CERTIFICATION TEST REPORT

Report Number. : 4789433105-FR1V1

Applicant	:	DREAMUS COMPANY 5, Bangbae-ro 18-gil, Seocho-gu, Seoul, Republic of Korea
Model	:	PPR21
FCC ID	:	QDMPPR21
EUT Description	:	SE200 (Music Player with BT and DTS b/g/n)
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
May 11, 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

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	05/11/20	Initial issue	Jaejin Lee

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

TABLE OF CONTENTS

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: DREAMUS COMPANY

EUT DESCRIPTION: SE200 (Music Player with BT and DTS b/g/n)

MODEL NUMBER: PPR21

SERIAL NUMBER: proto type (CONDUCTED)
proto type (RADIATED);

DATE TESTED: APRIL 16, 2020 – APRIL 29, 2020;

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

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

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

Approved & Released For
UL Korea, Ltd. By:

Changyoung Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Jaejin Lee
Suwon Lab Technician
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. 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 http://www.iasonline.org/wp-content/uploads/2017/05/TL-637.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	3.31 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.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Music Player with BT and DTS b/g/n.
This test report addresses the DTS (WLAN) operational mode.

WiFi operating mode

Frequency rage	Mode	Antenna Stream
2.4GHz (2412 MHz ~ 2462 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 - 2462	802.11b SISO	14.50	28.18
	802.11g SISO	12.62	18.28
	802.11n(HT20) SISO	12.41	17.42

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 a maximum gain of 1.119 dBi.

5.4. TESTED CHANNELS LIST

802.11b Mode	Channel	Frequency (MHz)
Low	1	2412
Mid	6	2437
High	11	2462

802.11g Mode	Channel	Frequency (MHz)
Low	1	2412
Mid	6	2437
High	11	2462

802.11n HT20 Mode	Channel	Frequency (MHz)
Low	1	2412
Mid	6	2437
High	11	2462

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.

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
802.11g mode: 6 Mbps 1TX
802.11n HT20 mode: MCS0 1TX

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	N/A	N/A	N/A
Data Cable	DREAMUS COMPANY	N/A	N/A	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

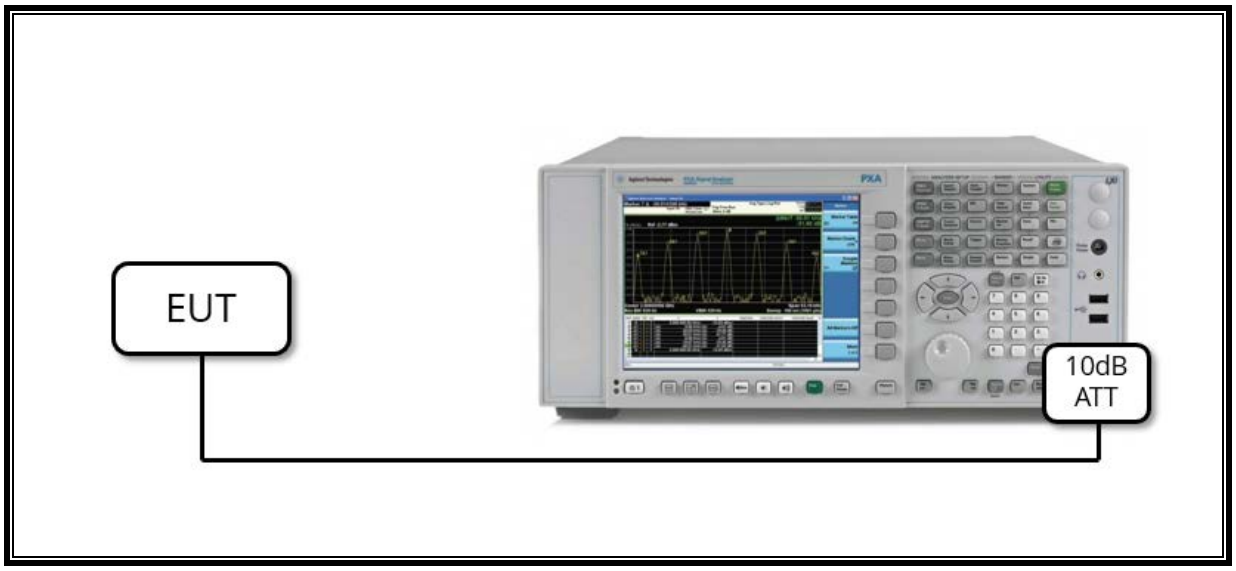
I/O CABLE

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	1.0m	N/A

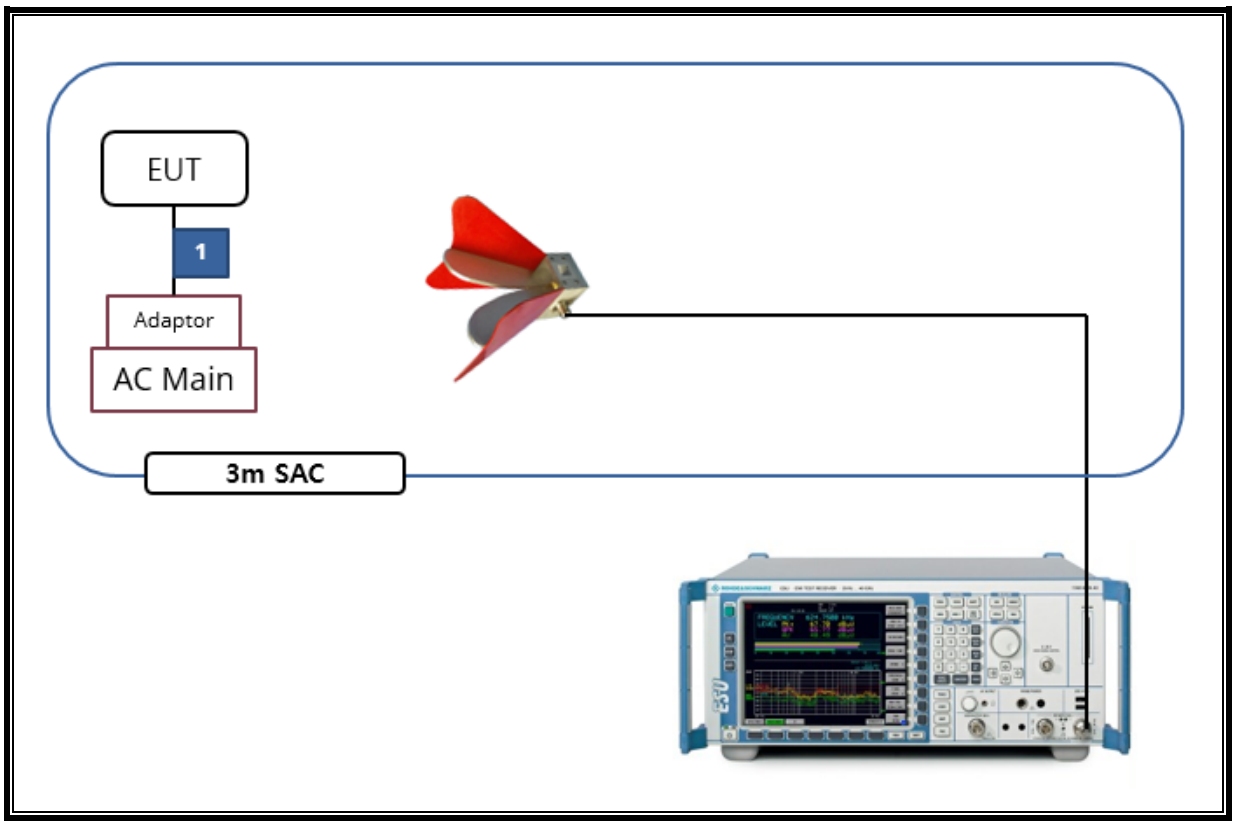
TEST SETUP

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 (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	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-08-20
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-20
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-20
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-09-20
Attenuator	PASTERNACK	PE7087-10	A001	08-08-20
Attenuator	PASTERNACK	PE7087-10	A008	08-08-20
Attenuator	PASTERNACK	PE7004-10	2	08-06-20
Attenuator	PASTERNACK	PE7087-10	A009	08-08-20
Attenuator	WEINSCHEL	54A-10	74560	08-08-20
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-20
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-05-20
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-05-20
EMI Test Receive, 3 GHz	R&S	ESR3	102592	06-28-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-06-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-06-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-20
LISN	R&S	ENV-216	101837	08-09-20
LISN	R&S	ENV216	102478	11-15-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100900	09-30-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
Bias Unit	R&S	IN600	100974	09-30-20

Software			
Description	**Manufacturer**	**Model**	**Version**
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted software	UL	UL EMC	Ver 9.5
AC Line Conducted software	R&S	EMC32	10.50.40

7. REFERENCE MEASUREMENT RESULTS

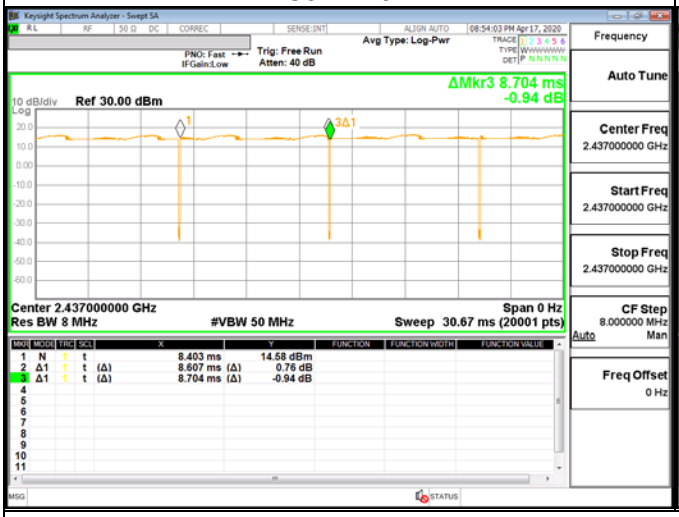
7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

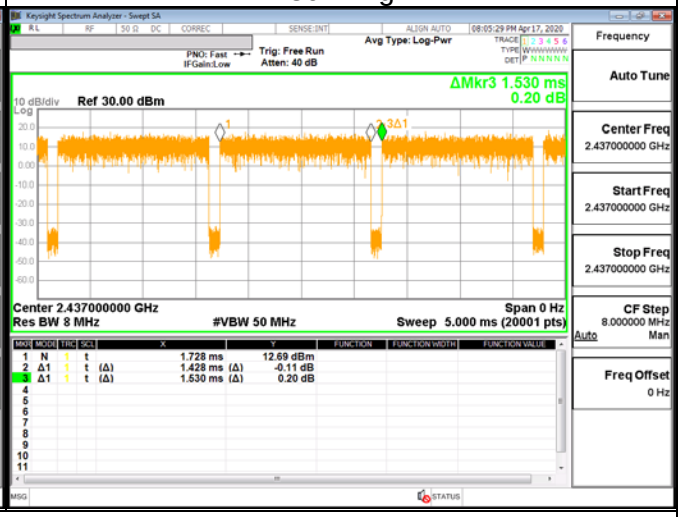
None; for reporting purposes only.

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	8.607	8.704	0.989	98.89	0.00	0.116
	802.11g	1.428	1.530	0.933	93.33	0.30	0.700
	802.11n HT20	1.335	1.436	0.930	92.97	0.32	0.749

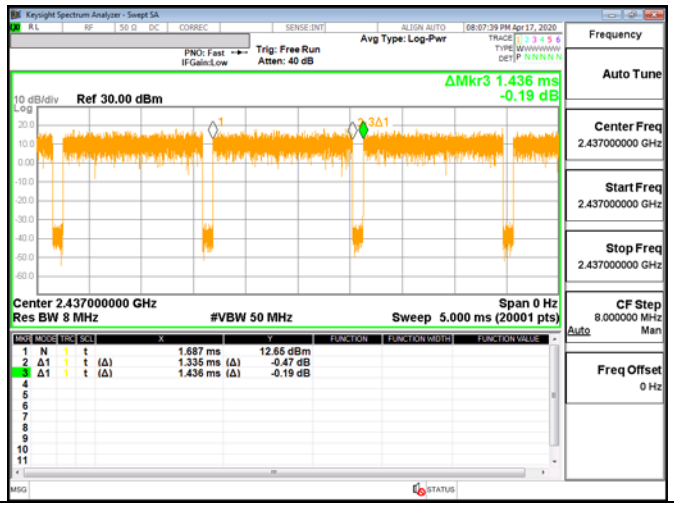
802.11b



802.11g



802.11n HT20



8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05r02, Section 8.2

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.2.3.

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

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

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

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

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

9. SUMMARY TABLE

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDUR

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

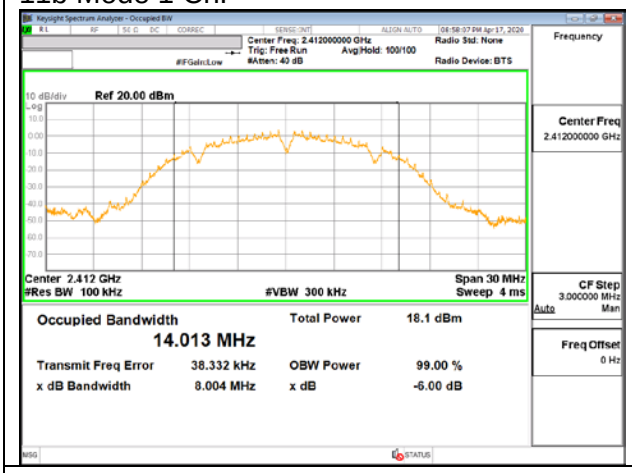
10.1.1. TEST RESULTS

Mode	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	6 dB BW Minimum Limit [MHz]
802.11b	1	2412	**8.004**	0.5
	6	2437	10.05	
	11	2462	9.020	
	Worst		**8.004**	
802.11g	1	2412	15.08	0.5
	6	2437	15.48	
	11	2462	**15.07**	
	Worst		**15.07**	
802.11n HT20	1	2412	15.68	0.5
	6	2437	15.01	
	11	2462	**14.20**	
	Worst		**14.20**	

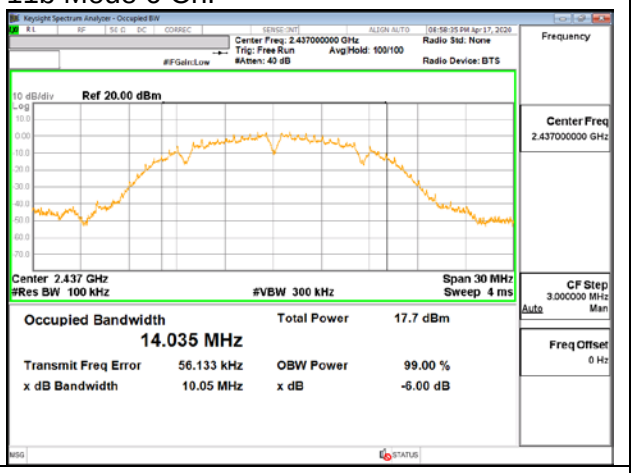
10.1.2. 6 dB Bandwidth TEST PLOTS

802.11b mode

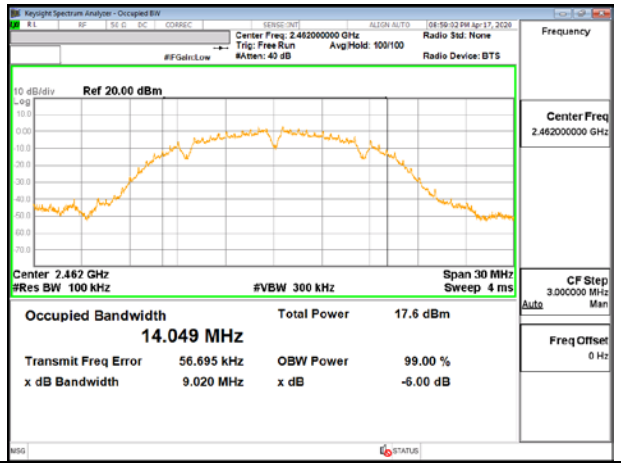
11b Mode 1 Ch.

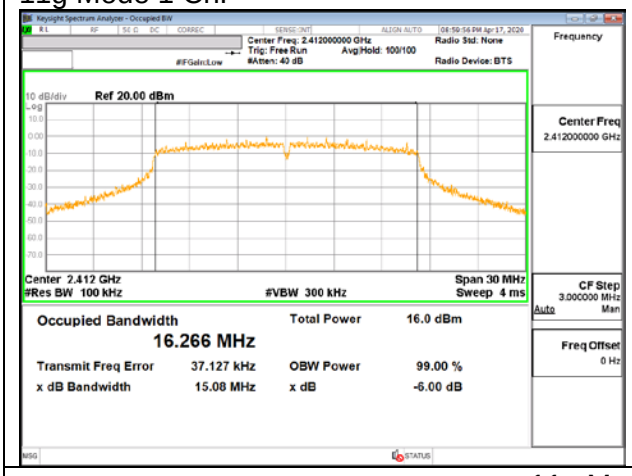
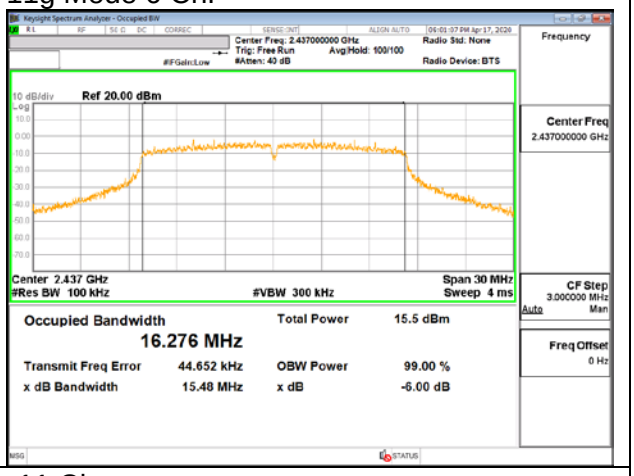
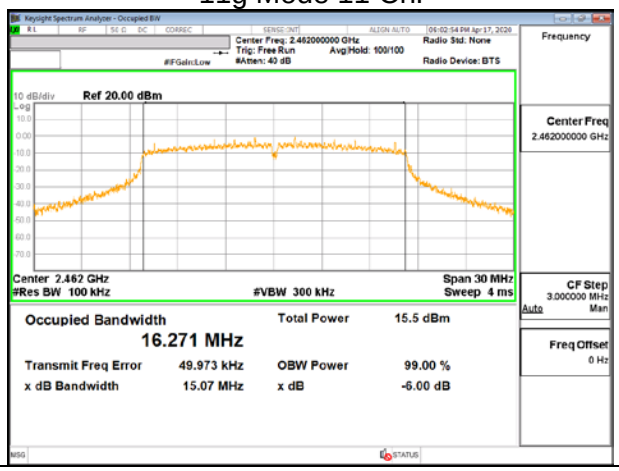


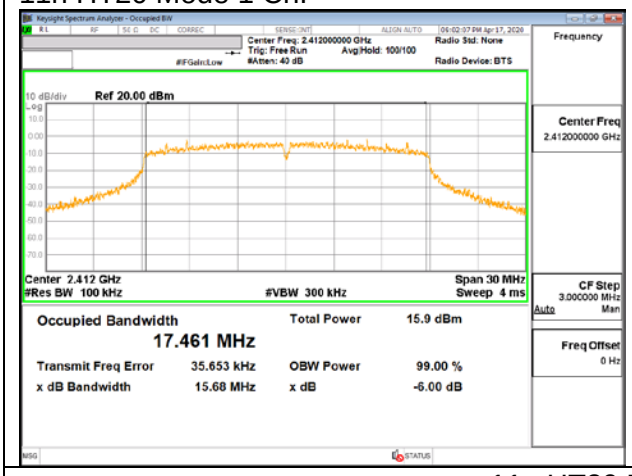
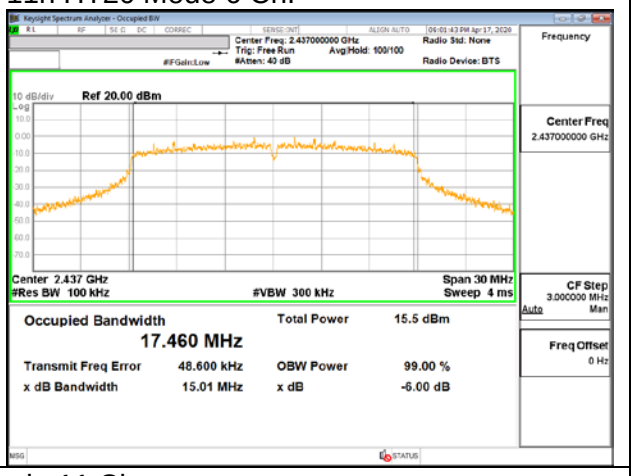
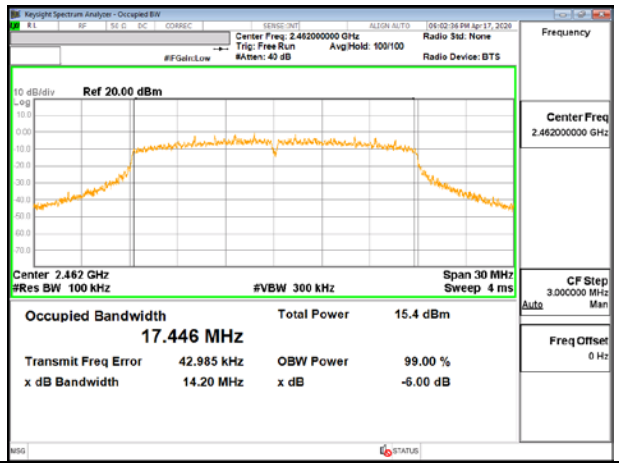
11b Mode 6 Ch.



11b Mode 11 Ch.



802.11g mode	
11g Mode 1 Ch.	11g Mode 6 Ch.
	
11g Mode 11 Ch.	
	

802.11n HT20 mode	
11n HT20 Mode 1 Ch.	11n HT20 Mode 6 Ch.
	
11n HT20 Mode 11 Ch.	
	

