38.70	-21.40	0.00	50.89	-	-	74.00	-23.11	-	-	0	100	H
			* 11.48509	32.93	PK-U	38.70	-21.40	0.00	50.23	-	-	74.00	-23.77	-	-	0	100	V
			17.242	32.03	PK-U	42.10	-17.10	0.00	57.03	-	-	-	-	68.20	-11.17	0	100	H
			17.239	32.08	PK-U	42.10	-17.10	0.00	57.08	-	-	-	-	68.20	-11.12	0	100	V
	5785	ANT1	8.684	34.17	PK-U	36.50	-22.90	0.00	47.77	-	-	-	-	68.20	-20.43	0	100	H
			8.670	34.40	PK-U	36.50	-23.00	0.00	47.90	-	-	-	-	68.20	-20.30	0	100	V
			* 11.57912	33.91	PK-U	38.80	-21.60	0.00	51.11	-	-	74.00	-22.89	-	-	0	100	H
			* 11.57566	33.70	PK-U	38.80	-21.60	0.00	50.90	-	-	74.00	-23.10	-	-	0	100	V
			17.353	32.60	PK-U	42.00	-17.20	0.00	57.40	-	-	-	-	68.20	**-10.80**	0	100	H
			17.364	31.79	PK-U	42.00	-17.30	0.00	56.49	-	-	-	-	68.20	-11.71	0	100	V
	5825	ANT1	8.737	34.18	PK-U	36.50	-22.80	0.00	47.88	-	-	-	-	68.20	-20.32	0	100	H
			8.737	34.67	PK-U	36.50	-22.80	0.00	48.37	-	-	-	-	68.20	-19.83	0	100	V
			* 11.64758	34.52	PK-U	38.80	-21.50	0.00	51.82	-	-	74.00	-22.18	-	-	0	100	H
			* 11.67091	34.46	PK-U	38.90	-21.50	0.00	51.86	-	-	74.00	**-22.14**	-	-	0	100	V
			17.483	31.57	PK-U	42.00	-16.80	0.00	56.77	-	-	-	-	68.20	-11.43	0	100	H
			17.470	31.50	PK-U	42.00	-16.80	0.00	56.70	-	-	-	-	68.20	-11.50	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

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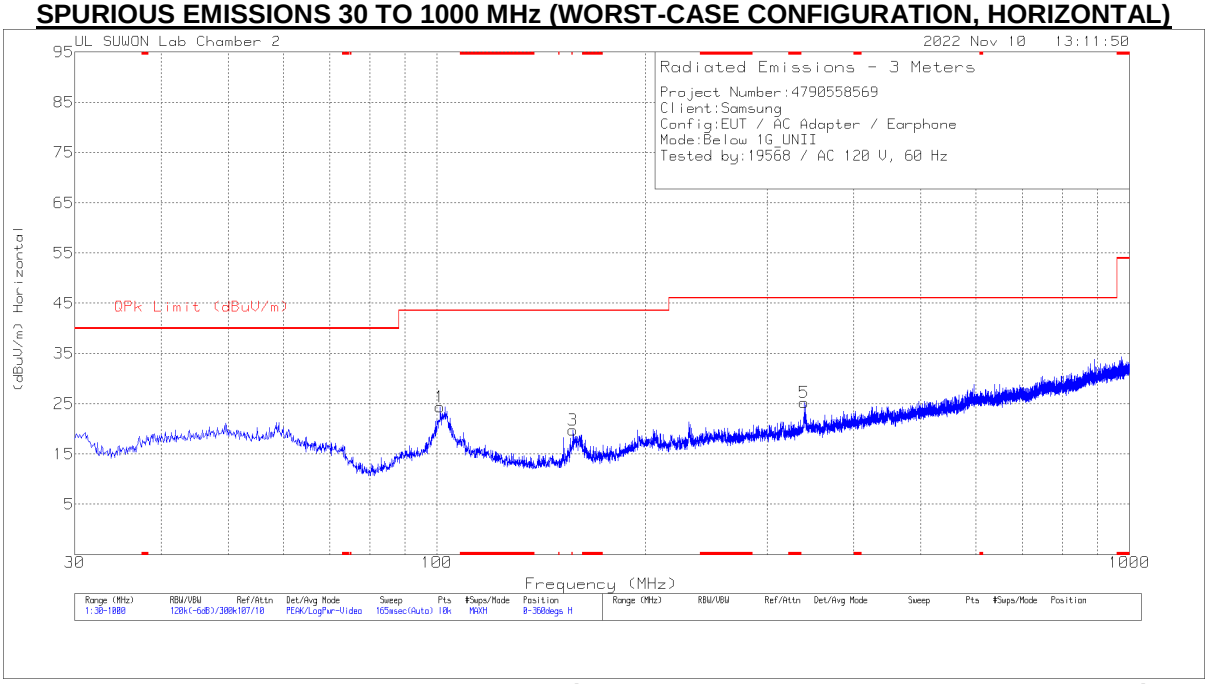
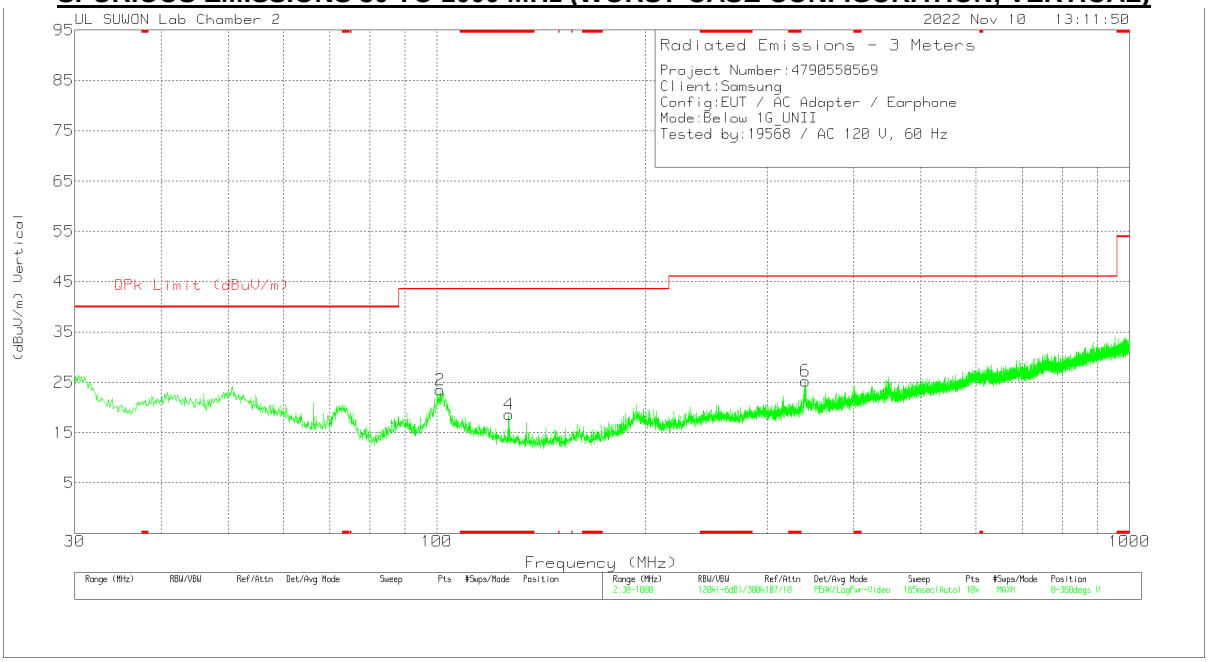
12. WORST-CASE BELOW 1 GHz

