CERTIFICATION TEST REPORT

Report Number. : 4789582668-E3V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SC-54A, SCG07
FCC ID	:	A3LSMA516JPN
EUT Description	:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
August 28, 2020

Prepared by:
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

IAS ACCREDITED
Testing Laboratory
TL-637

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	08/26/20	Initial issue	Jihyeon Park
V2	08/28/20	Updated to address TCB's question	Jihyeon Park

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL NUMBER: SC-54A, SCG07

SERIAL NUMBER: R38CN709MKFY (CONDUCTED)
R3CN709MQAT (RADIATED);

DATE TESTED: AUG 05, 2020 – AUG 25, 2020;

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

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

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

Approved & Released For
UL Korea, Ltd. By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Jihyeon Park
Suwon Lab Technician
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

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

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

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

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

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

This report covers the Samsung models SC-54A and SCG07.
These models are identical in hardware. Basic model SC-54A was set for test.
(see the PED document for details).

WiFi operating mode

Frequency rage	Mode	ANT 1
2.4GHz (2412 MHz ~ 2472 MHz)	802.11b SISO	TX/RX
	802.11g SISO	TX/RX
	802.11n(HT20) SISO	TX/RX

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]
2412 - 2472	802.11b SISO	19.75	94.41
	802.11g SISO	16.85	48.42
	802.11n(HT20) SISO	19.87	97.05

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

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

The radio utilizes an internal antennas, with Antenna 1's maximum gain of -2.82 dBi.

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5.4. TESTED CHANNELS LIST

802.11b,g,n HT20 Mode	Channel	Frequency (MHz)
Low	1	2412
Mid	6	2437
High	11	2462
Reduction High 1	12	2467
Reduction High 2	13	2472

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

For SISO, 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:
802.11b mode: 1 Mbps 1TX
802.11g mode: 6 Mbps 1TX
802.11n HT20 mode: MCS0 1TX

Note : All radiated and power line conducted tests were performed attached with charger and earphone for the worst case condition mode.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA200	R37MEFL0WRDK3	N/A
Data Cable	SAMSUNG	EP-DR140ABE	N/A	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

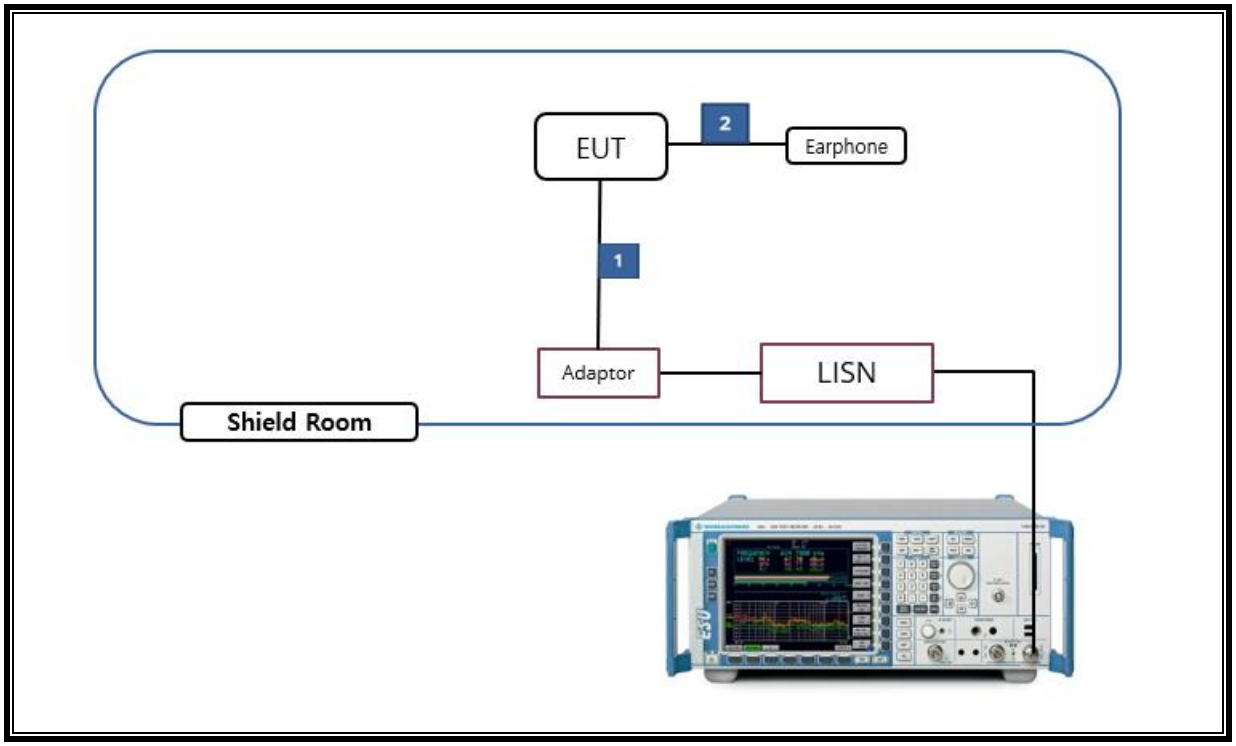
I/O CABLE

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	C Type	Shielded	1.1m	N/A

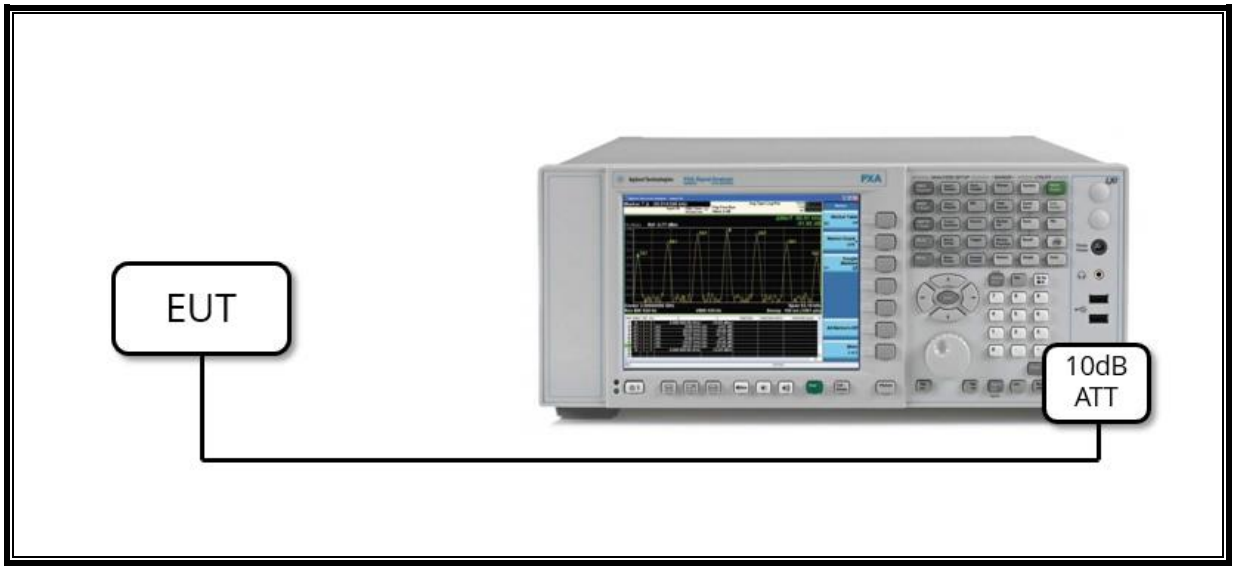
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable DTS mode.

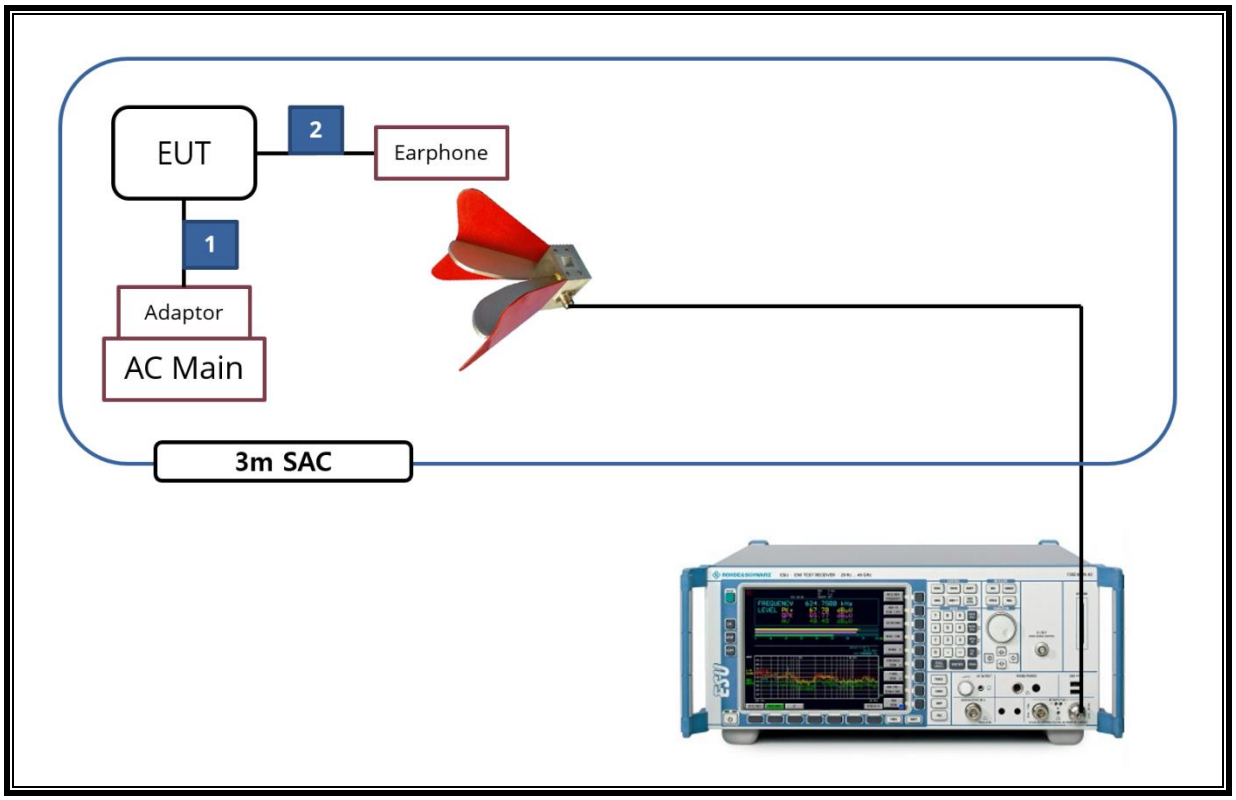
SETUP DIAGRAM FOR TESTS (AC Line Conducted)



SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

6 dB BW : KDB 558074 D01 v05r02, Section 8.2

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.2.3.

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

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

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

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

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

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7. 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**	**Next Cal. Date**	
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845(Note)	08-04-20	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749(Note)	08-04-20	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20	07-27-22
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-13-20	08-04-22
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21	
Preamplifier	ETS	3116C-PA	00168841	08-08-20	08-06-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-06-20	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20	08-03-21
Spectrum Analyzer, 44 GHz	Keysight	N9030B	MY57143717	01-20-21	
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-06-20	08-05-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-20	08-05-21
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-09-20	08-05-21
Attenuator	PASTERNACK	PE7087-10	A001	08-08-20	08-03-21
Attenuator	PASTERNACK	PE7087-10	A008	08-08-20	08-03-21
Attenuator	PASTERNACK	PE7087-10	A007	08-08-20	08-03-21
Attenuator	PASTERNACK	PE7087-10	A009	08-08-20	08-05-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-20	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20	08-03-21
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-05-20	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-06-20	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-06-20	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-06-20	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-06-20	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-06-20	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-06-20	08-03-21
LISN	R&S	ENV216	101837	08-09-20	08-06-21
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21	
UL Software					
Description	**Manufacturer**	**Model**	**Version**		
Radiated software	UL	UL EMC	Ver 9.5		
AC Line Conducted software	UL	UL EMC	Ver 9.5		

Note. The above antenna was not used for testing from August 4th to August 13th.

