



CERTIFICATION TEST REPORT

Report Number. : 4790390048-FR2V1

Applicant : Cresyn CO., Ltd.
5 Gangnam-daero 107-gil, Seocho-gu, Seoul, Korea

Model : TW0060

FCC ID : V2R-TW0060
IC : 10488A-TW0060

EUT Description : True Wireless Earphones

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 Issue 2
INDUSTRY CANADA RSS-GEN Issue 5

Date Of Issue:

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Prepared by:

UL Korea, Ltd.

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

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



ACCREDITED

Testing Laboratory

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	07/11/22	Initial issue	Jaejin Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Cresyn CO., Ltd.
EUT DESCRIPTION: True Wireless Earphones
MODEL: TW0060
SERIAL NUMBER: Proto type
DATE TESTED: 2022-05-02 ~ 2022-07-11

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
INDUSTRY CANADA RSS-247 Issue 2	Complies
INDUSTRY CANADA RSS-GEN Issue 5	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:



Anthony Kim
Senior Laboratory Engineer
UL Korea, Ltd.

Tested By:



Jaejin Lee
Laboratory Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. ANSI C63.10-2013.
5. IC RSS-GEN Issue 5.
6. IC RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

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

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input type="checkbox"/>	Chamber 2
<input checked="" type="checkbox"/>	Chamber 3

Used ISED Test Site Reg.(company number): 2324L
CAB Identifier: KR0161

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. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.87 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

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

4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Accuracy Method specified in Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT are Bluetooth Earphones.
 This test report addresses the BLE (DTS) operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

- **Left**

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	1Mbps (37 pkt)	Peak	10.720	11.80
		Average	10.457	11.11

- **Right**

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	1Mbps (37 pkt)	Peak	11.010	12.62
		Average	10.846	12.15

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.**

Left earphone,
 The radio utilizes an internal antennas, with maximum gain of -2.07 dBi.

Right earphone,
 The radio utilizes an internal antennas, with maximum gain of -1.75 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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

Power verification

The Output Power of two packet lengths(37 pkt, 255 pkt) are all investigated, the 1 Mbps(37 pkt) power is the worst case. All tests were performed in this mode.

- Left

Mode	Frequency [MHz]	Conducted Burst Avg [dBm]
1Mbps (37 pkt)	2402	10.360
	2440	10.371
	2480	10.457
1Mbps (255 pkt)	2402	10.357
	2440	10.369
	2480	10.457

- Right

Mode	Frequency [MHz]	Conducted Burst Avg [dBm]
1Mbps (37 pkt)	2402	10.821
	2440	10.823
	2480	10.846
1Mbps (255 pkt)	2402	10.819
	2440	10.821
	2480	10.844

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Notebook	SAMSUNG	NT550EBZ	0YM791HN300026T	N/A
Adaptor (for Notebook)	LITE-ON TECHNOLOGY CHANGZHOU CO., LTD	PA-1400-96	AA-PA2N40S	N/A
Test Jig Board	Cresyn	N/A	N/A	N/A

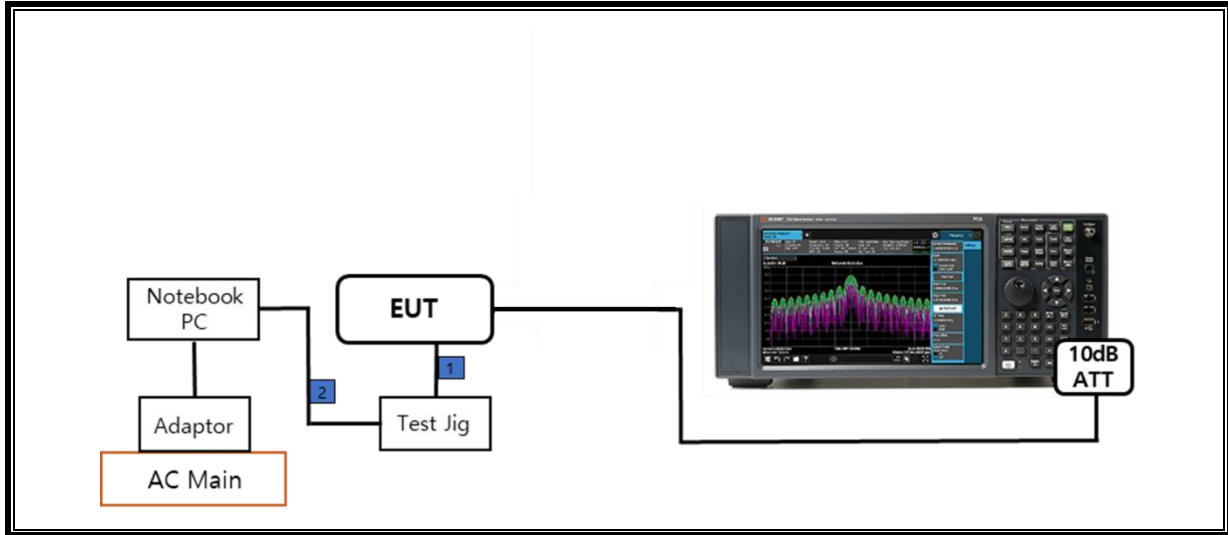
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power & Data	2	4 Pin to USB C	Unshielded	0.25 m	N/A
2	DC Power & Data	1	USB A to C	Shielded	1.8 m	N/A

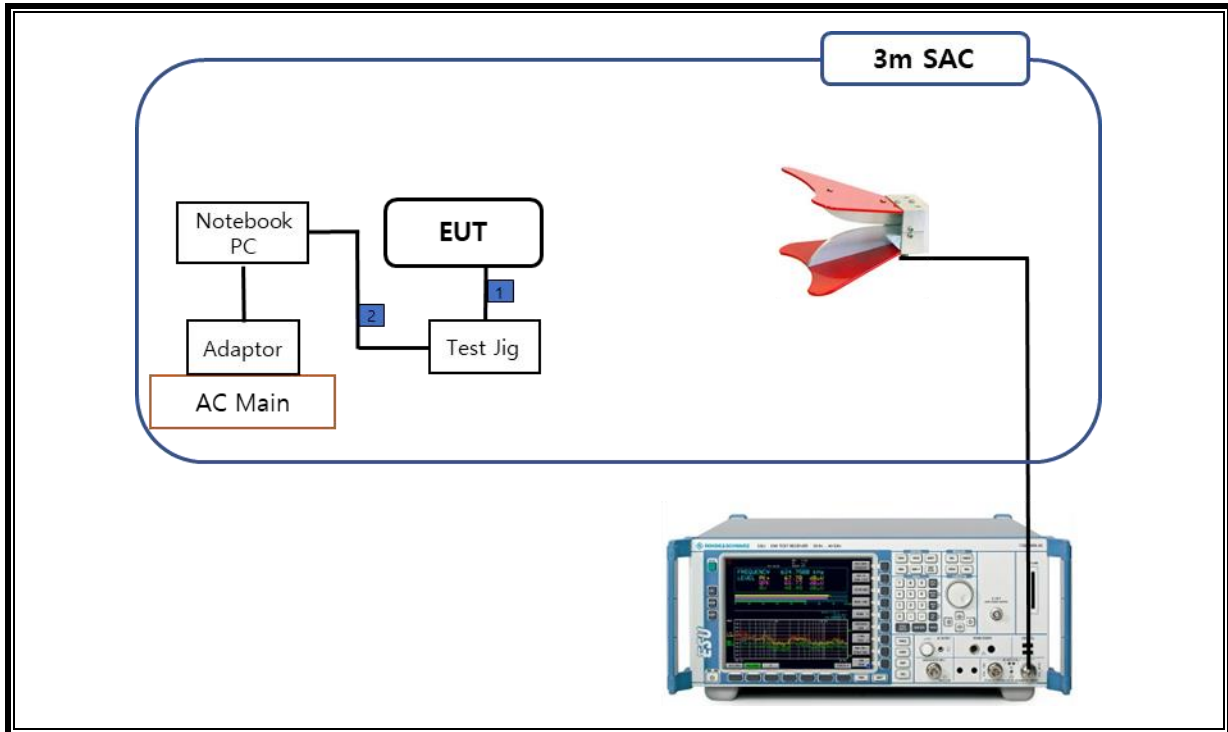
TEST SETUP

The EUT is a unit with test jig board during the tests.
 It was controlled by entering the test mode using a Notebook.

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 8.3.1.1

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

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	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143652	2023-01-11
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2023-04-15
Power Sensor	R&S	NRP-Z91	102681	2022-08-04
10dB ATTENUATOR	MINI-CIRCUITS	BW-K10-2W44+	2117	2022-10-22
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	

8. TEST RESULTS SUMMARY

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2(a)	Occupied Bandwidth(6dB)	> 500kHz	Conducted	PASS
2.1051, 15.247(d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20 dBc		PASS
15.247 (b)(3)	RSS-247 5.4(d)	TX conducted output power	< 30 dBm		PASS
15.247(e)	RSS-247 5.2(b)	PSD	< 8 dBm/3kHz		PASS
15.205, 15.209	RSS-GEN 8.9 & 8.10	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	PASS
15.207 (a)	RSS-GEN 8.8	AC Power Line Conducted Emission	Section 11	Power Line Conducted	N/P

Note. The AC power line test was not performed because the EUT does not operate Bluetooth mode while charging.

9. ANTENNA PORT TEST RESULTS

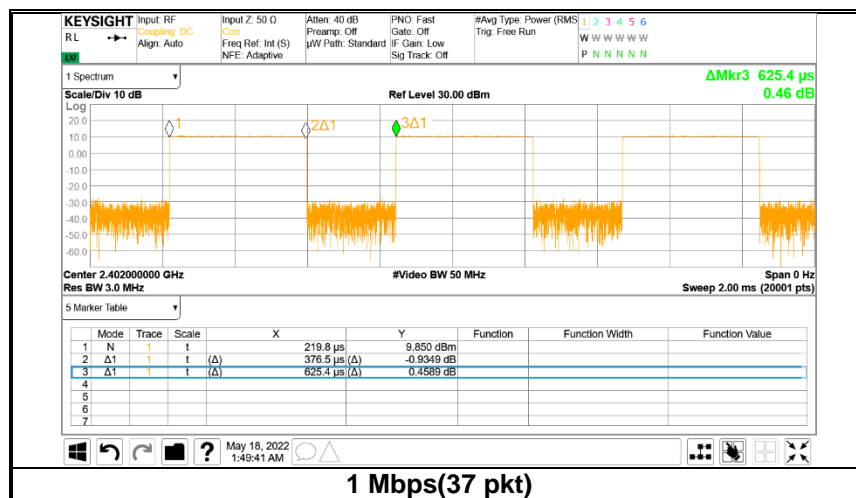
9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

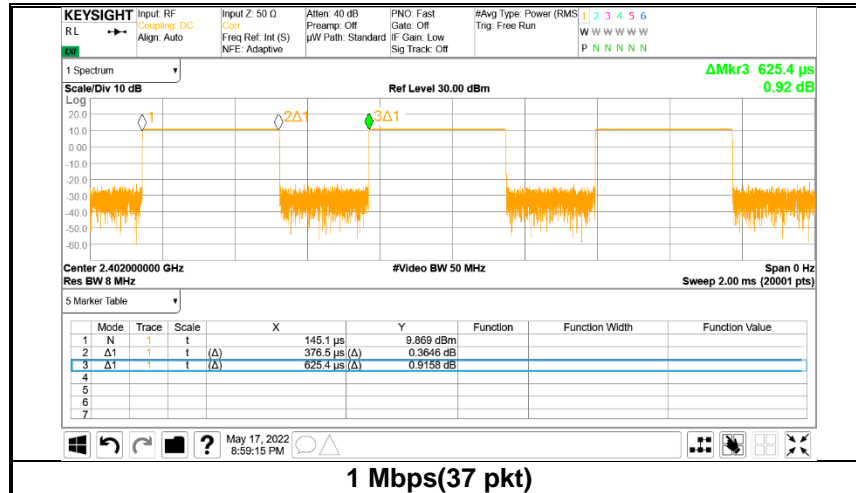
- Left

Mode	On time [msec]	Period [msec]	Duty cycle x [Linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Bands						
1 Mbps [37pkt]	0.3765	0.6254	0.6020	60.20	2.20	2.656



- Right

Mode	On time [msec]	Period [msec]	Duty cycle x [Linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Bands						
1 Mbps [37pkt]	0.3765	0.6254	0.6020	60.20	2.20	2.656



9.2. 6 dB & 99% BANDWIDTH

LIMITS

For 6dB Bandwidth,

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

For 99% Bandwidth,

None; for reporting purposes only.

RESULTS

9.2.1. Left_1 Mbps

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]	99% Bandwidth [kHz]
Low	2 402	708.0	500.0	1031.8
Mid	2 440	707.9	500.0	1031.6
High	2 480	707.4	500.0	1031.6

9.2.2. Right_1 Mbps

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]	99% Bandwidth [kHz]
Low	2 402	707.0	500.0	1033.0
Mid	2 440	703.5	500.0	1033.2
High	2 480	707.7	500.0	1033.4

9.2.3. 6 dB & 99% BANDWIDTH PLOTS

- Left



- Right



9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

RSS-247 (5.4) (d)

The maximum peak conducted output power shall not exceed 1 W.

TEST PROCEDURE

Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer(RBW \geq DTS bandwidth).

