



CERTIFICATION TEST REPORT

Report Number. : 4789424849-E4V1

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

Model : SM-A716V

FCC ID : A3LSMA716V

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac,
ANT+ and NFC

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

Date Of Issue:

May 20, 2020

Prepared by:

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REPORT REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	05/20/20	Initial issue	Hyunsik Yun

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL: SM-A716V

SERIAL NUMBER: 1010276d1b0900ad (CONDUCTED)
R3CN20P2NQJ (RADIATED);

DATE TESTED: APR 01, 2020 – APR 14, 2020;

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

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

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

Approved & Released For
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UL Korea, Ltd.

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Hyunsik Yun
Suwon Lab 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.

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 checked="" type="checkbox"/>	Chamber 2
<input type="checkbox"/>	Chamber 3

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

4. 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. DECISION RULES

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

4.4. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC. This test report addresses the DTS (BLE) operational mode.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	1Mbps	Peak	3.860	2.43
		Average	3.528	2.25
	2Mbps	Peak	3.980	2.50
		Average	3.301	2.14

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 antenna, with a maximum gain of -3.2 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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

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

Power verification

The Output Power of all data rate are all investigated, the 1 Mbps(255 pkt) and 2 Mbps(255 pkt) power is the worst case for symbol rate. All tests were performed in these two modes.

Symbol Rate [Ms/s]	Mode	Frequency [MHz]	Conducted Burst Avg [dBm]	Symbol Rate [Ms/s]	Mode	Frequency [MHz]	Conducted Burst Avg [dBm]
1	1Mbps (37 pkt)	2402	1.425	2	2Mbps (37 pkt)	2402	0.990
		2440	3.345			2440	2.925
		2480	2.753			2480	2.317
	1Mbps (255 pkt)	2402	1.598		2Mbps (255 pkt)	2402	1.379
		2440	3.528			2440	3.301
		2480	2.922			2480	2.679
1	Coded S=8 125 kbps (37 pkt)	2402	1.594				
		2440	3.528				
		2480	2.909				
	Coded S=8 125 kbps (128 pkt)	2402	1.605				
		2440	3.525				
		2480	2.895				
	Coded S=2 500 kbps (37 pkt)	2402	1.559				
		2440	3.492				
		2480	2.866				
	Coded S=2 500 kbps (128 pkt)	2402	1.599				
		2440	3.521				
		2480	2.896				

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37KAT317D4SE3	N/A
Data Cable	SAMSUNG	EP-DF700	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	N/A	N/A

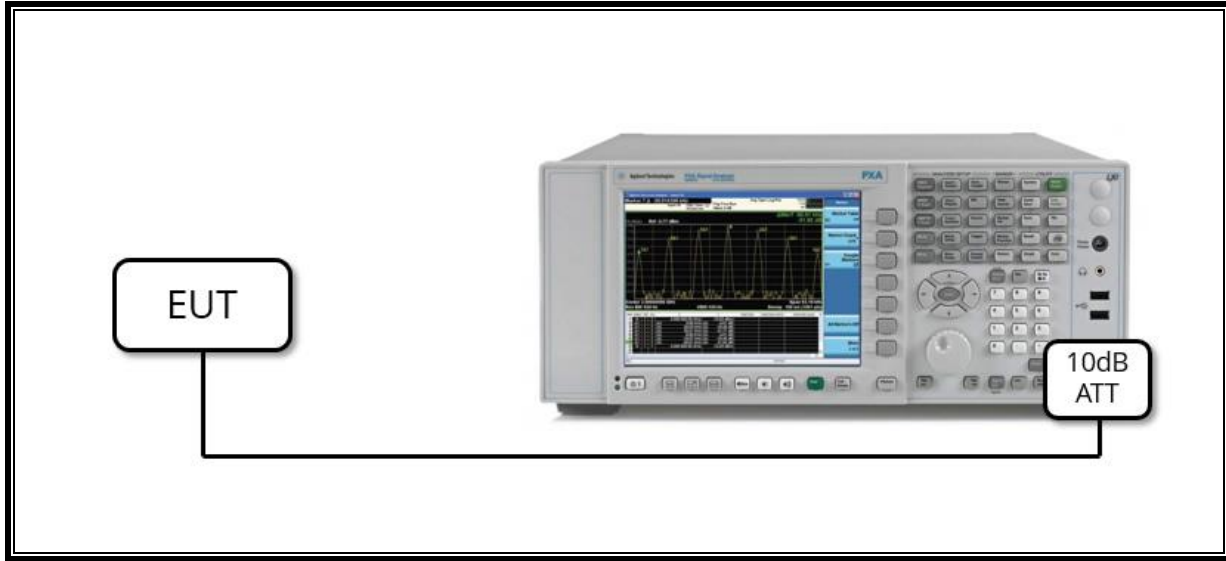
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length(m)	Remarks
1	DC Power	1	C Type	Shielded	1.1m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