8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	> 500kHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	TX conducted output power	< 30dBm		Pass
15.247 (e)	PSD	< 8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

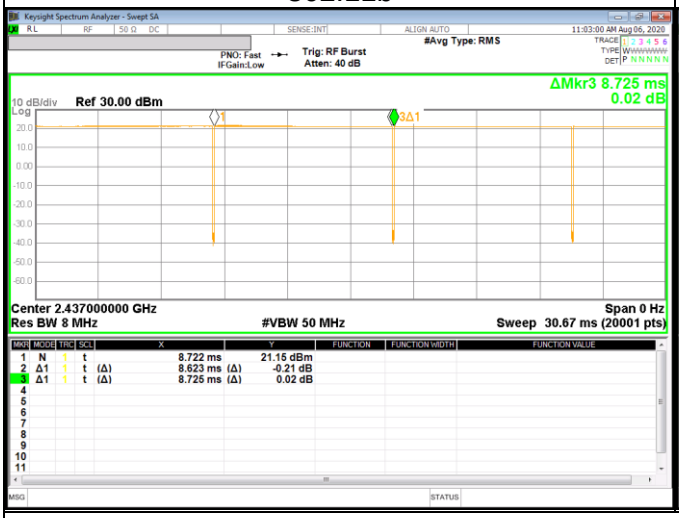
LIMITS

None; for reporting purposes only.

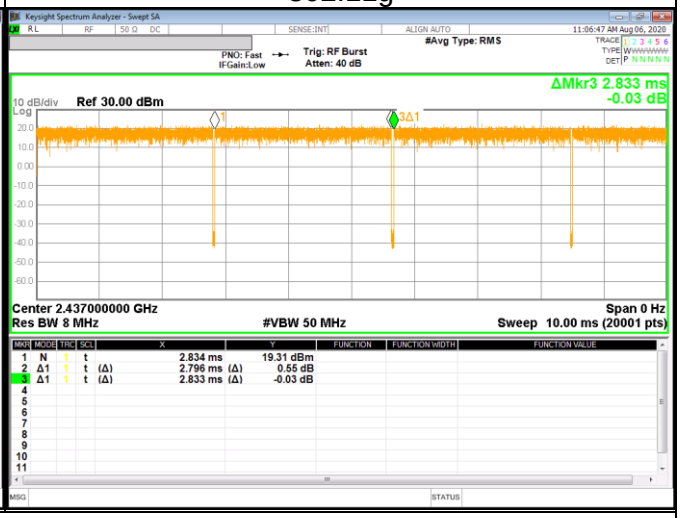
Band	Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2.4 GHz	802.11b	8.623	8.725	0.988	98.831	0.0	0.116
	802.11g	2.796	2.833	0.987	98.694	0.0	0.358
	802.11n(HT20)	2.600	2.637	0.986	98.597	0.0	0.385

Note. Since the duty cycle of all modes is over 98%, compensation is not included(average measurement)

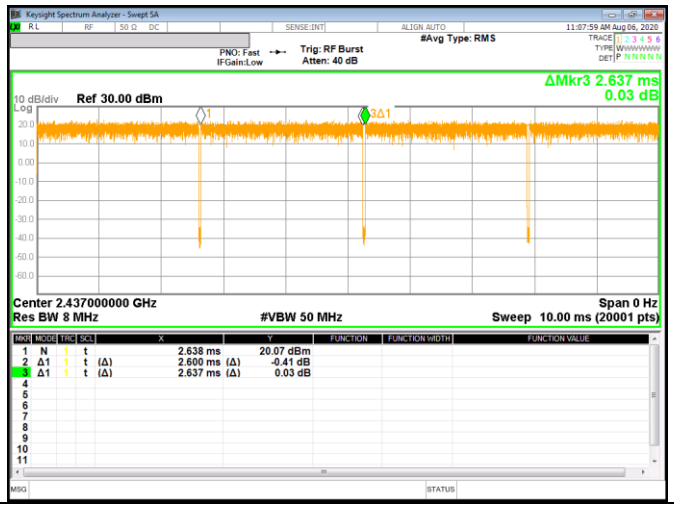
802.11b



802.11g



802.11n HT20



9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

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

RESULTS

- Please refer to the next page

9.2.1. 802.11b MODE

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	2412	9.043	0.5
6	2437	8.534	
11	2462	10.030	
12	2467	9.045	
13	2472	9.012	
Worst		**8.534**	

9.2.2. 802.11g MODE

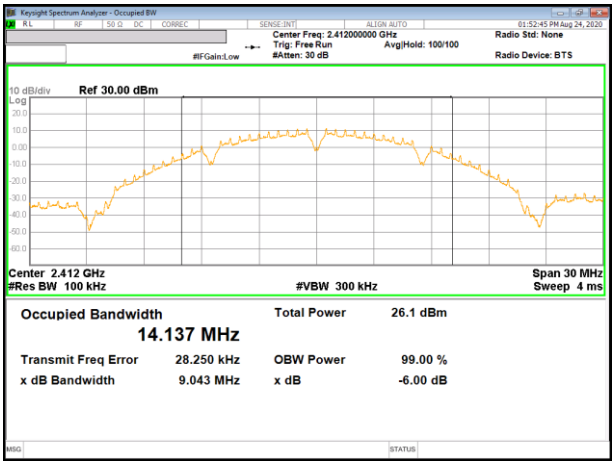
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	2412	15.050	0.5
6	2437	15.310	
11	2462	11.930	
12	2467	15.260	
13	2472	9.807	
Worst		**9.807**	

9.2.3. 802.11n HT20 MODE

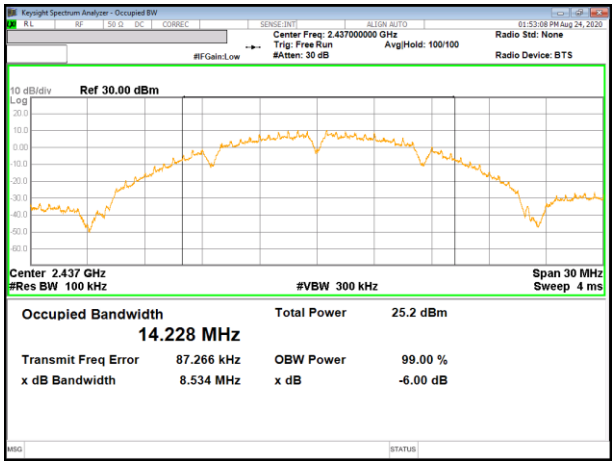
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	2412	13.410	0.5
6	2437	11.720	
11	2462	15.050	
12	2467	13.880	
13	2472	8.824	
Worst		**8.824**	

9.2.4. 6 dB BANDWIDTH PLOTS

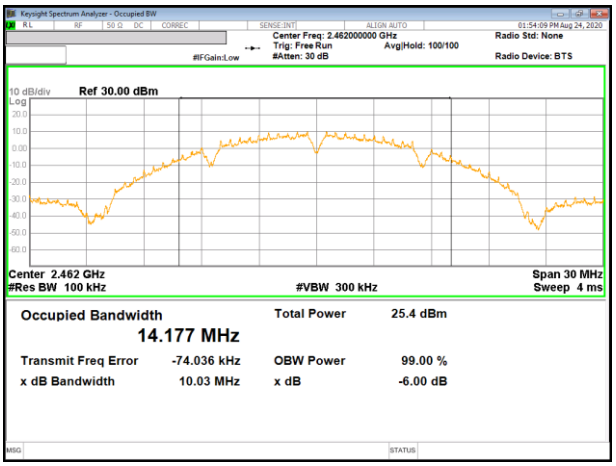
802.11b



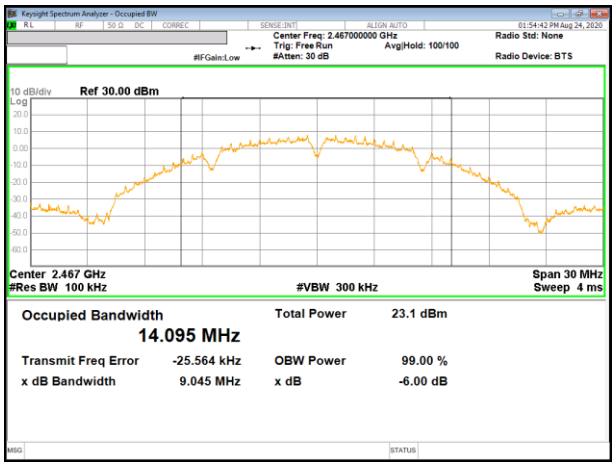
LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11



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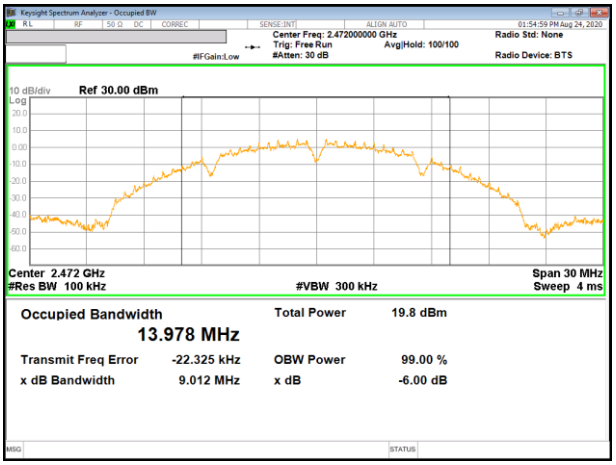
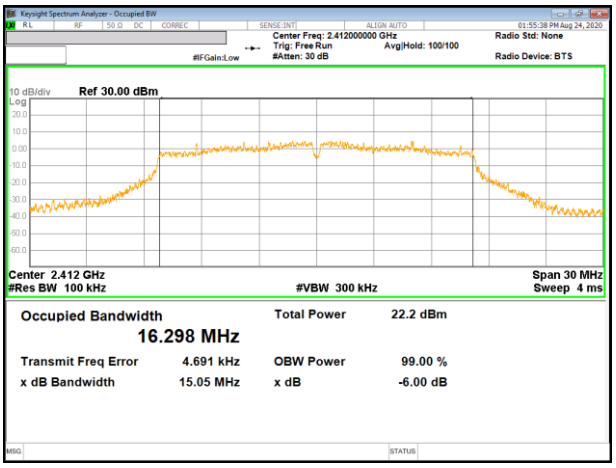


HIGH CHANNEL 13

802.11g



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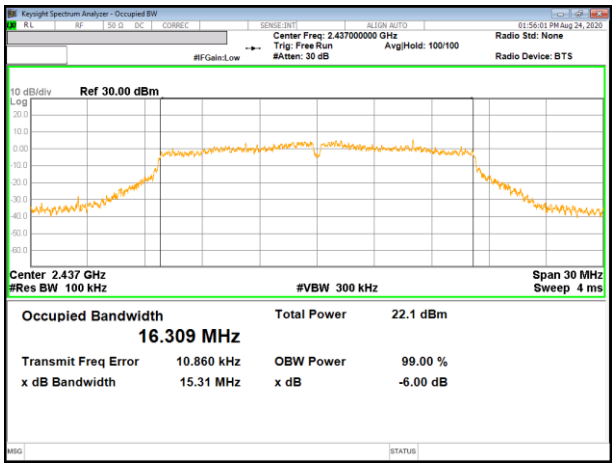