RESULTS

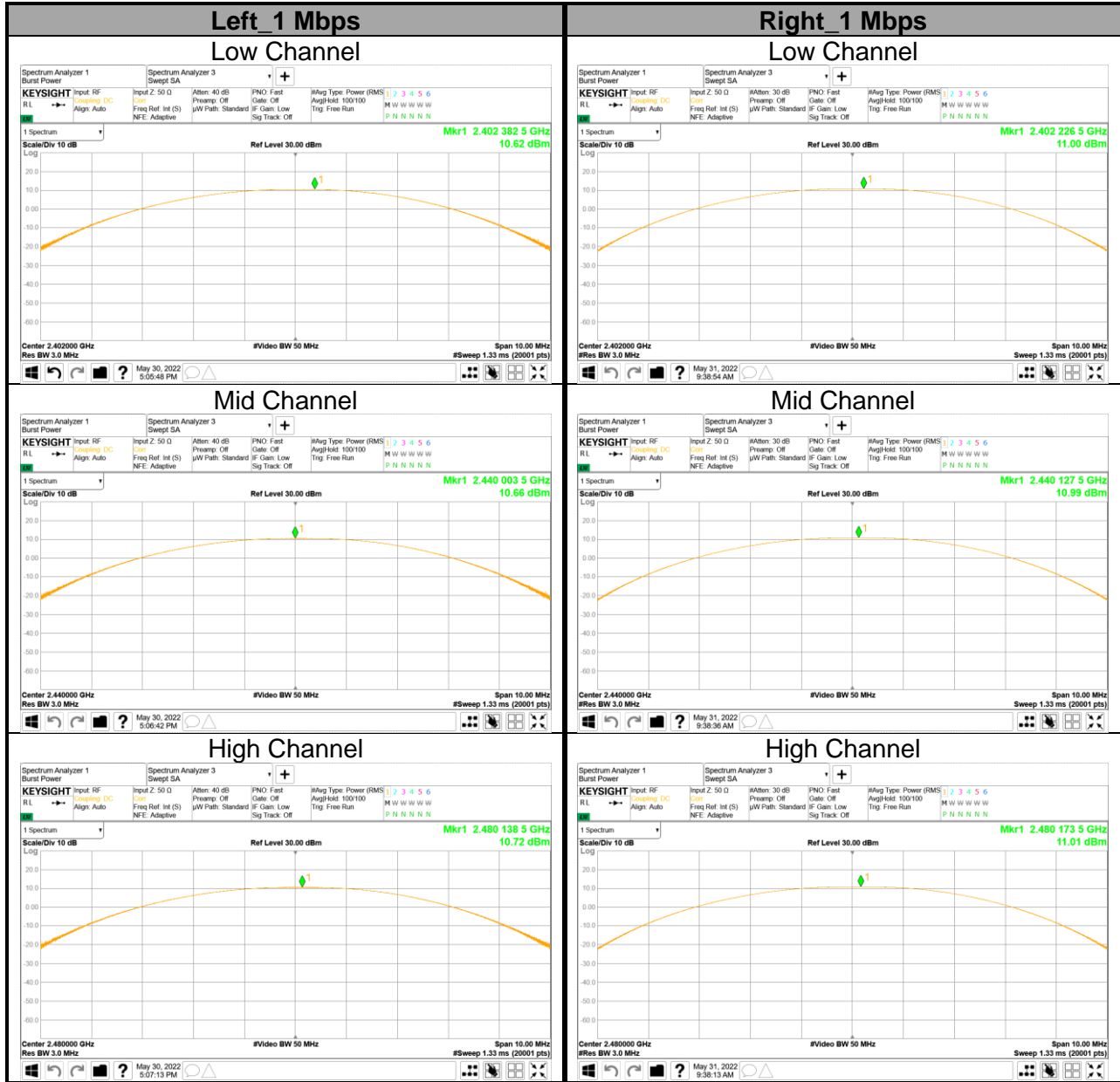
9.3.1. Left_1 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	10.62	30.00	-19.38
Mid	2440	10.66	30.00	-19.34
High	2480	10.72	30.00	-19.28
Worst		10.72	30.00	-19.28

9.3.2. Right_1 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	11.00	30.00	-19.00
Mid	2440	10.99	30.00	-19.01
High	2480	11.01	30.00	-18.99
Worst		11.01	30.00	-18.99

9.3.3. PEAK POWER PLOTS



9.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband RF frame average power sensor.
The cable assembly insertion loss and duty cycle correction factor were entered as an offset in the power meter to allow for direct reading of power.

RESULTS

9.4.1. Left_1 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
Low	2402	10.360	10.864
Mid	2440	10.371	10.892
High	2480	10.457	11.110

9.4.2. Right_1 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
Low	2402	10.821	12.081
Mid	2440	10.823	12.086
High	2480	10.846	12.151

9.5. 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

ANSI C63.10-2013, Section 11.10.2 Method PKPSD (Peak PSD)

RESULTS

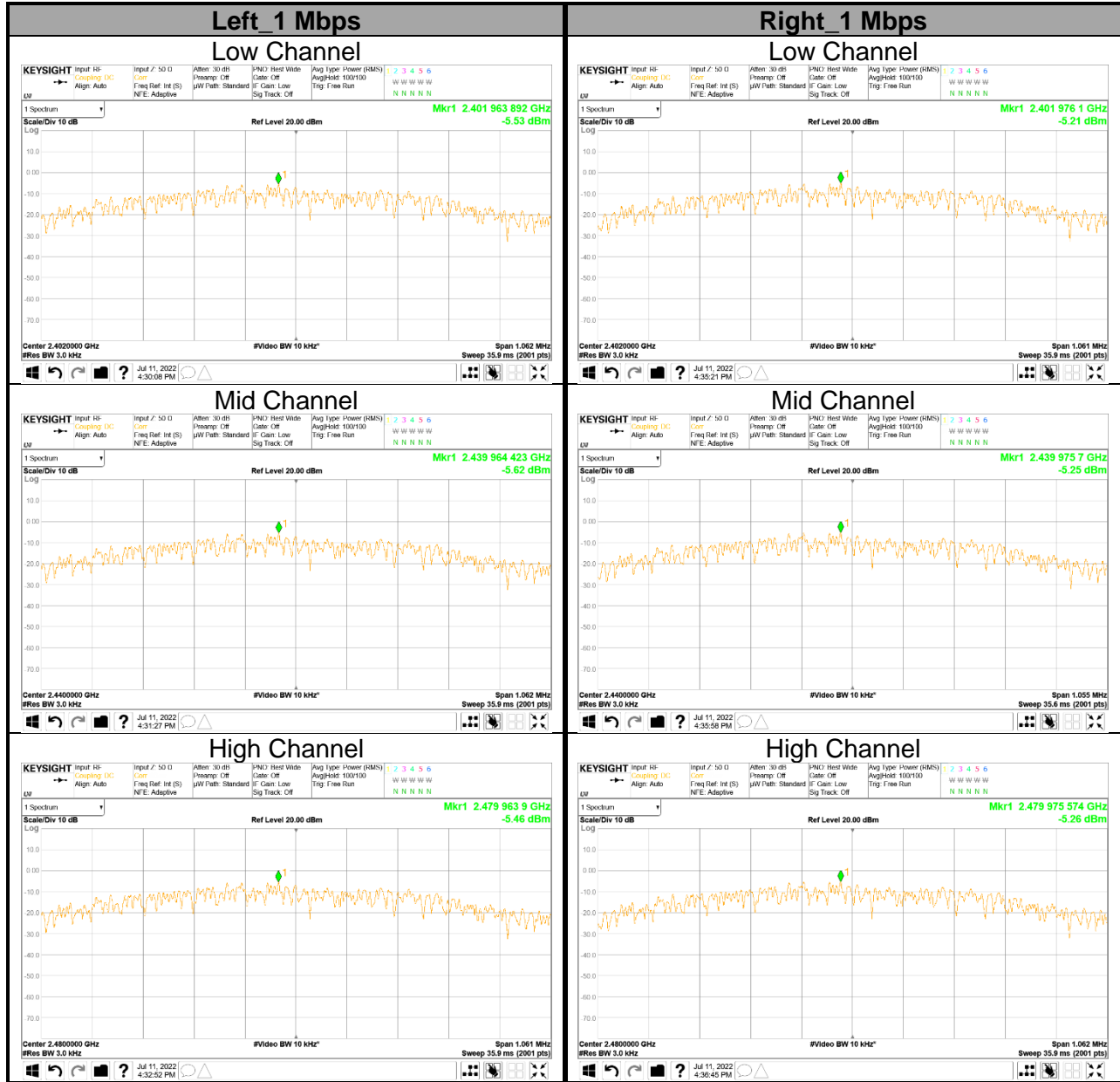
9.5.1. Left_1Mbps

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	2402	-5.53	8.00	-13.53
Mid	2440	-5.62	8.00	-13.62
High	2480	-5.46	8.00	-13.46

9.5.2. Right_1Mbps

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	2402	-5.21	8.00	-13.21
Mid	2440	-5.25	8.00	-13.25
High	2480	-5.26	8.00	-13.26

9.5.3. PSD TEST PLOTS



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

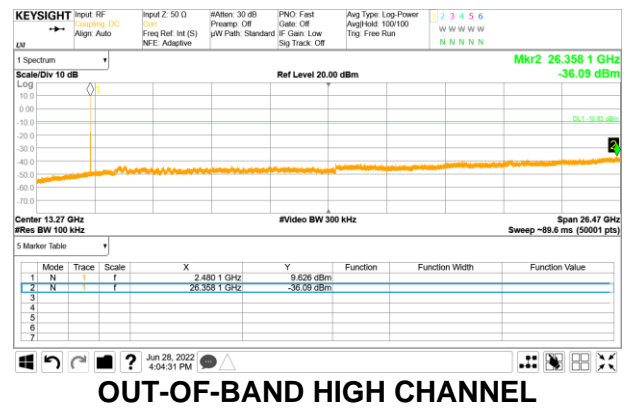
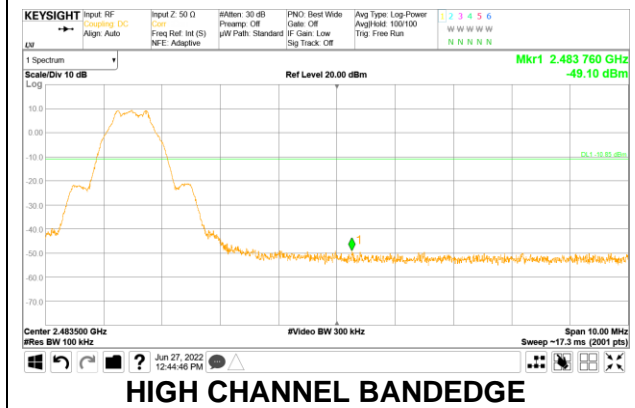
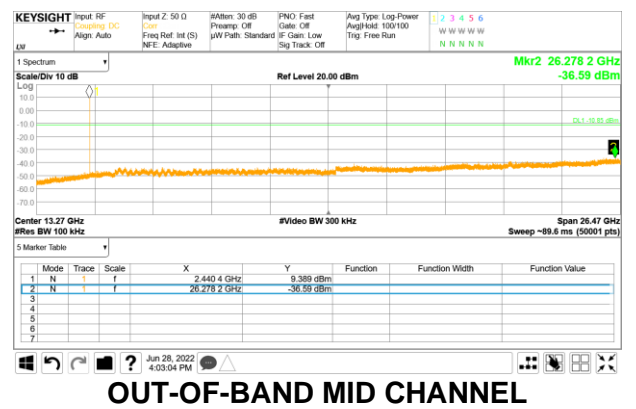
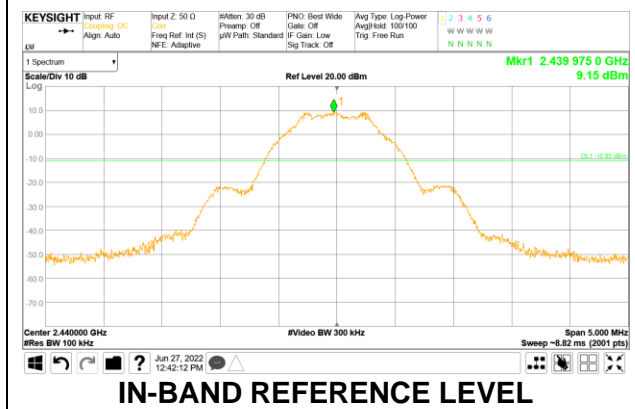
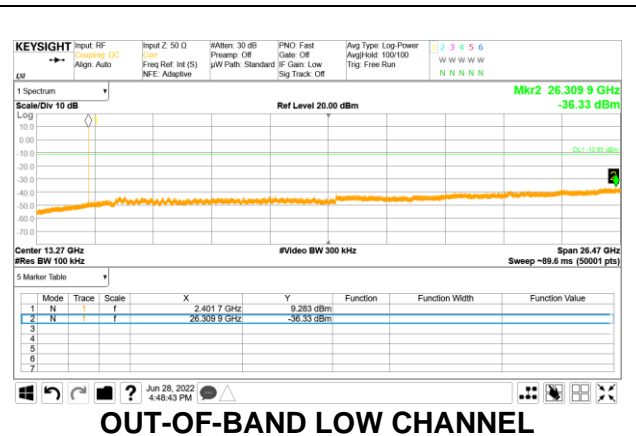
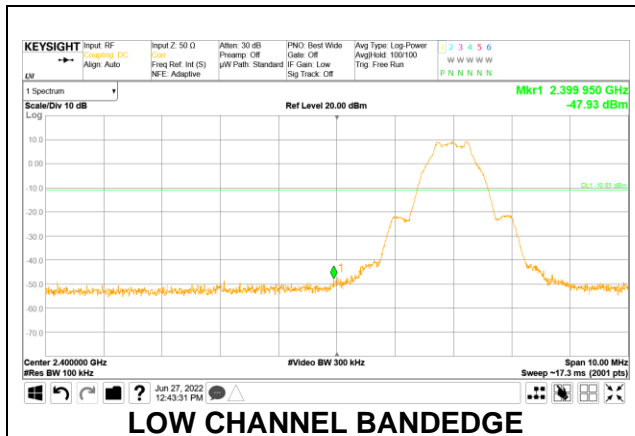
FCC §15.247 (d)