10.2. OUTPUT POWER

LIMITS

FCC §15.247

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

Output power measurement was performed utilizing the 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%.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain. The directional gain is:

Bands [MHz]	Maximum Antenna Gain [dBi]
2412-2462	1.119

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

RESULTS

10.2.1. TEST RESULTS

Frequency Range [MHz]	ANT Gain	FCC Power Limit [dBm]	Max Power [dBm]
2412 - 2462	1.119	30.00	30.00

Included in Calculations of Corr'd Power			
Duty Cycle CF	802.11b	0.00	dB
	802.11g	0.30	dB
	802.11n HT20	0.32	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	14.50	**14.50**	30.00
	6	2437	13.80	13.80	
	11	2462	13.68	13.68	
Worst Case				**14.50**	
802.11g	1	2412	12.32	**12.62**	30.00
	6	2437	12.06	12.36	
	11	2462	11.85	12.15	
Worst Case				**12.62**	
802.11n HT20	1	2412	12.09	**12.41**	30.00
	6	2437	11.89	12.21	
	11	2462	11.63	11.95	
Worst Case				**12.41**	

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

10.3. PSD

LIMITS

FCC §15.247

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

TEST PROCEDURE

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

RESULTS

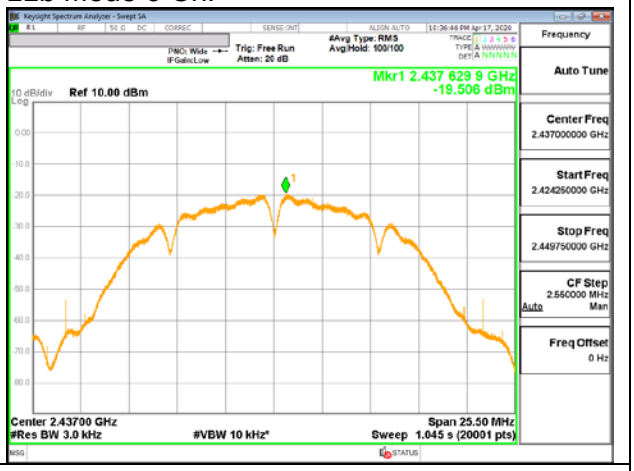
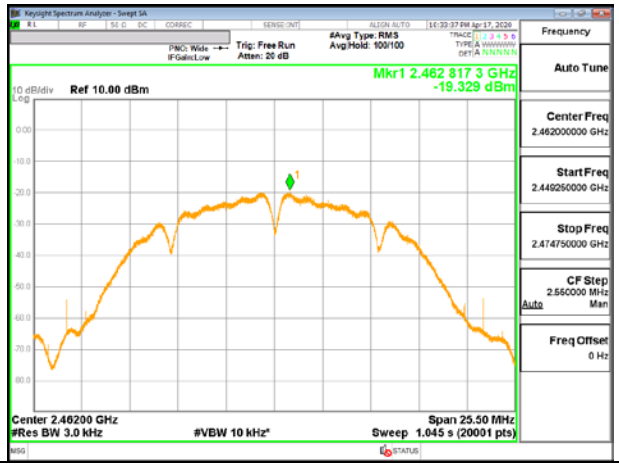
10.3.1. TEST RESULTS

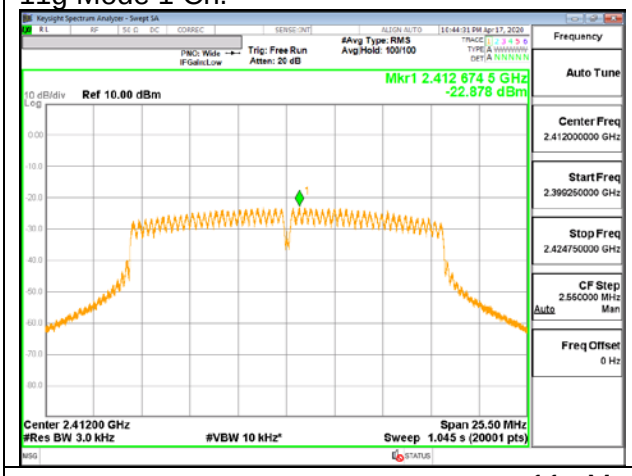
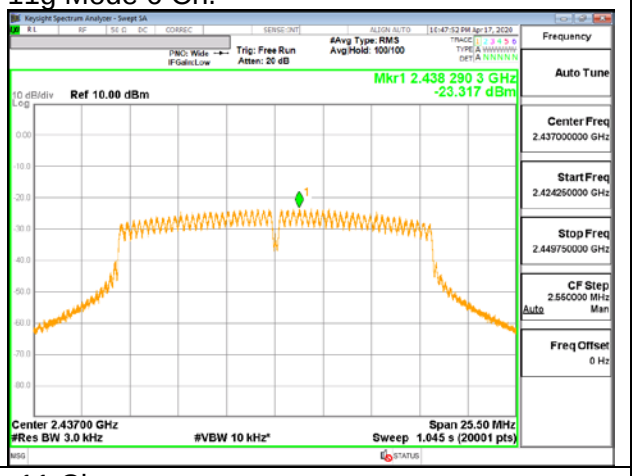
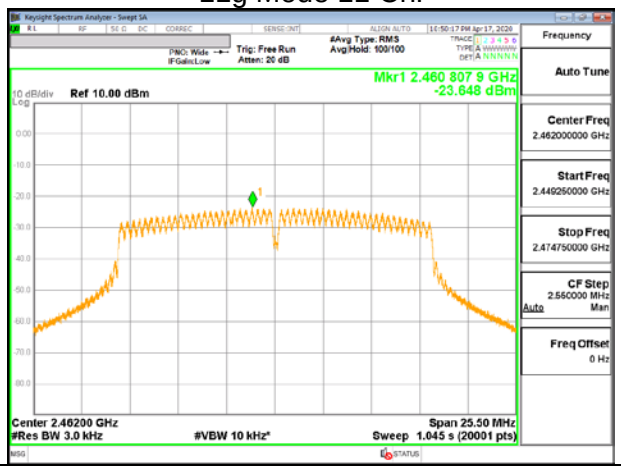
Included in Calculations of Corr'd Power			
Duty Cycle CF	802.11b	0.00	dB
	802.11g	0.30	dB
	802.11n HT20	0.32	dB

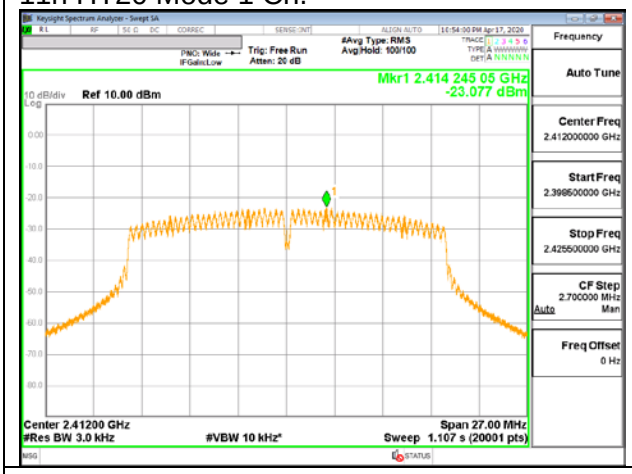
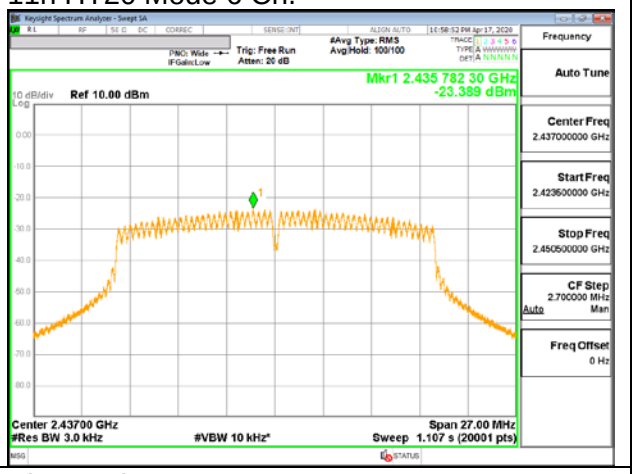
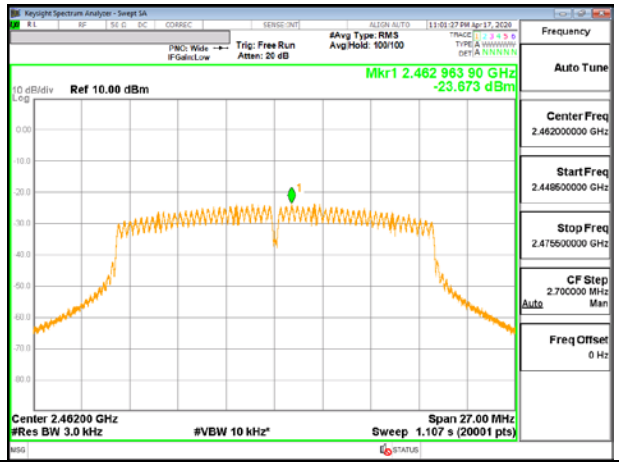
Calculation of Output PSD result
1. 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/3kHz]	Corr'd PSD [dBm/3kHz]	PSD Limit [dBm/3kHz]
802.11b	1	2412	-18.49	-18.49	8.00
	6	2437	-19.51	-19.51	
	11	2462	-19.33	-19.33	
Worst Case				-18.49	
802.11g	1	2412	-22.88	-22.58	8.00
	6	2437	-23.32	-23.02	
	11	2462	-23.65	-23.35	
Worst Case				-22.58	
802.11n HT20	1	2412	-23.08	-22.76	8.00
	6	2437	-23.39	-23.07	
	11	2462	-23.67	-23.35	
Worst Case				-22.76	

10.3.2. PSD PLOTS

802.11b mode	
11b Mode 1 Ch.	11b Mode 6 Ch.
	
11b Mode 11 Ch.	
	

802.11g mode	
11g Mode 1 Ch.	11g Mode 6 Ch.
	
11g Mode 11 Ch.	
	

802.11n HT20 mode	
11n HT20 Mode 1 Ch.	11n HT20 Mode 6 Ch.
	
11n HT20 Mode 11 Ch.	
	

10.4. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

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

TEST PROCEDURE

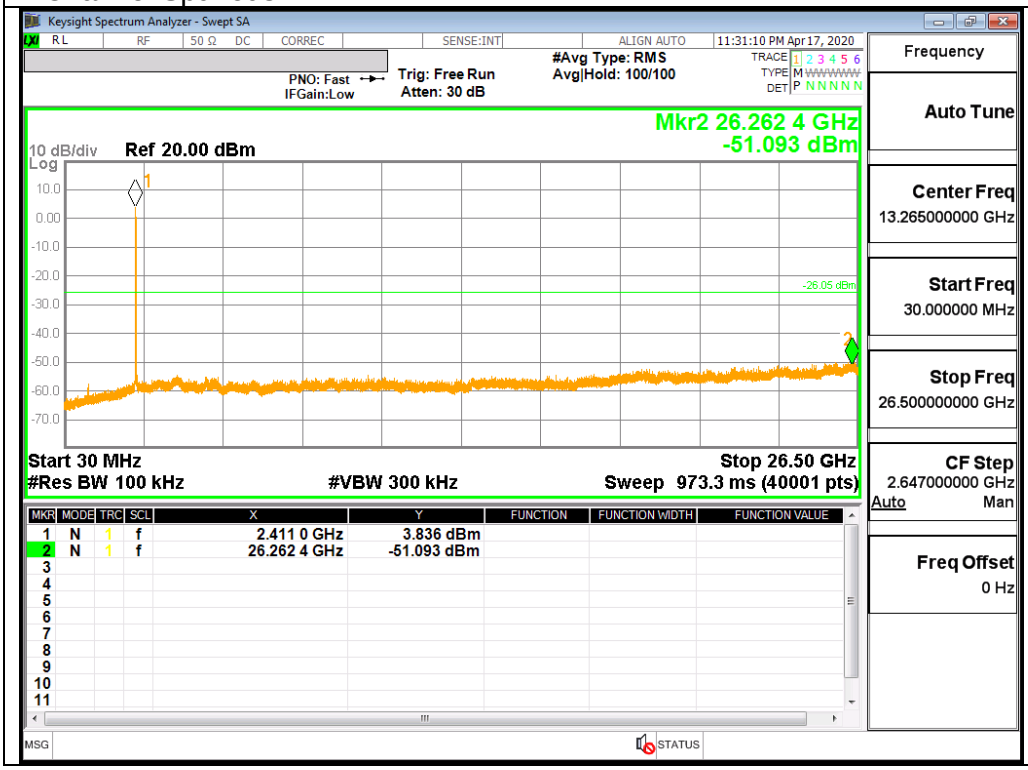
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge, out-of-band emissions (where measurements to the general radiated limits will not be made)