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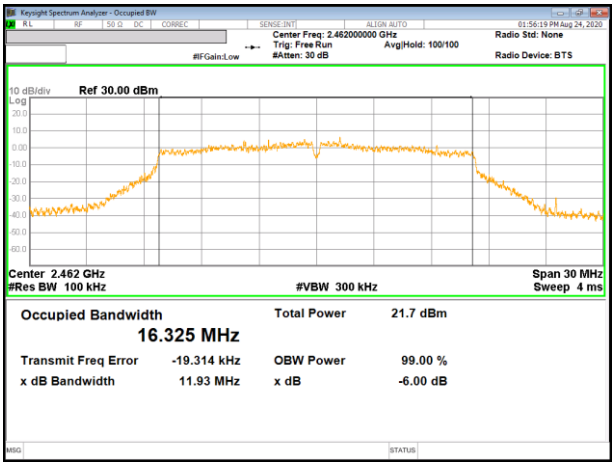

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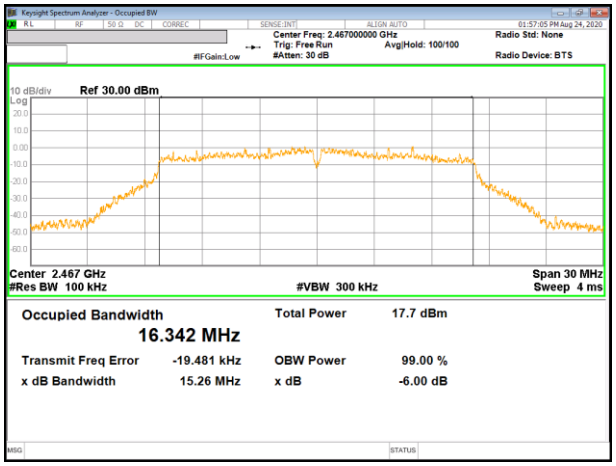

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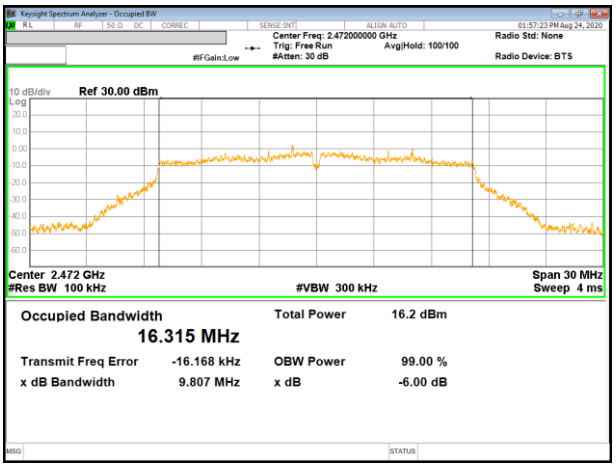
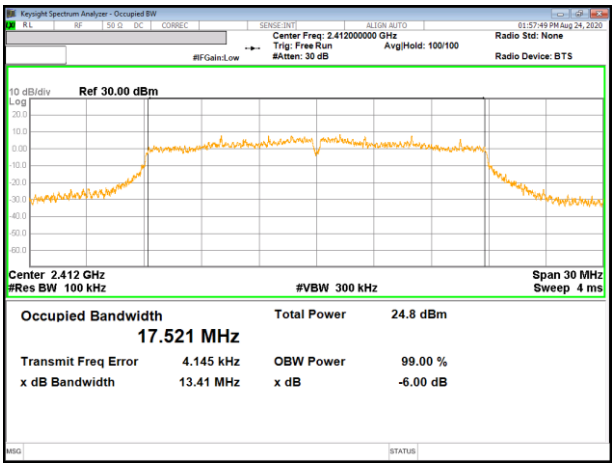


HIGH CHANNEL 13

802.11n HT20



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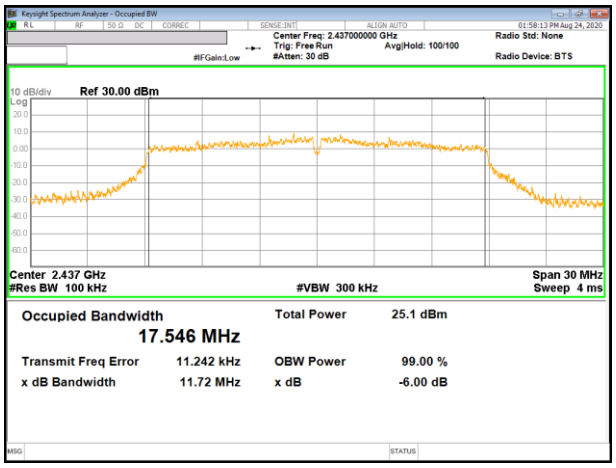

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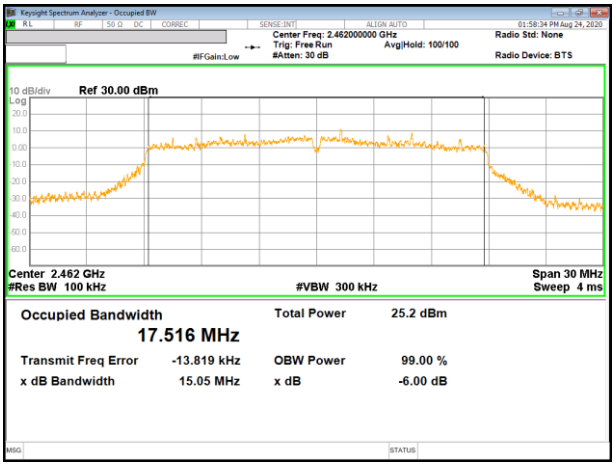

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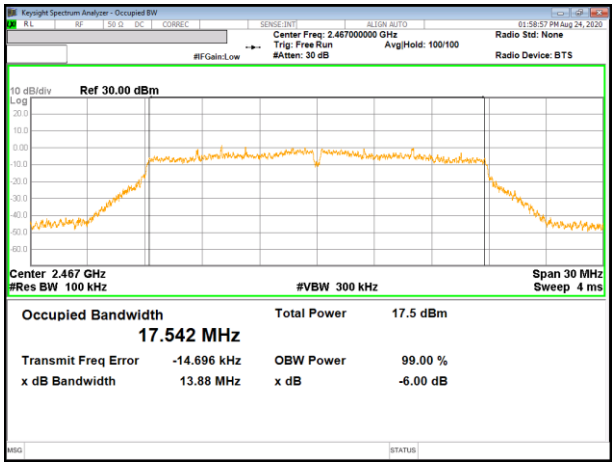

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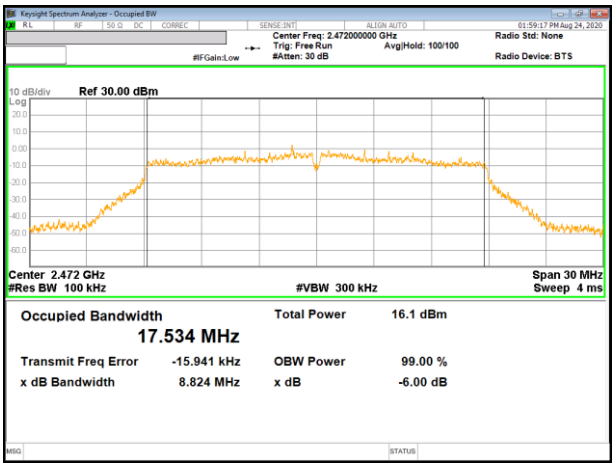

HIGH CHANNEL 13

9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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

TEST PROCEDURE

The transmitter output is connected to a power meter.
The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.
Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

Duty cycle correction factor is not added to the average output power results for duty cycle factor > 98%.

ANTENNA GAIN

Bands [MHz]	Single Antenna [dBi]
2 412- 2472	-2.82

RESULTS

9.3.1. 1TX_TEST RESULTS

Frequency Range [MHz]	Antenna Gain	FCC Power Limit [dBm]	Max Power [dBm]
2 412 – 2 472	-2.82	30.00	30.00

Included in Calculations of Corr'd Power			
Duty Cycle CF	802.11b	0.00	dB
	802.11g	0.00	dB
	802.11n HT20	0.00	dB

Calculation of Output Power result
→ Corr'd Power = Meas Power + Duty Cycle CF

Mode	Channel	Frequency [MHz]	Meas Power [dBm]	Corr'd Power [dBm]	Power Limit [dBm]
802.11b	1	2412	19.75	19.75	30.00
	6	2437	19.58	19.58	
	11	2462	19.74	19.74	
	12	2467	17.48	17.48	
	13	2472	13.73	13.73	
Worst Case				**19.75**	
802.11g	1	2412	16.85	16.85	30.00
	6	2437	16.82	16.82	
	11	2462	16.55	16.55	
	12	2467	12.39	12.39	
	13	2472	10.94	10.94	
Worst Case				**16.85**	
802.11n HT20	1	2412	19.44	19.44	30.00
	6	2437	19.84	19.84	
	11	2462	19.87	19.87	
	12	2467	12.20	12.20	
	13	2472	10.80	10.80	
Worst Case				**19.87**	

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9.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

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

TEST PROCEDURE

Power Spectral Density was performed utilizing the section8.4 under KDB558074 D01 15.247 Meas Guidance.

RESULTS

9.4.1. 802.11b MODE

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]	PSD Limit [dBm/3kHz]	Margin [dB]
802.11b	1	2412	-11.940	-11.940	8.00	-19.940
	6	2437	-11.948	-11.948		-19.948
	11	2462	-11.820	-11.820		-19.820
	12	2467	-14.270	-14.270		-22.270
	13	2472	-17.801	-17.801		-25.801
Worst Case				-11.820		-19.820

9.4.2. 802.11g MODE

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]	PSD Limit [dBm/3kHz]	Margin [dB]
802.11g	1	2412	-14.992	-14.992	8.00	-22.992
	6	2437	-15.421	-15.421		-23.421
	11	2462	-15.298	-15.298		-23.298
	12	2467	-19.820	-19.820		-27.820
	13	2472	-20.944	-20.944		-28.944
Worst Case				-14.992		-22.992

9.4.3. 802.11n HT20 MODE

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]	PSD Limit [dBm/3kHz]	Margin [dB]
802.11n HT20	1	2412	-11.991	-11.991	8.00	-19.991
	6	2437	-11.930	-11.930		-19.930
	11	2462	-12.360	-12.360		-20.360
	12	2467	-19.978	-19.978		-27.978
	13	2472	-21.613	-21.613		-29.613
Worst Case				-11.930		-19.930

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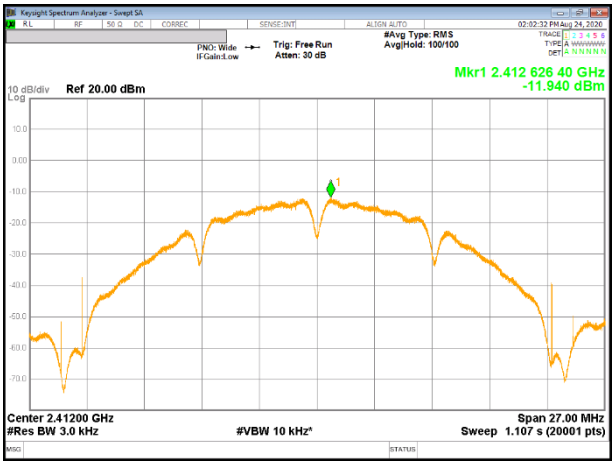
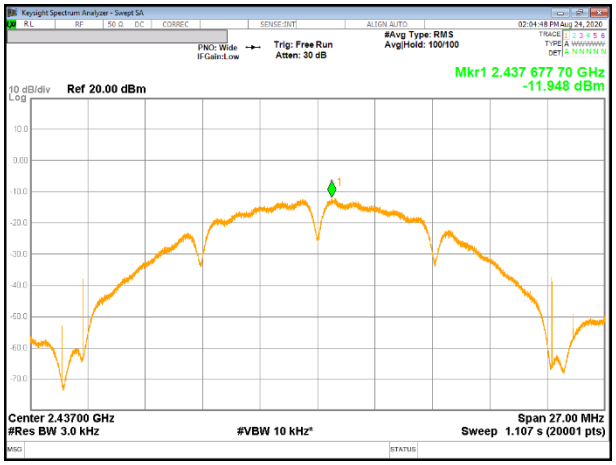
9.4.4. PSD TEST PLOTS