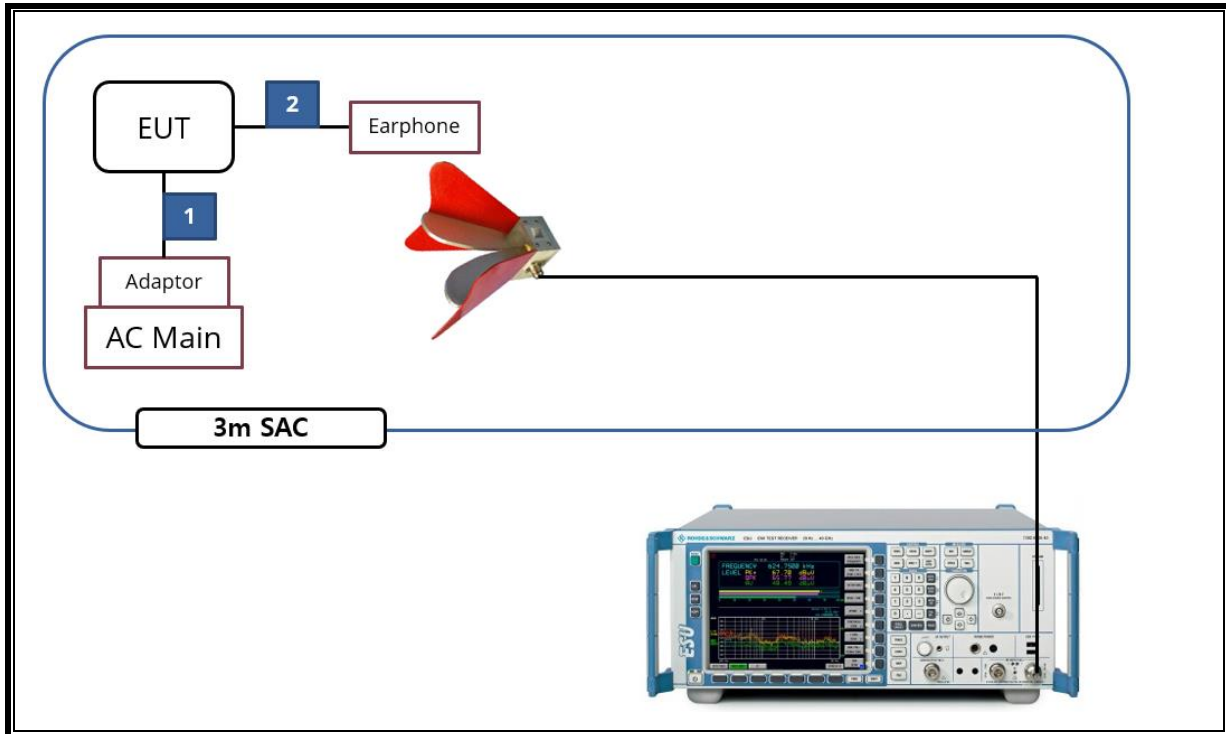
TEST SETUP

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

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	Next Cal. Date
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	Keysight	N9030B	MY57143717	01-20-21
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	PASTERNAK	PE7087-10	A001	08-08-20
Attenuator	PASTERNAK	PE7087-10	A008	08-08-20
Attenuator	PASTERNAK	PE7004-10	2	08-06-20
Attenuator	PASTERNAK	PE7087-10	A009	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
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
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

8. TEST RESULTS SUMMARY

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	-20dBc		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(Av)	Radiated	Pass