RSS-247 5.5

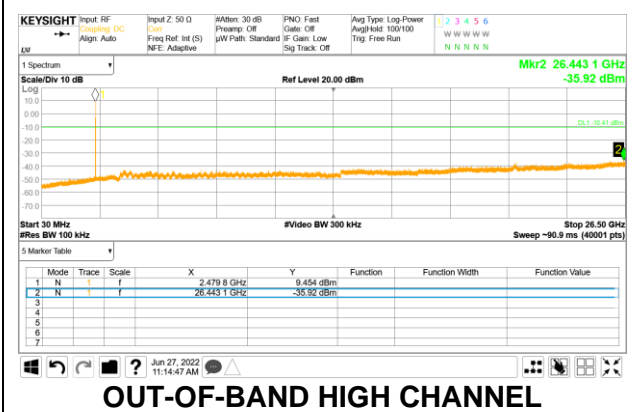
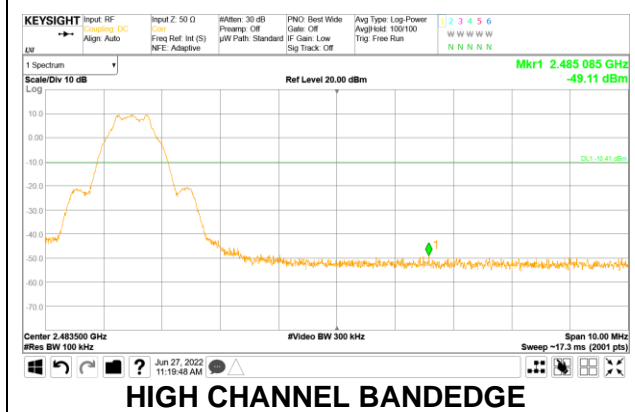
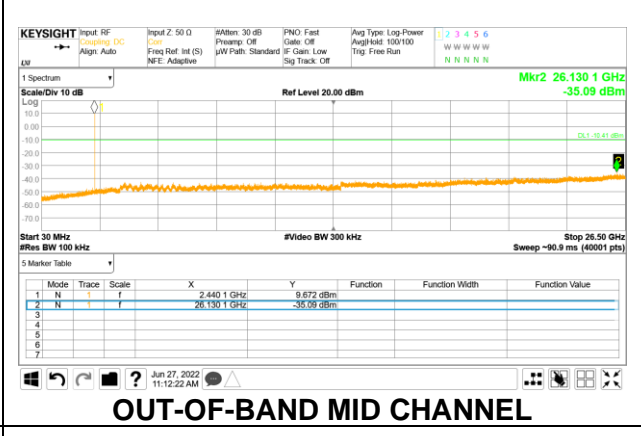
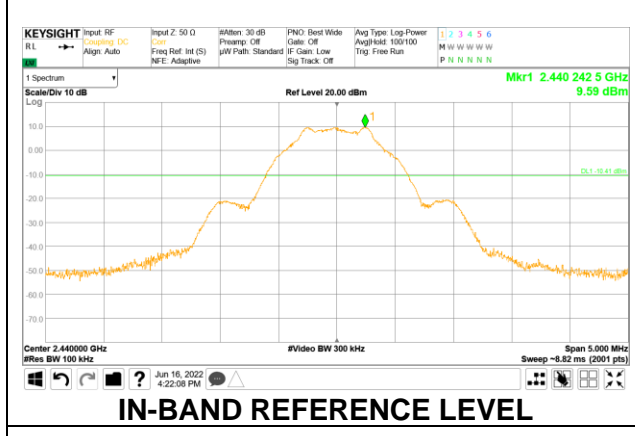
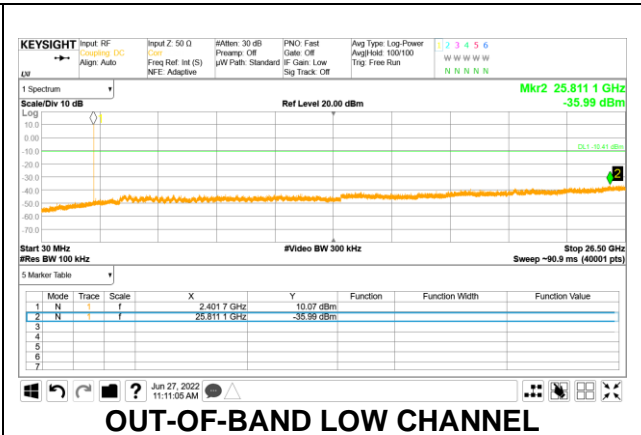
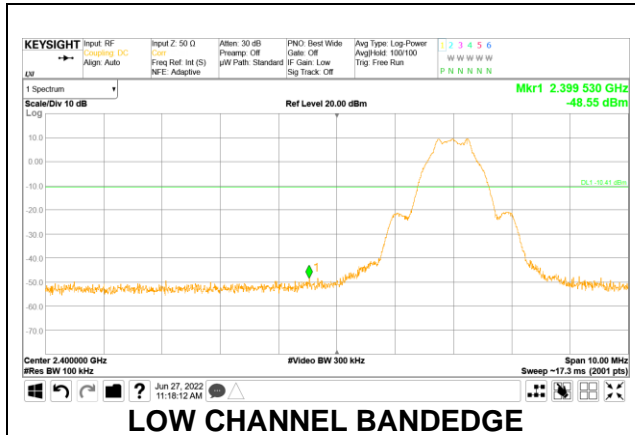
Output power was measured based on the use of a peak measurement.
Therefore, spurious emissions are required to be 20 dBc.

RESULTS

9.6.1. Left_1 Mbps



9.6.2. Right_1 Mbps



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-Gen 8.9 and 8.10

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits ($\mu\text{V}/\text{m}$)	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.

TEST PROCEDURE

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

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restricted bandedge, Final detection of spurious harmonic emissions)

Duty cycle factor = $10 \log (1/x)$.

For this sample:

For 1 Mbps, DCF = $10 \log(1/0.602)=2.2$ dB

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 the 2.4 GHz band.

(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).

Per FCC part 15.31(o), test results were not reported.

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

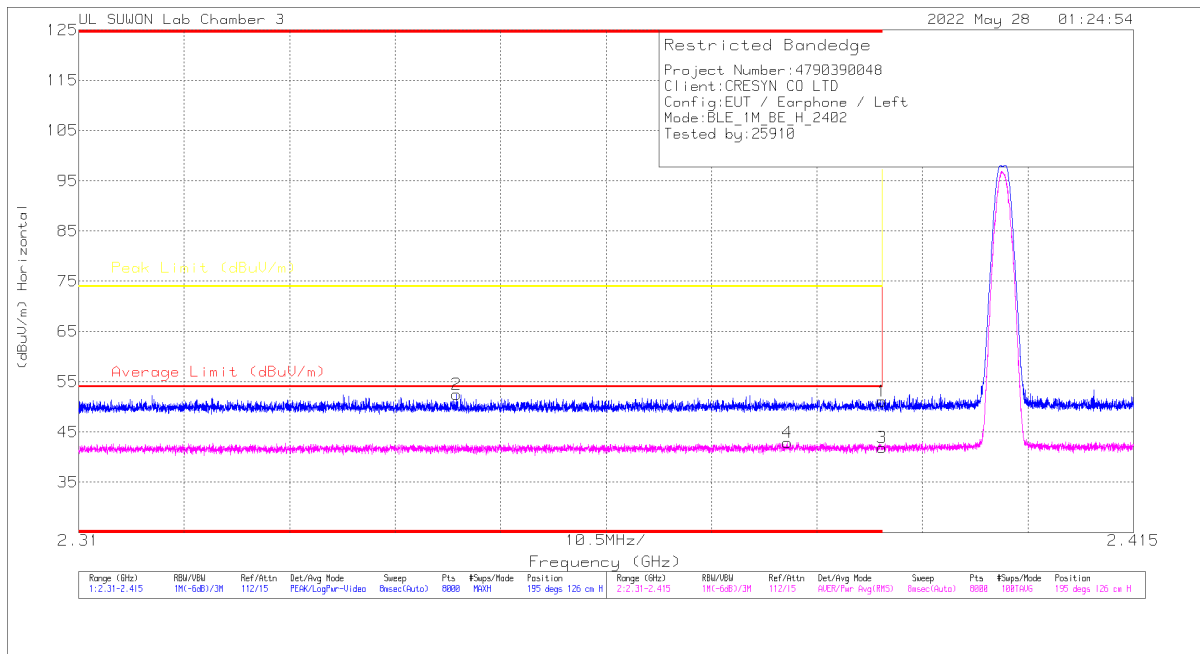
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. Left_1 Mbps

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

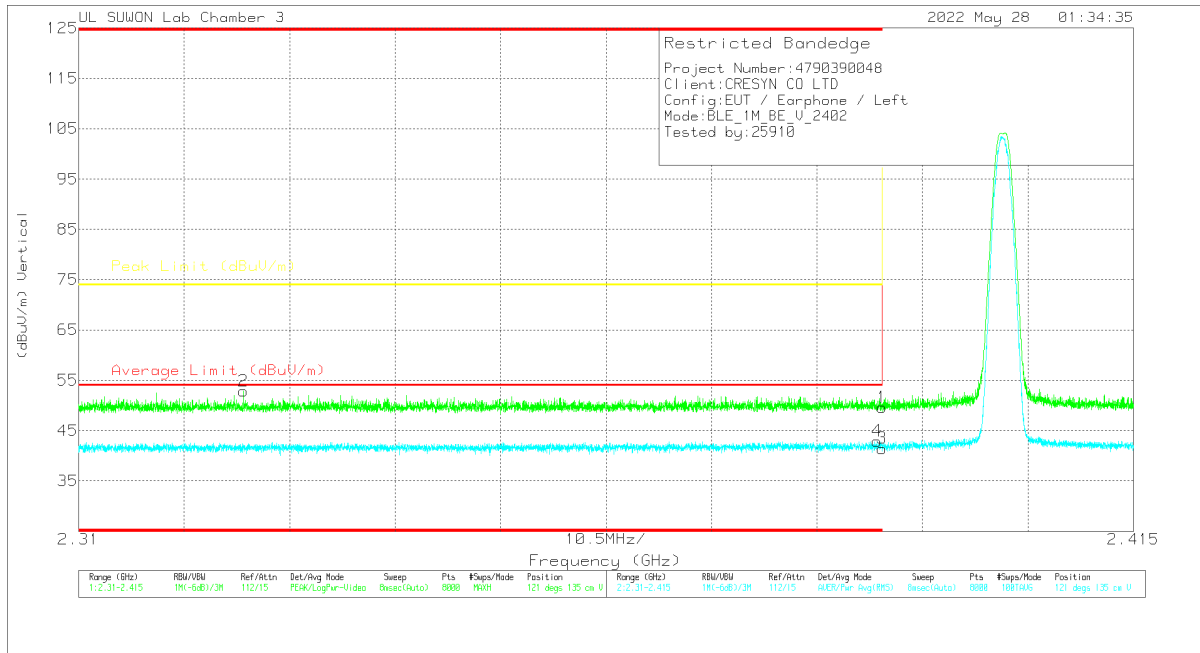


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.08	PK		-24.8	0	51.08	-	-	74	-22.92	195	126	H
2	* 2.34764	44.77	PK		-24.9	0	52.47	-	-	74	-21.53	195	126	H
3	* 2.39	31.76	RMS		-24.8	2.2	41.96	54	-12.04	-	-	195	126	H
4	* 2.38053	32.94	RMS		-24.9	2.2	42.94	54	-11.06	-	-	195	126	H