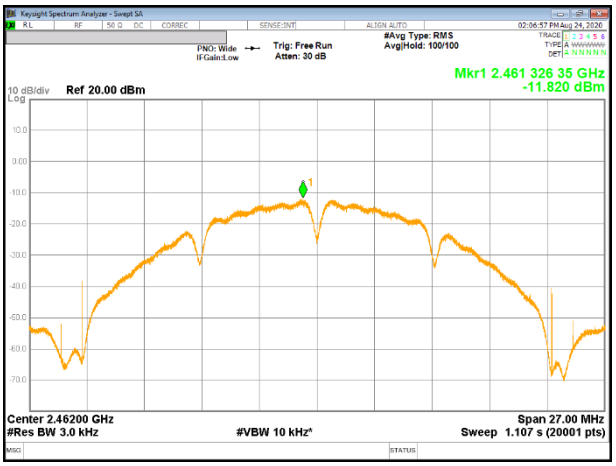
802.11b



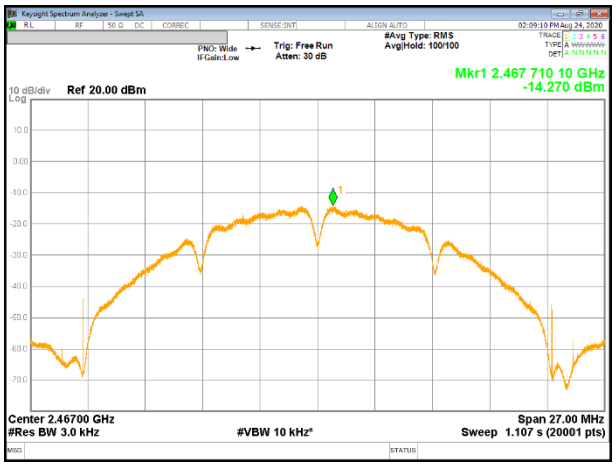
LOW CHANNEL 1



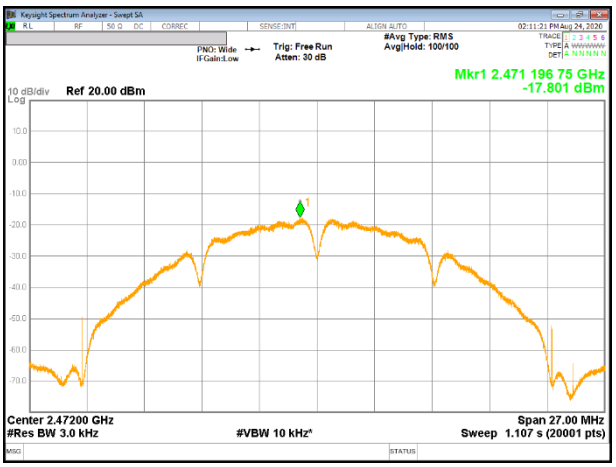
MID CHANNEL 6



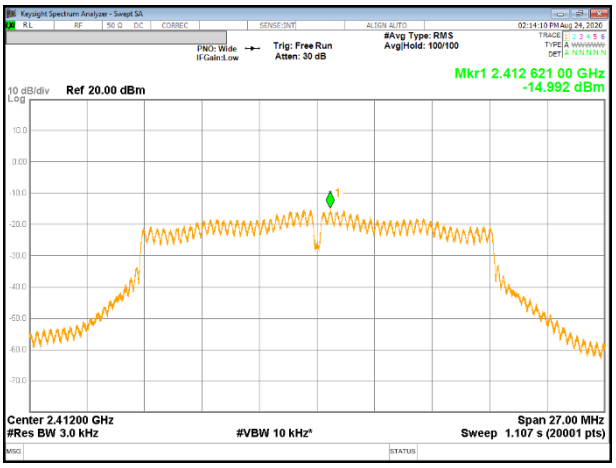
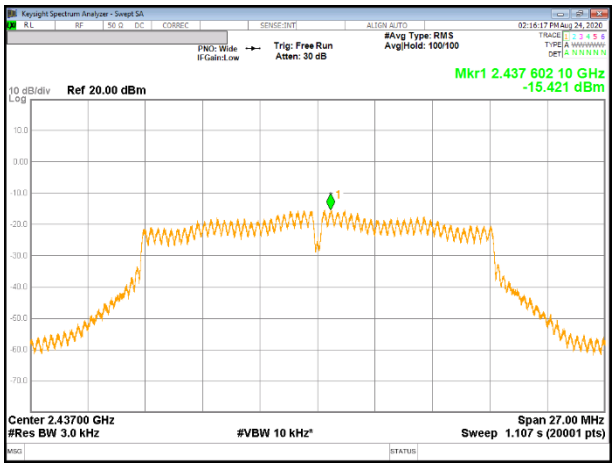
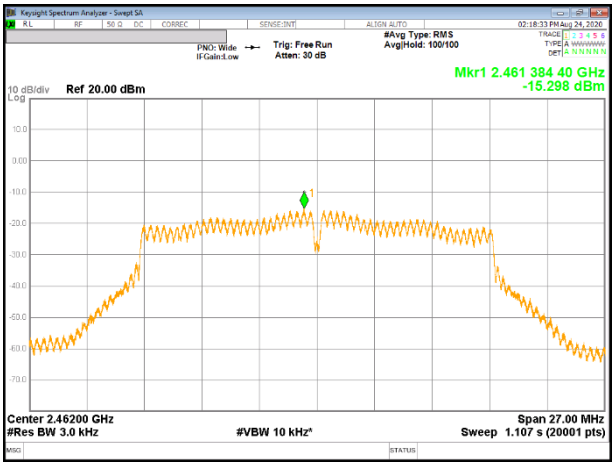
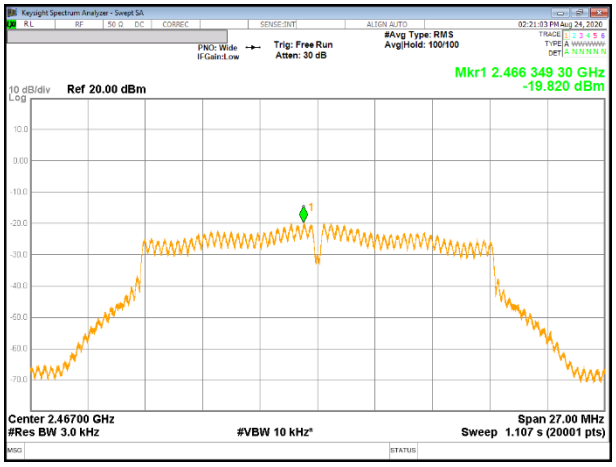
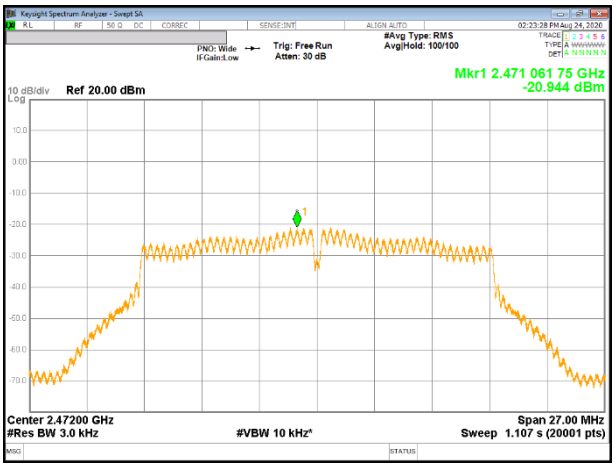
HIGH CHANNEL 11



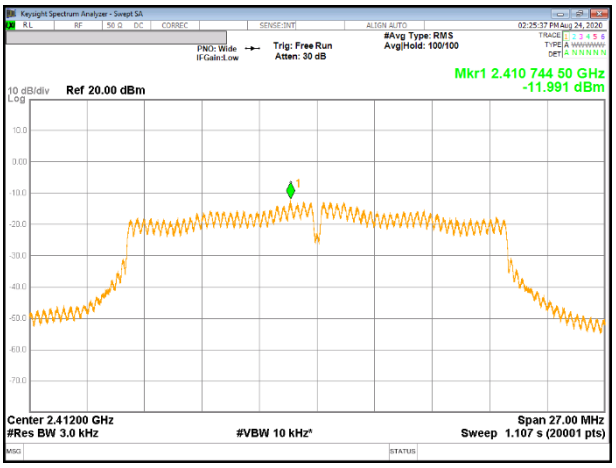
HIGH CHANNEL 12



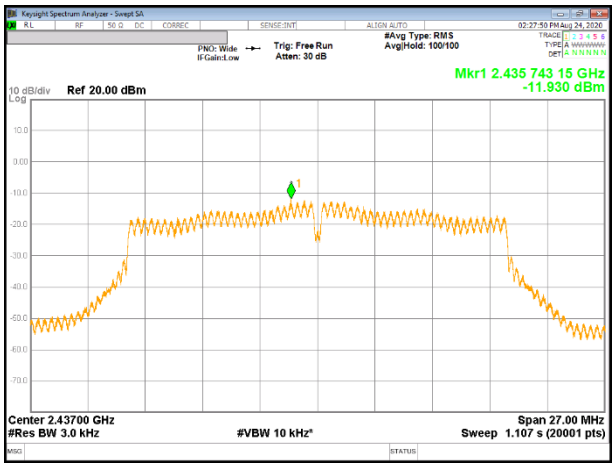
HIGH CHANNEL 13

802.11g	
	
LOW CHANNEL 1	**MID CHANNEL 6**
	
HIGH CHANNEL 11	**HIGH CHANNEL 12**
	
HIGH CHANNEL 13	

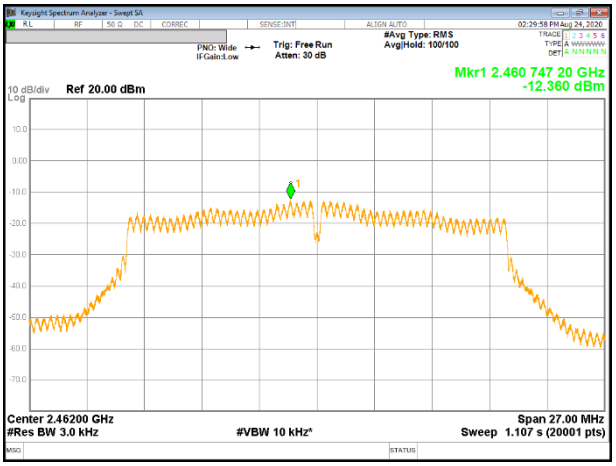
802.11n HT20



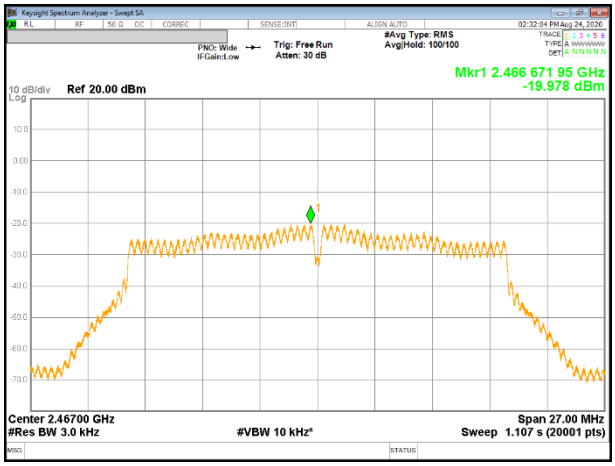
LOW CHANNEL 1



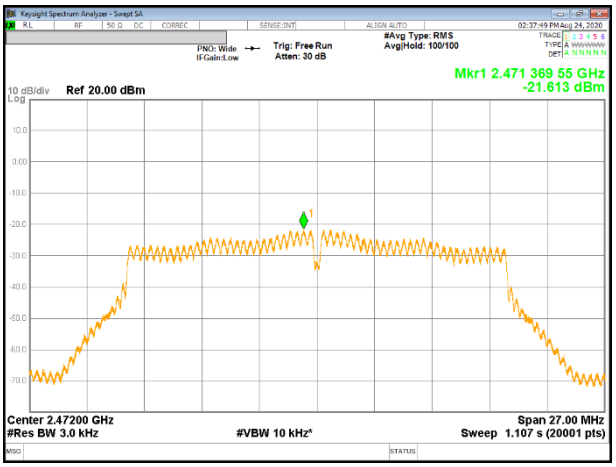
MID CHANNEL 6



HIGH CHANNEL 11



HIGH CHANNEL 12



HIGH CHANNEL 13

9.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

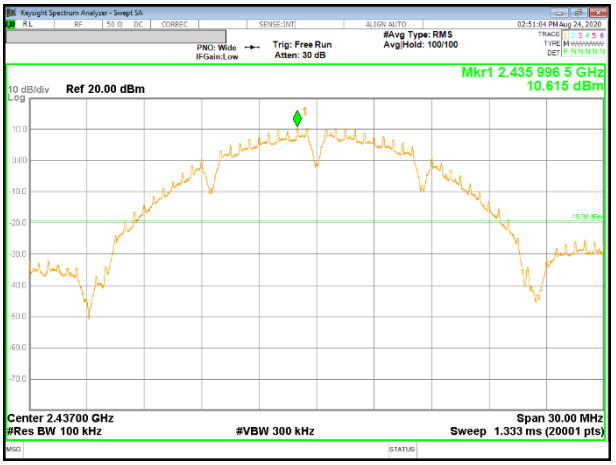
Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