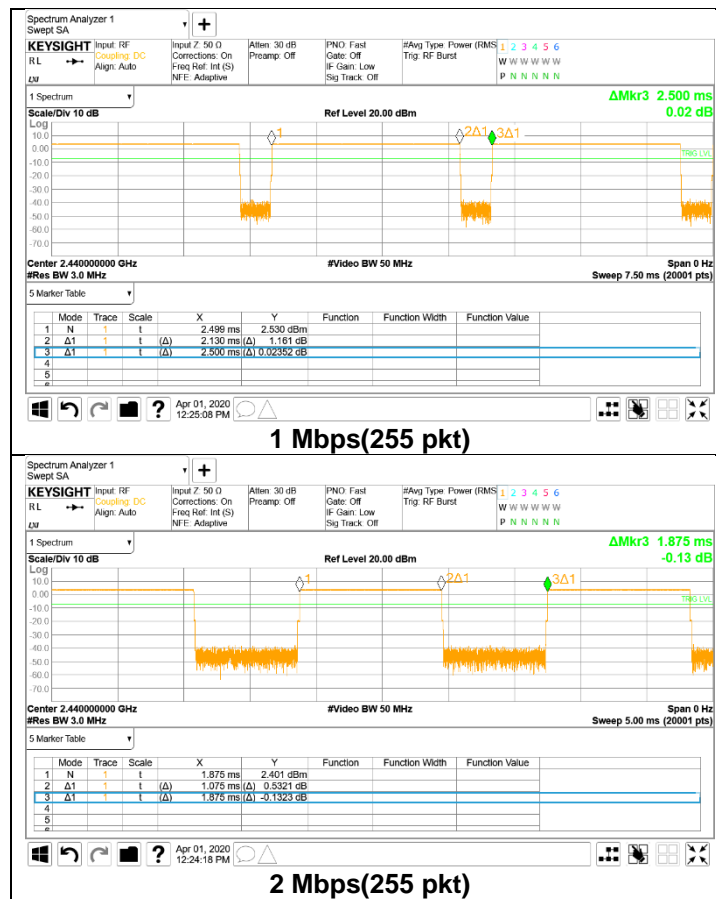
9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2400MHz Bands						
BLE 1 Mbps	2.130	2.500	0.852	85.2%	0.70	0.469
BLE 2 Mbps	1.075	1.875	0.573	57.3%	2.42	0.930



9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

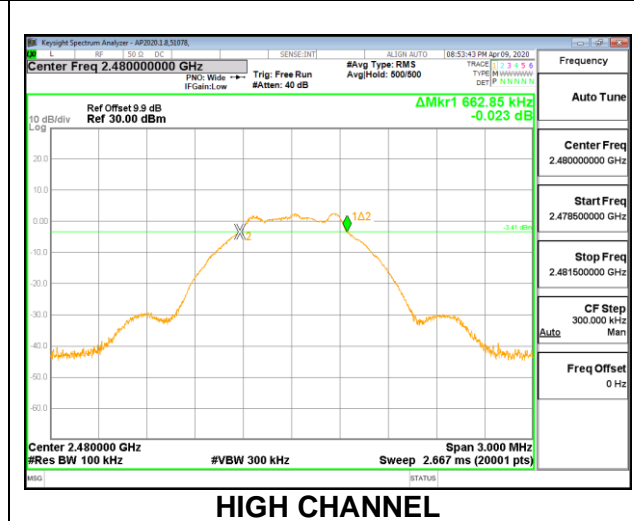
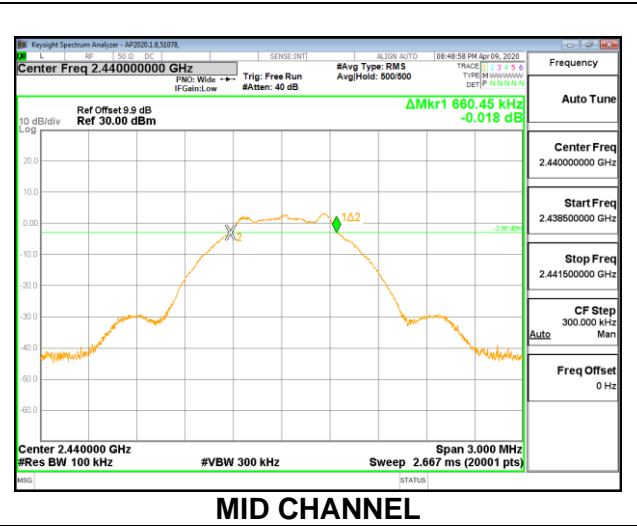
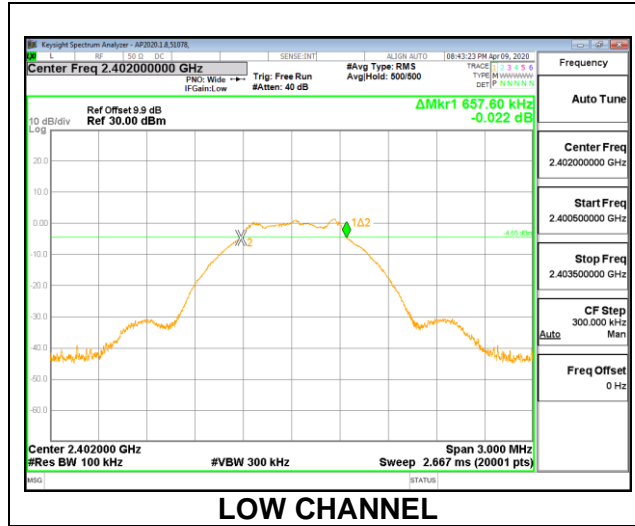
RSS-247 5.2 (a)