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

VERTICAL RESULT



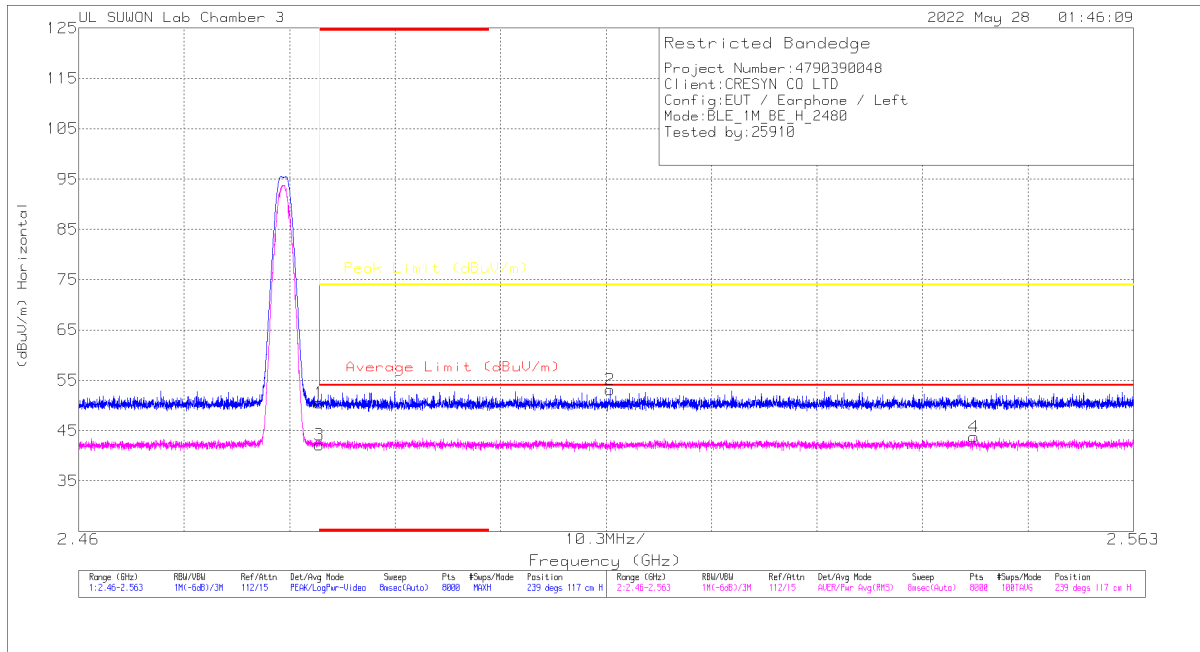
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Cor (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.6	Pk	32.8	-24.8	0	49.6	-	-	74	-24.4	121	135	V
2	* 2.3264	45.24	Pk	32.5	-24.9	0	52.84	-	-	74	-21.16	121	135	V
3	* 2.39	31.27	RMS	32.8	-24.8	2.2	41.47	54	-12.83	-	-	121	135	V
4	* 2.38947	32.76	RMS	32.8	-24.8	2.2	42.96	54	-11.04	-	-	121	135	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

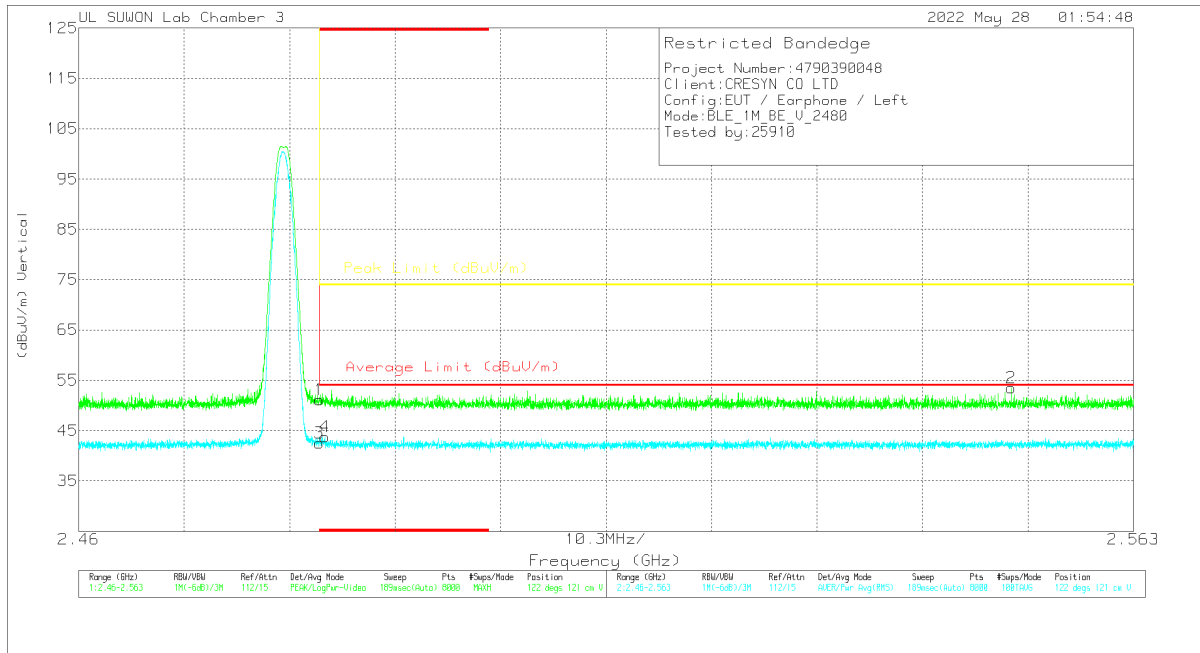


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.27	PK	32.9	-24.7	0	50.47	-	-	74	-23.53	239	117	H
2	2.51191	44.95	PK	32.9	-24.7	0	53.15	-	-	74	-20.85	239	117	H
3	* 2.4835	31.71	RMS	32.9	-24.7	2.2	42.11	54	-11.89	-	-	239	117	H
4	2.54742	33.32	RMS	32.9	-24.7	2.2	43.72	54	-10.28	-	-	239	117	H

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

VERTICAL RESULT



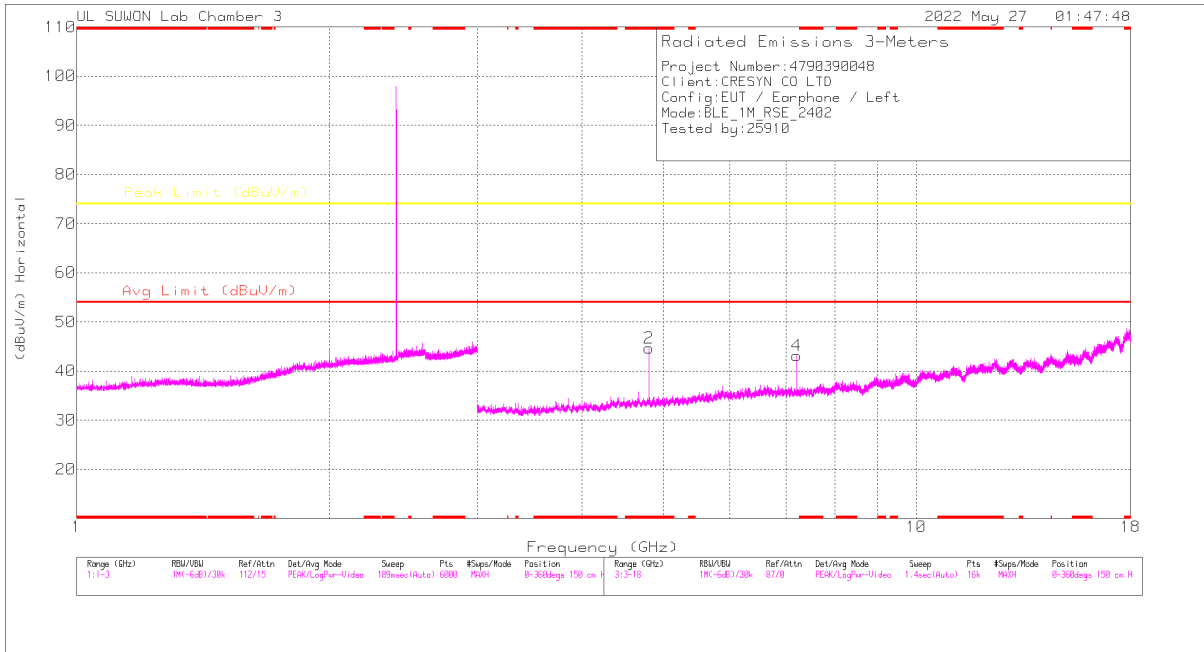
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.94	PK	32.9	-24.7	0	51.14	-	-	74	-22.86	122	121	V
2	2.55105	45.23	PK	32.9	-24.6	0	53.53	-	-	74	-20.47	122	121	V
3	* 2.4835	32.16	RMS	32.9	-24.7	2.2	42.56	54	-11.44	-	-	122	121	V
4	* 2.48403	33.36	RMS	32.9	-24.7	2.2	43.76	54	-10.24	-	-	122	121	V

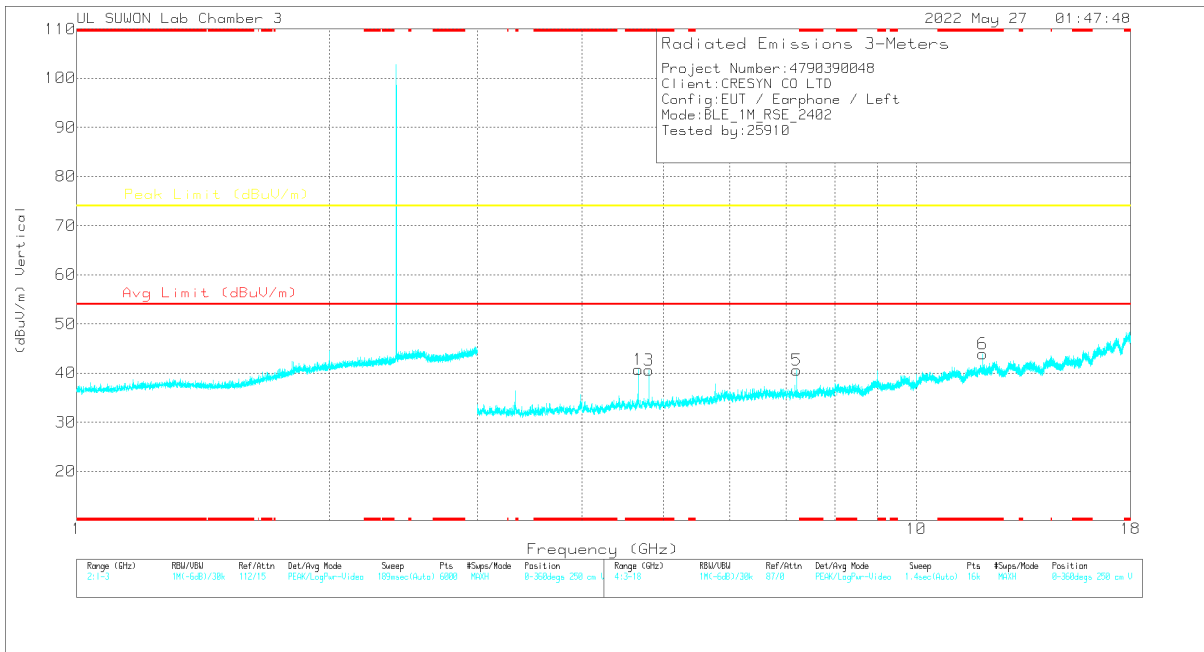
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

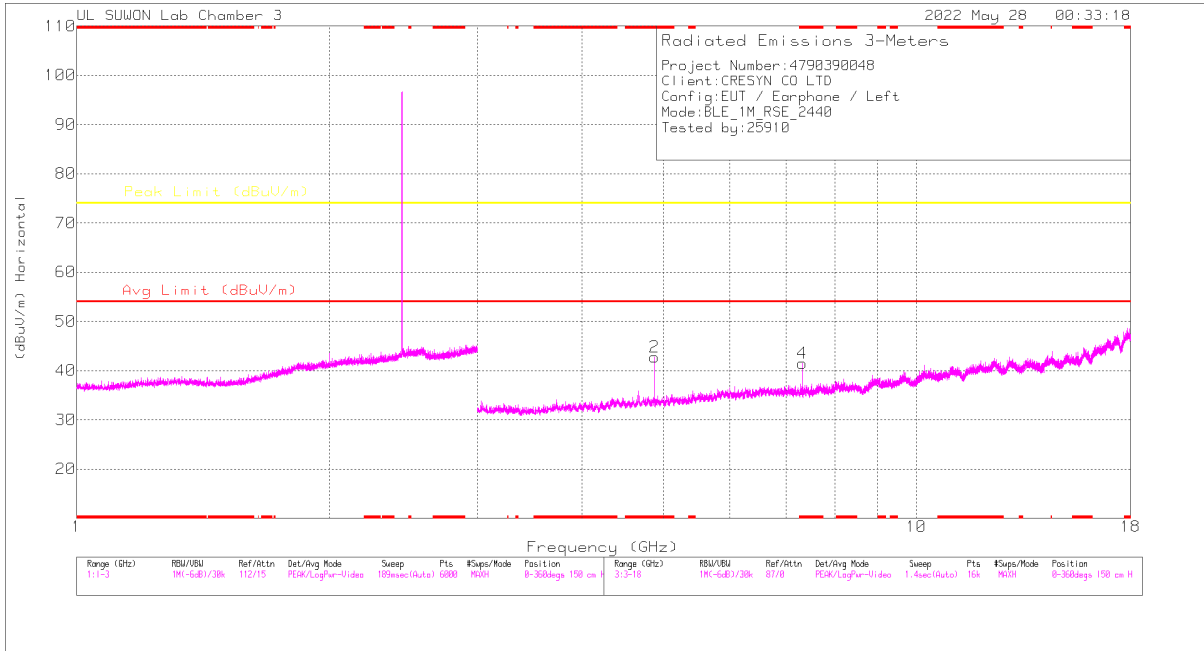
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