RESULTS

9.5.1. 802.11b MODE

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1



IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

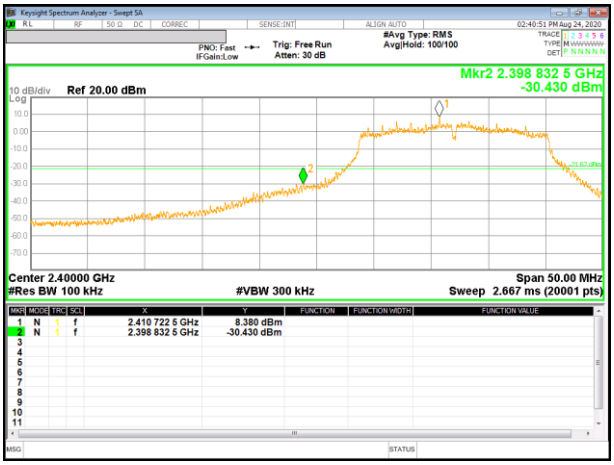
HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

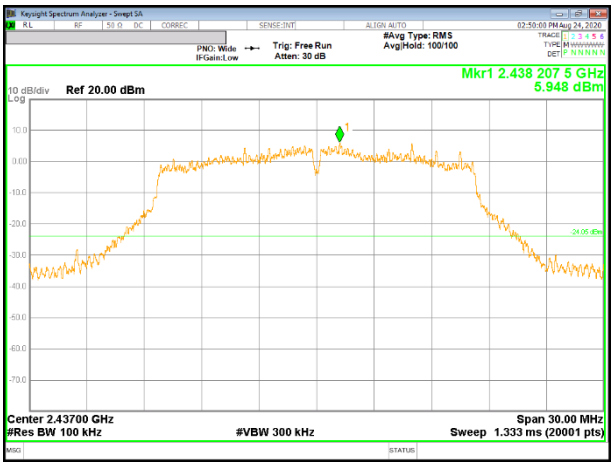
HIGH CHANNEL 13 BANDEDGE

9.5.2. 802.11g MODE



LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

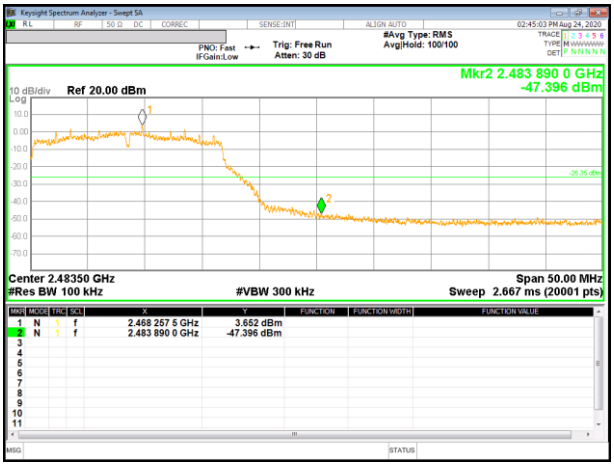


IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 11 BANDEDGE

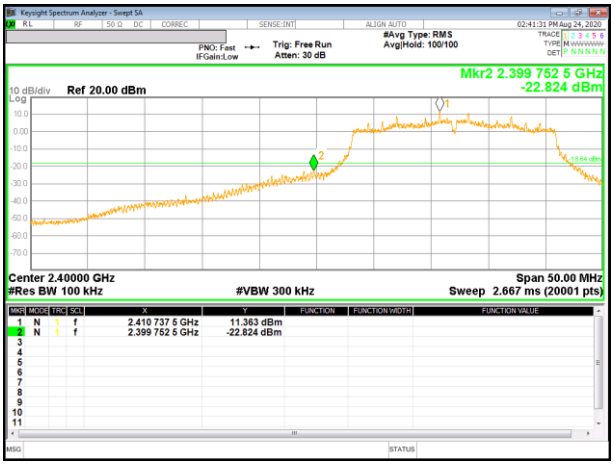
OUT-OF-BAND HIGH CHANNEL 11



HIGH CHANNEL 12 BANDEDGE

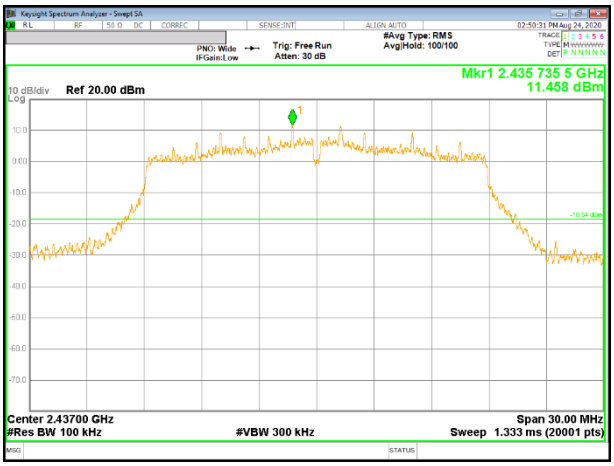
HIGH CHANNEL 13 BANDEDGE

9.5.3. 802.11n HT20 MODE



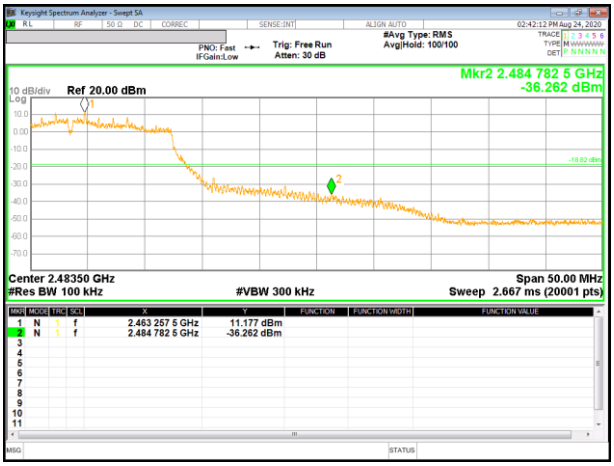
LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1



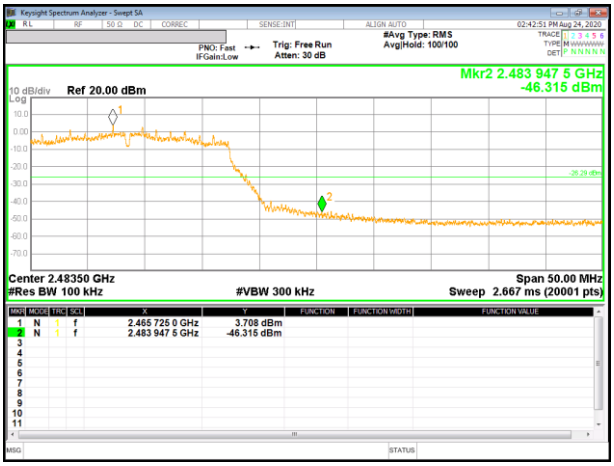
IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11



HIGH CHANNEL 12 BANDEDGE

HIGH CHANNEL 13 BANDEDGE

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

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

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

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

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

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz and 150 cm for above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restriced bandedge, Final detection of spurious harmonic emissions)
Duty cycle factor= 10log (1/x) For this sample 802.11b mode = 0dB (duty cycle >98%); 802.11g mode = 0dB (duty cycle >98%); 802.11n(HT20) mode = 0dB (duty cycle >98%).

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

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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

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

Although these tests were performed other than open area 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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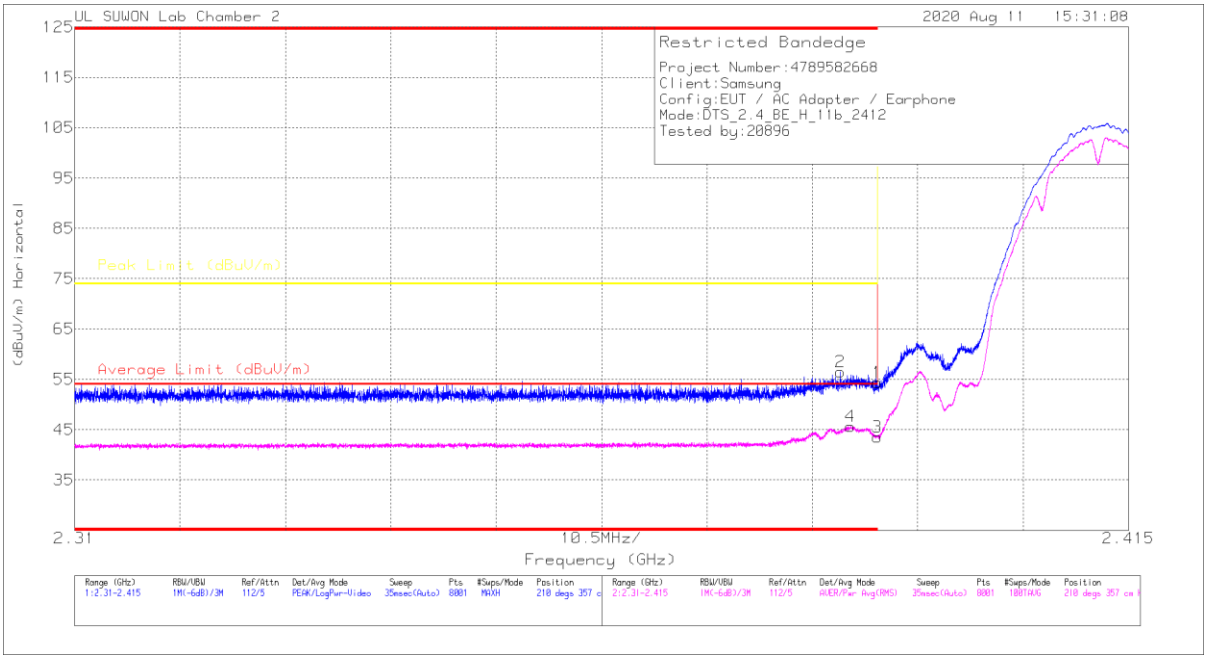
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

BANDEDGE (LOW CHANNEL, CH 1)