RESULTS

10.4.1. 802.11b MODE IN THE 2.4 GHz BAND

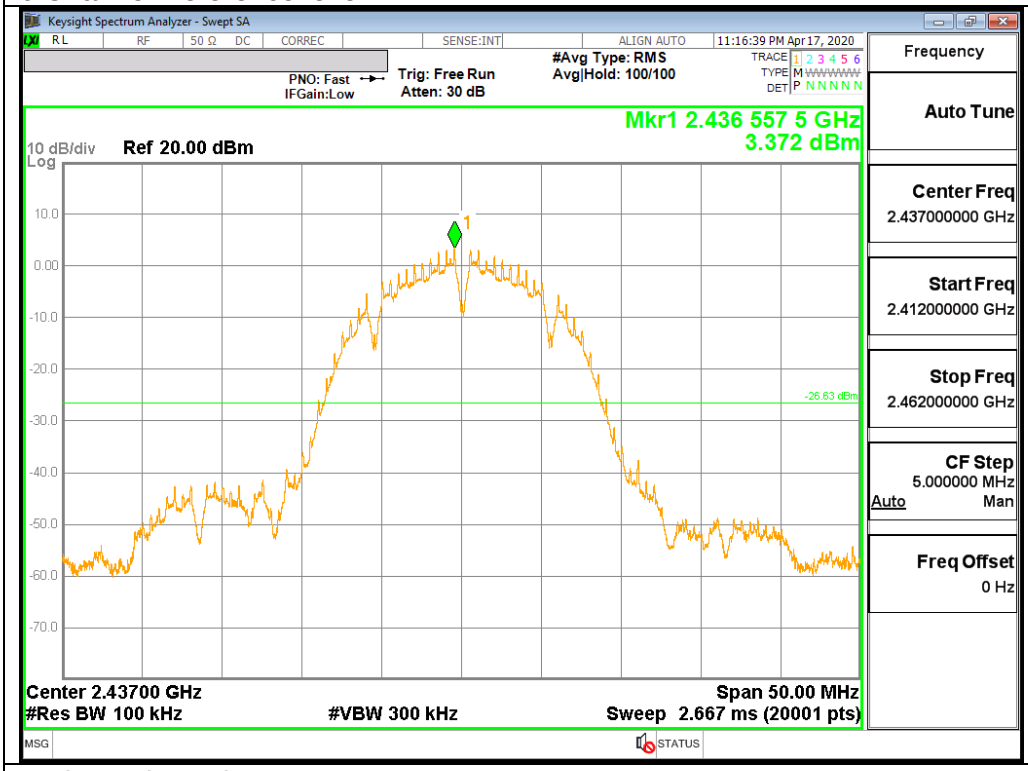
1 Channel BandEdge

1 Channel Spurious

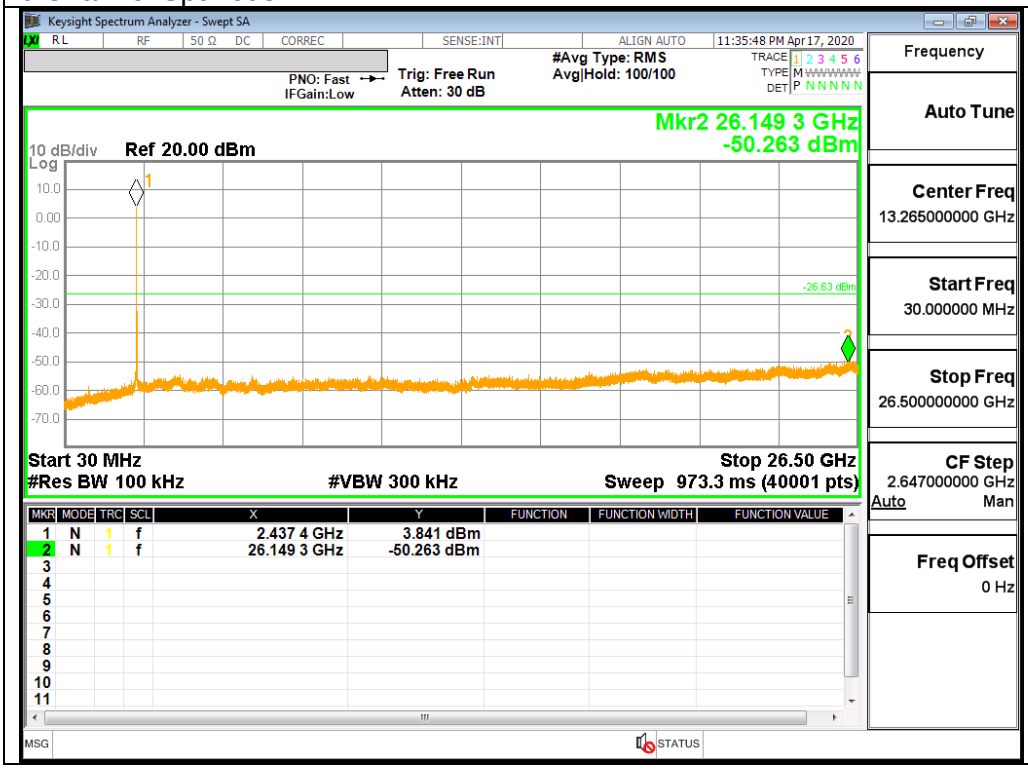


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

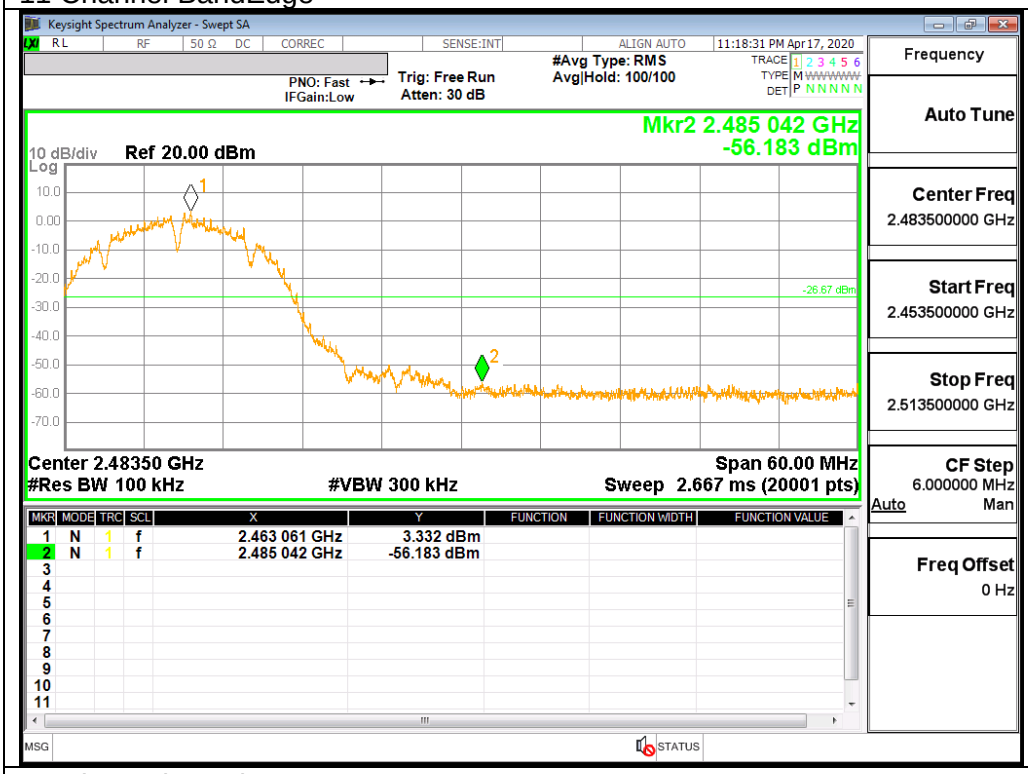
6 Channel Reference level



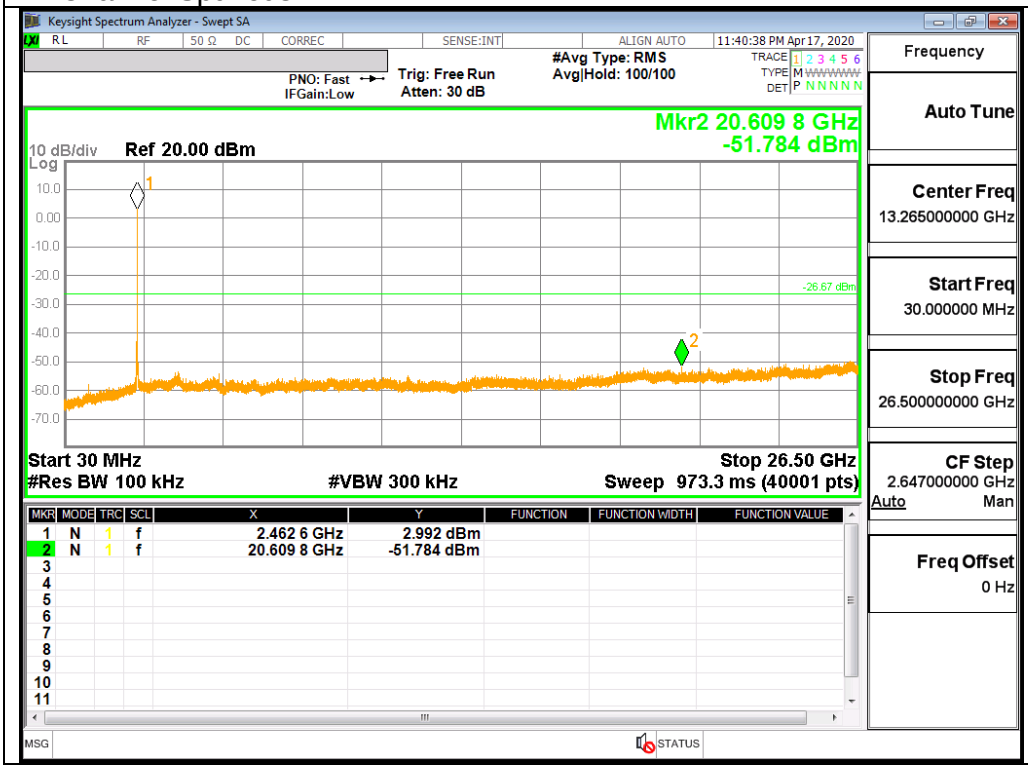
6 Channel Spurious



11 Channel BandEdge

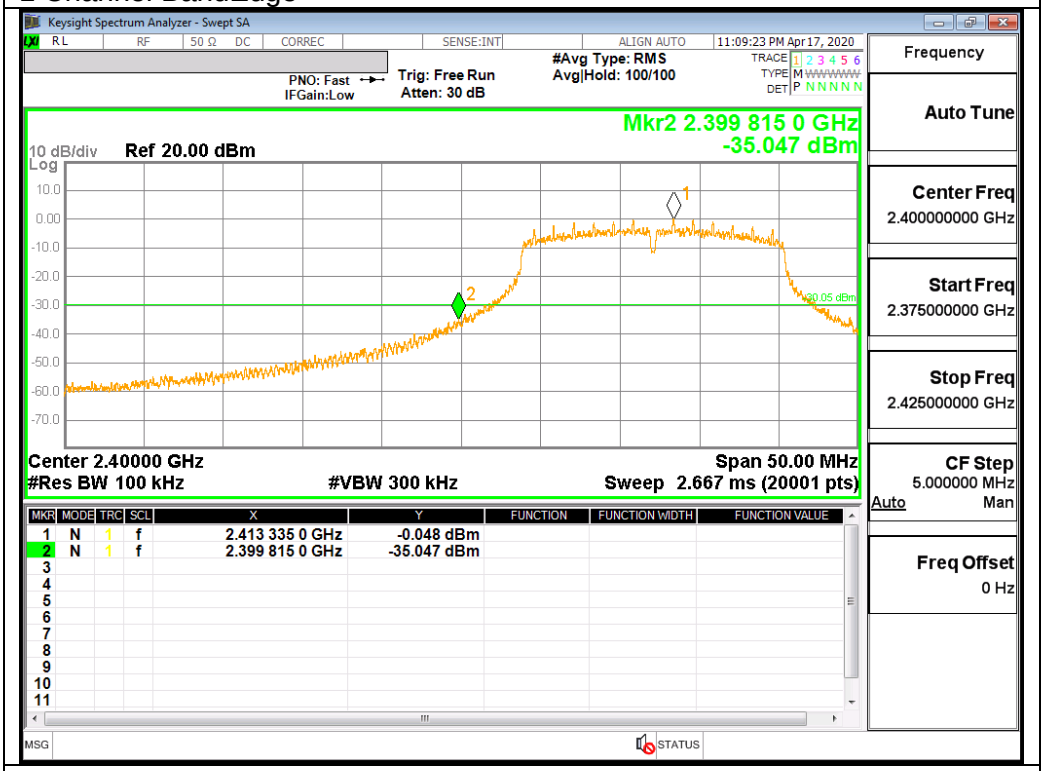


11 Channel Spurious

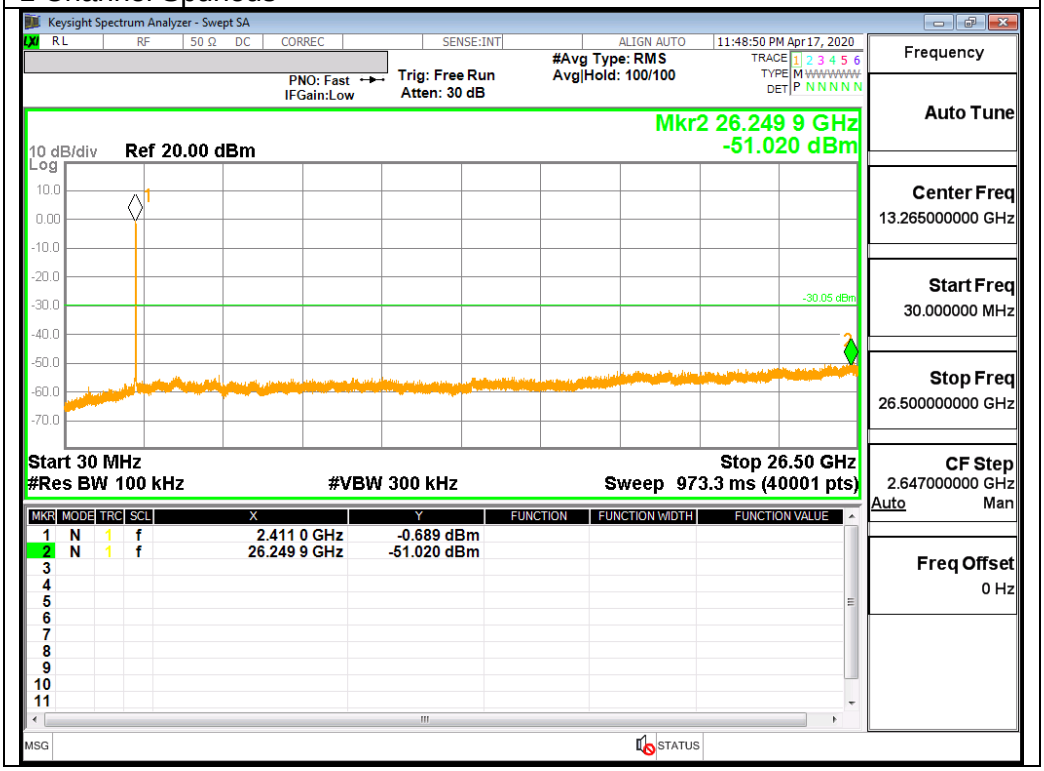


10.4.2. 802.11g MODE IN THE 2.4 GHz BAND

1 Channel BandEdge

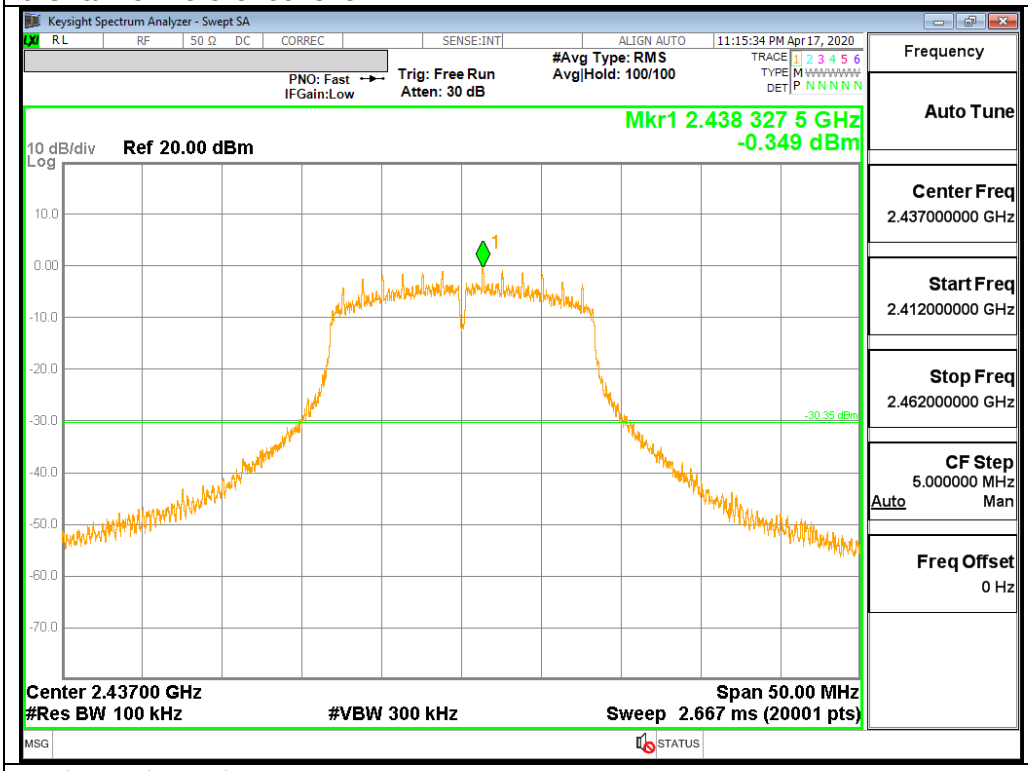


1 Channel Spurious

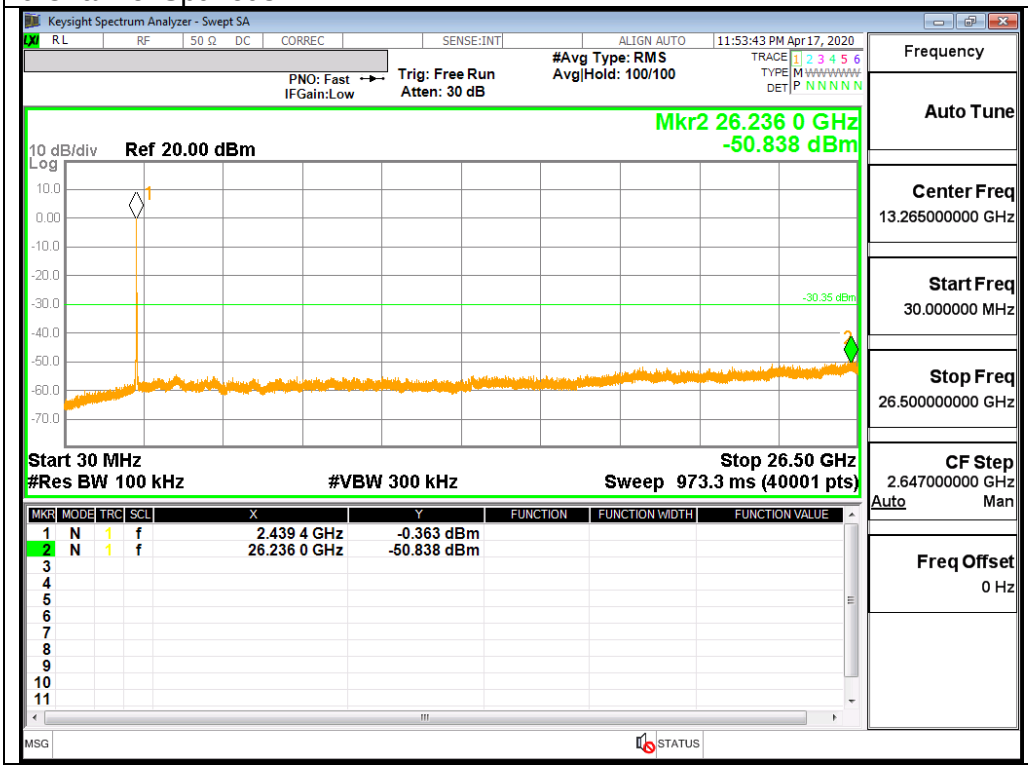


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

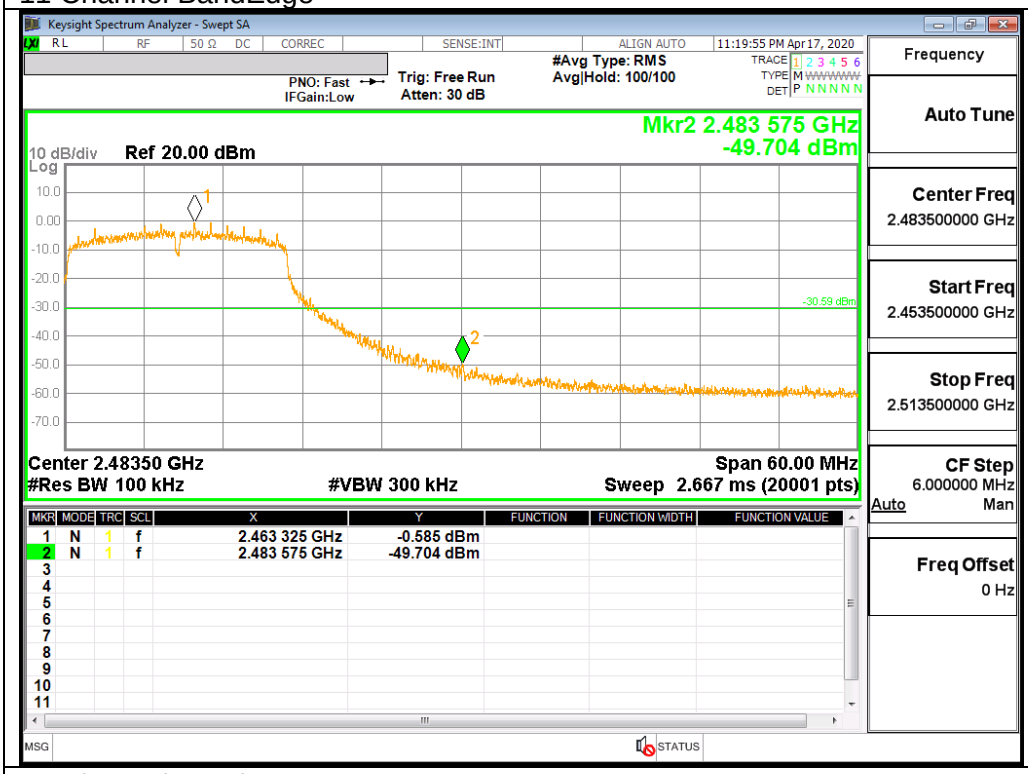
6 Channel Reference level



6 Channel Spurious



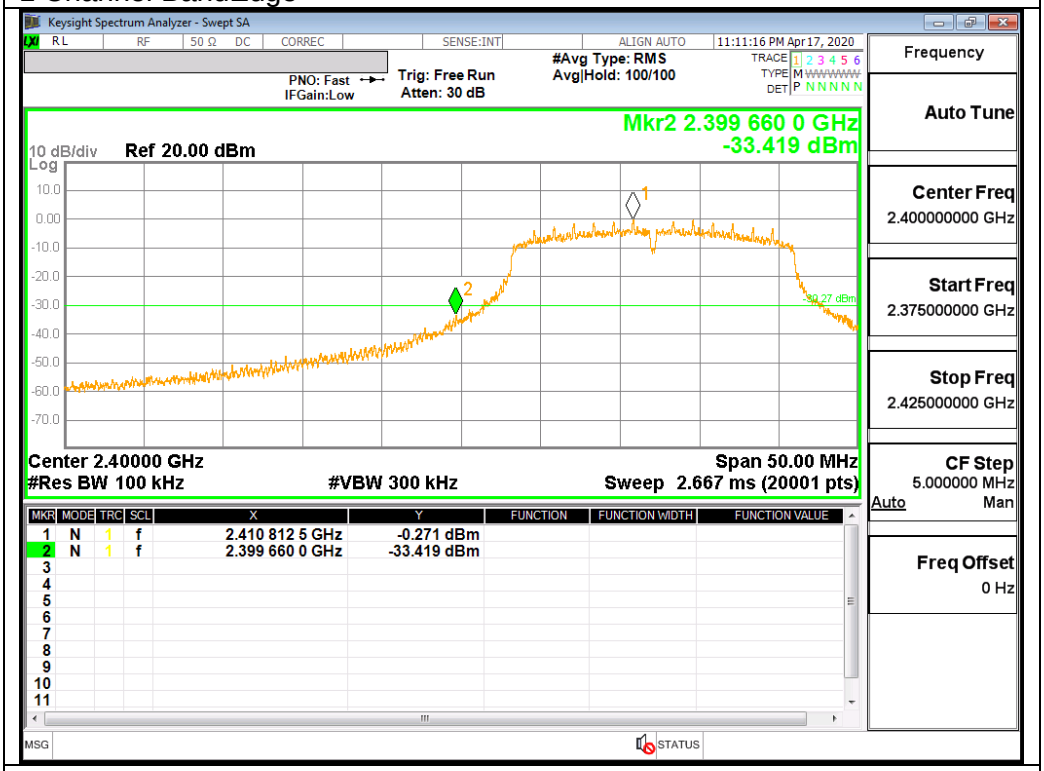
11 Channel BandEdge



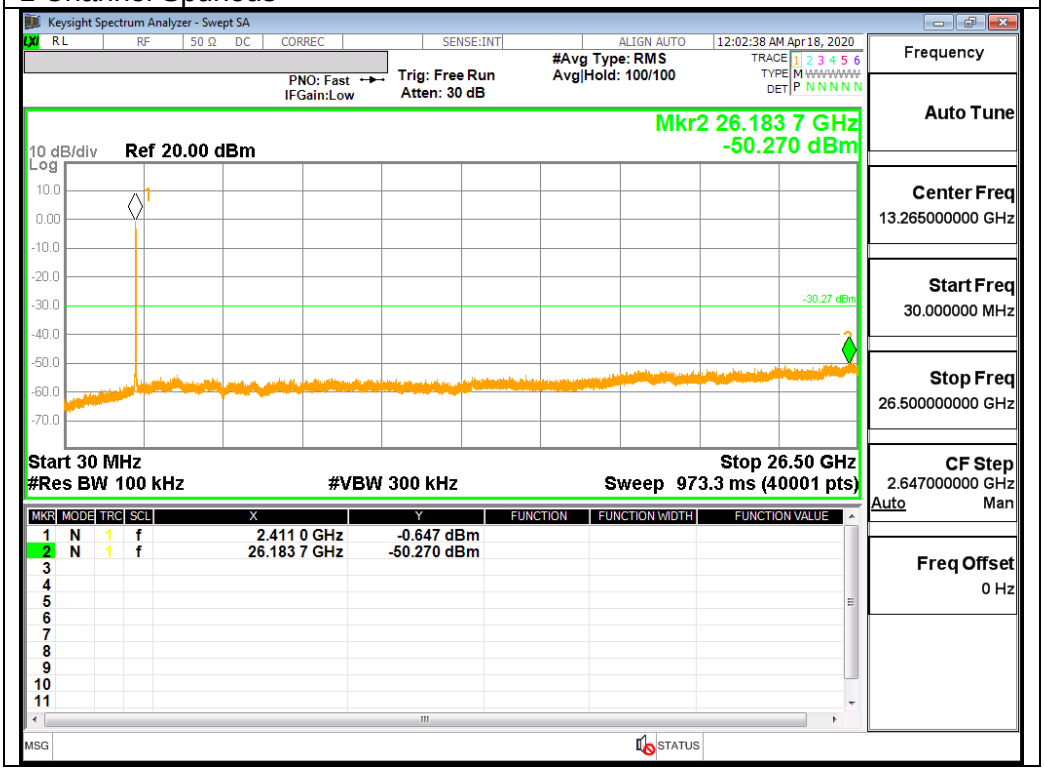
11 Channel Spurious

10.4.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

1 Channel BandEdge

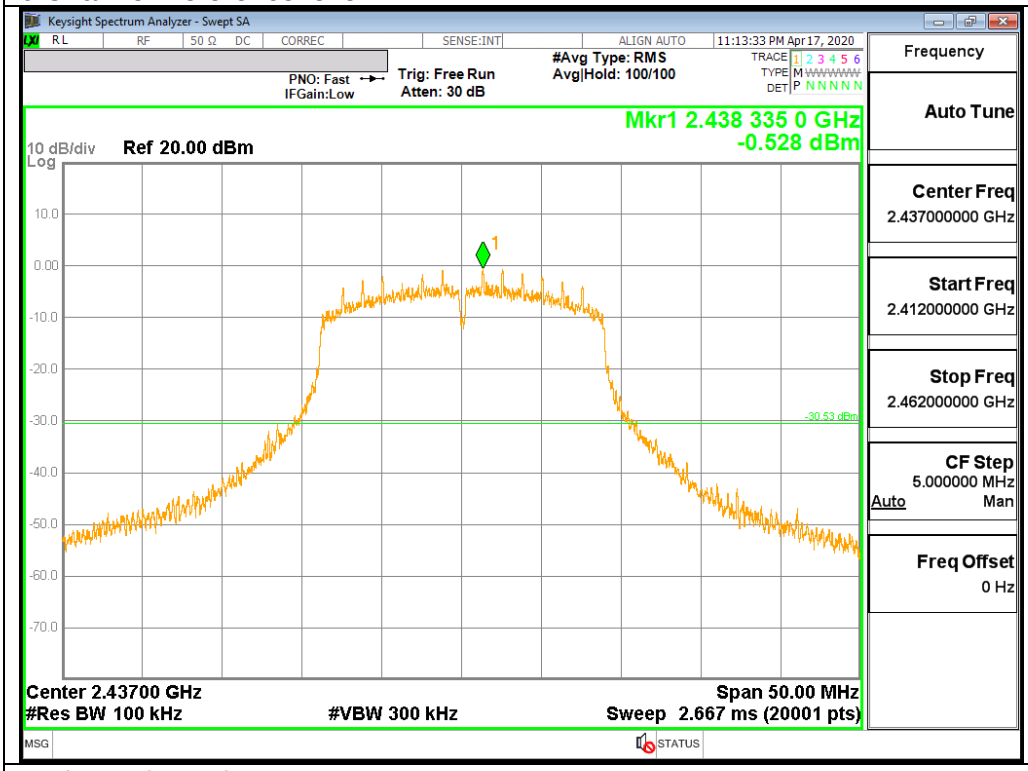


1 Channel Spurious

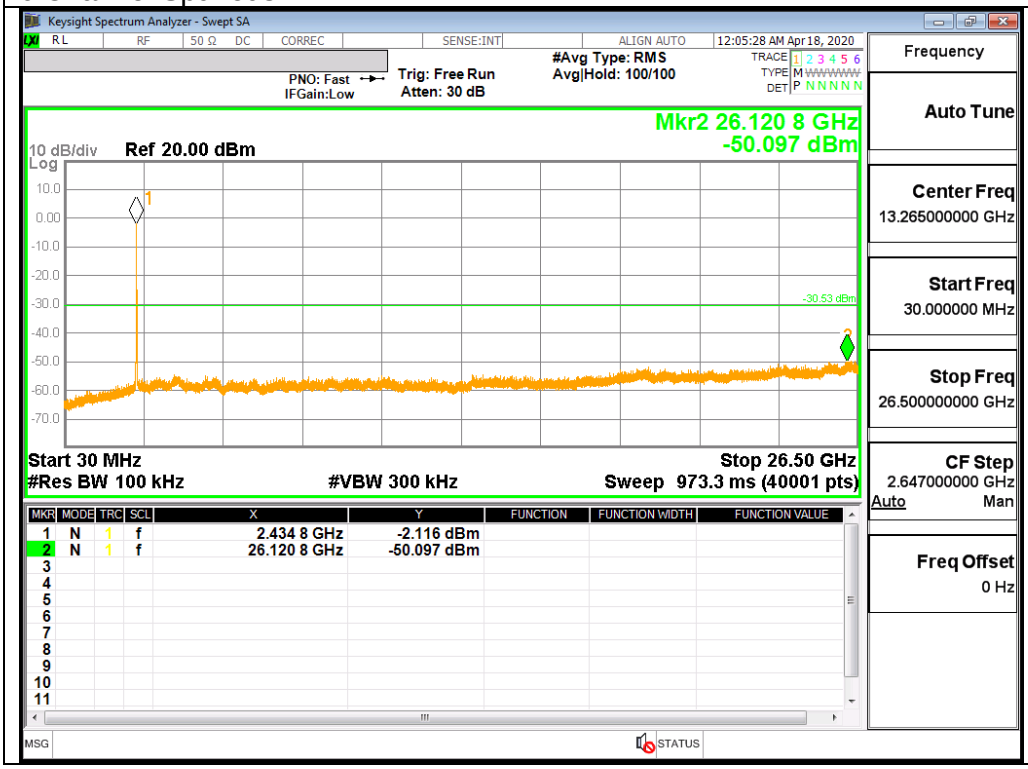


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

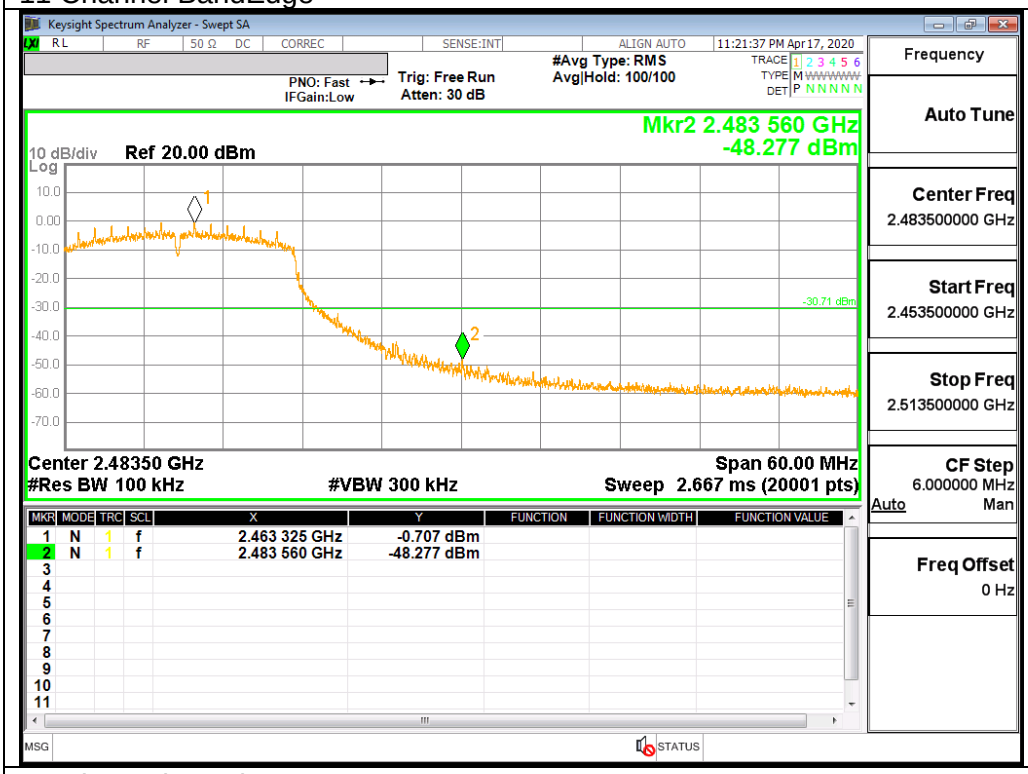
6 Channel Reference level



6 Channel Spurious



11 Channel BandEdge



11 Channel Spurious

11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

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 B mode = 0dB (duty cycle >98%);
G mode = 0.30dB (duty cycle <98%); N mode = 0.32dB (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.

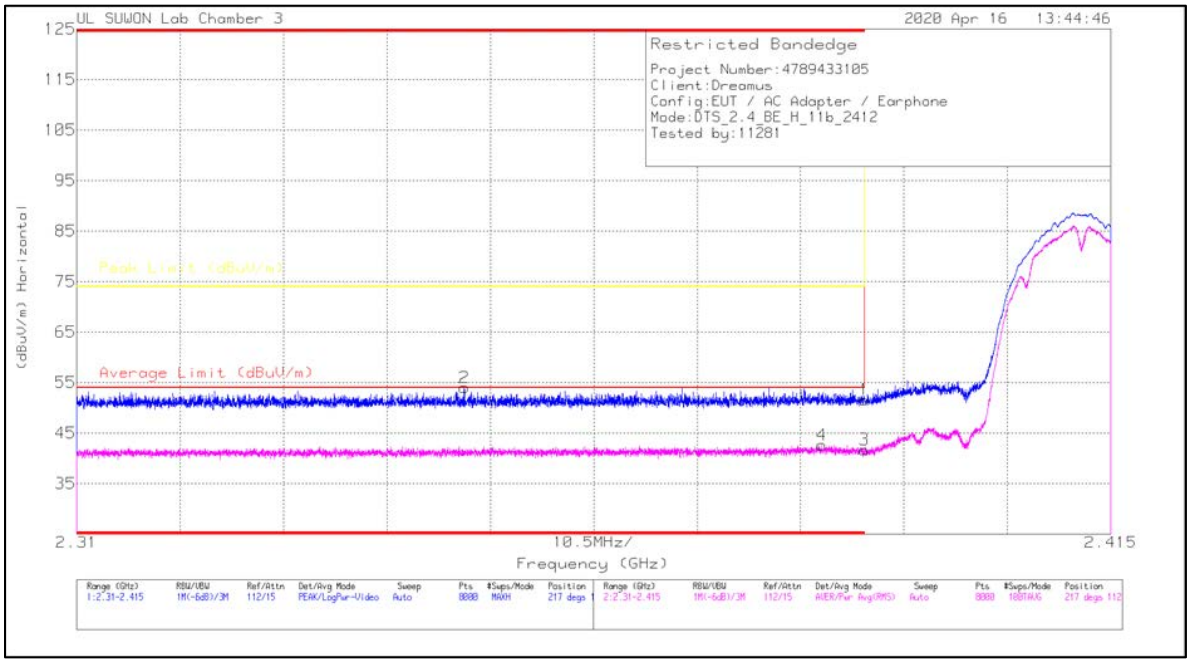
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

11.2. TRANSMITTER ABOVE 1 GHz

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