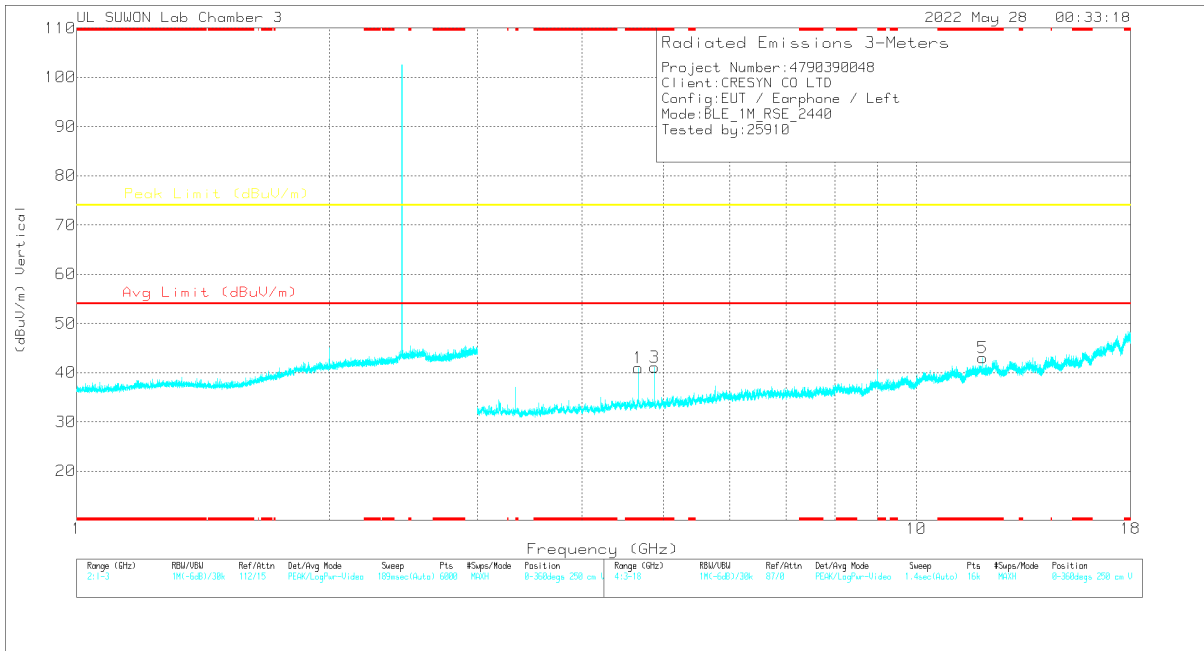
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80435	45.75	PK2	34.6	-29.9	0	50.45	-	-	74	-23.55	311	100	H
* 4.80389	36.96	MAv1	34.6	-29.9	2.2	43.86	54	-10.14	-	-	311	100	H
7.20675	41.07	PK2	36.1	-25.6	0	51.57	-	-	74	-22.43	51	100	H
* 4.66636	45.54	PK2	34.5	-30	0	50.04	-	-	74	-23.96	260	110	V
* 4.66642	37.95	MAv1	34.5	-30	2.2	44.65	54	-9.35	-	-	260	110	V
* 4.80422	44.14	PK2	34.6	-29.9	0	48.84	-	-	74	-25.16	179	102	V
* 4.80381	34.44	MAv1	34.6	-29.9	2.2	41.34	54	-12.66	-	-	179	102	V
7.20541	39.28	PK2	36.1	-25.6	0	49.78	-	-	74	-24.22	160	100	V
* 11.99958	33.57	PK2	39.2	-21.9	0	50.87	-	-	74	-23.13	101	117	V
* 11.99945	25.67	MAv1	39.2	-21.9	2.2	45.17	54	-8.83	-	-	101	117	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 RESULTS



HORIZONTAL



VERTICAL

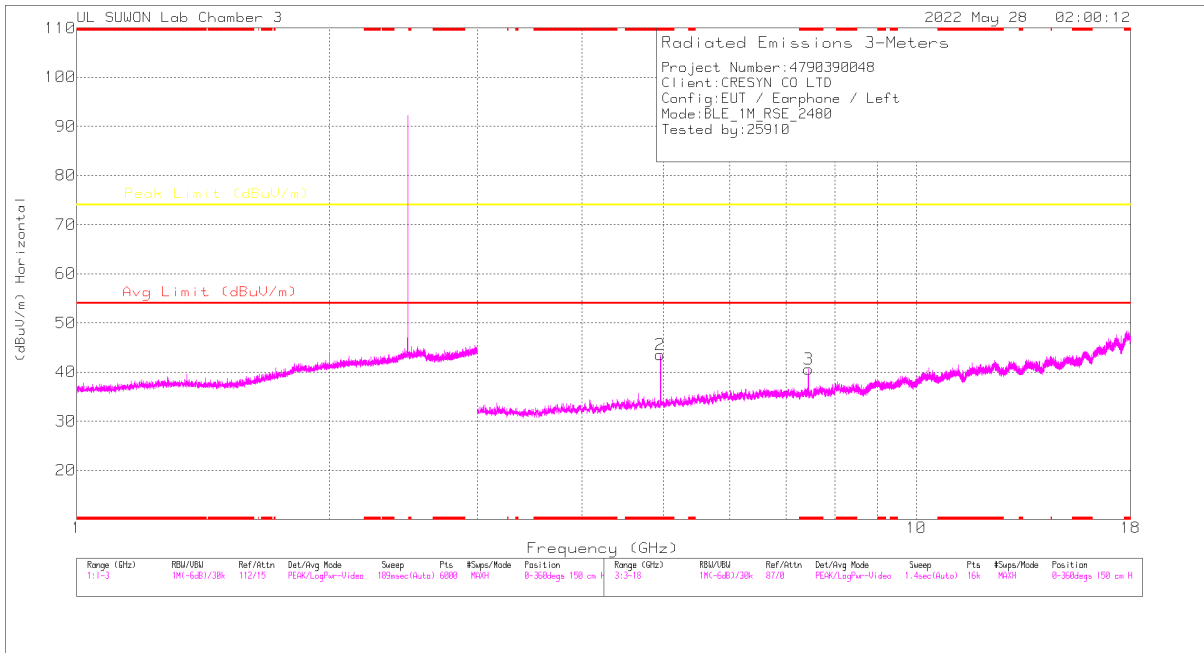
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

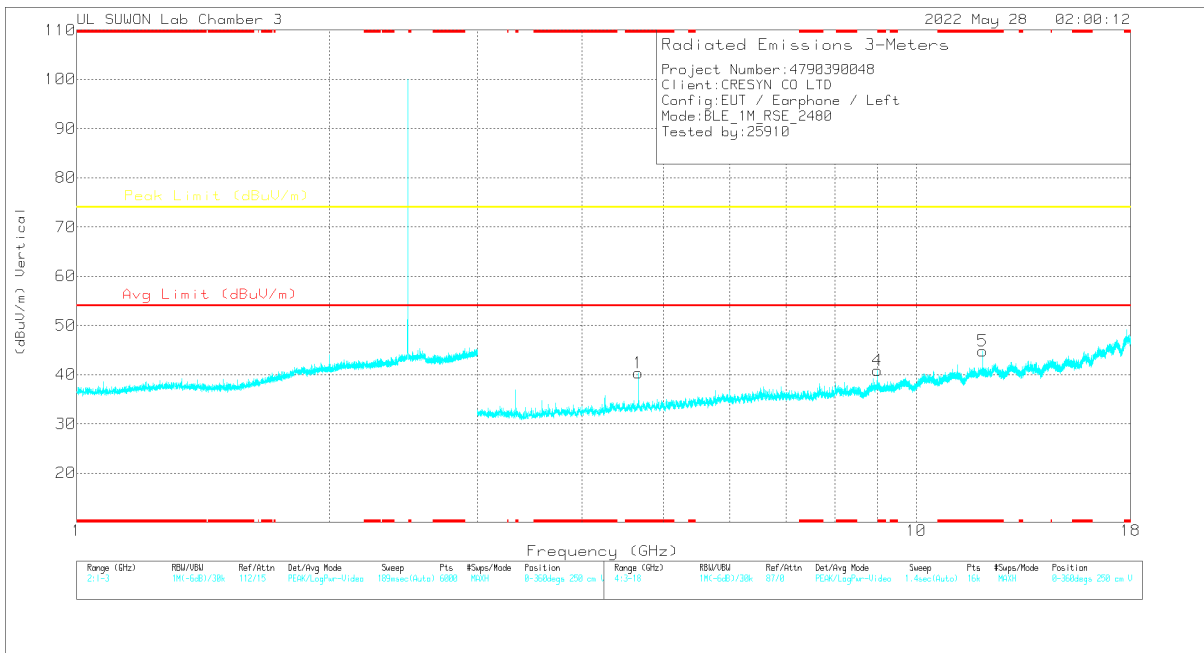
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87967	32.76	PK2	34.7	-30.6	0	36.86	-	-	74	-37.14	208	110	H
* 4.88006	35.72	MAv1	34.7	-30.6	2.2	42.02	54	-11.98	-	-	208	110	H
* 7.31924	38.21	PK2	36	-25.2	0	49.01	-	-	74	-24.99	52	103	H
* 7.31943	27.82	MAv1	36	-25.2	2.2	40.82	54	-13.18	-	-	52	103	H
* 4.66697	45.6	PK2	34.5	-30	0	50.1	-	-	74	-23.9	268	103	V
* 4.66653	37.99	MAv1	34.5	-30	2.2	44.69	54	-9.31	-	-	268	103	V
* 4.88004	43.35	PK2	34.7	-30.6	0	47.45	-	-	74	-26.55	186	100	V
* 4.88003	35.02	MAv1	34.7	-30.6	2.2	41.32	54	-12.68	-	-	186	100	V
* 11.99959	33.99	PK2	39.2	-21.9	0	51.29	-	-	74	-22.71	105	110	V
* 11.99932	26.49	MAv1	39.2	-21.9	2.2	45.99	54	-8.01	-	-	105	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 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

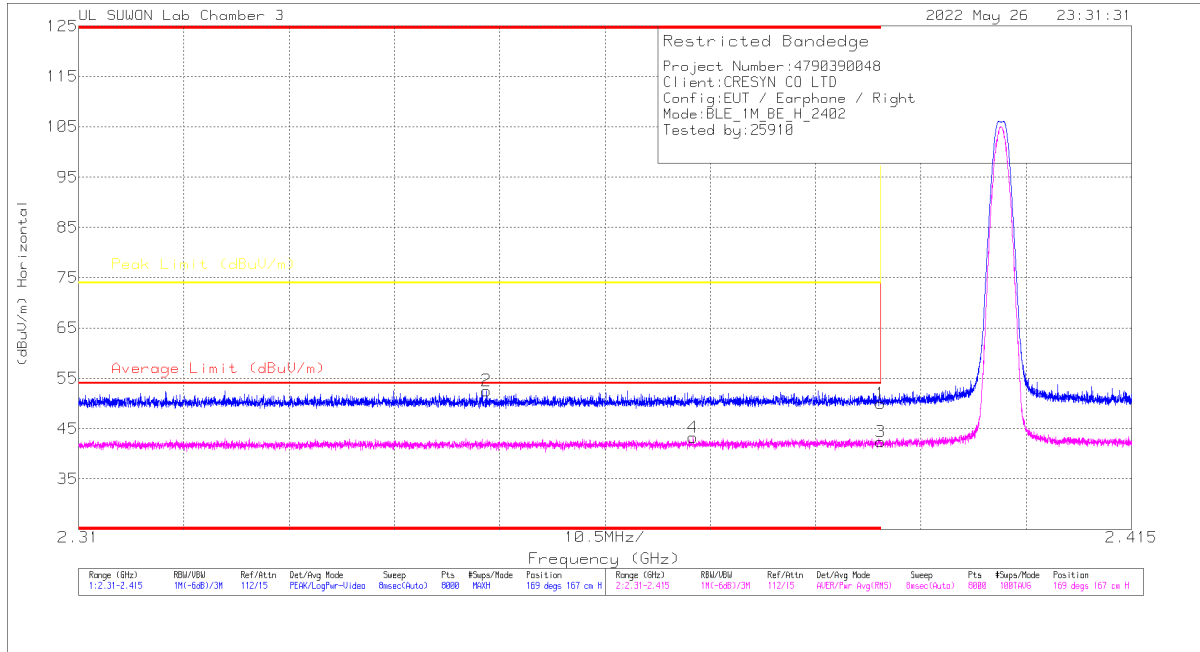
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.9596	46.58	PK2	34.7	-30.4	0	50.88	-	-	74	-23.12	38	110	H
* 4.95972	38.78	MAv1	34.7	-30.4	2.2	45.28	54	-8.72	-	-	38	110	H
* 7.43942	39.66	PK2	36	-24.8	0	50.86	-	-	74	-23.14	73	103	H
* 7.43938	30.42	MAv1	36	-24.8	2.2	43.82	54	-10.18	-	-	73	103	H
* 4.66686	44.95	PK2	34.5	-30	0	49.45	-	-	74	-24.55	269	100	V
* 4.66646	38.32	MAv1	34.5	-30	2.2	45.02	54	-8.98	-	-	269	100	V
* 9.00131	33.41	PK2	36.8	-22.3	0	47.91	-	-	74	-26.09	155	148	V
* 9.00001	22.84	MAv1	36.8	-22.3	2.2	39.54	54	-14.46	-	-	155	148	V
* 11.99955	34.44	PK2	39.2	-21.9	0	51.74	-	-	74	-22.26	265	101	V
* 11.99938	27.24	MAv1	39.2	-21.9	2.2	46.74	54	-7.26	-	-	265	101	V