HORIZONTAL RESULT

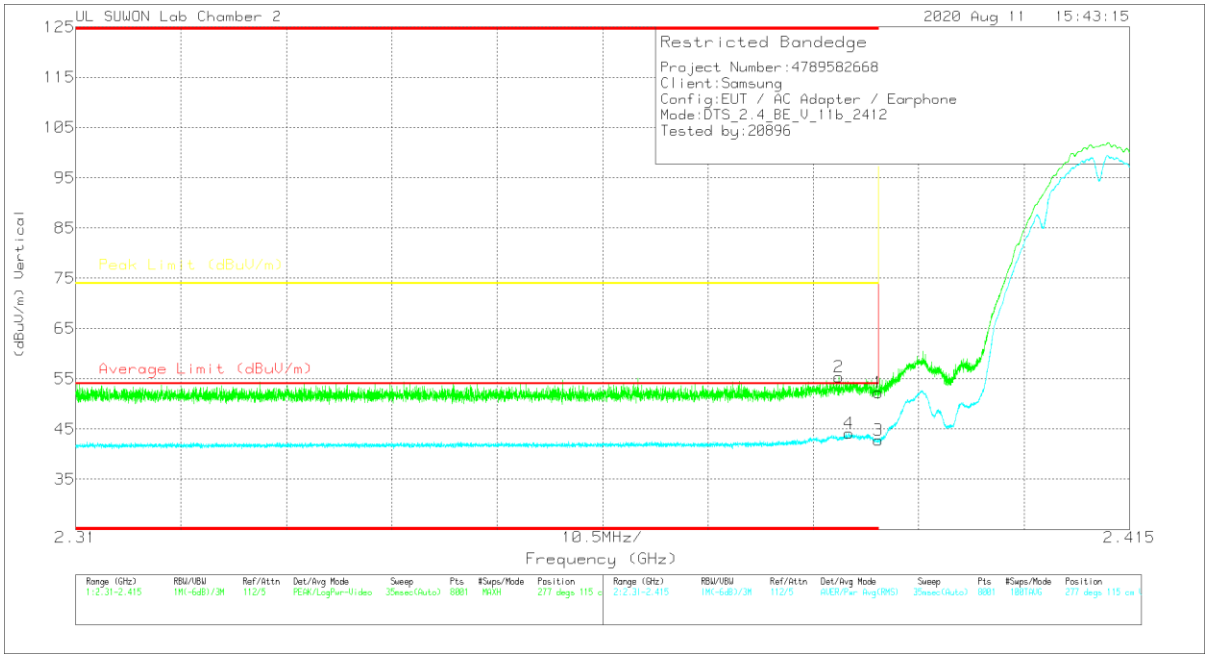


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.11	Pk	31.9	-20.6	0	54.41	-	-	74	-19.59	210	357	H
2	* 2.38631	45.22	Pk	31.9	-20.6	0	56.52	-	-	74	-17.48	210	357	H
3	* 2.39	32.22	RMS	31.9	-20.6	0	43.52	54	-10.48	-	-	210	357	H
4	* 2.38728	34.34	RMS	31.9	-20.6	0	45.64	54	-8.36	-	-	210	357	H

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

VERTICAL RESULT



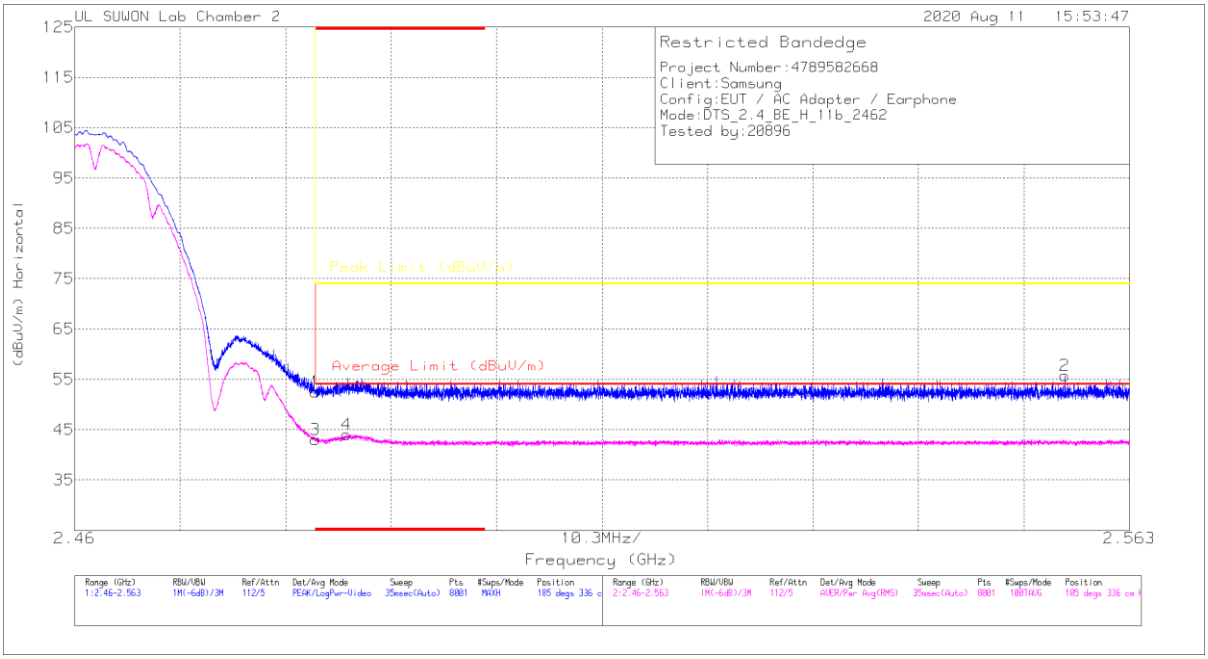
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.99	Pk	31.9	-20.6	0	52.29	-	-	74	-21.71	277	115	V
2	* 2.38605	44.09	Pk	31.9	-20.6	0	55.39	-	-	74	-18.61	277	115	V
3	* 2.39	31.43	RMS	31.9	-20.6	0	42.73	54	-11.27	-	-	277	115	V
4	* 2.38703	32.83	RMS	31.9	-20.6	0	44.13	54	-9.87	-	-	277	115	V

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

BANDEDGE (HIGH CHANNEL, CH 11)

HORIZONTAL RESULT

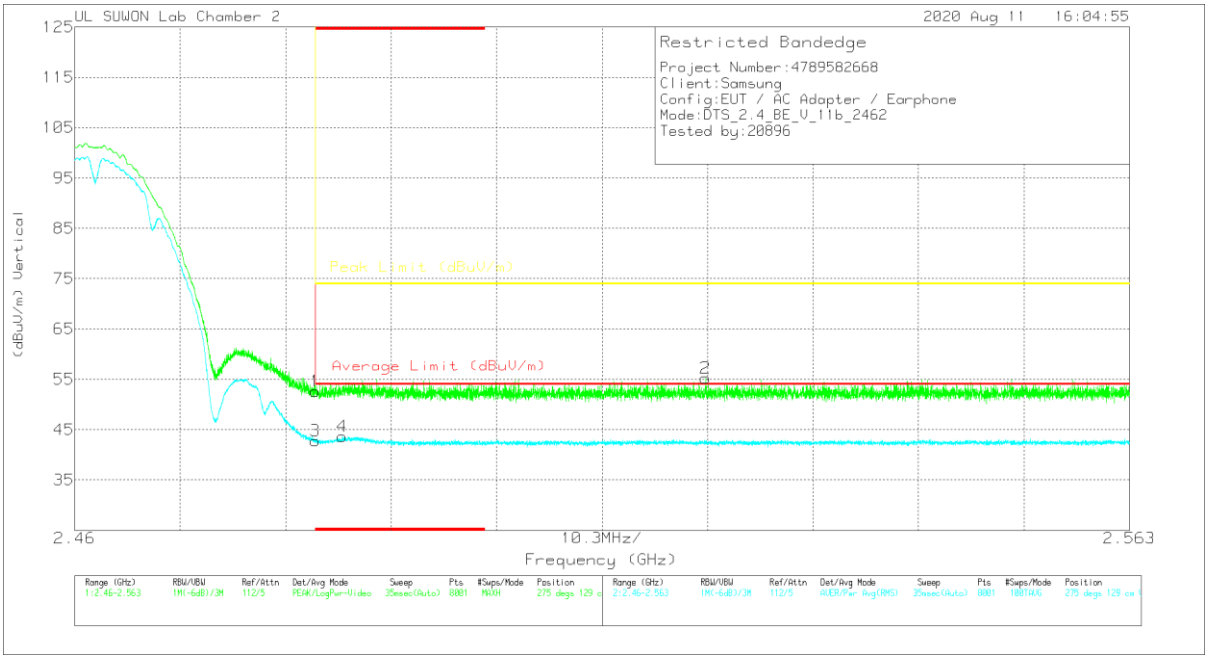


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.94	Pk	32	-20.4	0	52.54	-	-	74	-21.46	185	336	H
2	2.55667	43.94	Pk	32.2	-20.4	0	55.74	-	-	74	-18.26	185	336	H
3	* 2.48351	31.41	RMS	32	-20.4	0	43.01	54	-10.99	-	-	185	336	H
4	* 2.48657	32.51	RMS	32	-20.5	0	44.01	54	-9.99	-	-	185	336	H

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

VERTICAL RESULT



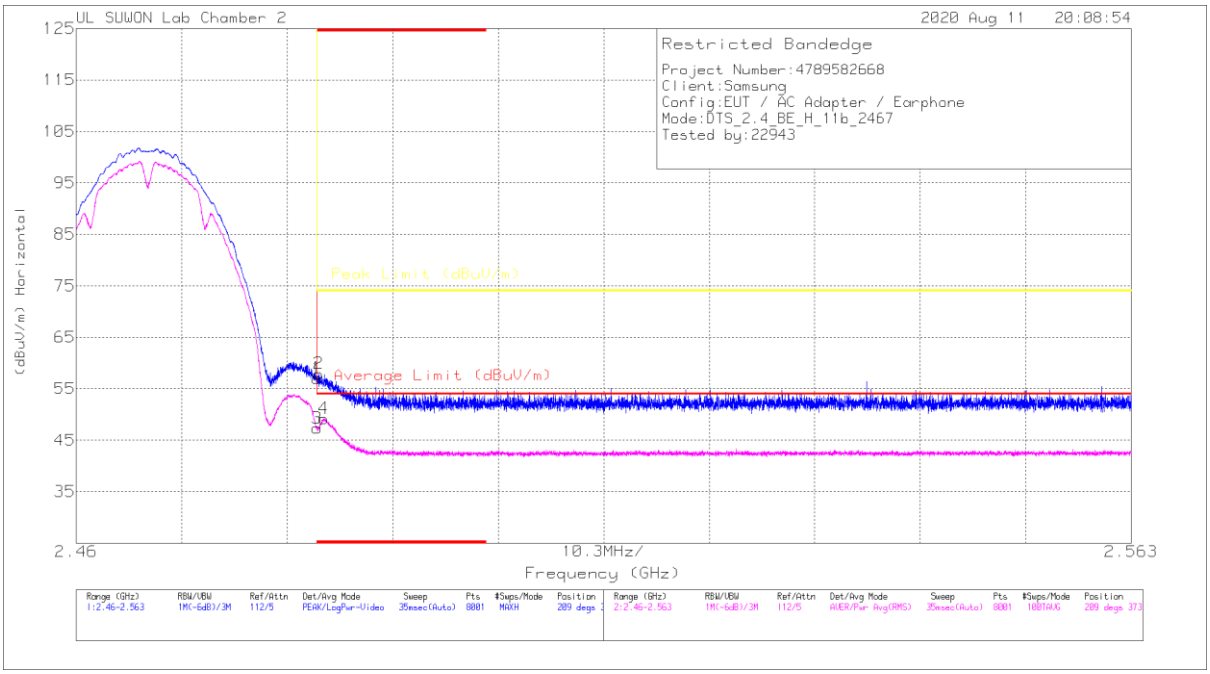
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.06	Pk	32	-20.4	0	52.66	-	-	74	-21.34	275	129	V
2	2.52159	43.5	Pk	32.1	-20.4	0	55.2	-	-	74	-18.8	275	129	V
3	* 2.48351	31.19	RMS	32	-20.4	0	42.79	54	-11.21	-	-	275	129	V
4	* 2.48615	32.17	RMS	32	-20.5	0	43.67	54	-10.33	-	-	275	129	V