RESTRICTED BANDEDGE (1 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



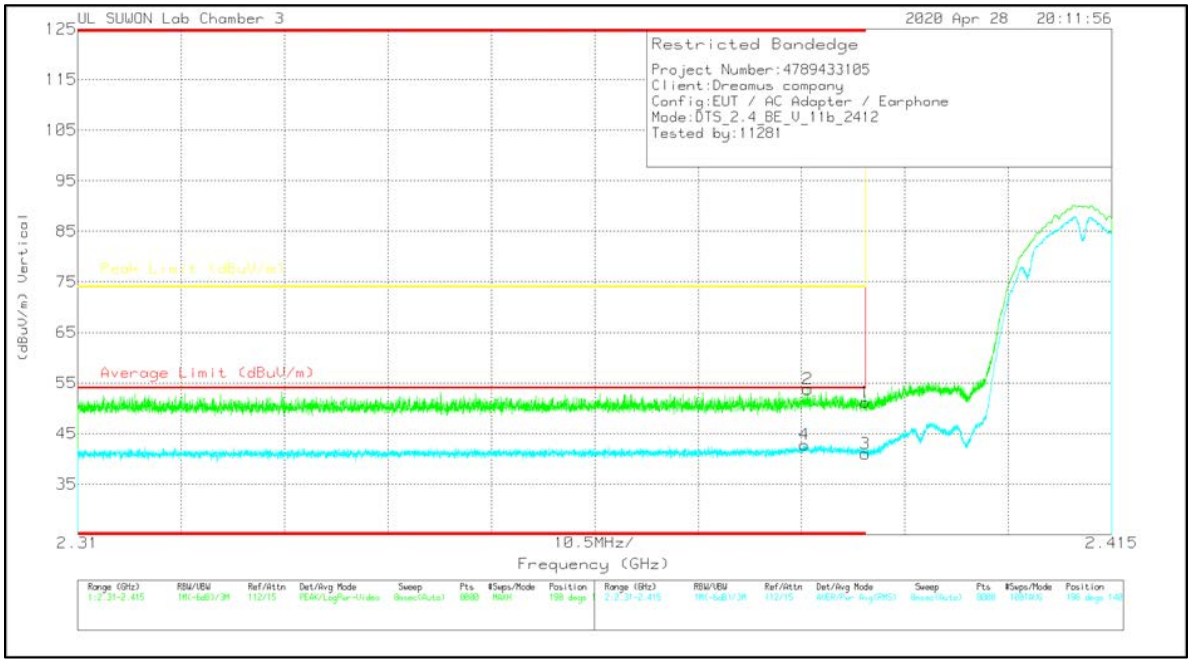
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.85	Pk	31.7	-22.9	51.65	-	-	74	-22.35	217	112	H
2	* 2.34935	45.3	Pk	31.6	-22.9	54	-	-	74	-20	217	112	H
3	* 2.39	32.95	RMS	31.7	-22.9	41.75	54	-12.25	-	-	217	112	H
4	* 2.38566	33.89	RMS	31.7	-22.9	42.69	54	-11.31	-	-	217	112	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

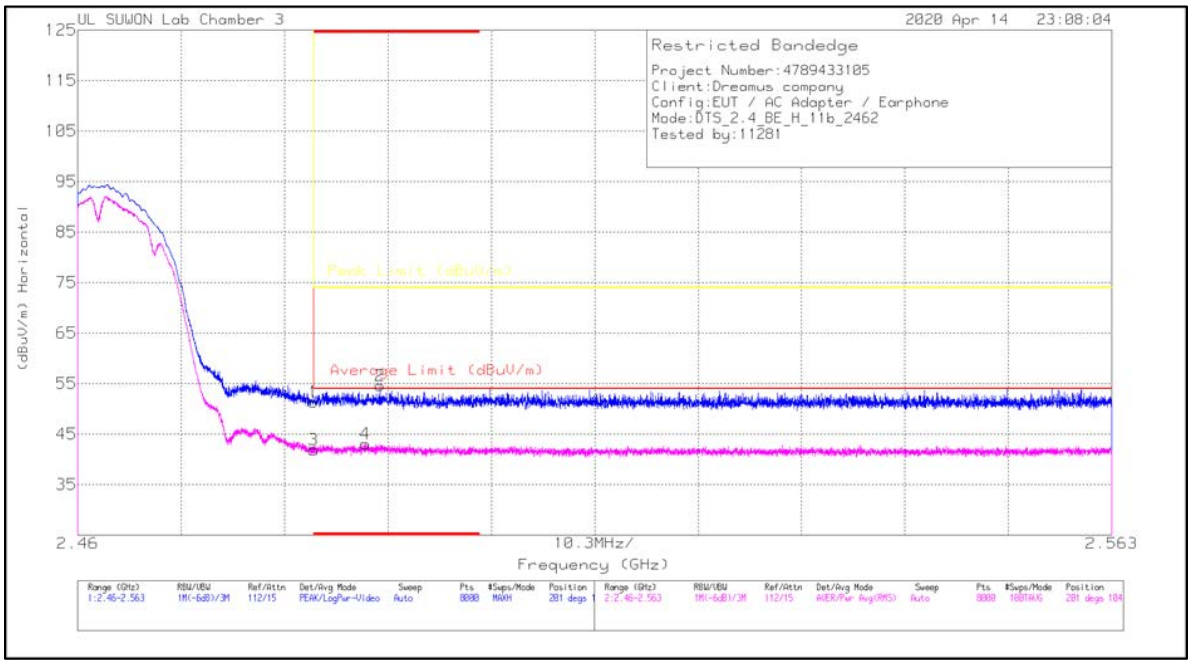
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.39	Pk	31.7	-22.9	51.19	-	-	74	-22.81	198	140	V
2	* 2.38413	45	Pk	31.7	-22.9	53.8	-	-	74	-20.2	198	140	V
3	* 2.39	32.21	RMS	31.7	-22.9	41.01	54	-12.99	-	-	198	140	V
4	* 2.38379	34.02	RMS	31.7	-22.9	42.82	54	-11.18	-	-	198	140	V

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

AUTHORIZED BANDEDGE (11 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



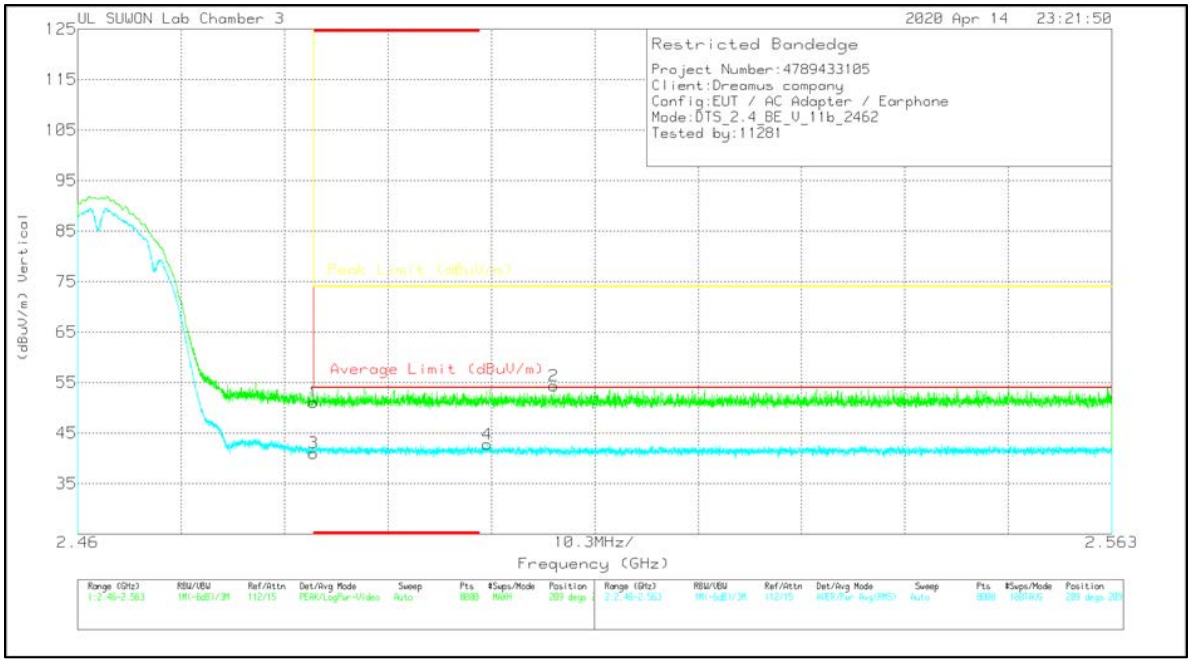
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.25	Pk	31.9	-22.8	51.35	-	-	74	-22.65	201	104	H
2	* 2.49011	45.52	Pk	31.9	-22.8	54.62	-	-	74	-19.38	201	104	H
3	* 2.4835	32.8	RMS	31.9	-22.8	41.9	54	-12.1	-	-	201	104	H
4	* 2.48866	33.97	RMS	31.9	-22.8	43.07	54	-10.93	-	-	201	104	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

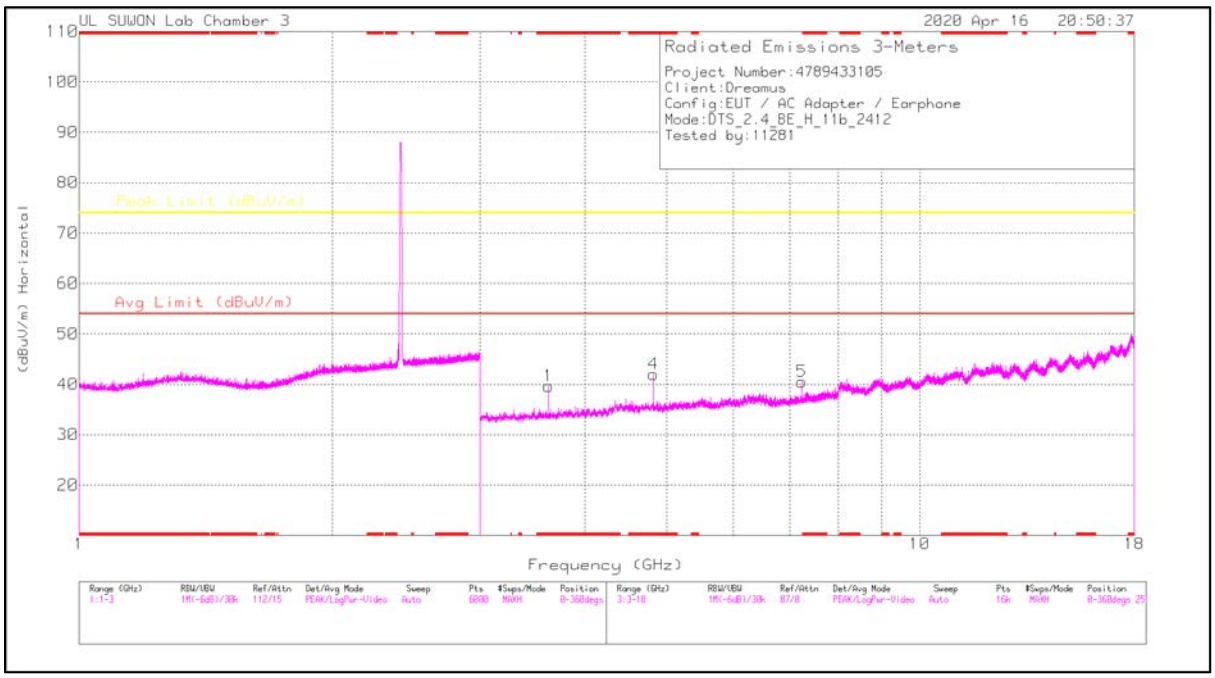
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	41.97	Pk	31.9	-22.8	51.07	-	-	74	-22.93	209	209	V
2	2.5074	45.09	Pk	32	-22.7	54.39	-	-	74	-19.61	209	209	V
3	* 2.4835	31.94	RMS	31.9	-22.8	41.04	54	-12.96	-	-	209	209	V
4	2.50079	33.5	RMS	32	-22.7	42.8	54	-11.2	-	-	209	209	V

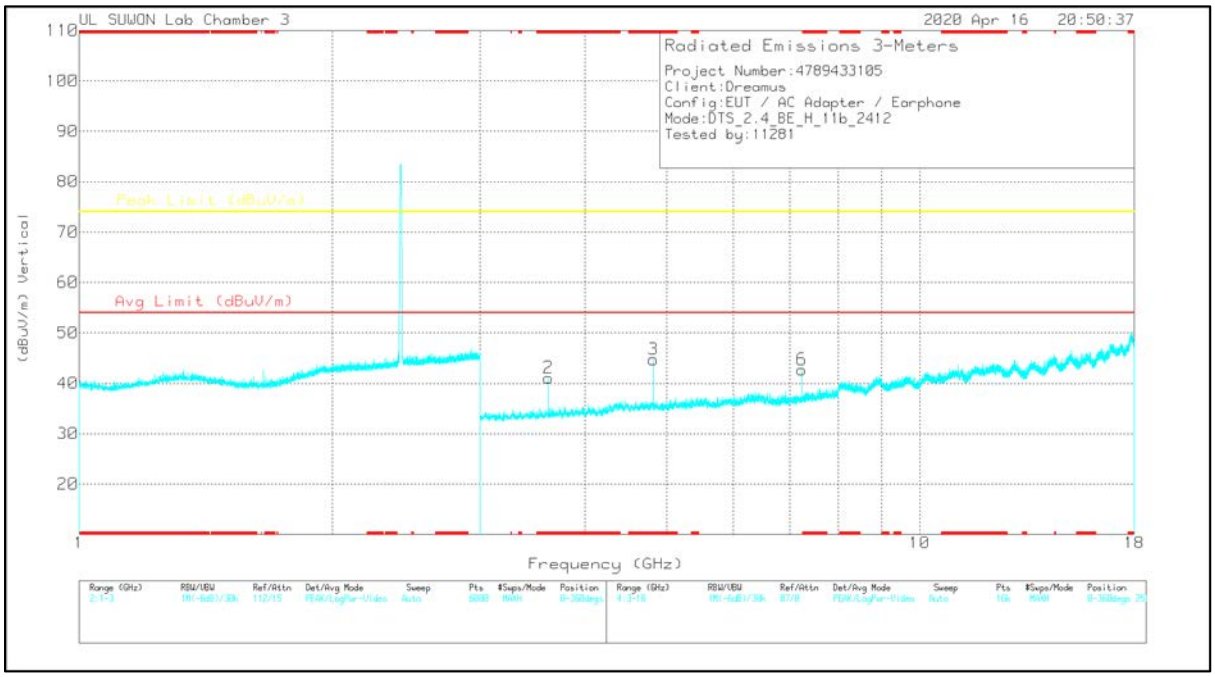
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