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]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	101.101	37.51	Pk	17.5	-30.6	24.41	43.52	-19.11	0-360	200	H
3	157.264	35.51	Pk	14.3	-30.1	19.71	43.52	-23.81	0-360	100	H
5	339.139	33.79	Pk	20.2	-28.8	25.19	46.02	-20.83	0-360	100	H
2	101.004	36.48	Pk	17.5	-30.5	23.48	43.52	-20.04	0-360	100	V
4	* 127.194	34.3	Pk	14.7	-30.4	18.6	43.52	-24.92	0-360	100	V
6	340.691	33.8	Pk	20.3	-28.8	25.3	46.02	-20.72	0-360	100	V

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

13. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

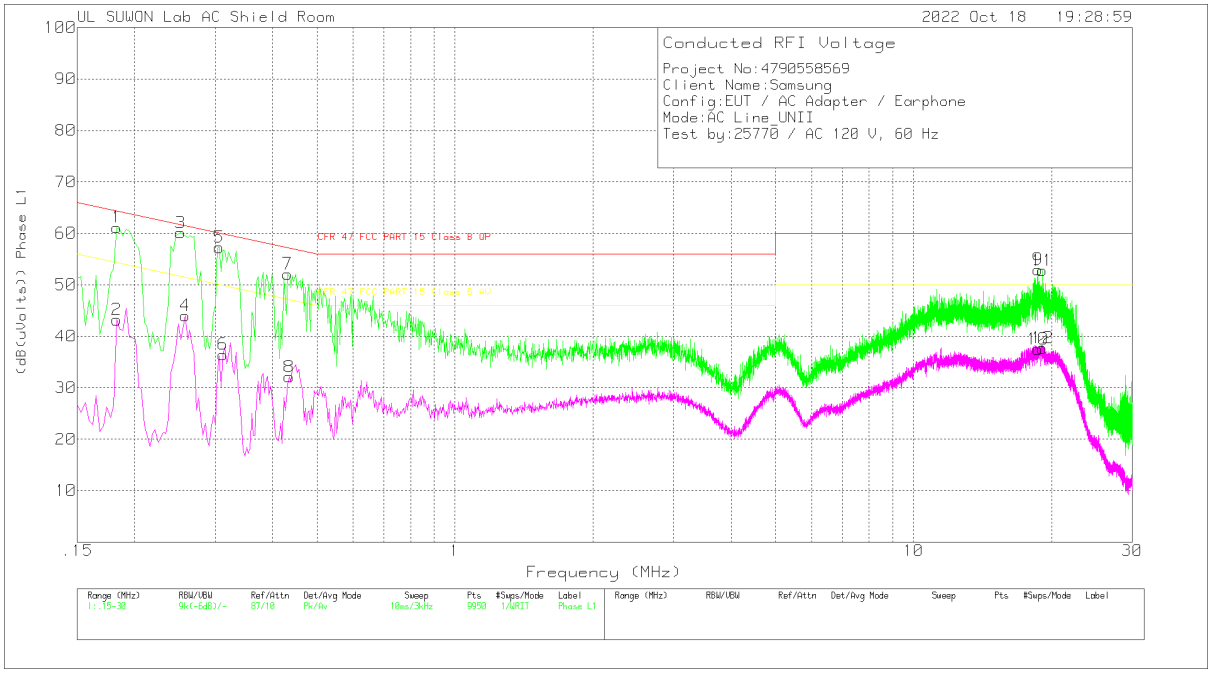
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