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

10.2.2. Right_1 Mbps

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

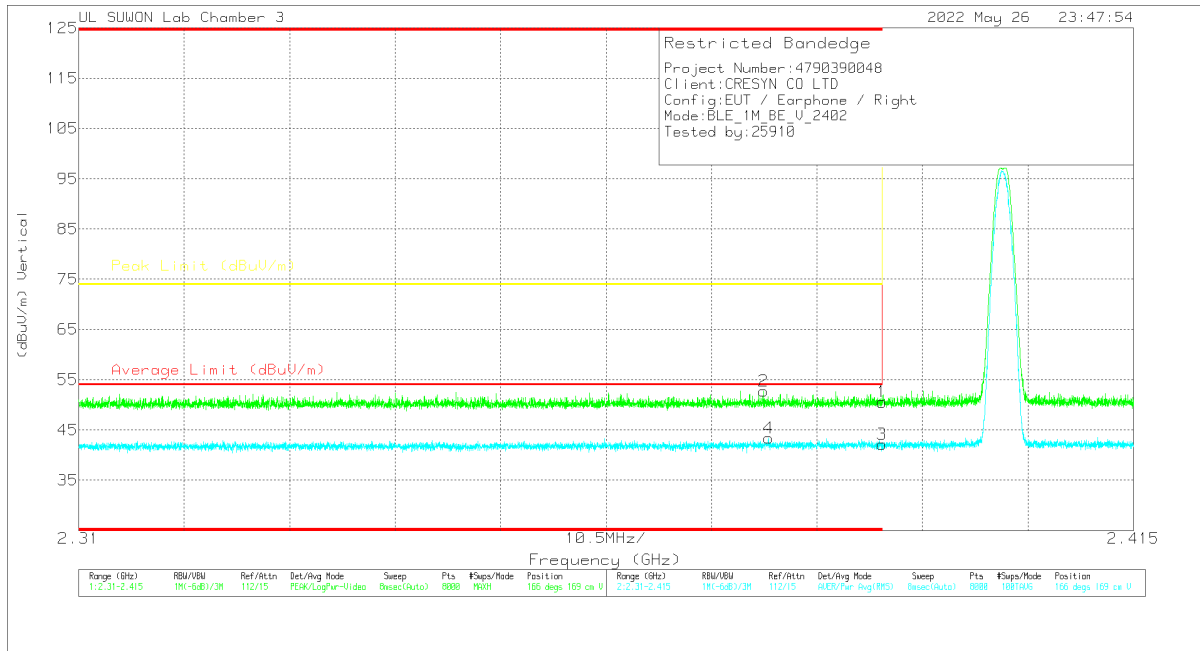


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Cor (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	42.02	PK	32.8	-24.8	0	50.02	-	-	74	-23.96	169	167	H
2	* 2.35267	44.96	PK	32.6	-24.9	0	52.56	-	-	74	-21.44	169	167	H
3	* 2.39	32.25	RMS	32.8	-24.8	2.2	42.45	54	-11.55	-	-	169	167	H
4	* 2.37129	33.24	RMS	32.7	-24.9	2.2	43.24	54	-10.76	-	-	169	167	H

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

VERTICAL RESULT



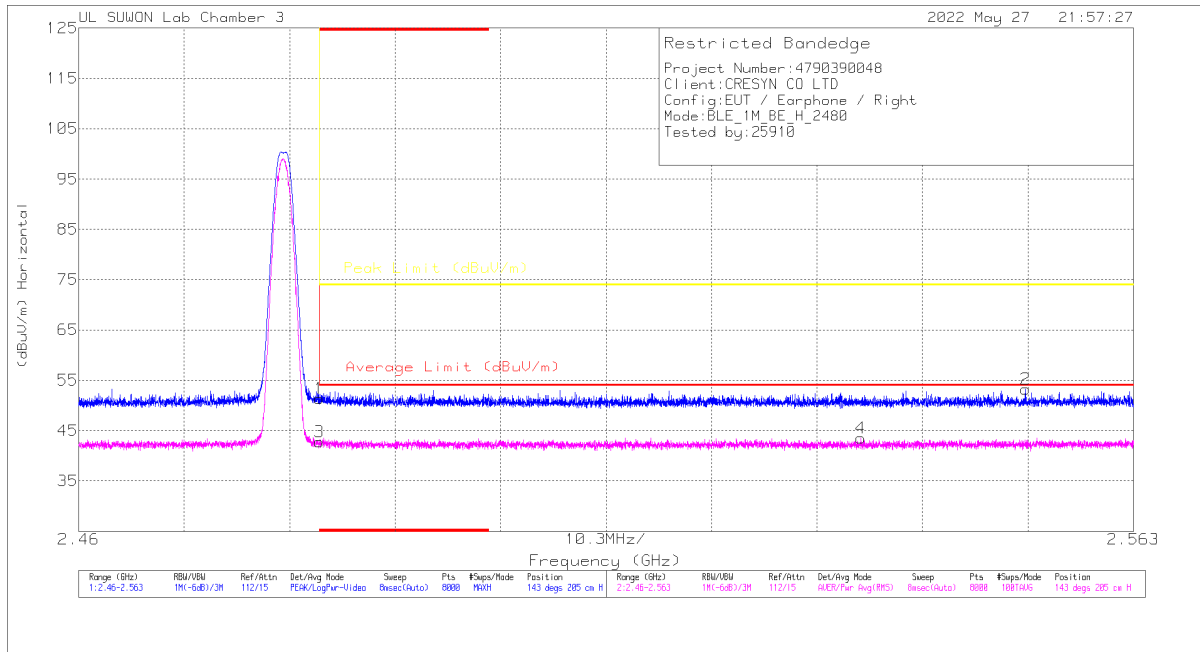
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Cor (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.330	42.57	PK	32.8	-24.8	0	50.57	-	-	74	-23.43	166	169	V
2	* 2.37817	44.98	PK	32.7	-24.9	0	52.78	-	-	74	-21.22	166	169	V
3	* 2.330	31.98	RMS	32.8	-24.8	2.2	42.18	54	-11.82	-	-	166	169	V
4	* 2.37867	33.44	RMS	32.7	-24.9	2.2	43.44	54	-10.56	-	-	166	169	V

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

BANEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

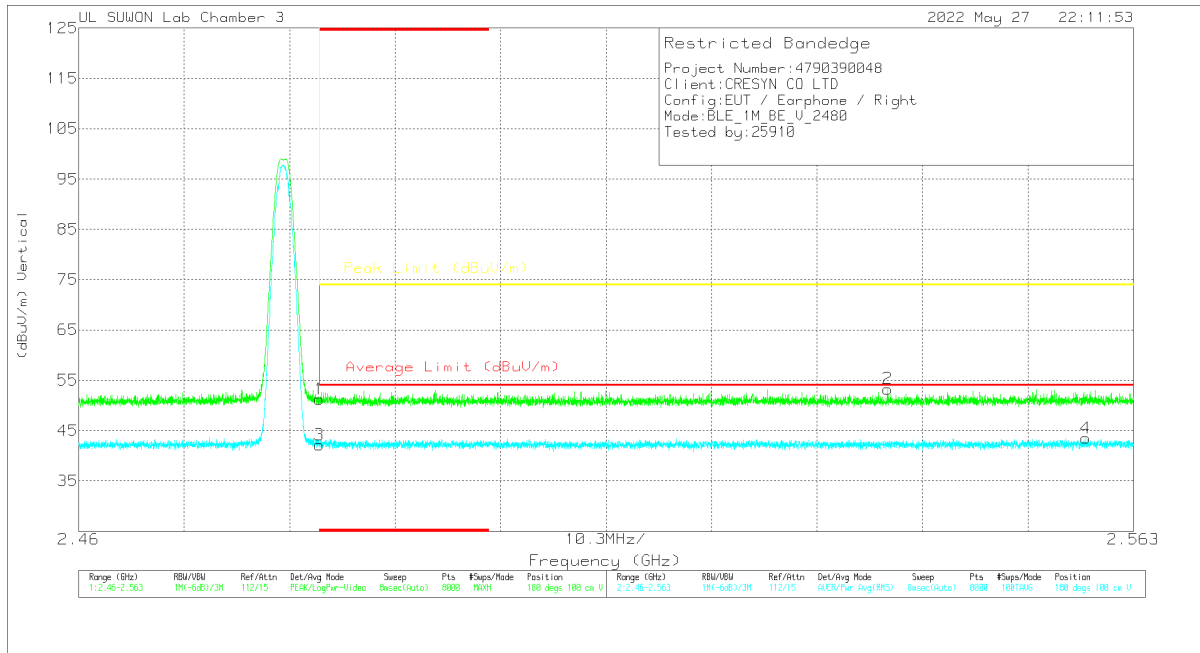


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	43.22	PK	32.9	-24.7	0	51.42	-	-	74	-22.58	143	205	H
2	2.55244	44.89	PK	32.9	-24.6	0	53.19	-	-	74	-20.81	143	205	H
3	* 2.4835	32.4	RMS	32.9	-24.7	2.2	42.8	54	-11.2	-	-	143	205	H
4	2.53639	33.06	RMS	32.9	-24.6	2.2	43.56	54	-10.44	-	-	143	205	H

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

VERTICAL RESULT



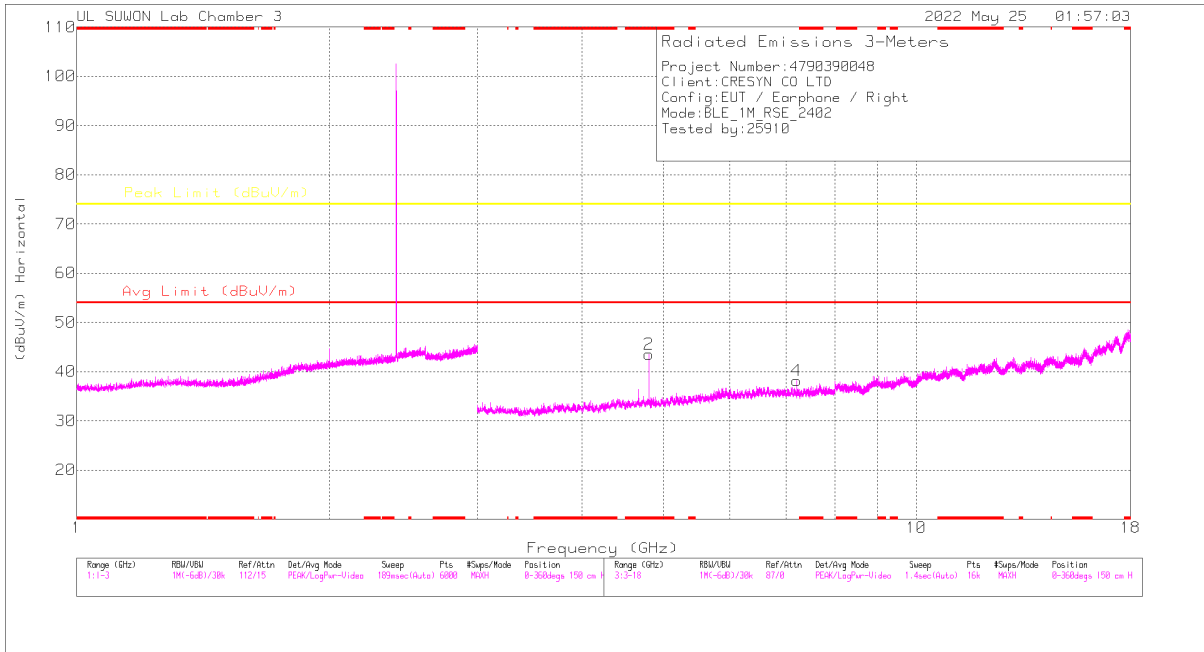
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Acimuh (Degs)	Height (cm)	Polarity
1	* 2.4835	43.1	PK	32.9	-24.7	0	51.3	-	-	74	-22.7	180	100	V
2	2.53899	45.11	PK	32.9	-24.7	0	53.31	-	-	74	-20.69	180	100	V
3	* 2.4835	31.75	RMS	32.9	-24.7	2.2	42.15	54	-11.85	-	-	180	100	V
4	2.55833	32.99	RMS	32.9	-24.6	2.2	43.49	54	-10.51	-	-	180	100	V

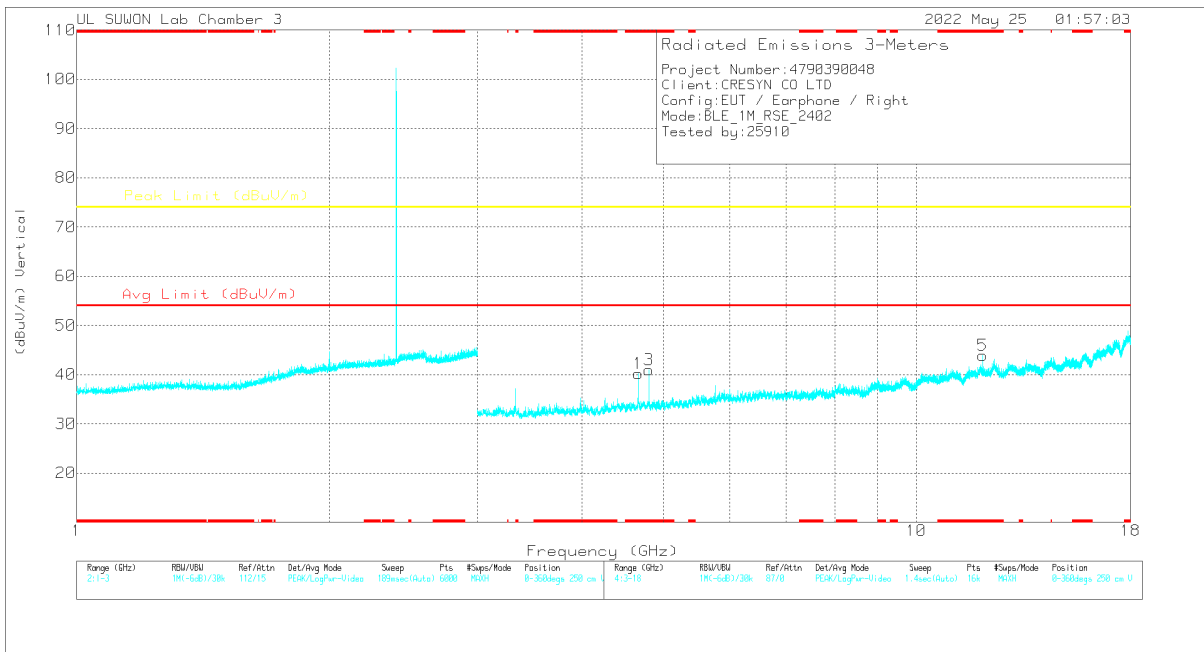
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