1 CHANNEL HORIZONTAL



1 CHANNEL 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.

1 CHANNEL DATA

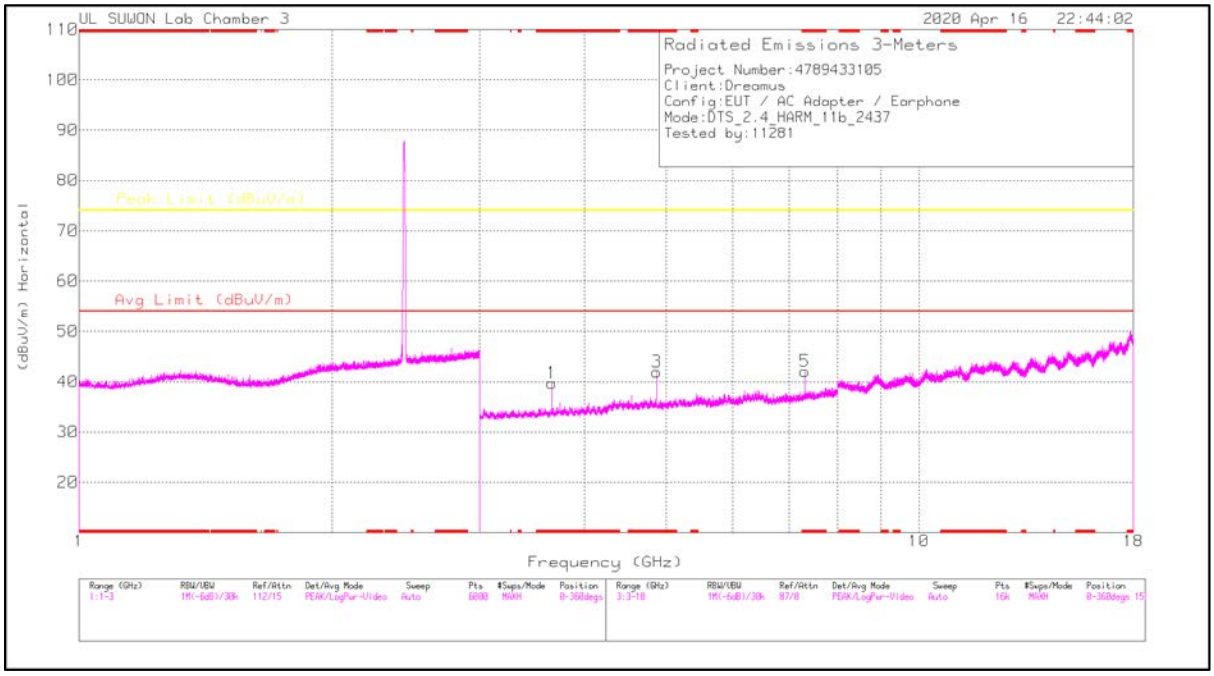
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.61791	44.02	PK2	33.1	-30.6	46.52	-	-	74	-27.48	119	209	H
* 3.61811	36.37	MAv1	33.1	-30.6	38.87	54	-15.13	-	-	119	209	H
* 4.82394	42.06	PK2	34.2	-28.1	48.16	-	-	74	-25.84	170	303	H
* 4.82404	38.08	MAv1	34.2	-28.1	44.18	54	-9.82	-	-	170	303	H
7.23595	37.92	PK2	35.8	-23.7	50.02	-	-	74	-23.98	201	296	H
7.23607	30.33	MAv1	35.8	-23.7	42.43	-	-	-	-	201	296	H
* 3.61813	44.59	PK2	33.1	-30.6	47.09	-	-	74	-26.91	177	208	V
* 3.61805	37.85	MAv1	33.1	-30.6	40.35	54	-13.65	-	-	177	208	V
* 4.82389	43.21	PK2	34.2	-28.1	49.31	-	-	74	-24.69	160	264	V
* 4.82399	37.63	MAv1	34.2	-28.1	43.73	54	-10.27	-	-	160	264	V
7.23628	38.34	PK2	35.8	-23.7	50.44	-	-	74	-23.56	145	346	V
7.2361	30.16	MAv1	35.8	-23.7	42.26	-	-	-	-	145	346	V

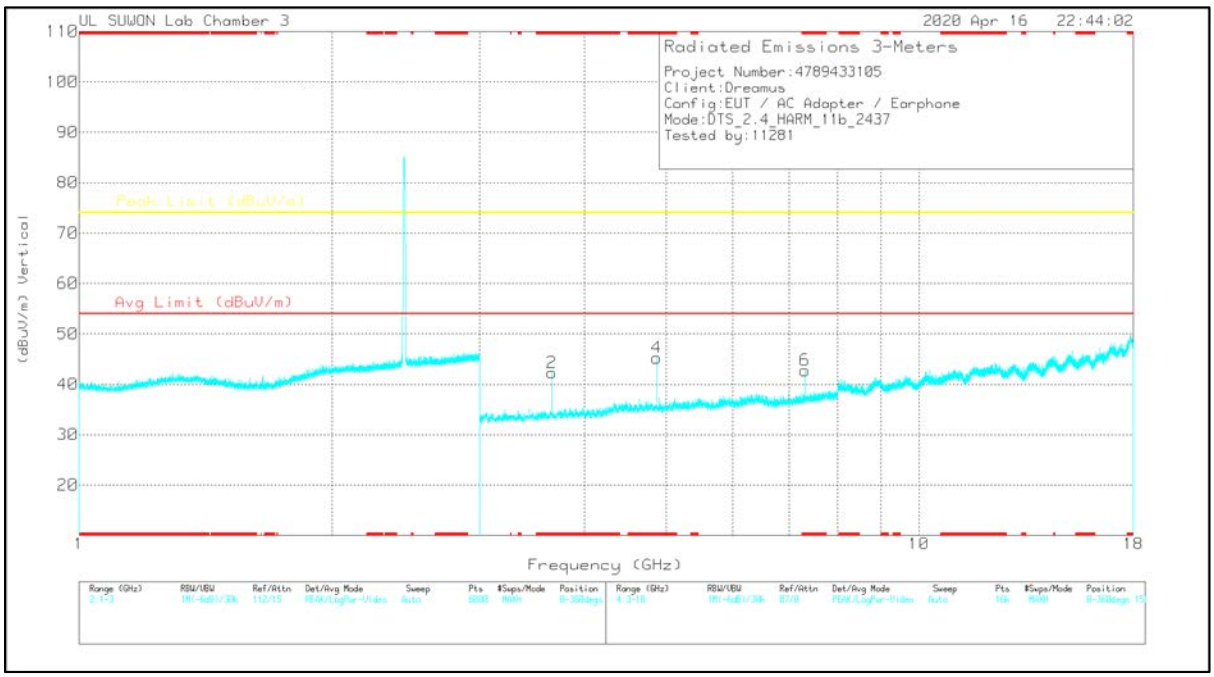
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

6 CHANNEL HORIZONTAL



6 CHANNEL 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.

6 CHANNEL DATA

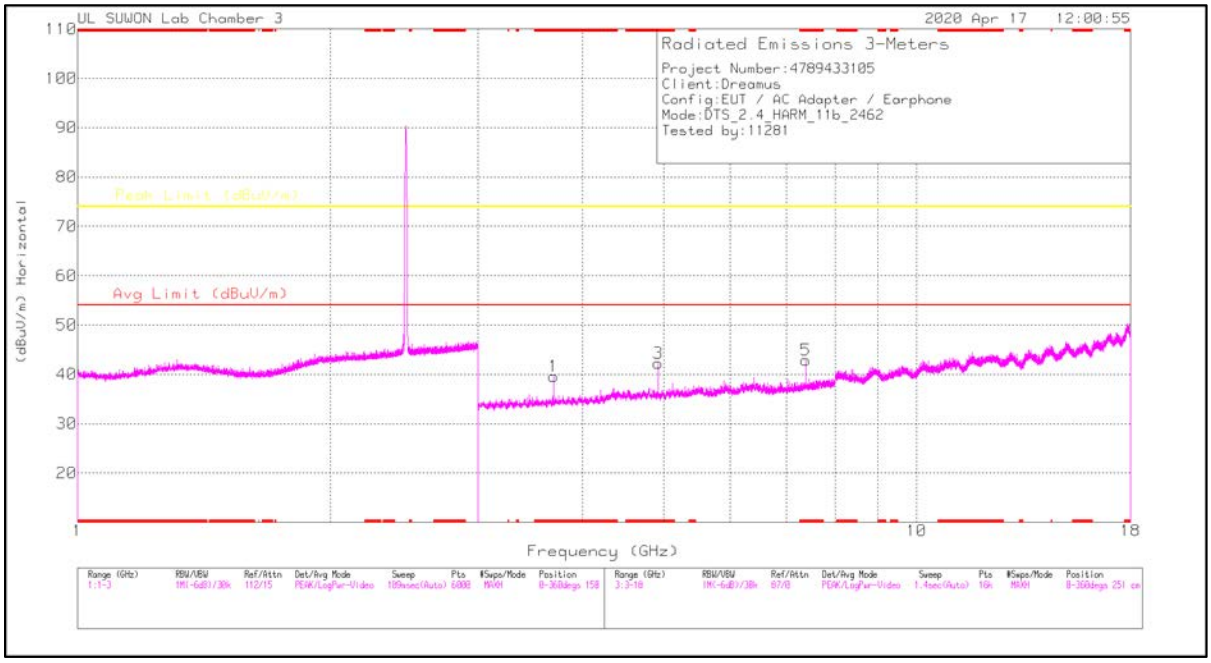
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.65552	44.01	PK2	33.1	-30.3	46.81	-	-	74	-27.19	125	267	H
* 3.6555	37.22	MAv1	33.1	-30.3	40.02	54	-13.98	-	-	125	267	H
* 4.87413	43.28	PK2	34.2	-28.7	48.78	-	-	74	-25.22	172	276	H
* 4.87413	36.36	MAv1	34.2	-28.7	41.86	54	-12.14	-	-	172	276	H
* 7.31111	37.73	PK2	35.8	-23.3	50.23	-	-	74	-23.77	207	286	H
* 7.31117	30.05	MAv1	35.8	-23.3	42.55	54	-11.45	-	-	207	286	H
* 3.65552	44.7	PK2	33.1	-30.3	47.5	-	-	74	-26.5	176	277	V
* 3.65556	38.34	MAv1	33.1	-30.3	41.14	54	-12.86	-	-	176	277	V
* 4.87419	44.89	PK2	34.2	-28.7	50.39	-	-	74	-23.61	163	257	V
* 4.87405	39.31	MAv1	34.2	-28.7	44.81	54	-9.19	-	-	163	257	V
* 7.3111	37.58	PK2	35.8	-23.3	50.08	-	-	74	-23.92	151	243	V
* 7.311	30.48	MAv1	35.8	-23.3	42.98	54	-11.02	-	-	151	243	V

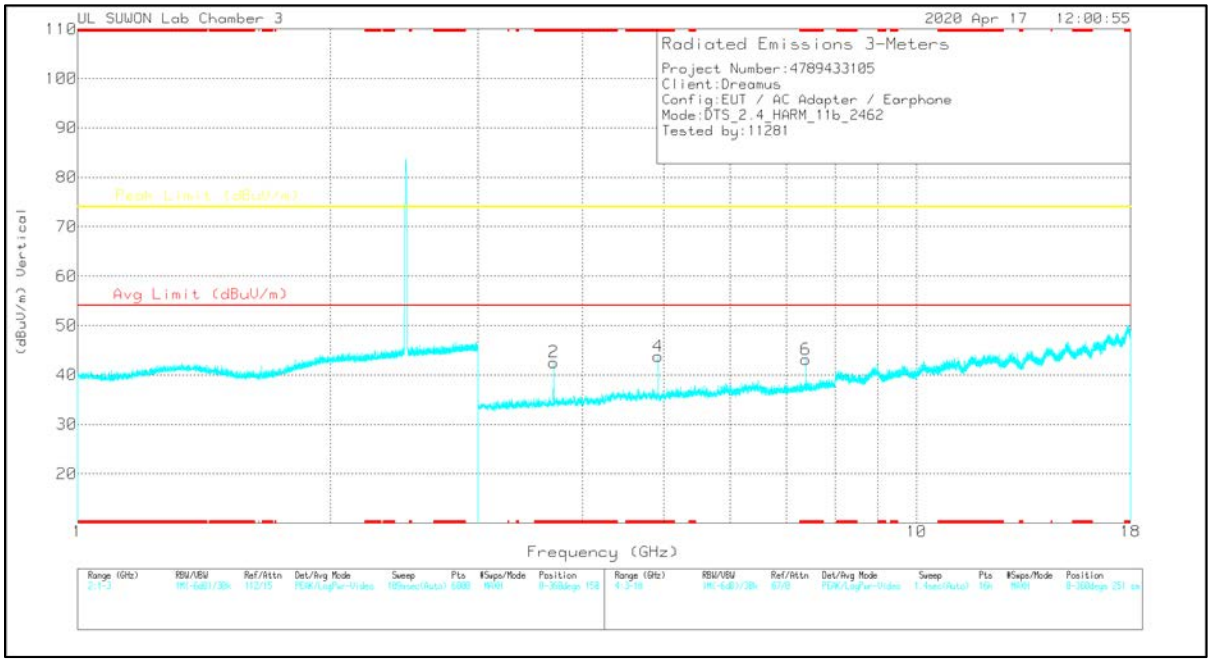
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

11 CHANNEL HORIZONTAL



11 CHANNEL 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.

11 CHANNEL DATA

Radiated Emissions

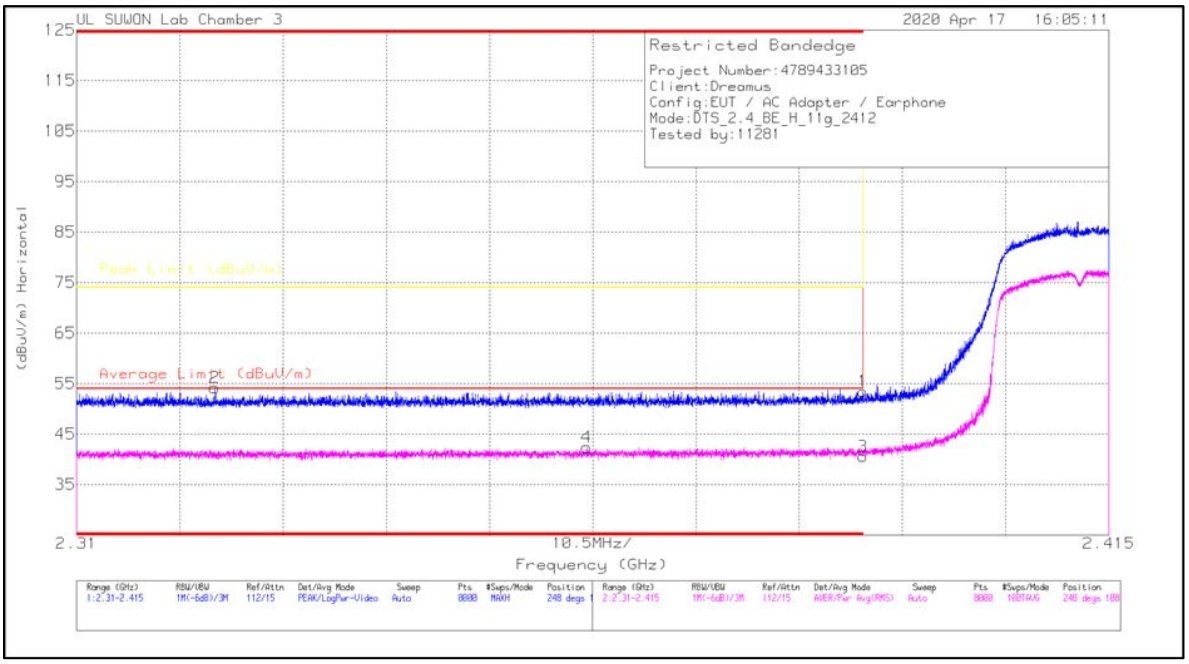
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.69303	43.2	PK2	33.1	-29.7	46.6	-	-	74	-27.4	109	128	H
* 3.69311	35.81	MAv1	33.1	-29.7	39.21	54	-14.79	-	-	109	128	H
* 4.92414	43.38	PK2	34.2	-28.8	48.78	-	-	74	-25.22	175	272	H
* 4.92406	36.06	MAv1	34.2	-28.8	41.46	54	-12.54	-	-	175	272	H
* 7.38604	37.05	PK2	35.8	-22.7	50.15	-	-	74	-23.85	201	294	H
* 7.38608	29.08	MAv1	35.8	-22.7	42.18	54	-11.82	-	-	201	294	H
* 3.69303	44.04	PK2	33.1	-29.7	47.44	-	-	74	-26.56	168	279	V
* 3.69305	37.64	MAv1	33.1	-29.7	41.04	54	-12.96	-	-	168	279	V
* 4.92398	43.54	PK2	34.2	-28.8	48.94	-	-	74	-25.06	171	224	V
* 4.92402	38.16	MAv1	34.2	-28.8	43.56	54	-10.44	-	-	171	224	V
* 7.38614	37.87	PK2	35.8	-22.7	50.97	-	-	74	-23.03	134	219	V
* 7.38606	30.94	MAv1	35.8	-22.7	44.04	54	-9.96	-	-	134	219	V

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

11.2.2. TX ABOVE 1 GHz 802.11g IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (1 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



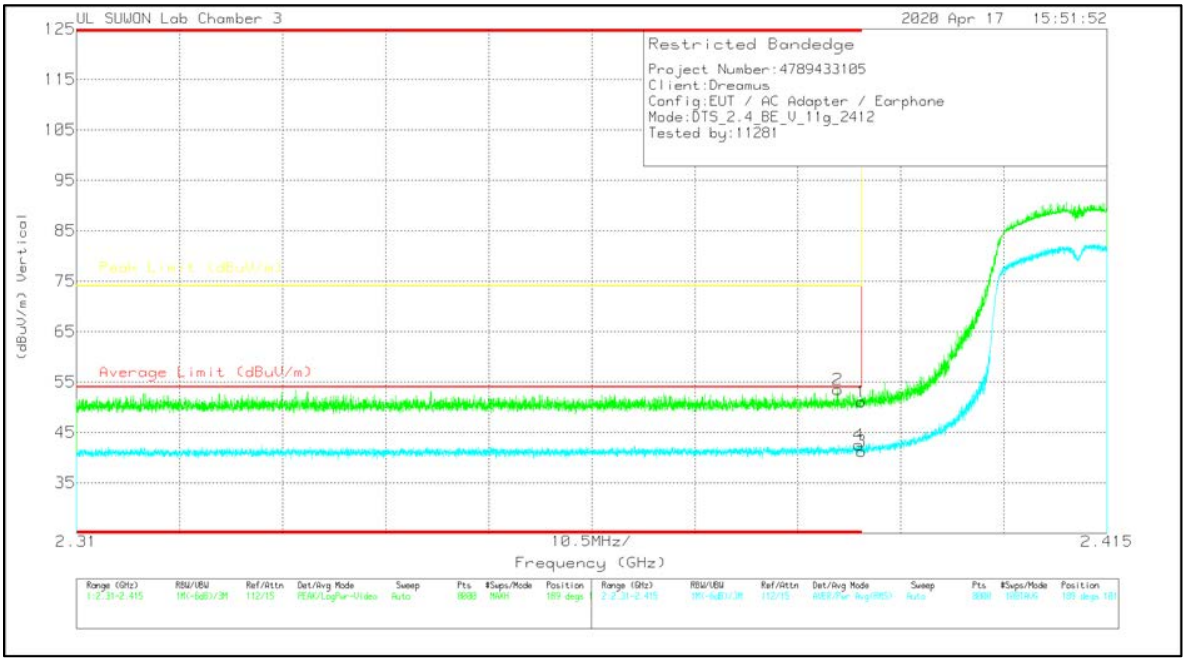
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	44.68	Pk	31.7	-22.9	0	53.48	-	-	74	-20.52	248	108	H
2	* 2.32403	45.63	Pk	31.5	-22.9	0	54.23	-	-	74	-19.77	248	108	H
3	* 2.39	31.5	RMS	31.7	-22.9	.3	40.6	54	-13.4	-	-	248	108	H
4	* 2.36186	33.39	RMS	31.6	-22.9	.3	42.39	54	-11.61	-	-	248	108	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

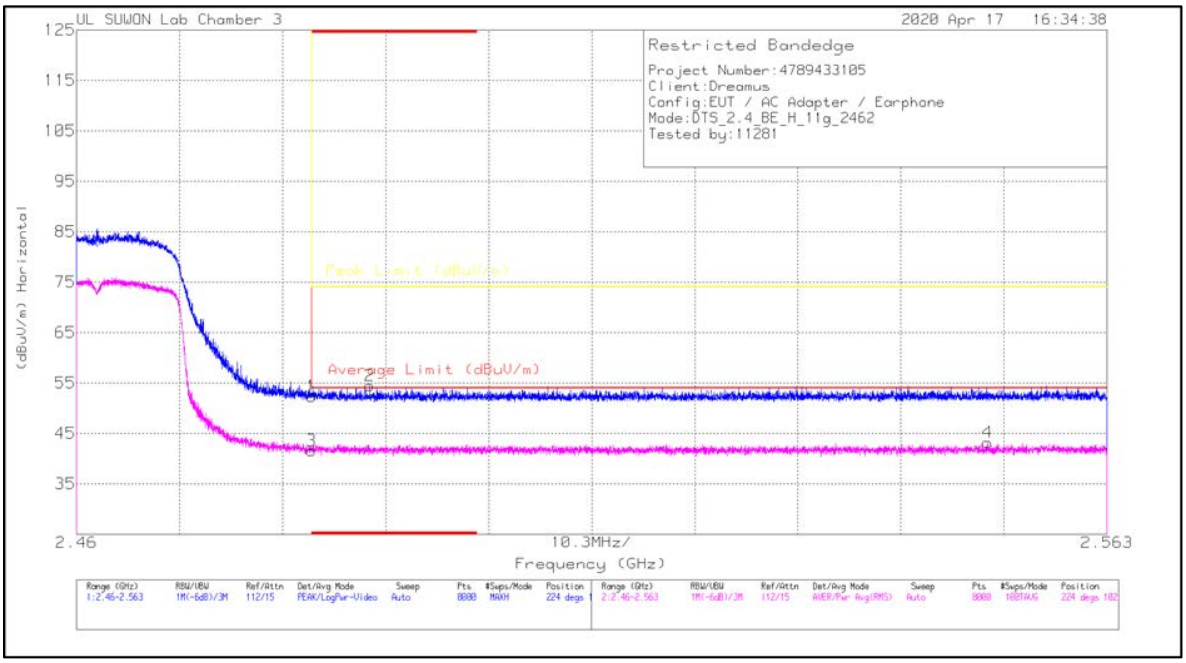
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	42.29	Pk	31.7	-22.9	0	51.09	-	-	74	-22.91	189	101	V
2	* 2.38757	44.74	Pk	31.7	-22.9	0	53.54	-	-	74	-20.46	189	101	V
3	* 2.39	32.15	RMS	31.7	-22.9	.3	41.25	54	-12.75	-	-	189	101	V
4	* 2.38969	33.45	RMS	31.7	-22.9	.3	42.55	54	-11.45	-	-	189	101	V