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

RESULTS

LINE 1 DATA



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[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)
1	.183	51.07	Pk	9.9	.2	61.17	64.35	-3.18	-	-
2	.183	33.12	Av	9.9	.2	43.22	-	-	54.35	-11.13
3	.252	50.32	Pk	9.6	.2	60.12	61.69	-1.57	-	-
4	.258	34.21	Av	9.6	.2	44.01	-	-	51.5	-7.49
5	.306	47.37	Pk	9.7	.2	57.27	60.08	-2.81	-	-
6	.312	26.57	Av	9.7	.2	36.47	-	-	49.92	-13.45
7	.432	42.1	Pk	9.8	.2	52.1	57.21	-5.11	-	-
8	.435	22.13	Av	9.8	.2	32.13	-	-	47.16	-15.03
9	18.69	42.44	Pk	10.1	.4	52.94	60	-7.06	-	-
10	18.69	26.97	Av	10.1	.4	37.47	-	-	50	-12.53
11	19.113	42.27	Pk	10.1	.4	52.77	60	-7.23	-	-
12	19.113	27.2	Av	10.1	.4	37.7	-	-	50	-12.3

Pk - Peak detector
Av - Average detection

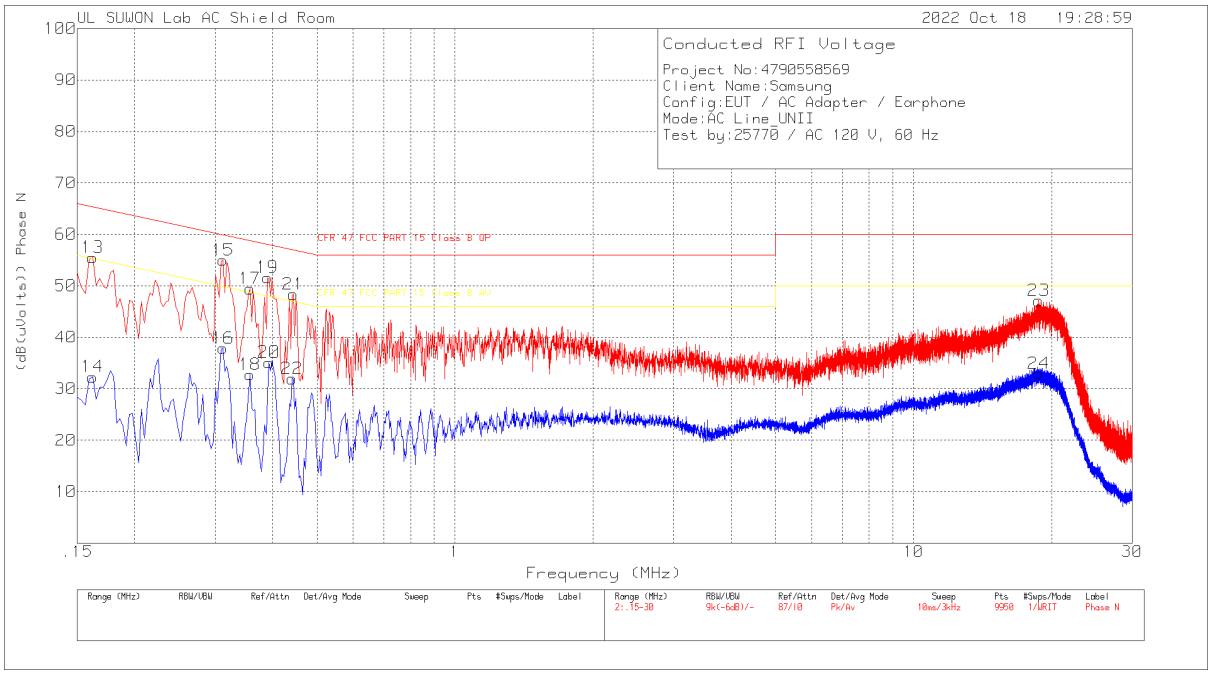
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[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)
.18225	35.77	Qp	9.9	.2	45.87	64.38	-18.51	-	-
.25125	30.79	Qp	9.6	.2	40.59	61.72	-21.13	-	-
.30675	40.89	Qp	9.7	.2	50.79	60.06	-9.27	-	-
.43275	27.91	Qp	9.8	.2	37.91	57.2	-19.29	-	-
18.6902	27.86	Qp	10.1	.4	38.36	60	-21.64	-	-
19.1132	27.83	Qp	10.1	.4	38.33	60	-21.67	-	-