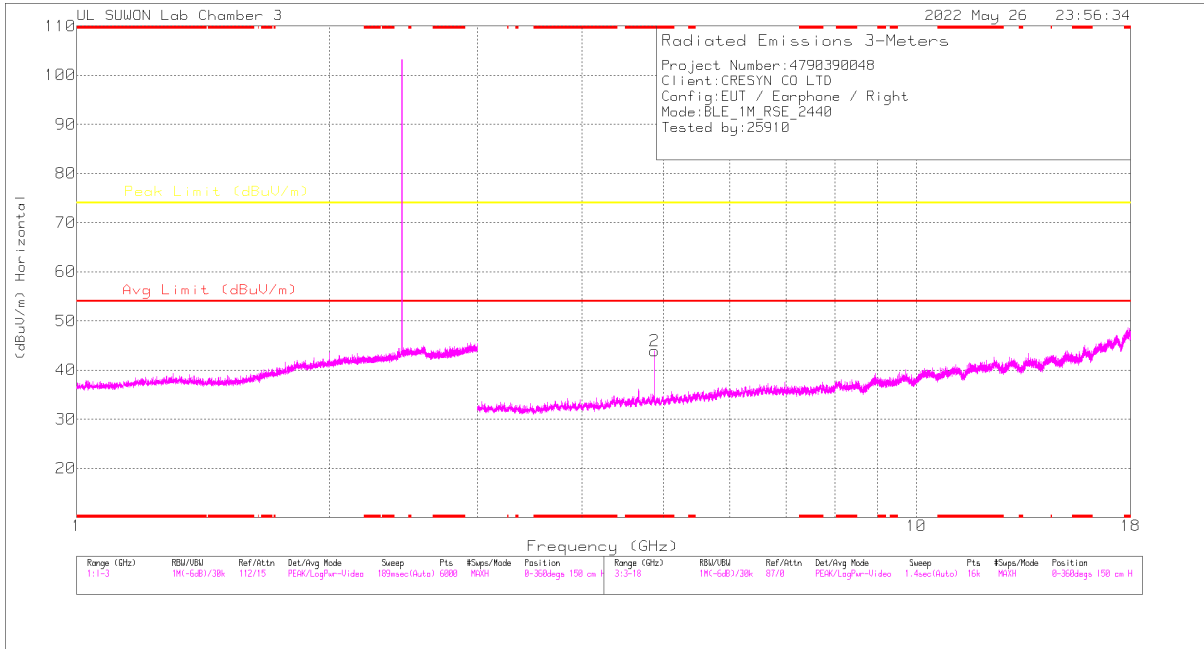
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

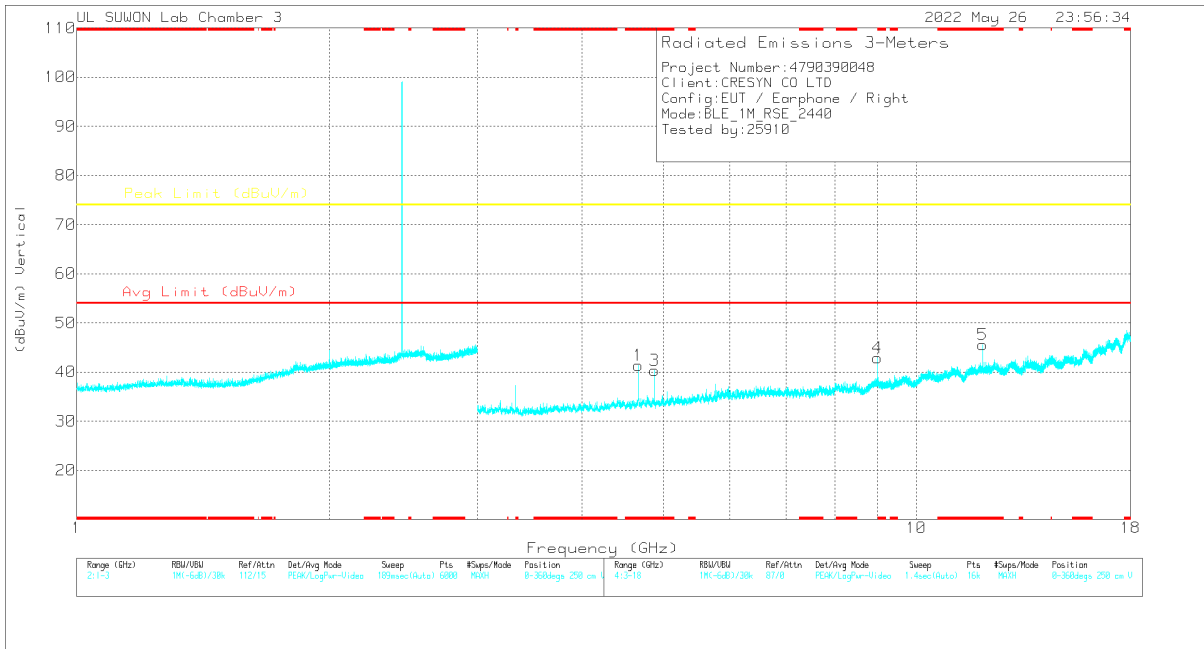
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80409	36.3	PK2	34.6	-29.9	0	41	-	-	74	-33	289	115	H
* 4.80392	35.8	MAv1	34.6	-29.9	2.2	42.7	54	-11.3	-	-	289	115	H
7.2053	37.86	PK2	36.1	-25.6	0	48.36	-	-	74	-25.64	251	111	H
* 4.66695	42.03	PK2	34.5	-30	0	46.53	-	-	74	-27.47	160	119	H
* 4.66654	33.21	MAv1	34.5	-30	2.2	39.91	54	-14.09	-	-	160	119	H
* 4.80392	45.22	PK2	34.6	-29.9	0	49.92	-	-	74	-24.08	285	116	H
* 4.80387	37	MAv1	34.6	-29.9	2.2	43.9	54	-10.1	-	-	285	116	H
* 11.99921	33.4	PK2	39.2	-21.9	0	50.7	-	-	74	-23.3	292	101	H
* 11.99929	23.89	MAv1	39.2	-21.9	2.2	43.39	54	-10.61	-	-	292	101	H

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

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

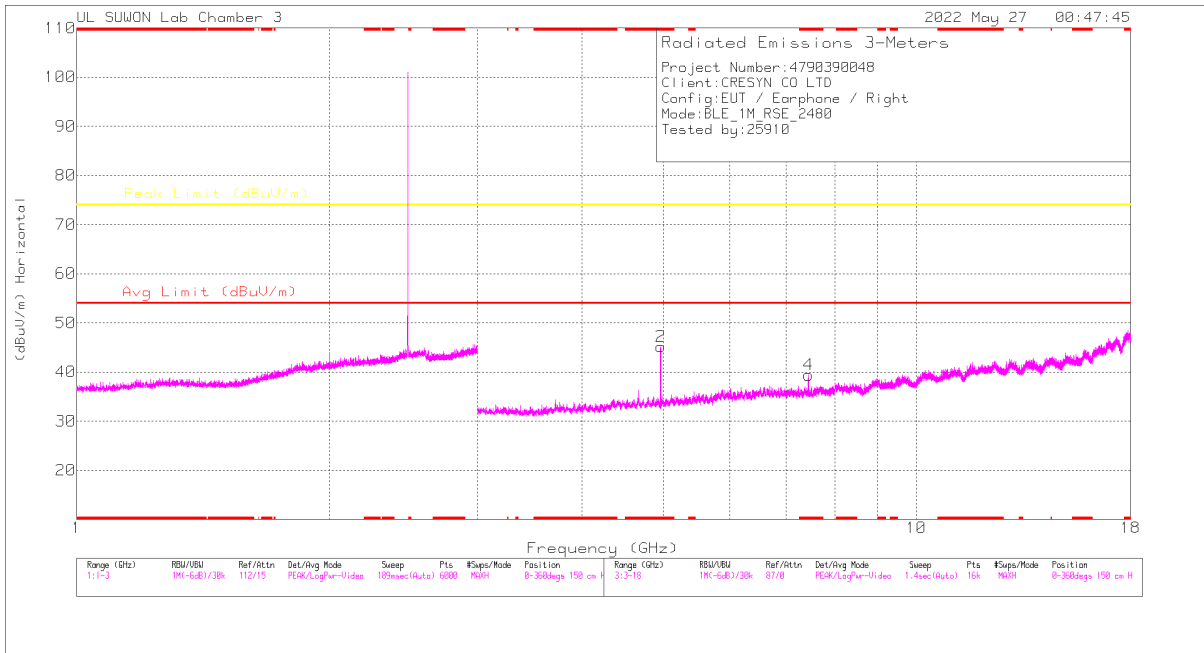
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

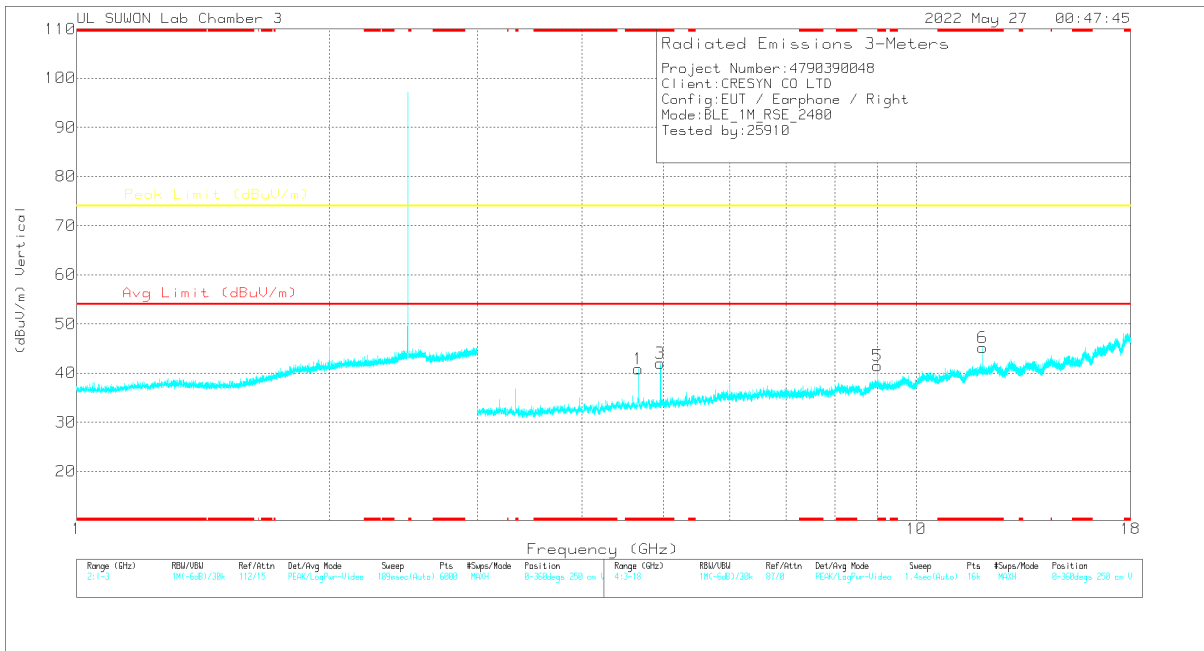
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87991	46.38	PK2	34.7	-30.6	0	50.48	-	-	74	-23.52	249	101	H
* 4.87986	37.6	MAv1	34.7	-30.6	2.2	43.9	54	-10.1	-	-	249	101	H
* 4.66655	44.98	PK2	34.5	-30	0	49.48	-	-	74	-24.52	63	105	V
* 4.66644	37.52	MAv1	34.5	-30	2.2	44.22	54	-9.78	-	-	63	105	V
* 4.87991	43.83	PK2	34.7	-30.6	0	47.93	-	-	74	-26.07	156	382	V
* 4.87994	35.52	MAv1	34.7	-30.6	2.2	41.82	54	-12.18	-	-	156	382	V
* 9.00006	33.71	PK2	36.8	-22.3	0	48.21	-	-	74	-25.79	150	115	V
* 9	23.43	MAv1	36.8	-22.3	2.2	40.13	54	-13.87	-	-	150	115	V
* 11.99942	34.4	PK2	39.2	-21.9	0	51.7	-	-	74	-22.3	101	118	V
* 11.99946	26.71	MAv1	39.2	-21.9	2.2	46.21	54	-7.79	-	-	101	118	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 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