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

AUTHORIZED BANDEDGE (11 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



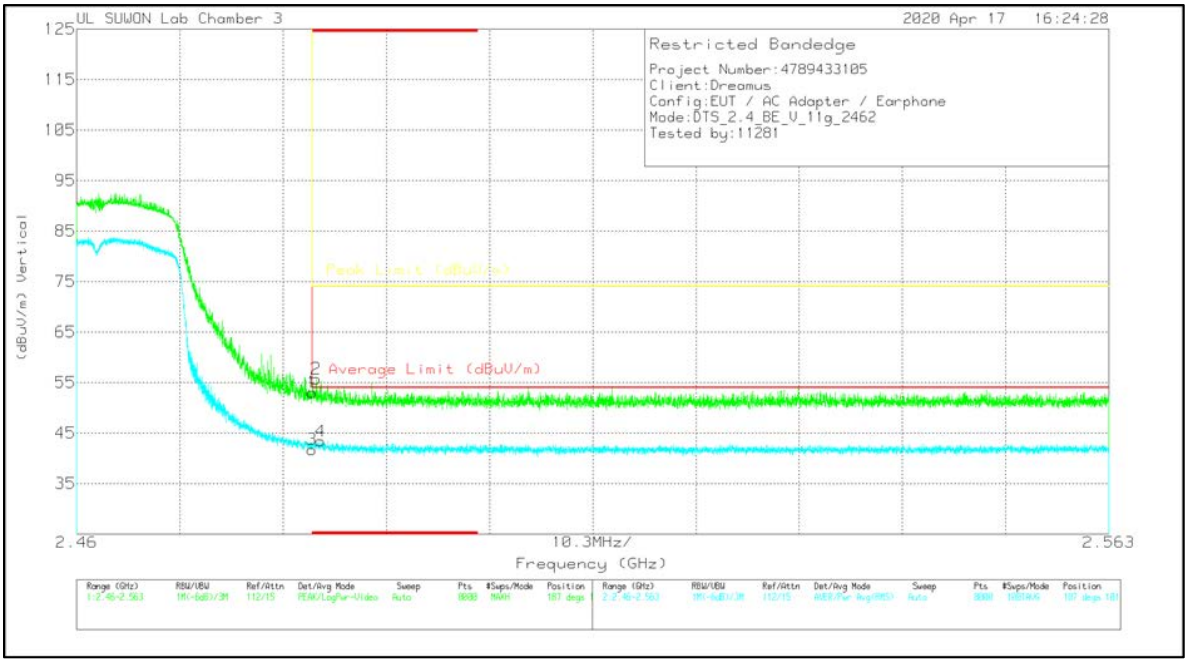
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	* 2.4835	43.3	Pk	31.9	-22.8	0	52.4	-	-	74	-21.6	224	102	H
2	* 2.48932	45.4	Pk	31.9	-22.8	0	54.5	-	-	74	-19.5	224	102	H
3	* 2.4835	32.2	RMS	31.9	-22.8	.3	41.6	54	-12.4	-	-	224	102	H
4	2.55107	33.63	RMS	32	-22.7	.3	43.23	54	-10.77	-	-	224	102	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

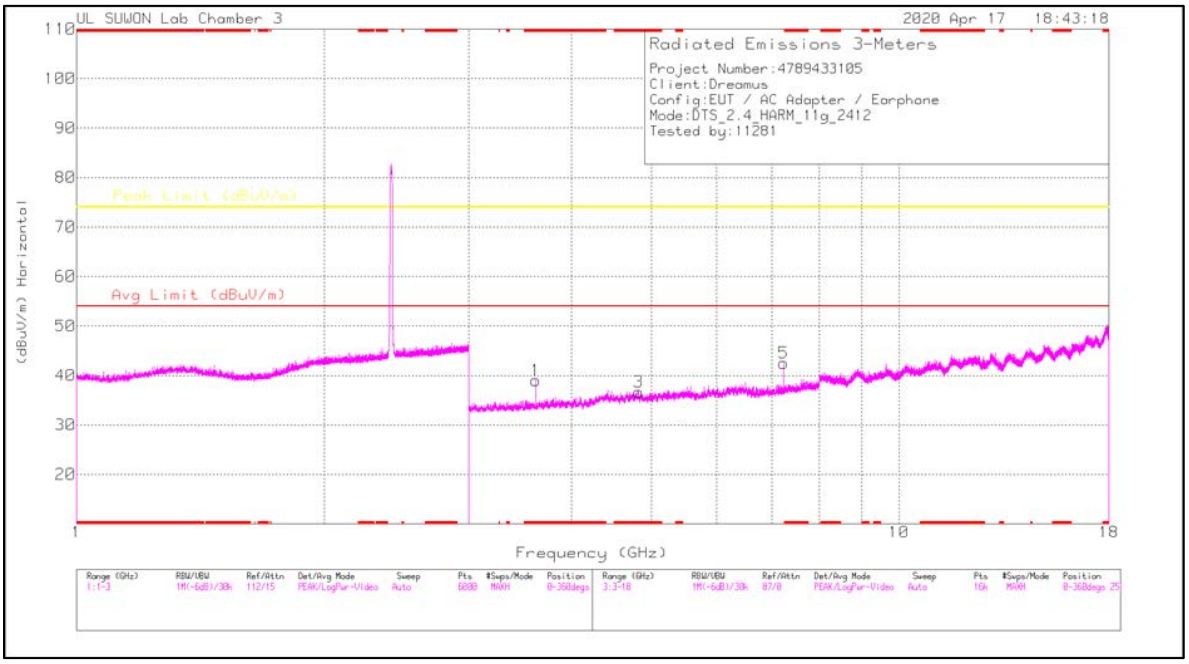
Trace Markers

Marker	Frequency(GHz)	MeterReading(dBuV)	Det	3117_00205959	10dB_ATT[dB]	DC Corr (dB)	CorrectedReading(dBuV/m)	Average Limit (dBuV/m)	Margin(dB)	Peak Limit (dBuV/m)	PK Margin(dB)	Azimuth(Degs)	Height(cm)	Polarity
1	* 2.4835	43.99	Pk	31.9	-22.8	0	53.09	-	-	74	-20.91	187	101	V
2	* 2.48389	46.54	Pk	31.9	-22.7	0	55.74	-	-	74	-18.26	187	101	V
3	* 2.4835	32.37	RMS	31.9	-22.8	.3	41.77	54	-12.23	-	-	187	101	V
4	* 2.48436	33.91	RMS	31.9	-22.7	.3	43.41	54	-10.59	-	-	187	101	V

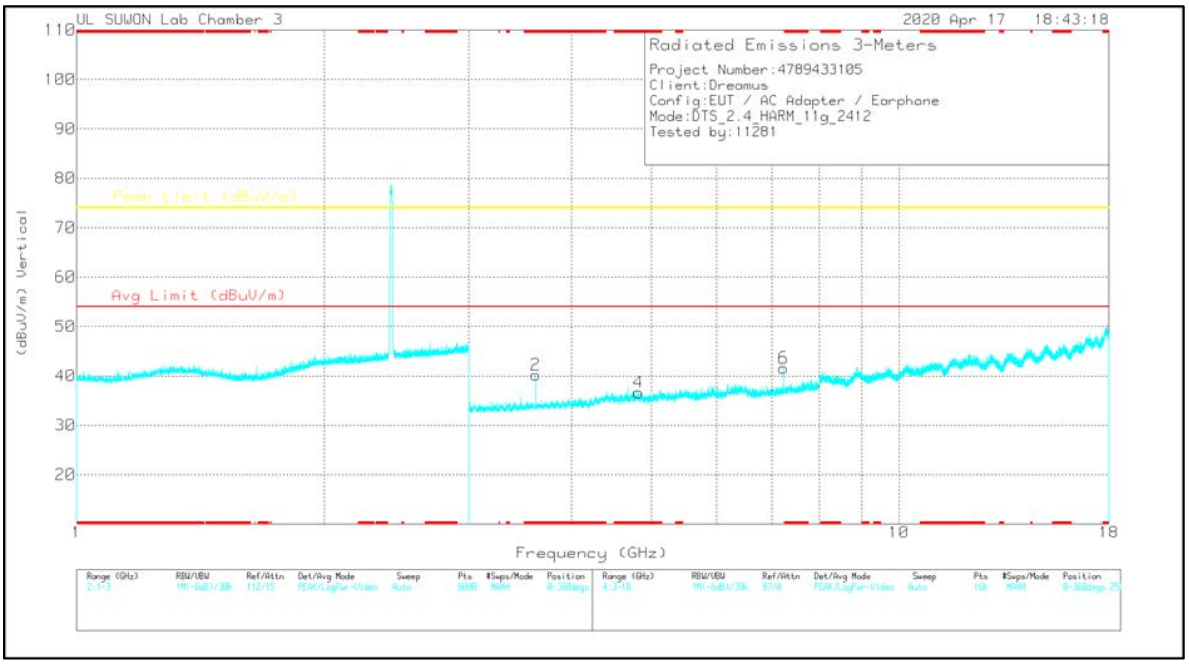
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

1 CHANNEL HORIZONTAL



1 CHANNEL 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.

1 CHANNEL DATA

Radiated Emissions

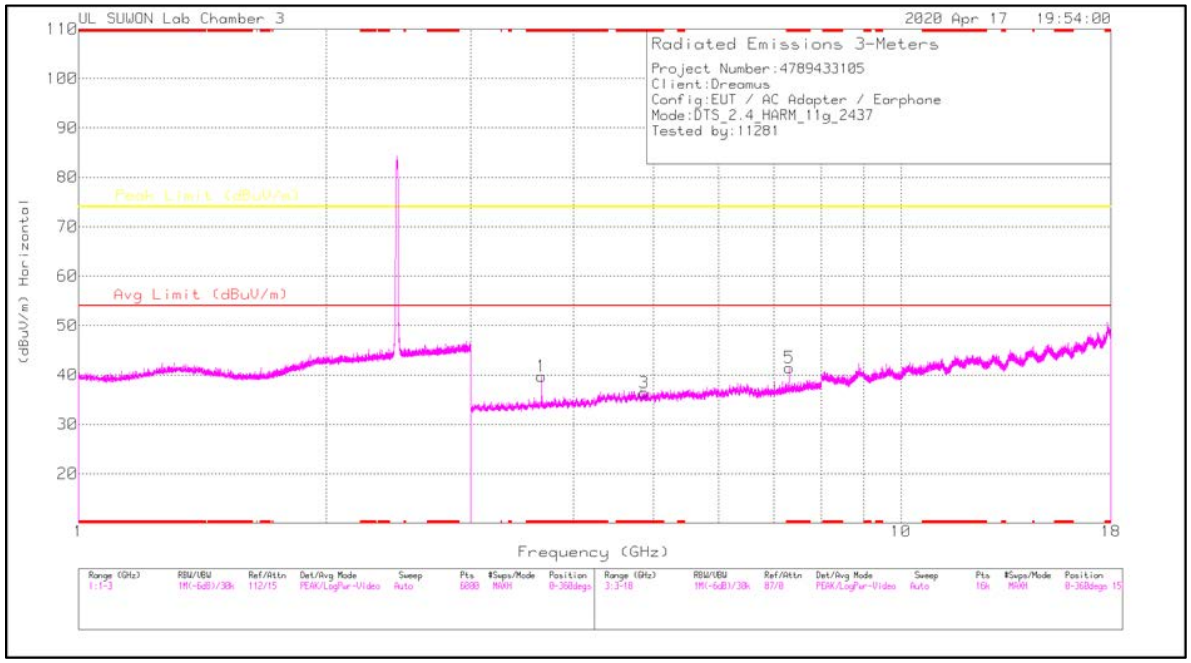
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.61819	43.46	PK2	33.1	-30.6	0	45.96	-	-	74	-28.04	118	250	H
* 3.61809	35.97	MAv1	33.1	-30.6	.3	38.77	54	-15.23	-	-	118	250	H
* 4.83409	36.29	PK2	34.2	-28.2	0	42.29	-	-	74	-31.71	0	100	H
* 4.81869	27.64	MAv1	34.2	-28.1	.3	34.04	54	-19.96	-	-	0	100	H
7.23621	37.83	PK2	35.8	-23.7	0	49.93	-	-	74	-24.07	247	118	H
7.23609	29.08	MAv1	35.8	-23.7	.3	41.48	-	-	-	-	247	118	H
* 3.61802	45.16	PK2	33.1	-30.6	0	47.66	-	-	74	-26.34	148	119	V
* 3.61804	39.37	MAv1	33.1	-30.6	.3	42.17	54	-11.83	-	-	148	119	V
* 4.83167	35.69	PK2	34.2	-28.2	0	41.69	-	-	74	-32.31	0	100	V
* 4.82874	27.74	MAv1	34.2	-28.2	.3	34.04	54	-19.96	-	-	0	100	V
7.23608	37.87	PK2	35.8	-23.7	0	49.97	-	-	74	-24.03	148	279	V
7.2362	29.85	MAv1	35.8	-23.7	.3	42.25	-	-	-	-	148	279	V

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

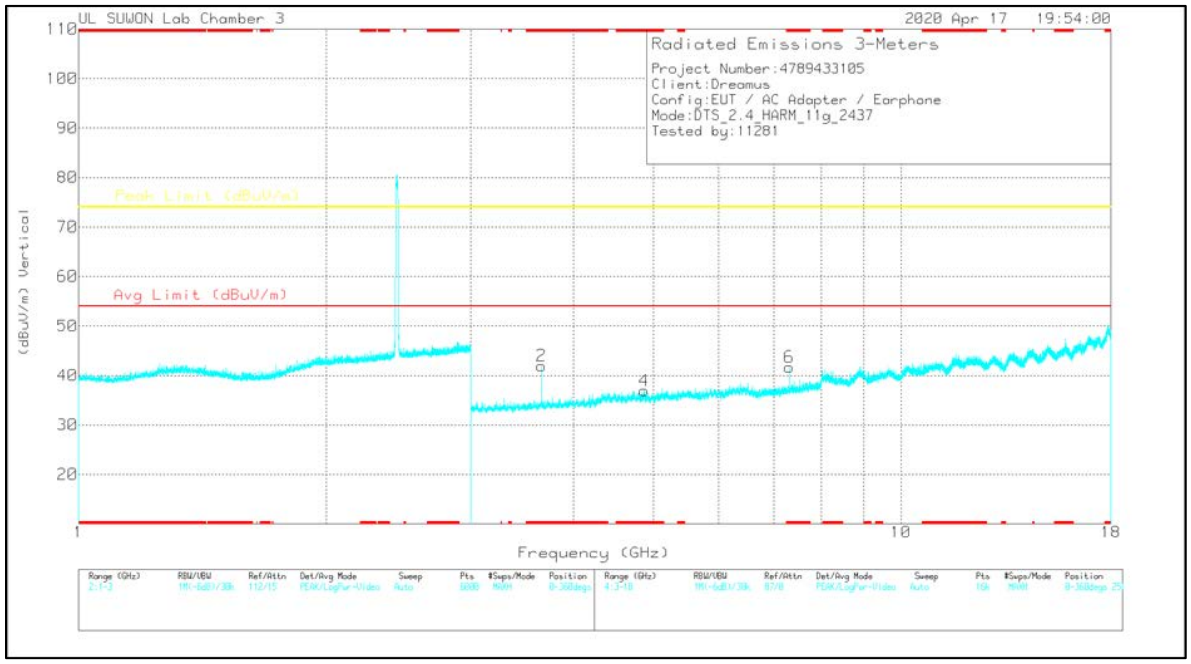
PK2 – KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

6 CHANNEL HORIZONTAL



6 CHANNEL 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.

6 CHANNEL DATA

Radiated Emissions

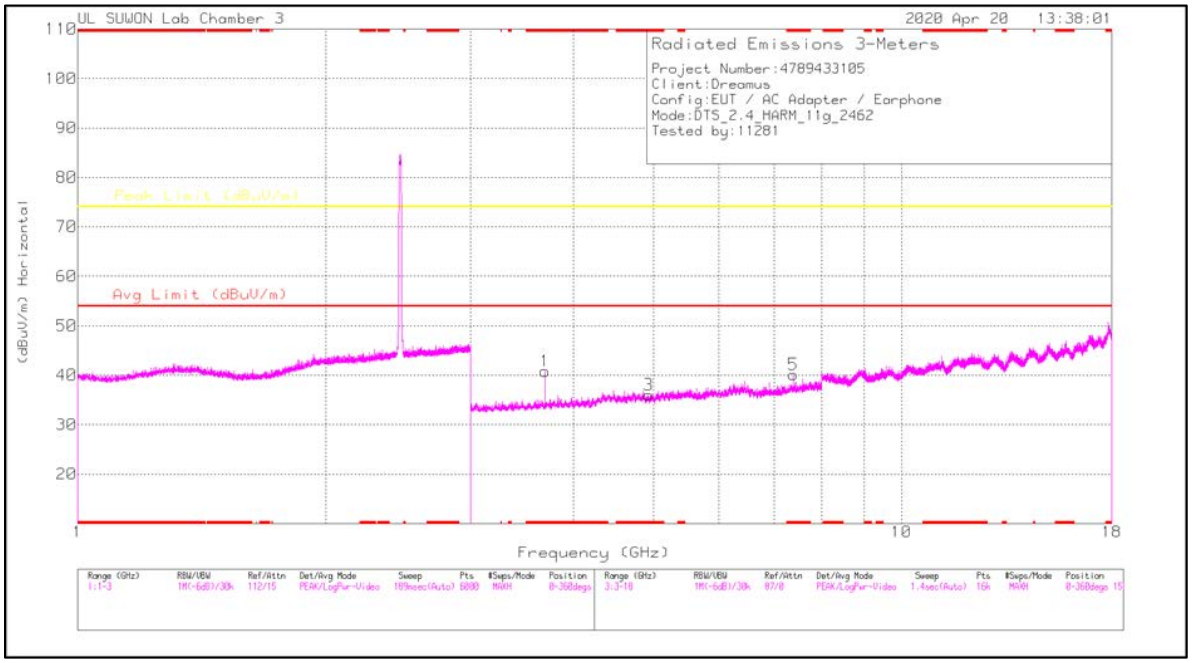
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.65559	44.34	PK2	33.1	-30.3	0	47.14	-	-	74	-26.86	114	374	H
* 3.65561	37.89	MAv1	33.1	-30.3	.3	40.99	54	-13.01	-	-	114	374	H
* 4.86398	37.75	PK2	34.2	-28.5	0	43.45	-	-	74	-30.55	360	100	H
* 4.86324	28.69	MAv1	34.2	-28.5	.3	34.69	54	-19.31	-	-	360	100	H
* 7.31076	36.83	PK2	35.8	-23.3	0	49.33	-	-	74	-24.67	117	103	H
* 7.31102	29.28	MAv1	35.8	-23.3	.3	42.08	54	-11.92	-	-	117	103	H
* 3.65566	44.93	PK2	33.1	-30.3	0	47.73	-	-	74	-26.27	151	123	V
* 3.65552	39.47	MAv1	33.1	-30.3	.3	42.57	54	-11.43	-	-	151	123	V
* 4.86529	37.96	PK2	34.2	-28.5	0	43.66	-	-	74	-30.34	0	100	V
* 4.86929	28.17	MAv1	34.2	-28.6	.3	34.07	54	-19.93	-	-	0	100	V
* 7.31091	38.65	PK2	35.8	-23.3	0	51.15	-	-	74	-22.85	147	270	V
* 7.31115	31.22	MAv1	35.8	-23.3	.3	44.02	54	-9.98	-	-	147	270	V

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

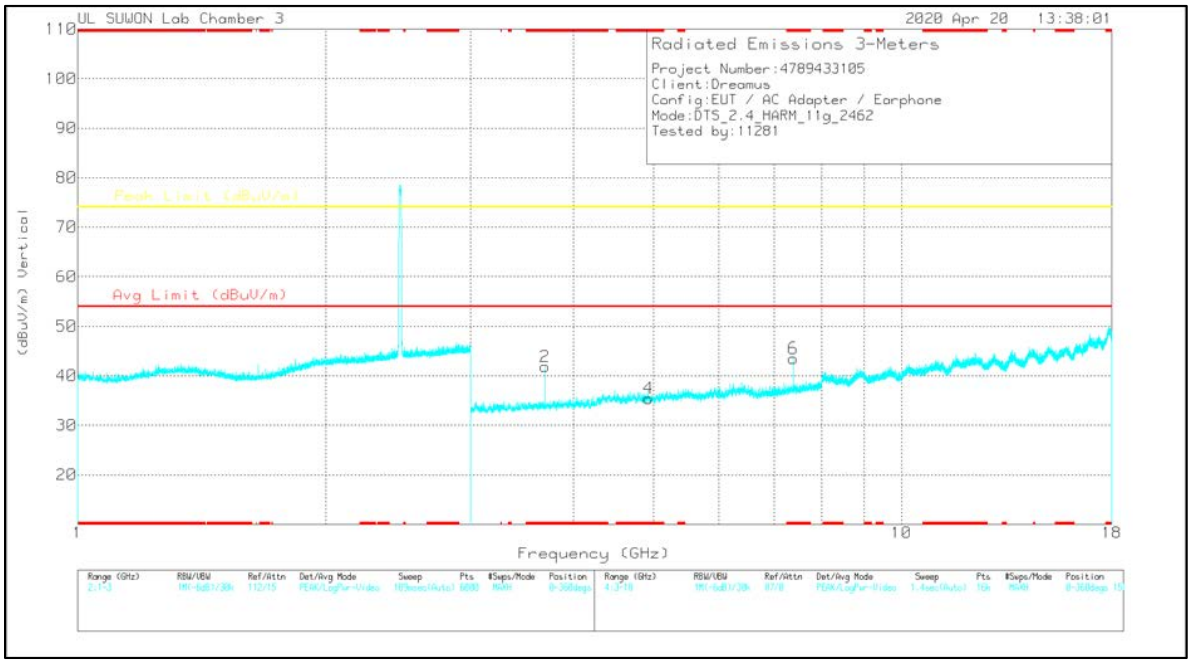
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