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

RESULTS

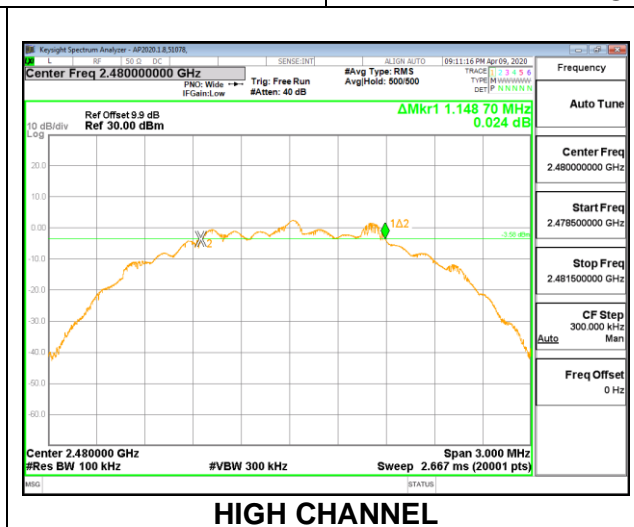
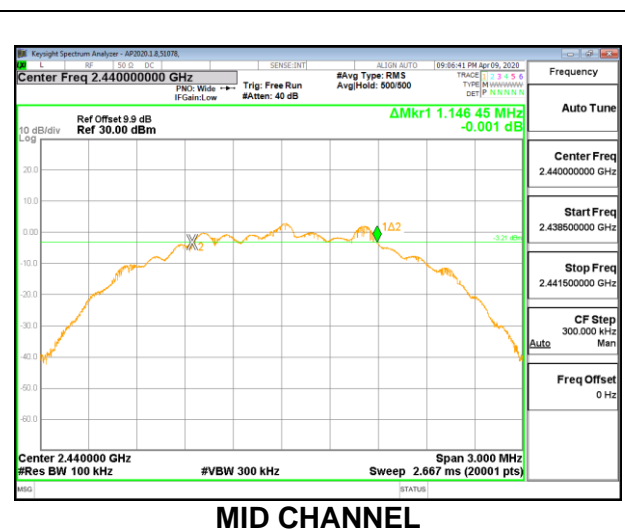
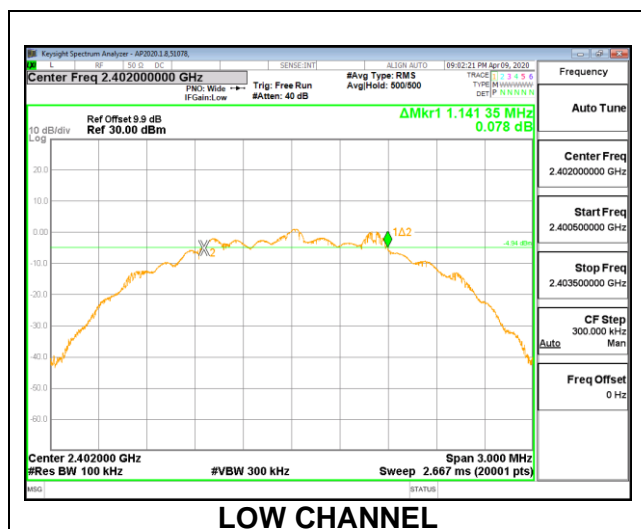
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6580	0.5
Middle	2440	0.6600	0.5
High	2480	0.6630	0.5



9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.1410	0.5
Middle	2440	1.1460	0.5
High	2480	1.1490	0.5



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.