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

BANDEDGE (HIGH CHANNEL, CH 12)

HORIZONTAL RESULT

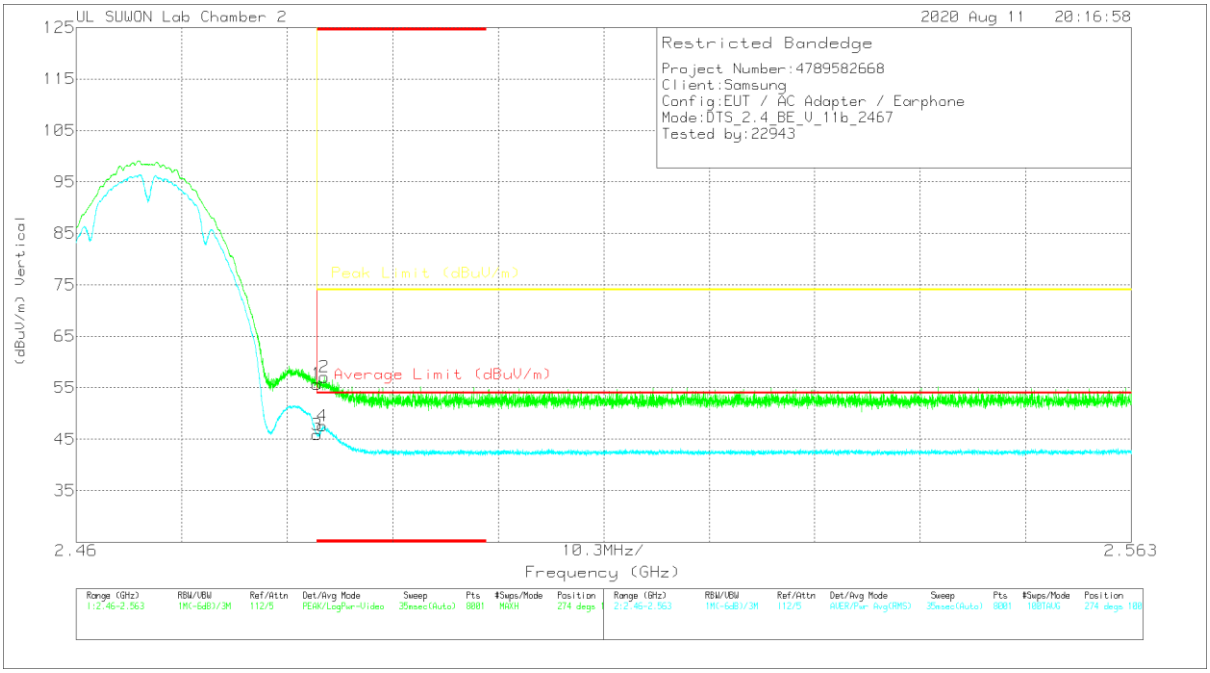


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.48351	45.45	Pk	32	-20.4	0	57.05	-	-	74	-16.95	209	373	H
2	*2.48369	46.32	Pk	32	-20.4	0	57.92	-	-	74	-16.08	209	373	H
3	*2.48351	35.72	RMS	32	-20.4	0	47.32	54	-6.68	-	-	209	373	H
4	*2.48418	37.59	RMS	32	-20.4	0	49.19	54	-4.81	-	-	209	373	H

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

VERTICAL RESULT



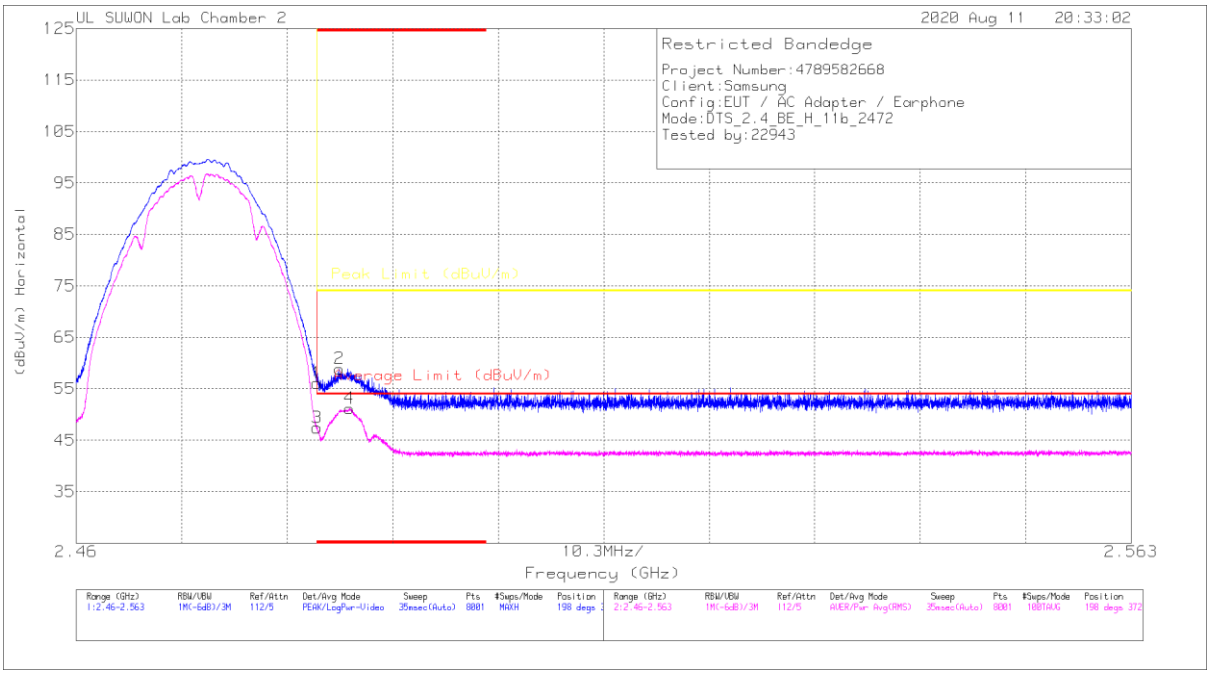
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	44.1	Pk	32	-20.4	0	55.7	-	-	74	-18.3	274	100	V
2	* 2.48421	45.49	Pk	32	-20.4	0	57.09	-	-	74	-16.91	274	100	V
3	* 2.48351	34.26	RMS	32	-20.4	0	45.86	54	-8.14	-	-	274	100	V
4	* 2.48405	35.98	RMS	32	-20.4	0	47.58	54	-6.42	-	-	274	100	V

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

BANDEDGE (HIGH CHANNEL, CH 13)

HORIZONTAL RESULT

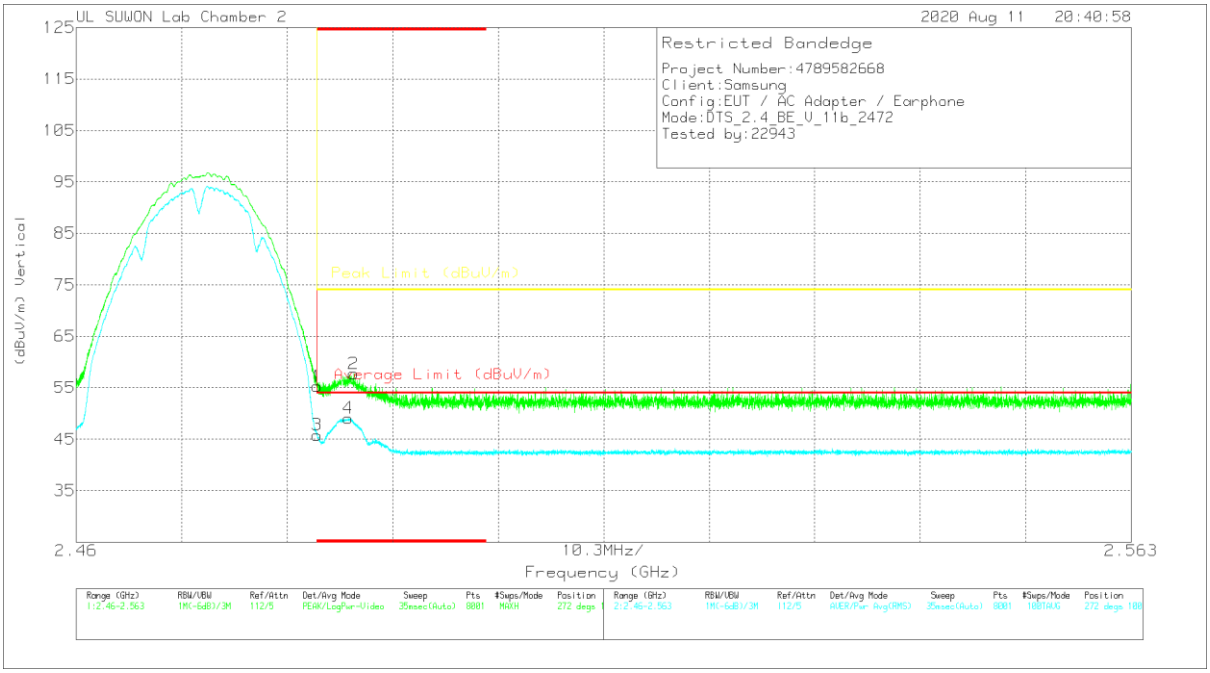


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.48351	44.51	Pk	32	-20.4	0	56.11	-	-	74	-17.89	198	372	H
2	*2.48571	47.4	Pk	32	-20.5	0	58.9	-	-	74	-15.1	198	372	H
3	*2.48351	35.84	RMS	32	-20.4	0	47.44	54	-6.56	-	-	198	372	H
4	*2.48668	39.68	RMS	32	-20.5	0	51.18	54	-2.82	-	-	198	372	H

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

VERTICAL RESULT



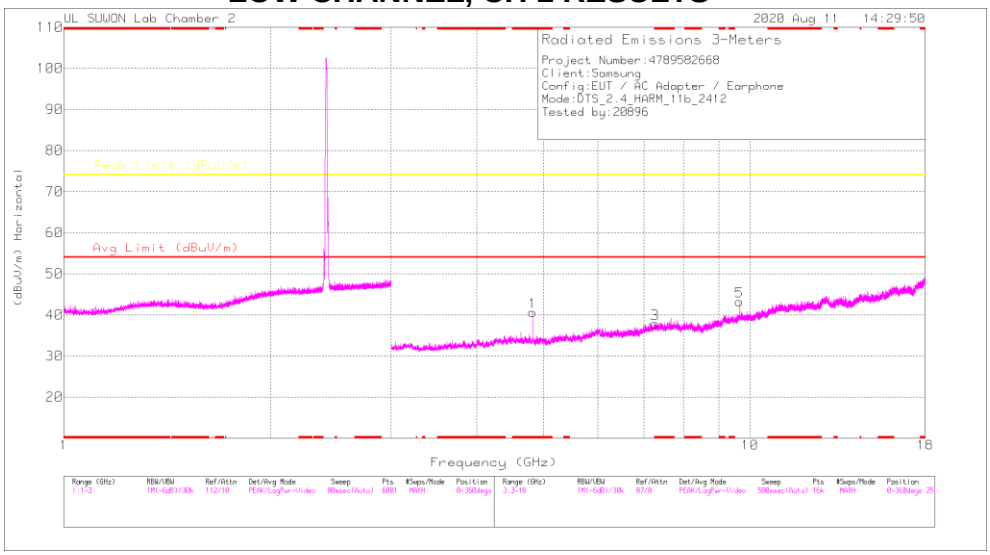
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.69	Pk	32	-20.4	0	55.29	-	-	74	-18.71	272	100	V
2	* 2.48708	46.22	Pk	32	-20.5	0	57.72	-	-	74	-16.28	272	100	V
3	* 2.48351	34.22	RMS	32	-20.4	0	45.82	54	-8.18	-	-	272	100	V
4	* 2.48656	37.57	RMS	32	-20.5	0	49.07	54	-4.93	-	-	272	100	V