Qp - Quasi-Peak detector

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	.162	45.49	Pk	9.9	.1	55.49	65.36	-9.87	-	-
14	.162	22.31	Av	9.9	.1	32.31	-	-	55.36	-23.05
15	.312	45.07	Pk	9.7	.2	54.97	59.92	-4.95	-	-
16	.312	27.97	Av	9.7	.2	37.87	-	-	49.92	-12.05
17	.357	39.45	Pk	9.8	.2	49.45	58.8	-9.35	-	-
18	.357	22.75	Av	9.8	.2	32.75	-	-	48.8	-16.05
19	.39	41.59	Pk	9.8	.2	51.59	58.06	-6.47	-	-
20	.393	25.09	Av	9.8	.2	35.09	-	-	48	-12.91
21	.444	38.24	Pk	9.9	.2	48.34	56.99	-8.65	-	-
22	.441	21.87	Av	9.9	.2	31.97	-	-	47.04	-15.07
23	18.759	36.52	Pk	10.2	.4	47.12	60	-12.88	-	-
24	18.756	22.36	Av	10.2	.4	32.96	-	-	50	-17.04

Pk - Peak detector
Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

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)
.16215	37.98	Qp	9.9	.1	47.98	65.35	-17.37	-	-
.31215	42.07	Qp	9.7	.2	51.97	59.91	-7.94	-	-
.35775	35.6	Qp	9.8	.2	45.6	58.78	-13.18	-	-
.39075	37.52	Qp	9.8	.2	47.52	58.05	-10.53	-	-
.44415	34.07	Qp	9.9	.2	44.17	56.98	-12.81	-	-

Qp - Quasi-Peak detector

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. ≥ 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
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period. (See Notes 1 and 2)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (See Note 3)

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* 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 *U-NII Detection Bandwidth* 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) x (19 x 10^6 PRI_{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 *Detection Bandwidth* test, *Channel Move Time*, and *Channel Closing Time* tests.

Table 6 – Long Pulse Radar Test Signal

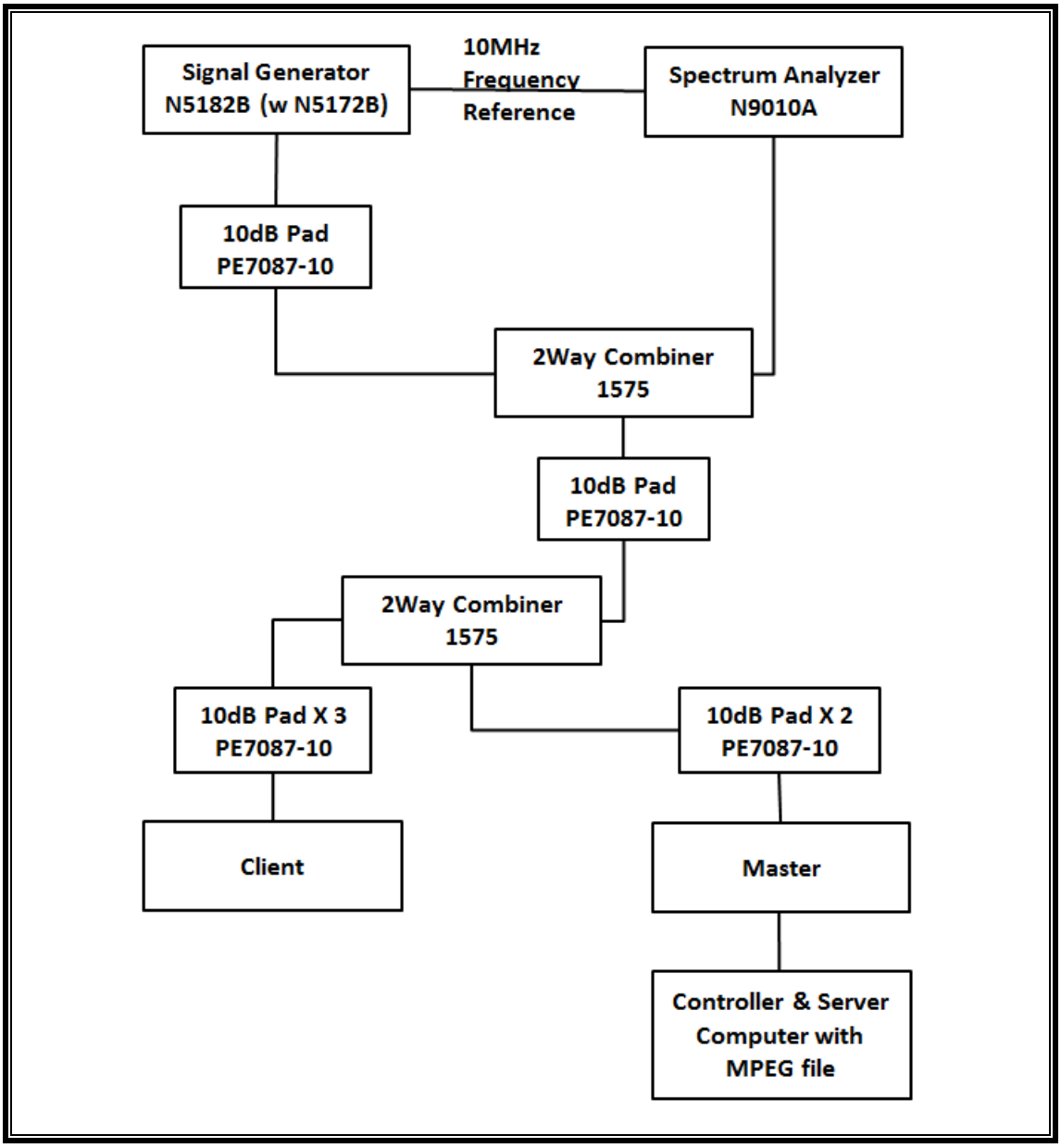
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

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.