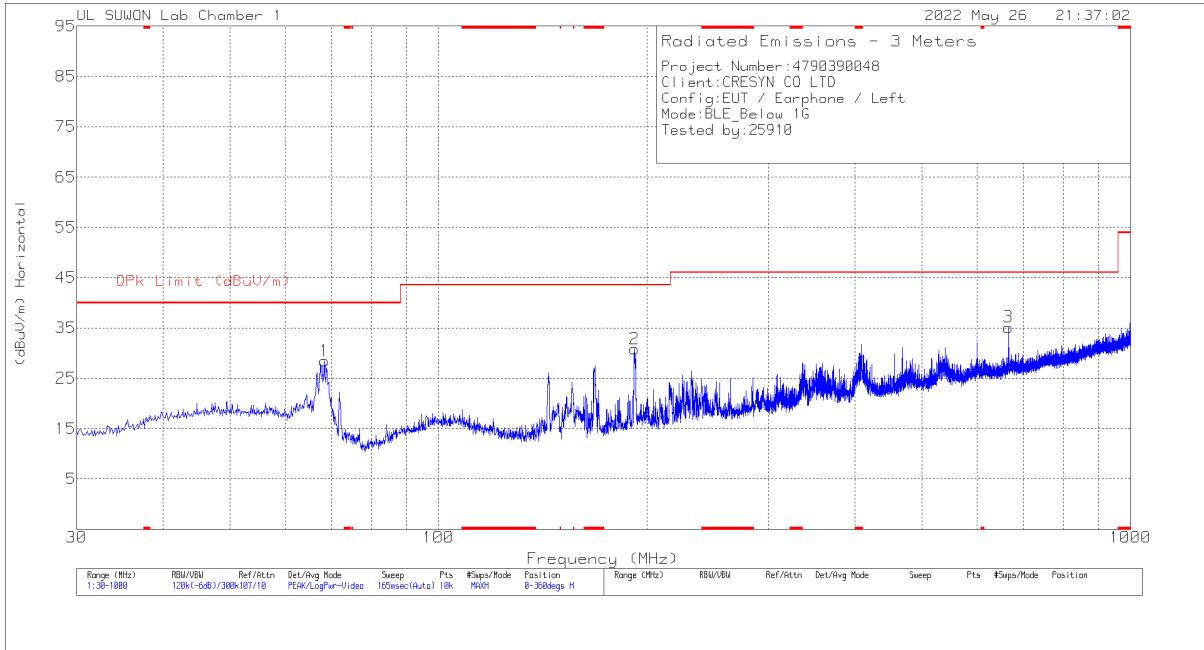
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0021895 7	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96009	47.08	PK2	34.7	-30.4	0	51.38	-	-	74	-22.62	246	101	H
* 4.95996	38.72	MAv1	34.7	-30.4	2.2	45.22	54	-8.78	-	-	246	101	H
* 7.44009	37.64	PK2	36	-24.8	0	48.84	-	-	74	-25.16	297	104	H
* 7.43941	27.35	MAv1	36	-24.8	2.2	40.75	54	-13.25	-	-	297	104	H
* 4.66642	44.86	PK2	34.5	-30	0	49.36	-	-	74	-24.64	62	106	V
* 4.66639	38.07	MAv1	34.5	-30	2.2	44.77	54	-9.23	-	-	62	106	V
* 4.95978	44.81	PK2	34.7	-30.4	0	49.11	-	-	74	-24.89	156	368	V
* 4.95994	36.06	MAv1	34.7	-30.4	2.2	42.56	54	-11.44	-	-	156	368	V
* 9.00018	34.07	PK2	36.8	-22.3	0	48.57	-	-	74	-25.43	148	137	V
* 9.00001	23.64	MAv1	36.8	-22.3	2.2	40.34	54	-13.66	-	-	148	137	V
* 11.99952	34.14	PK2	39.2	-21.9	0	51.44	-	-	74	-22.56	101	103	V
* 11.99948	26.45	MAv1	39.2	-21.9	2.2	45.95	54	-8.05	-	-	101	103	V

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

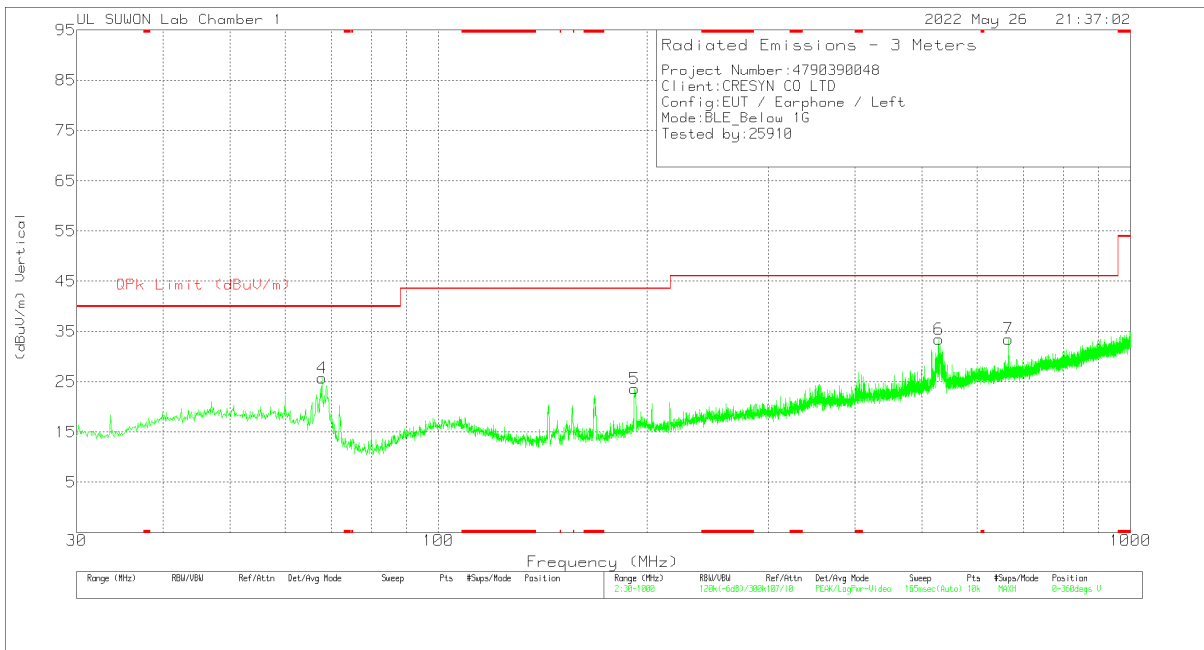
10.3. WORST CASE BELOW 1 GHZ

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

- Left



HORIZONTAL



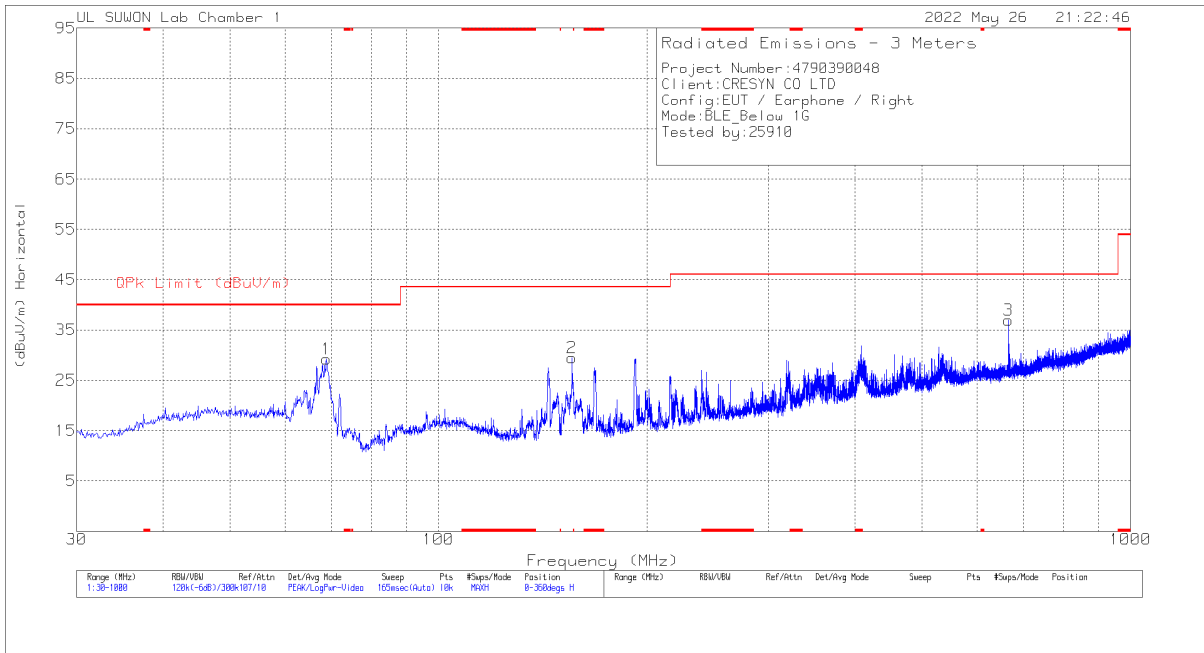
VERTICAL

Below 1GHz Data

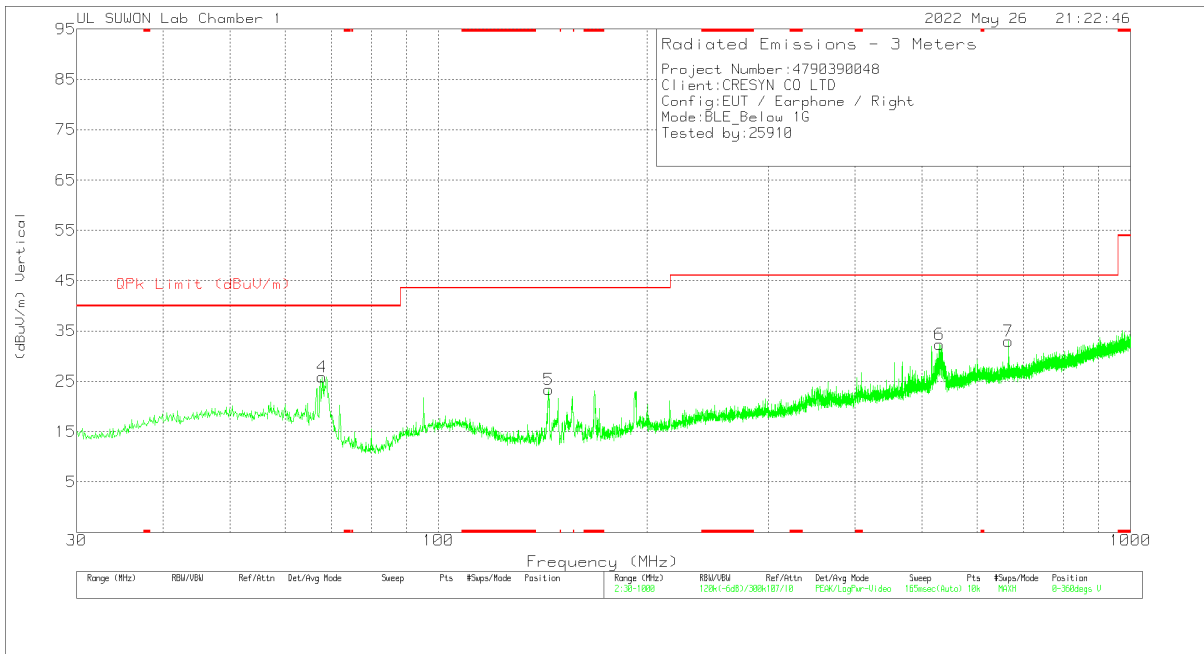
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	68.412	43.19	Pk	16	-30.7	28.49	40	-11.51	0-360	200	H
2	191.99	43.42	Pk	16.8	-29.4	30.82	43.52	-12.7	0-360	100	H
3	666.708	36.65	Pk	25.4	-26.9	35.15	46.02	-10.87	0-360	100	H
4	67.83	40.03	Pk	16.3	-30.6	25.73	40	-14.27	0-360	400	V
5	191.99	36.26	Pk	16.8	-29.4	23.66	43.52	-19.86	0-360	200	V
6	527.998	37.58	Pk	23.4	-27.5	33.48	46.02	-12.54	0-360	200	V
7	666.708	35.03	Pk	25.4	-26.9	33.53	46.02	-12.49	0-360	200	V

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

- Right



HORIZONTAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	68.897	44.09	Pk	15.8	-30.7	29.19	40	-10.81	0-360	200	H
2	155.906	45.05	Pk	14.1	-29.7	29.45	43.52	-14.07	0-360	100	H
3	666.708	38.4	Pk	25.4	-26.9	36.9	46.02	-9.12	0-360	100	H
4	67.927	40.28	Pk	16.2	-30.6	25.88	40	-14.12	0-360	400	V
5	144.46	39.23	Pk	13.8	-29.7	23.33	43.52	-20.19	0-360	200	V
6	530.035	36.45	Pk	23.4	-27.5	32.35	46.02	-13.67	0-360	200	V
7	666.708	34.43	Pk	25.4	-26.9	32.93	46.02	-13.09	0-360	200	V

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

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-GEN 8.8

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS: N/P

Note. The AC power line test was not performed because the EUT does not operate Bluetooth mode while charging.

END OF TEST REPORT