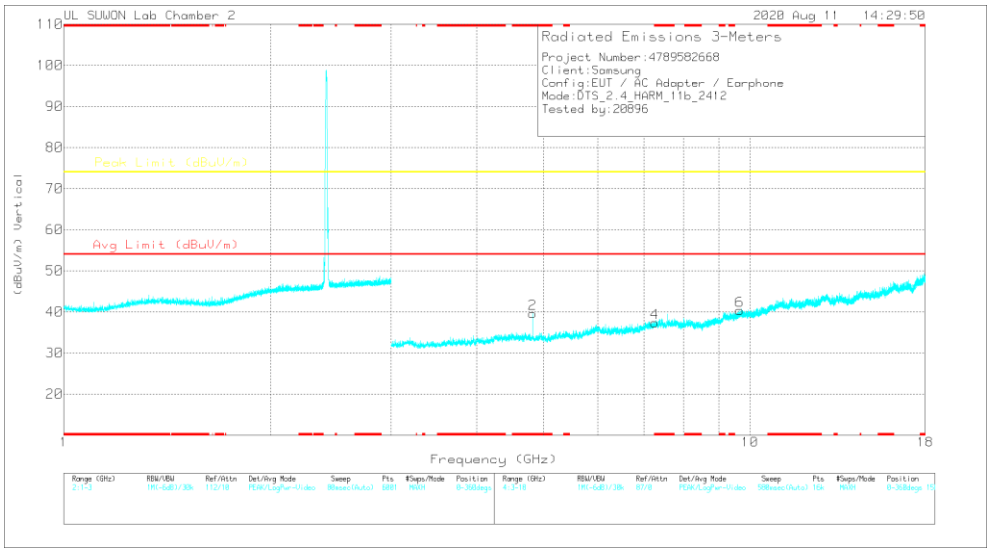
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL, CH 1 RESULTS



HORIZONTAL



VERTICAL

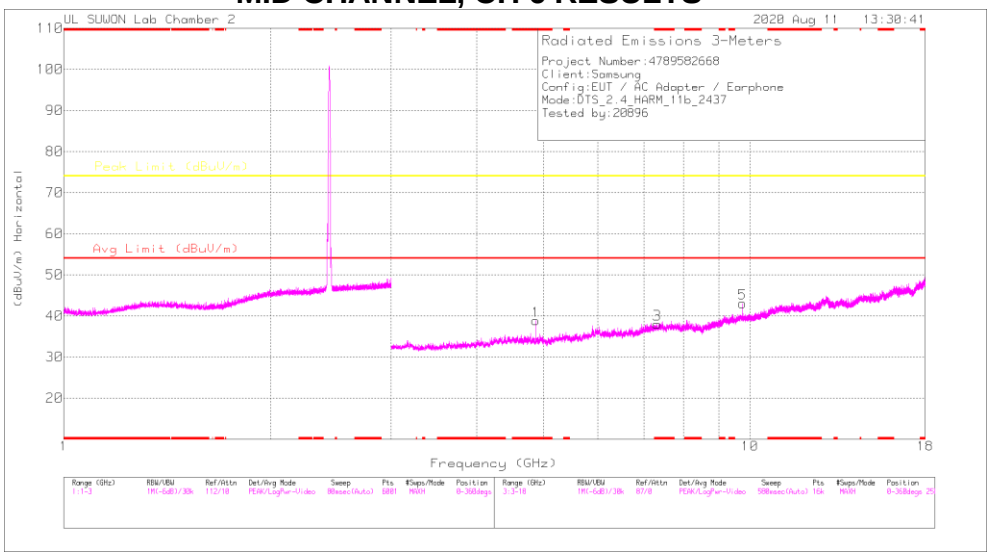
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

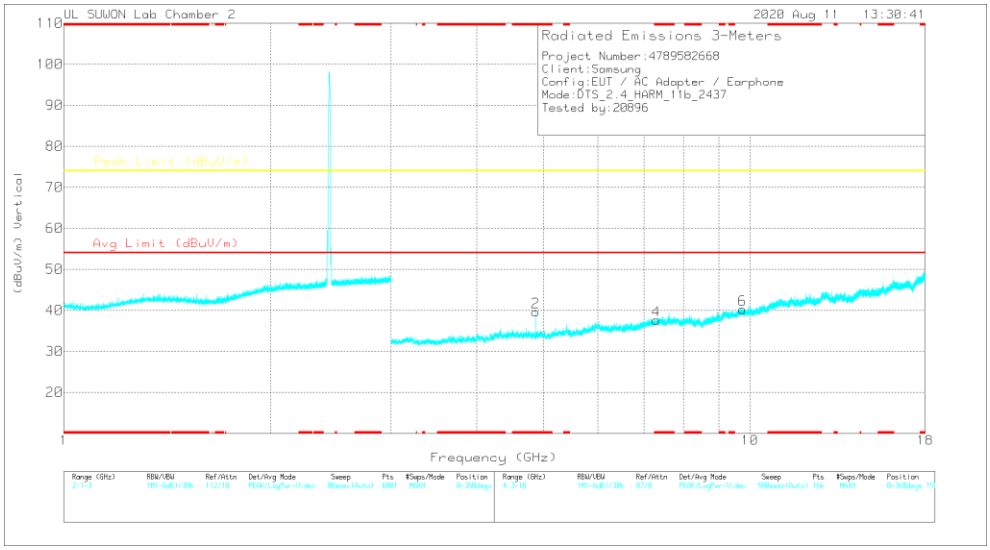
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.82412	40.43	PK2	34.1	-28.1	0	46.43	-	-	74	-27.57	255	100	H
* 4.82396	34.52	MAv1	34.1	-28.1	0	40.52	54	-13.48	-	-	255	100	H
* 4.82412	39.94	PK2	34.1	-28.1	0	45.94	-	-	74	-28.06	191	102	V
* 4.82396	33.32	MAv1	34.1	-28.1	0	39.32	54	-14.68	-	-	191	102	V
* 7.2634	35.34	PK2	36.2	-25.3	0	46.24	-	-	74	-27.76	360	100	H
* 7.26131	35.1	PK2	36.2	-25.3	0	46	-	-	74	-28	360	100	V
9.64793	34.26	PK2	37	-21.5	0	49.76	-	-	74	-24.24	183	211	H
9.64569	32.79	PK2	37	-21.5	0	48.29	-	-	74	-25.71	188	100	V

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

MID CHANNEL, CH 6 RESULTS



HORIZONTAL



VERTICAL

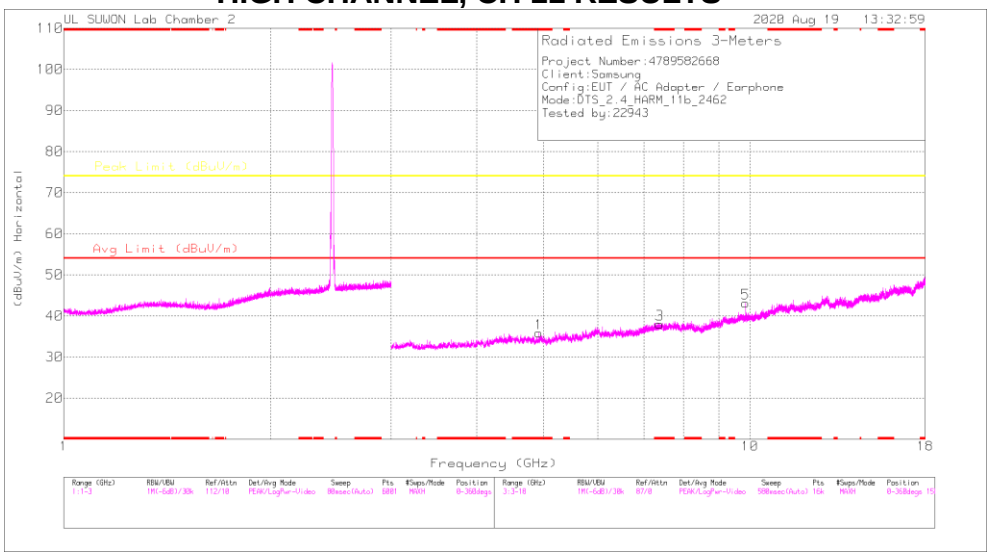
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

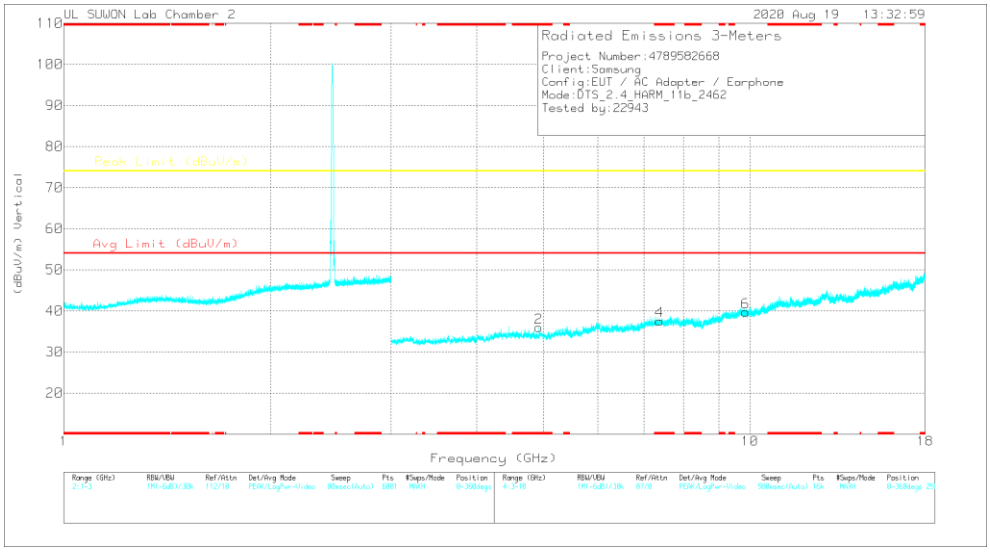
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.8739	38.69	PK2	34.1	-27.9	0	44.89	-	-	74	-29.11	129	109	H
* 4.87394	31.6	MAv1	34.1	-27.9	0	37.8	54	-16.2	-	-	129	109	H
* 4.87406	39.4	PK2	34.1	-27.9	0	45.6	-	-	74	-28.4	178	111	V
* 4.87398	32.23	MAv1	34.1	-27.9	0	38.43	54	-15.57	-	-	178	111	V
* 7.31137	34.9	PK2	36.2	-24.9	0	46.2	-	-	74	-27.8	360	100	H
* 7.30341	34.95	PK2	36.2	-24.9	0	46.25	-	-	74	-27.75	360	100	V
9.76742	33.15	PK2	37.2	-21.3	0	49.05	-	-	74	-24.95	126	194	H
9.7459	32.7	PK2	37.2	-21.2	0	48.7	-	-	74	-25.3	188	110	V

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

HIGH CHANNEL, CH 11 RESULTS



HORIZONTAL



VERTICAL

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

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016872 4	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.92414	37.36	PK2	34.1	-27.2	0	44.26	-	-	74	-29.74	159	123	H
* 4.92402	28.34	MAv1	34.1	-27.2	0	35.24	54	-18.76	-	-	159	123	H
* 4.9239	37.65	PK2	34.1	-27.2	0	44.55	-	-	74	-29.45	180	116	V
* 4.92404	28.51	MAv1	34.1	-27.2	0	35.41	54	-18.59	-	-	180	116	V
* 7.38622	34.66	PK2	36.1	-24.2	0	46.56	-	-	74	-27.44	0	100	H
* 7.38542	34.79	PK2	36.1	-24.1	0	46.79	-	-	74	-27.21	0	100	V
9.84778	34.78	PK2	37.3	-21.6	0	50.48	-	-	74	-23.52	151	241	H
9.85116	33.02	PK2	37.3	-21.6	0	48.72	-	-	74	-25.28	99	102	V

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