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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**	**Cal Due**
Spectrum Analyzer, 7 GHz	Agilent / HP	N9010A	MY54200580	2023-08-01
Vector Signal Generator, 6GHz	Agilent / HP	N5182B	MY53051241	2023-08-01
Combiner	WEINSCHEL	WA1534	UL003	2023-01-11
Combiner	WEINSCHEL	WA1535	UL004	2023-01-11

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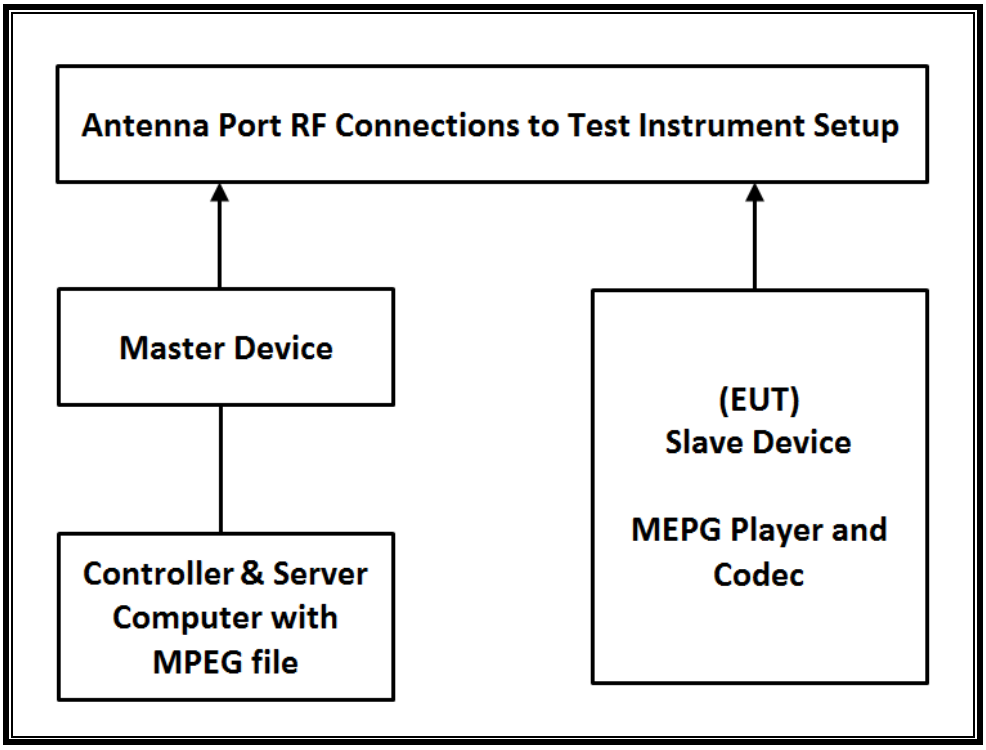
14.1.3. SETUP OF EUT

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 12.32 dBm in the 5250-5350 MHz band and 12.38 dBm in the 5470-5725 MHz band.

The antenna assembly utilized two antenna.
Gain of ANT: -2.16 dBi for UNII 2A and -2.27 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.

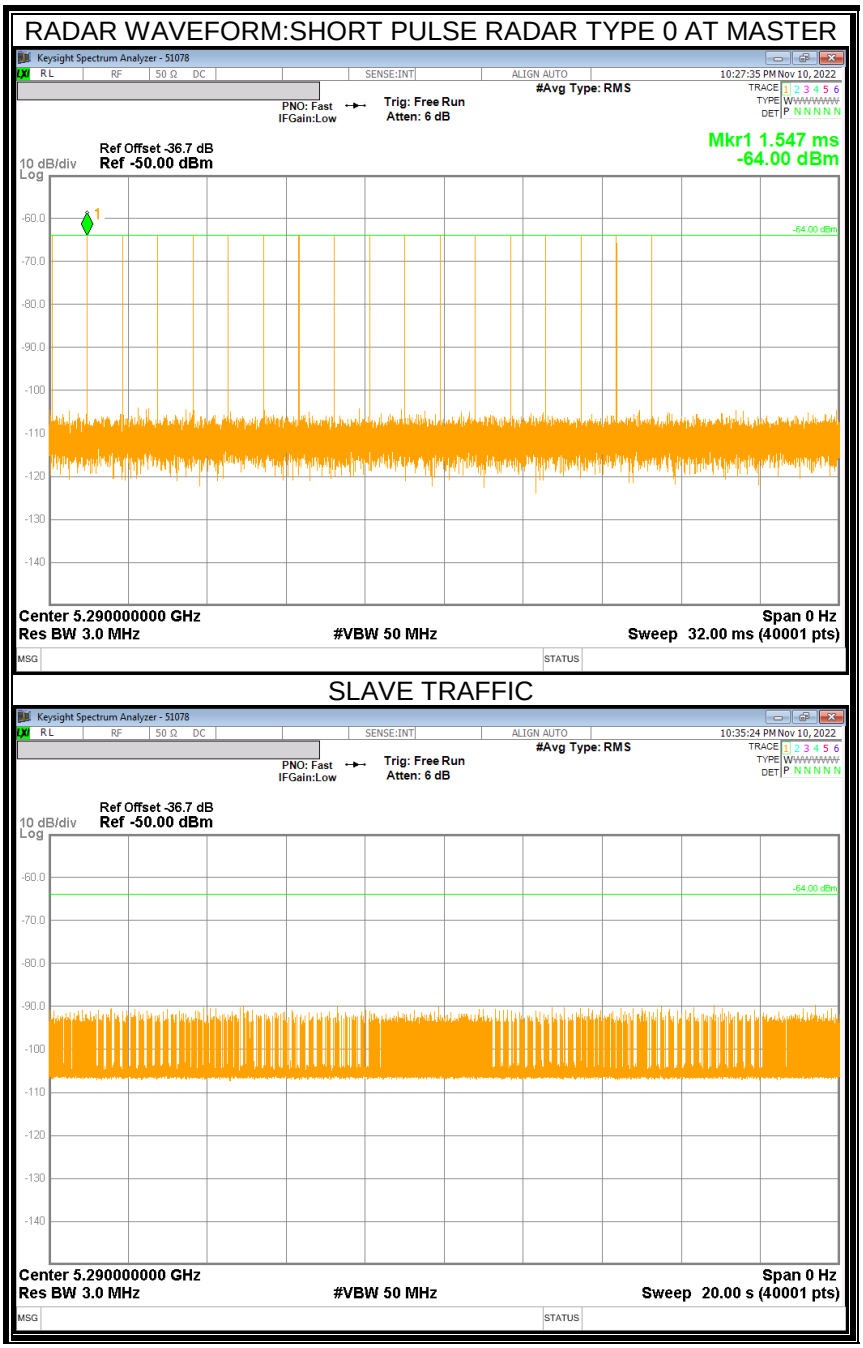
14.2. RESULTS FOR 80 MHz BANDWIDTH (UNII-2A BAND)