11 CHANNEL HORIZONTAL



11 CHANNEL 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.

11 CHANNEL DATA

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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
* 3.6932	44.26	PK2	33.1	-29.7	0	47.66	-	-	74	-26.34	122	200	H
* 3.69298	37.47	MAv1	33.1	-29.7	.3	41.17	54	-12.83	-	-	122	200	H
* 4.93593	36.68	PK2	34.2	-28.7	0	42.18	-	-	74	-31.82	0	100	H
* 4.91967	28.24	MAv1	34.2	-28.8	.3	33.94	54	-20.06	-	-	0	100	H
* 7.38626	37.44	PK2	35.8	-22.7	0	50.54	-	-	74	-23.46	131	103	H
* 7.38612	29.59	MAv1	35.8	-22.7	.3	42.99	54	-11.01	-	-	131	103	H
* 3.69307	45.53	PK2	33.1	-29.7	0	48.93	-	-	74	-25.07	150	120	V
* 3.69303	39.46	MAv1	33.1	-29.7	.3	43.16	54	-10.84	-	-	150	120	V
* 4.92389	37	PK2	34.2	-28.8	0	42.4	-	-	74	-31.6	0	100	V
* 4.936	28.4	MAv1	34.2	-28.7	.3	34.2	54	-19.8	-	-	0	100	V
* 7.38595	37.45	PK2	35.8	-22.7	0	50.55	-	-	74	-23.45	148	103	V
* 7.38615	30.17	MAv1	35.8	-22.7	.3	43.57	54	-10.43	-	-	148	103	V

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

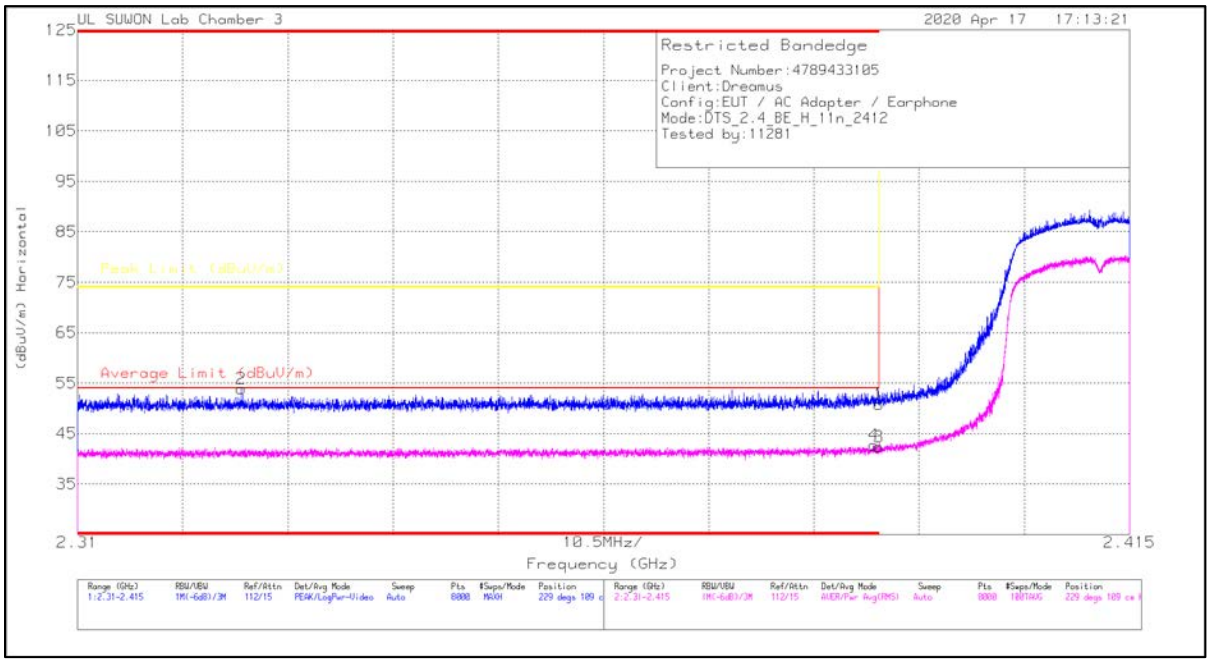
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

11.2.3. TX ABOVE 1GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (1 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



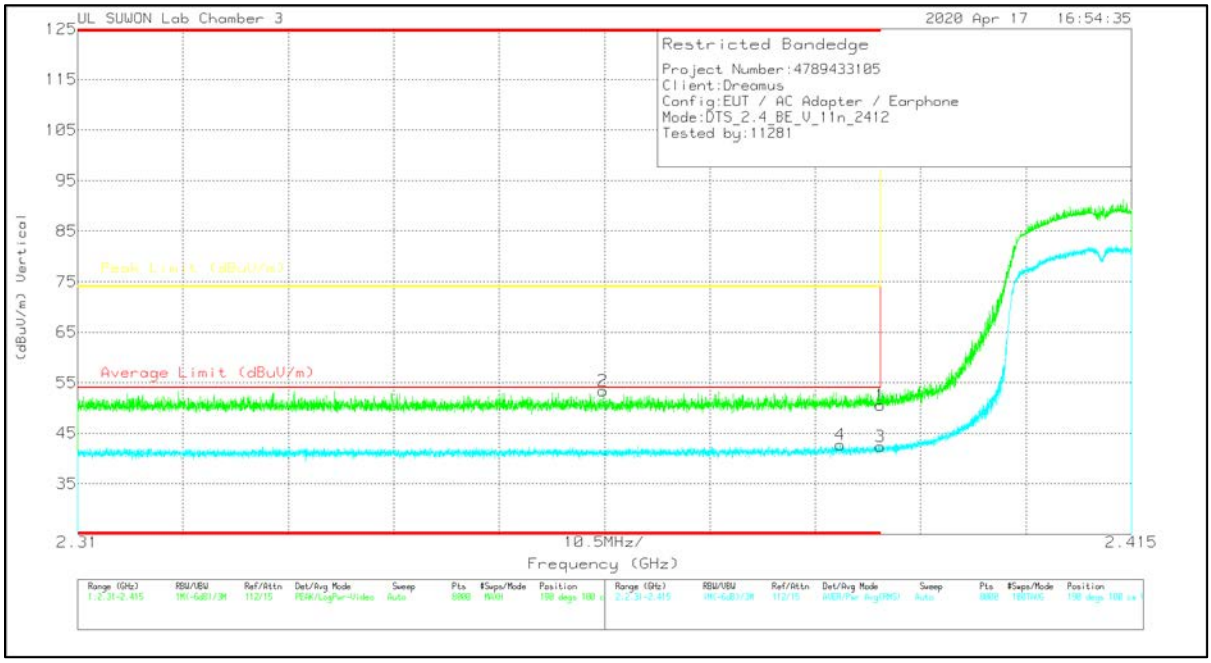
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	42	Pk	31.7	-22.9	0	50.8	-	-	74	-23.2	229	109	H
2	* 2.32634	45.34	Pk	31.5	-22.9	0	53.94	-	-	74	-20.06	229	109	H
3	* 2.39	33.23	RMS	31.7	-22.9	.32	42.35	54	-11.65	-	-	229	109	H
4	* 2.3895	33.55	RMS	31.7	-22.9	.32	42.67	54	-11.33	-	-	229	109	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

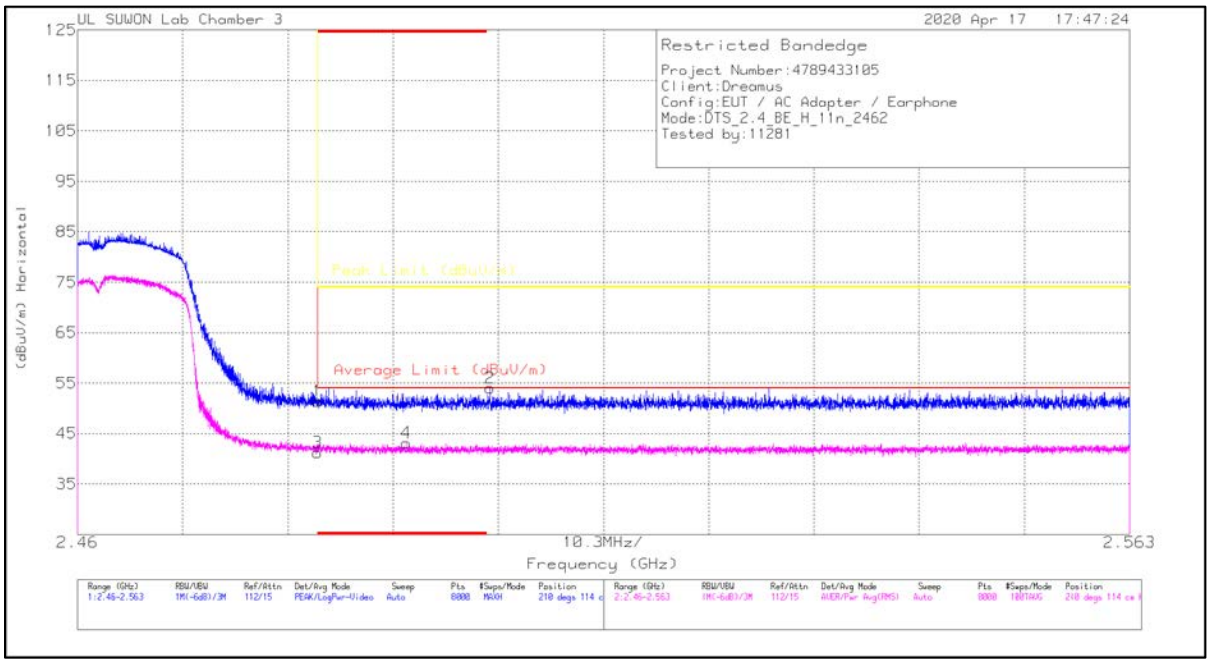
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	41.73	Pk	31.7	-22.9	0	50.53	-	-	74	-23.47	190	100	V
2	* 2.36234	44.74	Pk	31.6	-22.9	0	53.44	-	-	74	-20.56	190	100	V
3	* 2.39	33.24	RMS	31.7	-22.9	.32	42.36	54	-11.64	-	-	190	100	V
4	* 2.38597	33.59	RMS	31.7	-22.9	.32	42.71	54	-11.29	-	-	190	100	V

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

AUTHORIZED BANDEDGE (11 CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



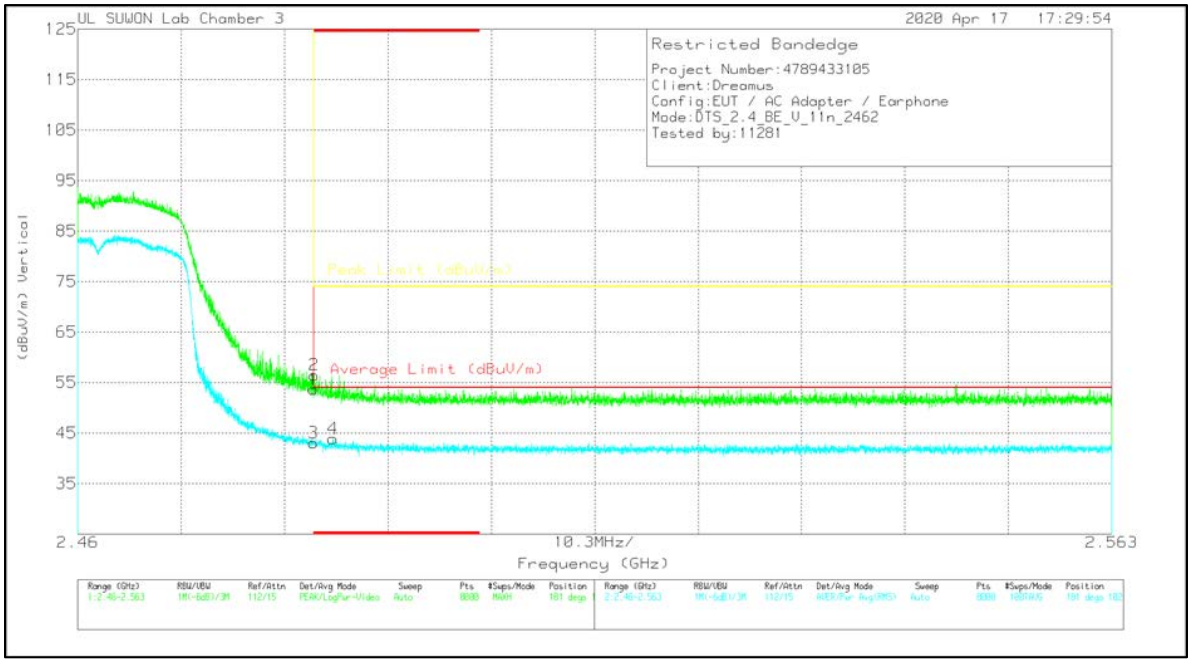
HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	* 2.4835	42.28	Pk	31.9	-22.8	0	51.38	-	-	74	-22.62	210	114	H
2	2.5004	44.85	Pk	32	-22.8	0	54.05	-	-	74	-19.95	210	114	H
3	* 2.4835	31.76	RMS	31.9	-22.8	.32	41.18	54	-12.82	-	-	210	114	H
4	* 2.49218	33.73	RMS	31.9	-22.8	.32	43.15	54	-10.85	-	-	210	114	H

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

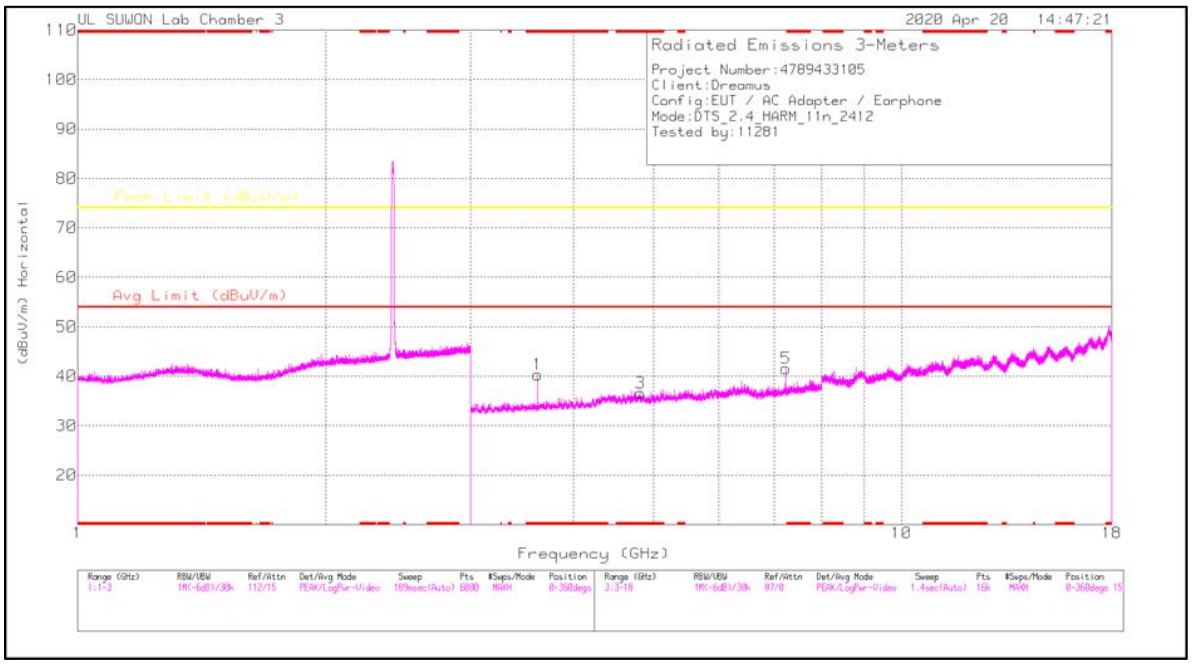
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	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	* 2.4835	44.57	Pk	31.9	-22.8	0	53.67	-	-	74	-20.33	181	102	V
2	* 2.48355	47.42	Pk	31.9	-22.8	0	56.52	-	-	74	-17.48	181	102	V
3	* 2.4835	33.67	RMS	31.9	-22.8	.32	43.09	54	-10.91	-	-	181	102	V
4	* 2.48542	34.51	RMS	31.9	-22.8	.32	43.93	54	-10.07	-	-	181	102	V

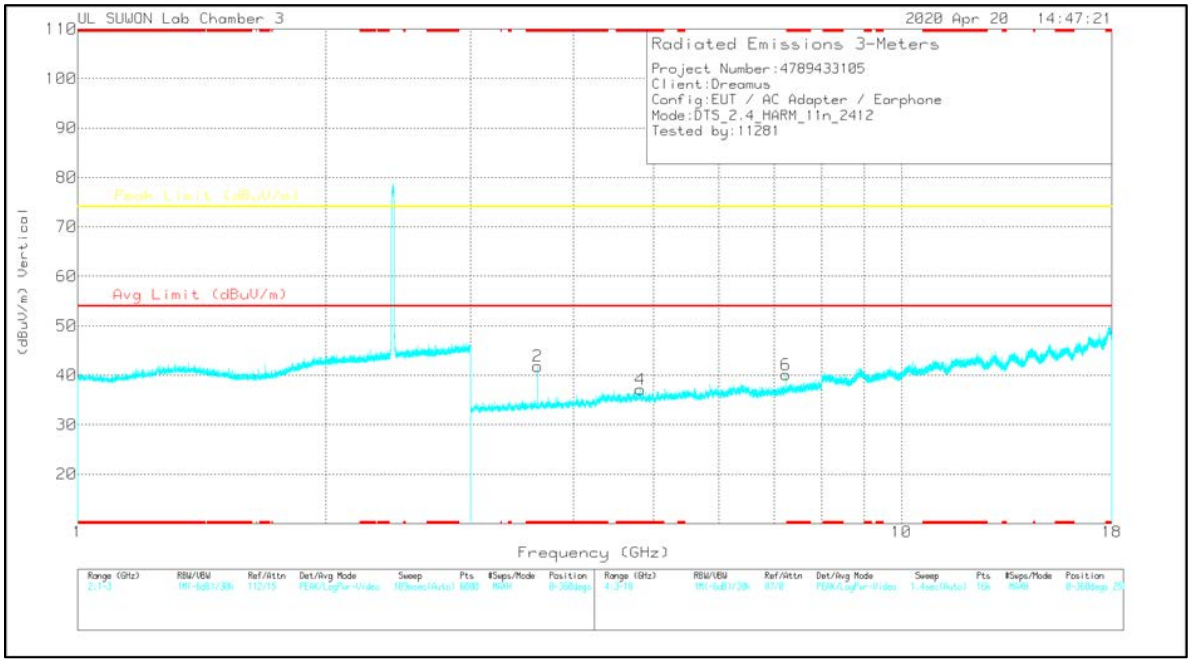
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

1 CHANNEL HORIZONTAL



1 CHANNEL 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.

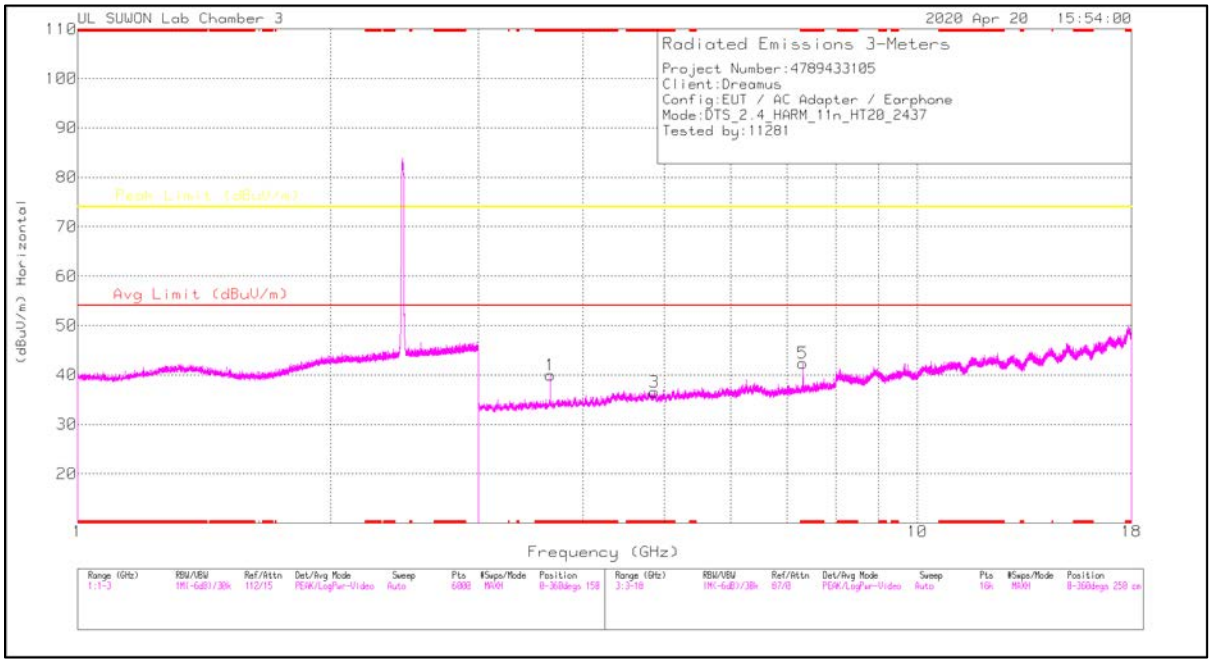
1 CHANNEL DATA

Radiated Emissions

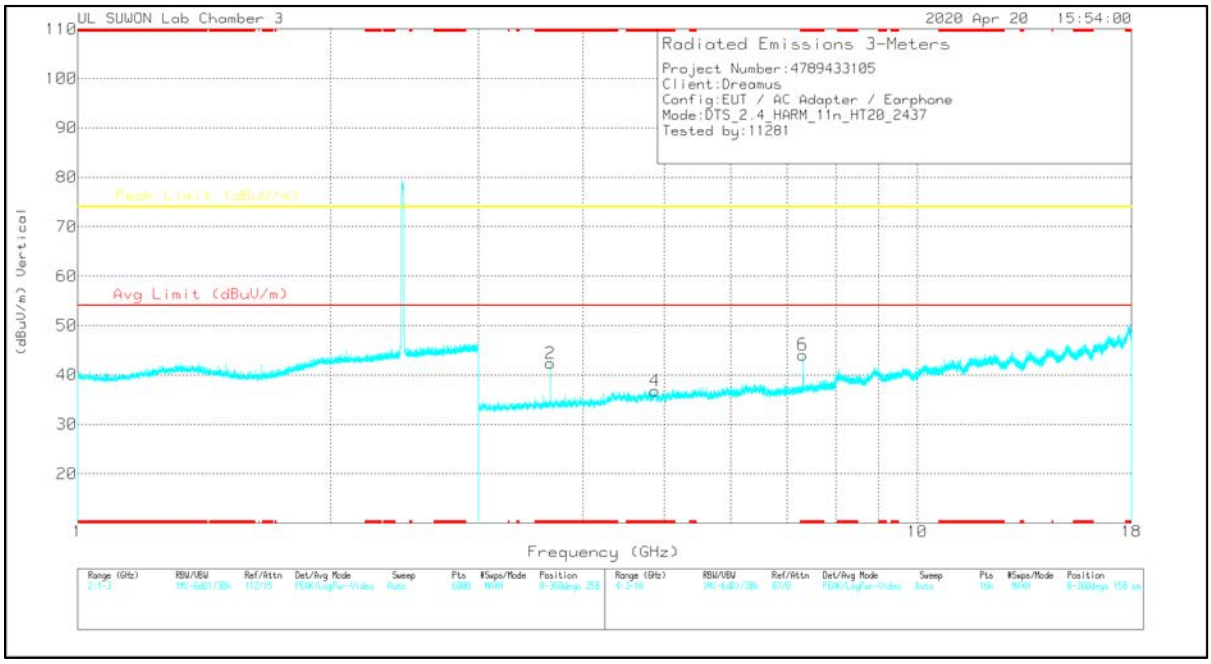
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.61819	43.38	PK2	33.1	-30.6	0	45.88	-	-	74	-28.12	111	122	H
* 3.61799	35.59	MAv1	33.1	-30.6	.32	38.41	54	-15.59	-	-	111	122	H
* 4.82628	36.07	PK2	34.2	-28.2	0	42.07	-	-	74	-31.93	0	100	H
* 4.83168	27.5	MAv1	34.2	-28.2	.32	33.82	54	-20.18	-	-	0	100	H
7.23621	37.78	PK2	35.8	-23.7	0	49.88	-	-	74	-24.12	246	193	H
7.23601	29.03	MAv1	35.8	-23.7	.32	41.45	-	-	-	-	246	193	H
* 3.61799	44.64	PK2	33.1	-30.6	0	47.14	-	-	74	-26.86	184	189	V
* 3.61797	38.17	MAv1	33.1	-30.6	.32	40.99	54	-13.01	-	-	184	189	V
* 4.81079	36.82	PK2	34.2	-28	0	43.02	-	-	74	-30.98	0	100	V
* 4.8094	28.04	MAv1	34.2	-28	.32	34.56	54	-19.44	-	-	0	100	V
7.23589	37.84	PK2	35.8	-23.7	0	49.94	-	-	74	-24.06	144	252	V
7.23611	29.64	MAv1	35.8	-23.7	.32	42.06	-	-	-	-	144	252	V