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)
0.764	10

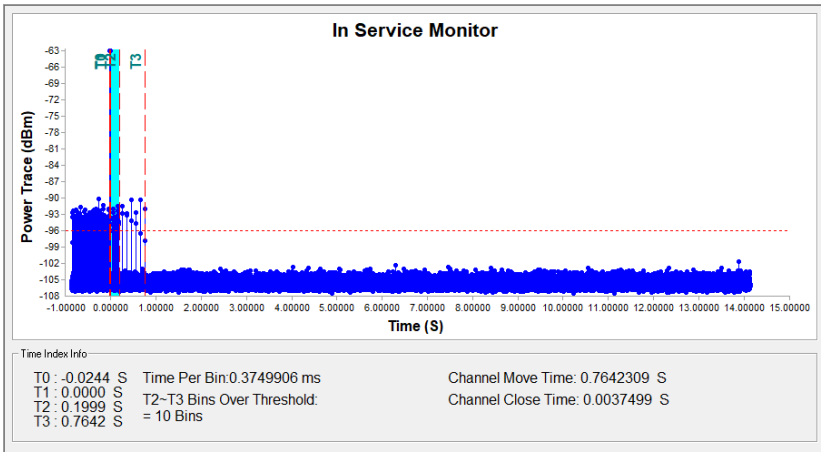
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
3.750	60

MOVE TIME & CHANNEL CLOSING TIME

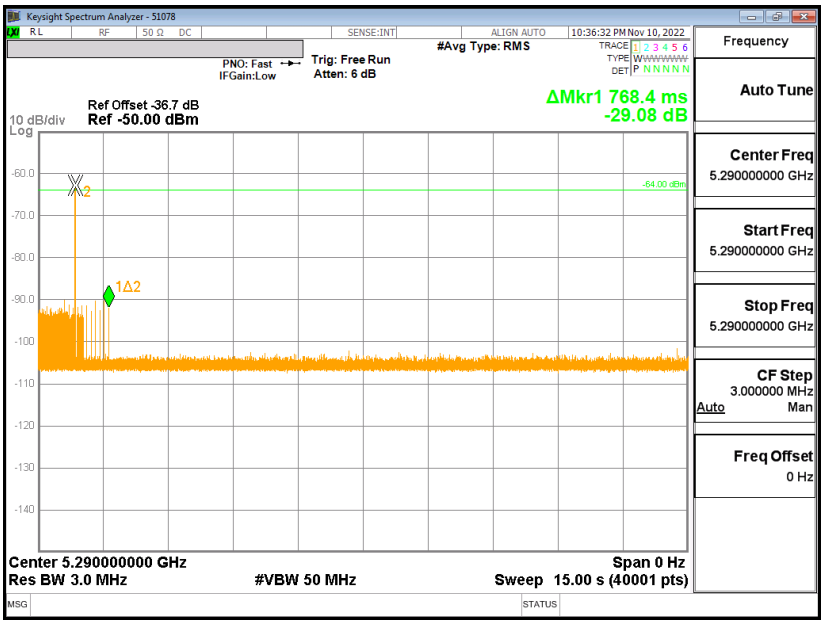
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

MOVE TIME & AGGREGATE CHANNEL CLOSING TRANSMISSION TIME



MOVE TIME & CLOSING TIME AT IN SERVICE MONITOR

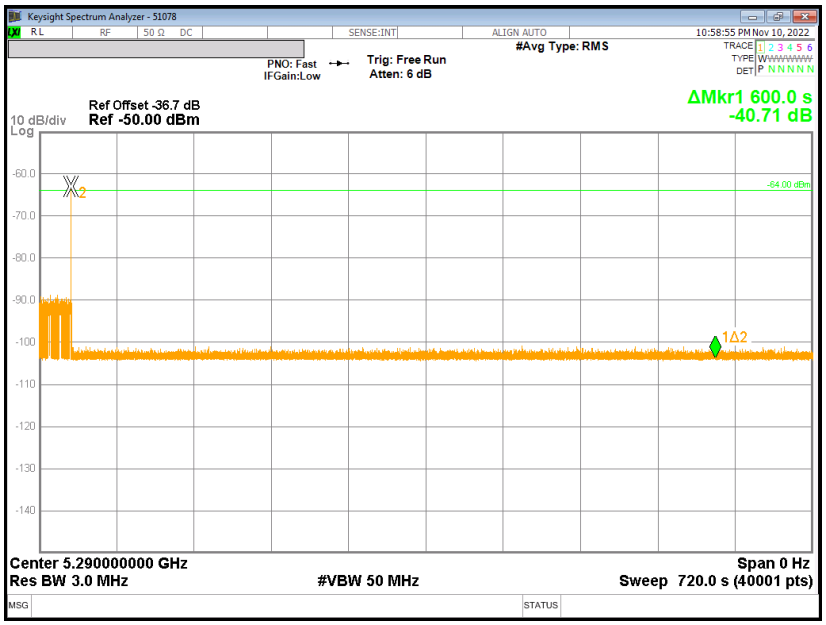


NON-OCCUPANCY PERIOD

RESULTS

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

10-MINUTE BEACON MONITORING PERIOD



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

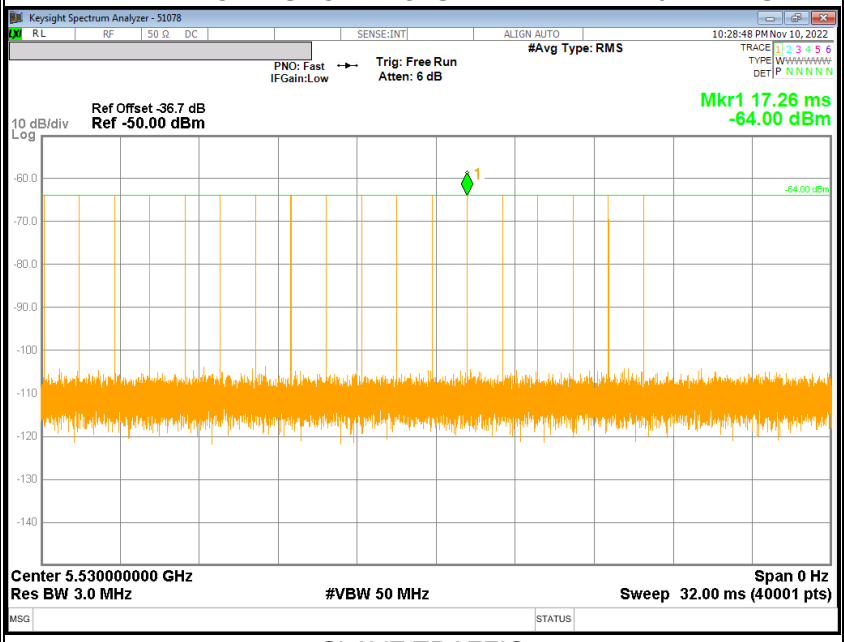
14.3.1. TEST CHANNEL

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

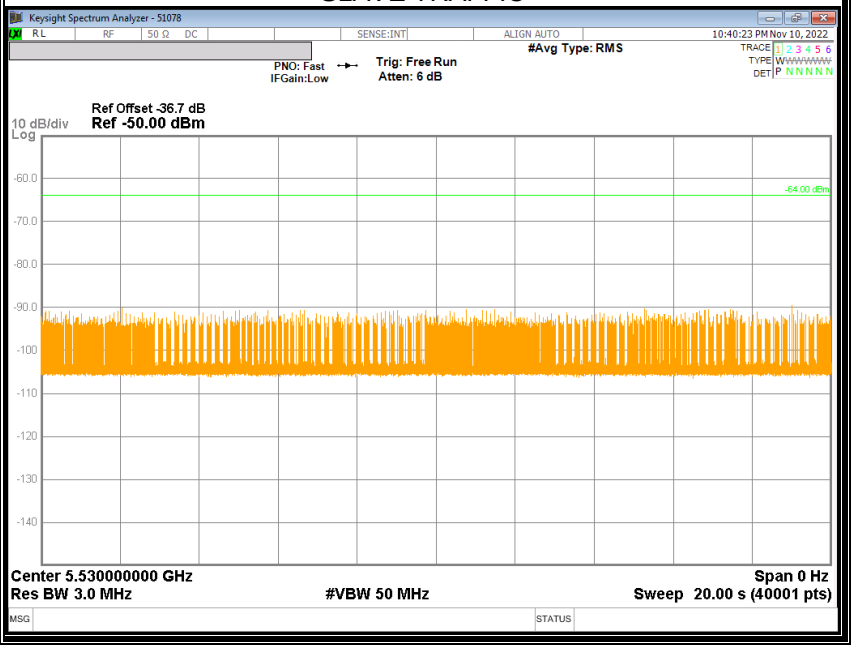
14.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM

RADAR WAVEFORM:SHORT PULSE RADAR TYPE 0 AT MASTER



SLAVE TRAFFIC



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)
0.780	10

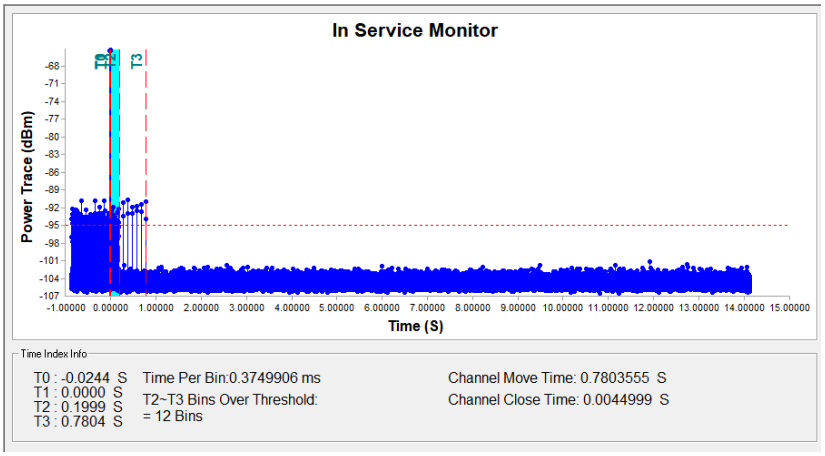
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
4.500	60

MOVE TIME & CHANNEL CLOSING TIME

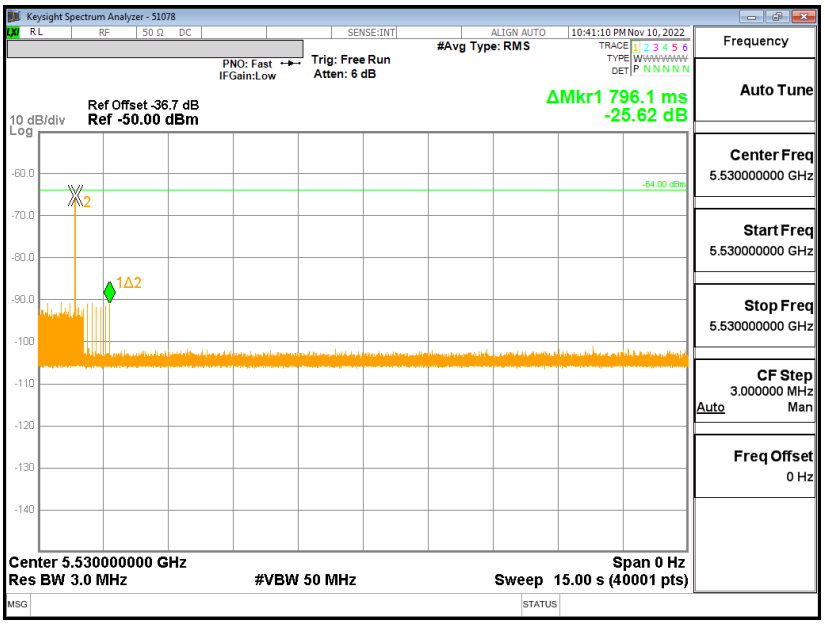
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.

MOVE TIME & AGGREGATE CHANNEL CLOSING TRANSMISSION TIME



MOVE TIME & CLOSING TIME AT IN SERVICE MONITOR

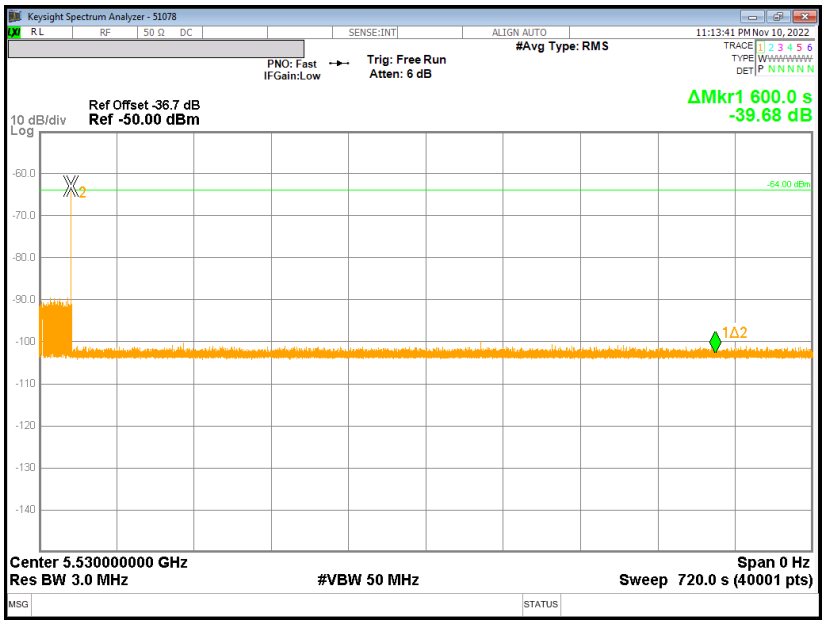


NON-OCCUPANCY PERIOD

RESULTS

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

10-MINUTE BEACON MONITORING PERIOD



END OF TEST REPORT