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

6 CHANNEL HORIZONTAL



6 CHANNEL 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.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

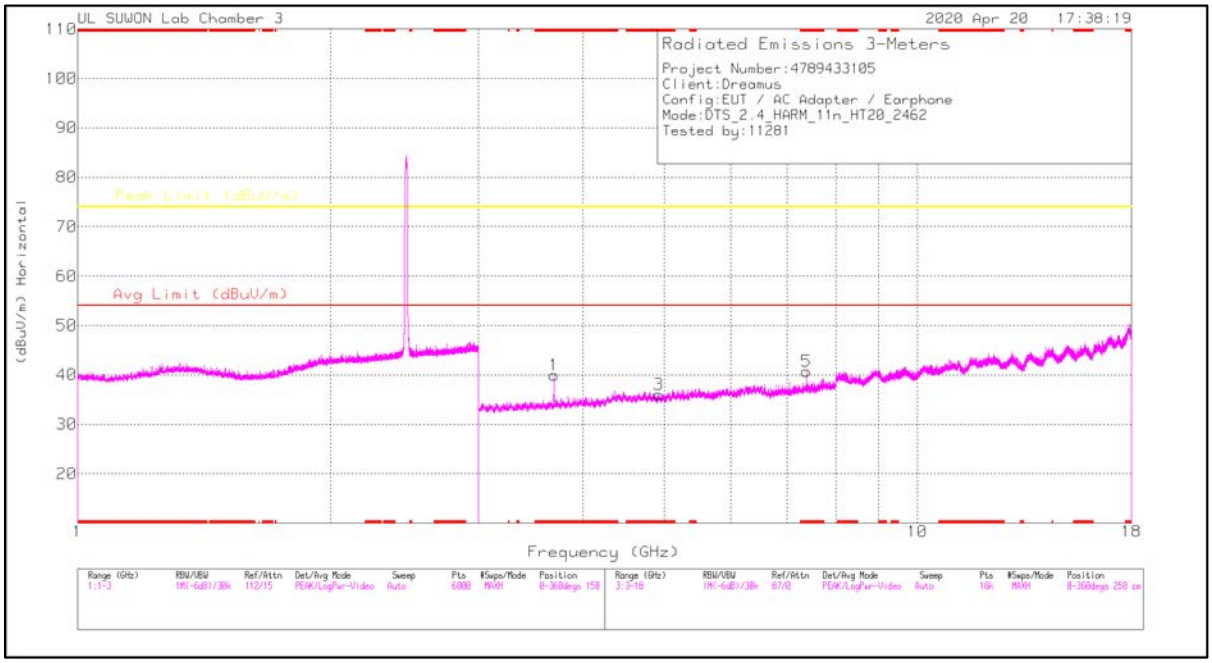
6 CHANNEL DATA

Radiated Emissions

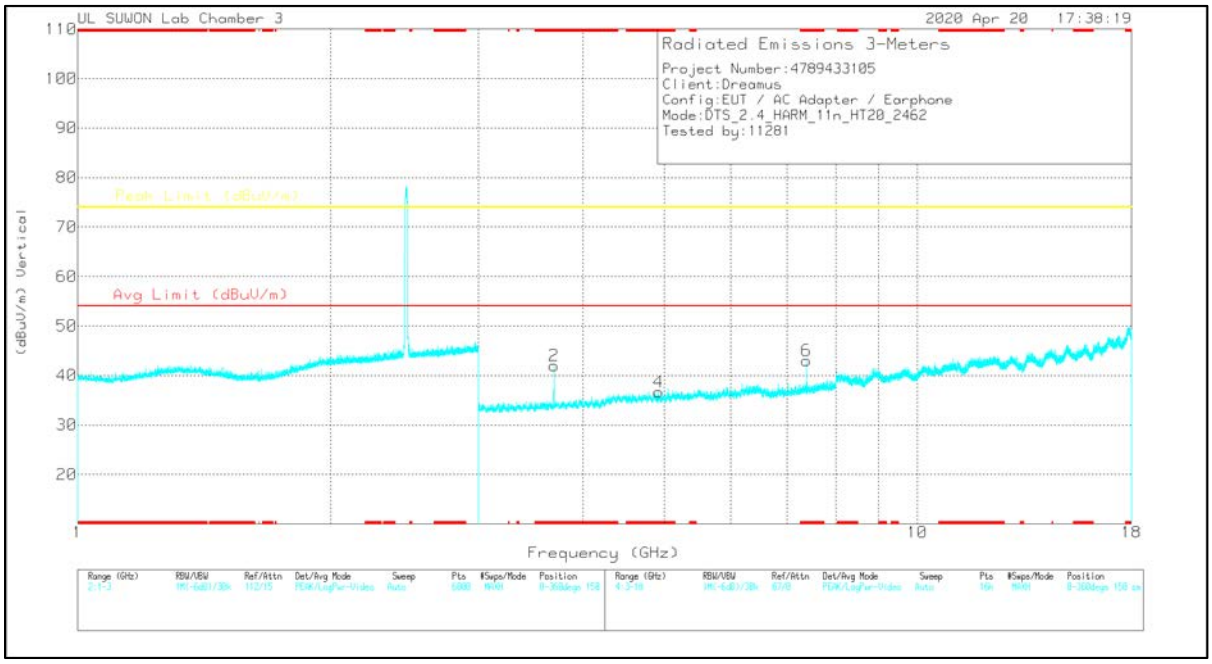
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.65575	44.53	PK2	33.1	-30.2	0	47.43	-	-	74	-26.57	123	272	H
* 3.65559	37.89	MAv1	33.1	-30.3	.32	41.01	54	-12.99	-	-	123	272	H
* 4.86294	37.4	PK2	34.2	-28.5	0	43.1	-	-	74	-30.9	0	100	H
* 4.85649	28.39	MAv1	34.2	-28.5	.32	34.41	54	-19.59	-	-	0	100	H
* 7.3112	37.76	PK2	35.8	-23.3	0	50.26	-	-	74	-23.74	194	246	H
* 7.31104	30.18	MAv1	35.8	-23.3	.32	43	54	-11	-	-	194	246	H
* 3.6556	44.73	PK2	33.1	-30.3	0	47.53	-	-	74	-26.47	174	270	V
* 3.65554	38.73	MAv1	33.1	-30.3	.32	41.85	54	-12.15	-	-	174	270	V
* 4.8811	37.73	PK2	34.2	-28.7	0	43.23	-	-	74	-30.77	0	100	V
* 4.86799	28.39	MAv1	34.2	-28.6	.32	34.31	54	-19.69	-	-	0	100	V
* 7.31107	38.24	PK2	35.8	-23.3	0	50.74	-	-	74	-23.26	145	270	V
* 7.31103	31.36	MAv1	35.8	-23.3	.32	44.18	54	-9.82	-	-	145	270	V

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

11 CHANNEL HORIZONTAL



11 CHANNEL 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.

11 CHANNEL DATA

Radiated Emissions

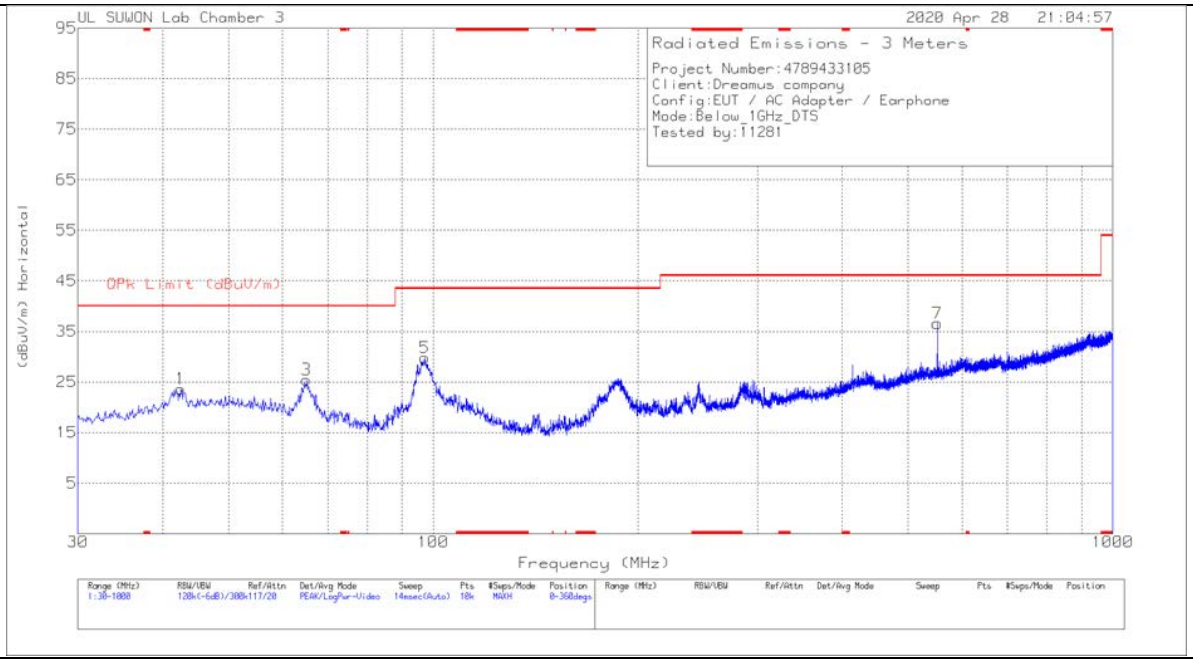
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00205959	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.69308	43.29	PK2	33.1	-29.7	0	46.69	-	-	74	-27.31	119	197	H
* 3.69314	36.41	MAv1	33.1	-29.7	.32	40.13	54	-13.87	-	-	119	197	H
* 4.91277	38.42	PK2	34.2	-28.8	0	43.82	-	-	74	-30.18	360	100	H
* 4.9151	28.38	MAv1	34.2	-28.8	.32	34.1	54	-19.9	-	-	360	100	H
* 7.38608	37.27	PK2	35.8	-22.7	0	50.37	-	-	74	-23.63	117	106	H
* 7.386	29.24	MAv1	35.8	-22.7	.32	42.66	54	-11.34	-	-	117	106	H
* 3.69312	44.8	PK2	33.1	-29.7	0	48.2	-	-	74	-25.8	151	103	V
* 3.693	39.39	MAv1	33.1	-29.7	.32	43.11	54	-10.89	-	-	151	103	V
* 4.92981	37.91	PK2	34.2	-28.8	0	43.31	-	-	74	-30.69	0	100	V
* 4.92396	28.65	MAv1	34.2	-28.8	.32	34.37	54	-19.63	-	-	0	100	V
* 7.38614	37.25	PK2	35.8	-22.7	0	50.35	-	-	74	-23.65	139	266	V
* 7.3861	30.66	MAv1	35.8	-22.7	.32	44.08	54	-9.92	-	-	139	266	V

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

11.3. WORST-CASE BELOW 1 GHz

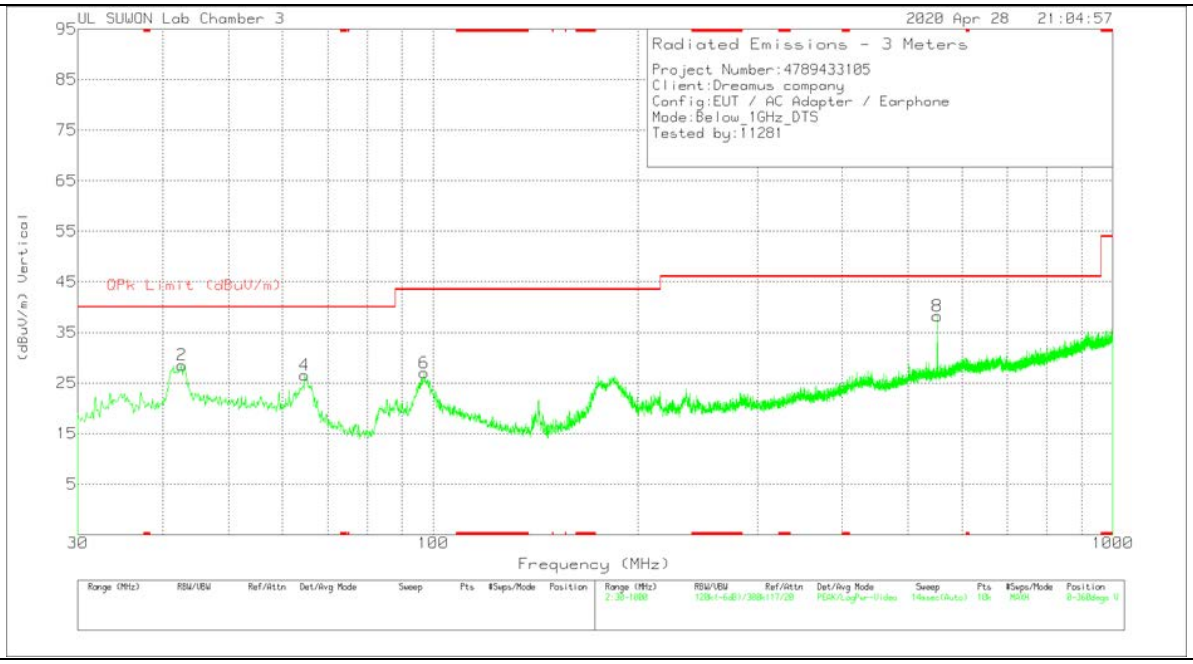
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



Below 1G Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-845	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	42.5143	36.23	Pk	19.5	-32.1	23.63	40	-16.37	0-360	300	H
3	65.1176	40.35	Pk	17	-31.9	25.45	40	-14.55	0-360	400	H
5	97.2279	44.18	Pk	17.4	-31.8	29.78	43.52	-13.74	0-360	300	H
7	552.0108	43	Pk	23.8	-30.2	36.6	46.02	-9.42	0-360	200	H
2	42.7083	41.13	Pk	19.6	-32.2	28.53	40	-11.47	0-360	100	V
4	64.7296	41.36	Pk	17.1	-31.9	26.56	40	-13.44	0-360	200	V
6	97.0339	41.51	Pk	17.3	-31.8	27.01	43.52	-16.51	0-360	400	V
8	552.0108	44.64	Pk	23.8	-30.2	38.24	46.02	-7.78	0-360	100	V

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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

12. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

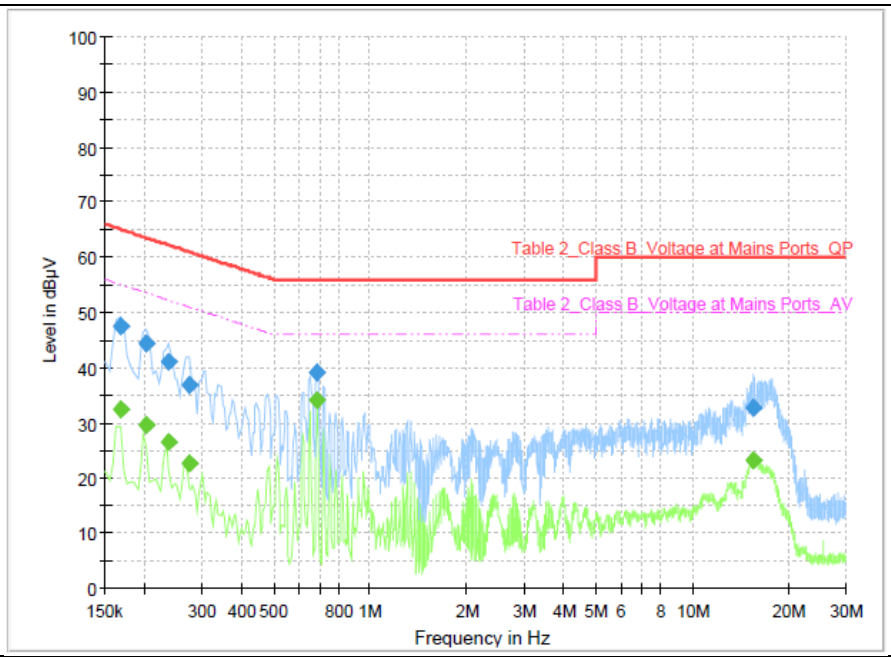
Line conducted data is recorded for both NEUTRAL and HOT lines.

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

RESULTS

WORST EMISSIONS

LINE 1 PLOT



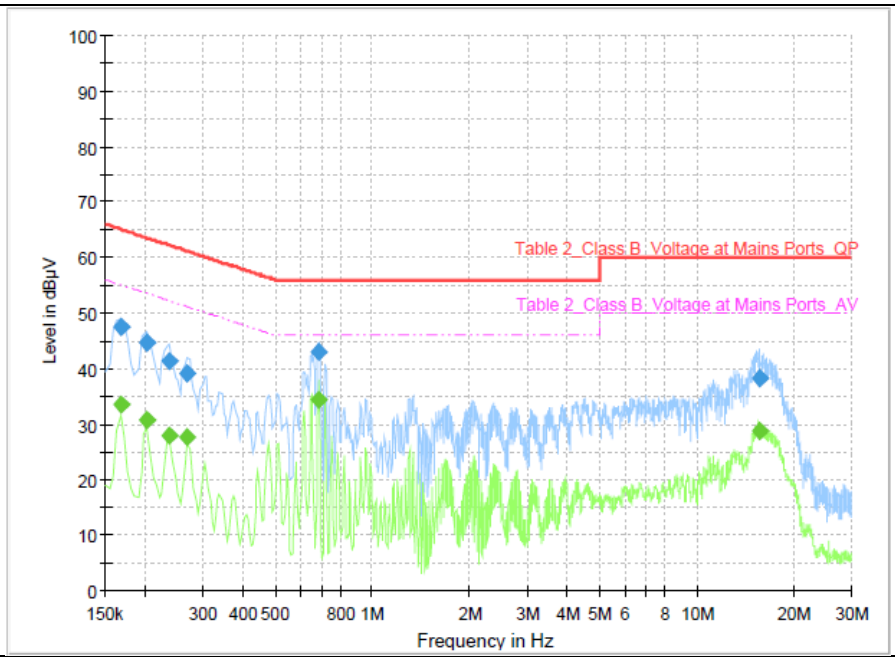
LINE 1 RESULTS

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.167559	---	32.53	55.08	22.55	L1	ON	10.0
0.167559	47.48	---	65.08	17.60	L1	ON	10.0
0.202677	---	29.56	53.50	23.94	L1	ON	9.8
0.202677	44.38	---	63.50	19.12	L1	ON	9.8
0.237794	---	26.41	52.17	25.77	L1	ON	9.7
0.237794	40.97	---	62.17	21.21	L1	ON	9.7
0.272912	---	22.51	51.03	28.52	L1	ON	9.7
0.272912	37.00	---	61.03	24.03	L1	ON	9.7
0.685544	---	34.07	46.00	11.93	L1	ON	9.8
0.685544	39.17	---	56.00	16.83	L1	ON	9.8
15.549088	---	23.08	50.00	26.92	L1	ON	10.0
15.549088	32.59	---	60.00	27.41	L1	ON	10.0

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

LINE 2 PLOT



LINE 2 RESULTS

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.167559	---	33.40	55.08	21.68	N	ON	9.9
0.167559	47.45	---	65.08	17.63	N	ON	9.9
0.202677	---	30.69	53.50	22.81	N	ON	9.8
0.202677	44.56	---	63.50	18.94	N	ON	9.8
0.237794	---	28.04	52.17	24.14	N	ON	9.7
0.237794	41.27	---	62.17	20.90	N	ON	9.7
0.268522	---	27.69	51.16	23.48	N	ON	9.6
0.268522	39.01	---	61.16	22.15	N	ON	9.6
0.681154	---	34.46	46.00	11.54	N	ON	9.8
0.681154	42.88	---	56.00	13.12	N	ON	9.8
15.619324	---	28.79	50.00	21.21	N	ON	10.0
15.619324	38.23	---	60.00	21.77	N	ON	10.0

END OF REPORT

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C(03)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433