TEST PROCEDURE

Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer.

RESULTS

- 1 Mbps

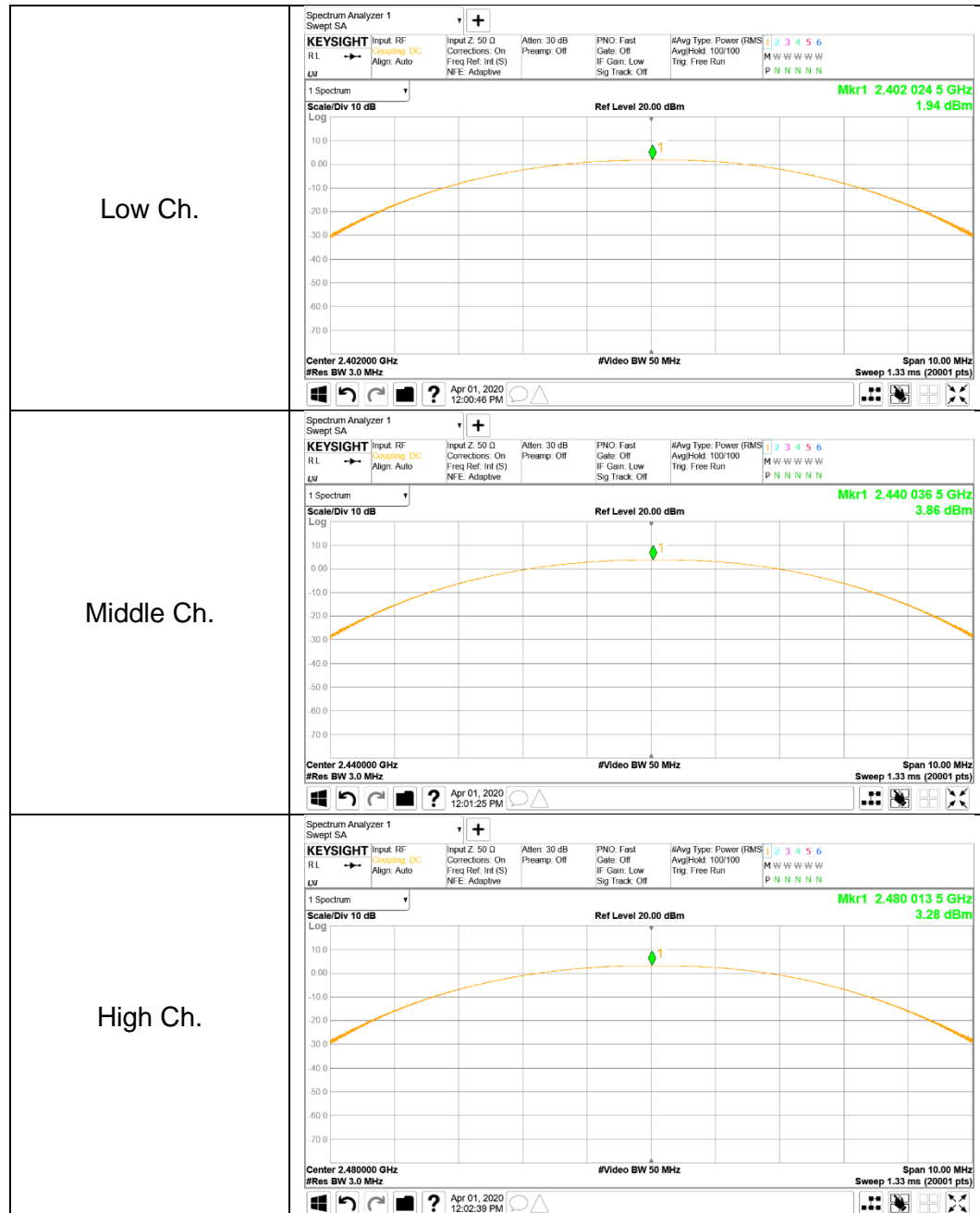
Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	1.940	30.000	-28.060
Mid	2 440	3.860	30.000	-26.140
High	2 480	3.280	30.000	-26.720
Worst		3.860	30.000	-26.140

- 2 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	2.060	30.000	-27.940
Mid	2 440	3.980	30.000	-26.020
High	2 480	3.390	30.000	-26.610
Worst		3.980	30.000	-26.020

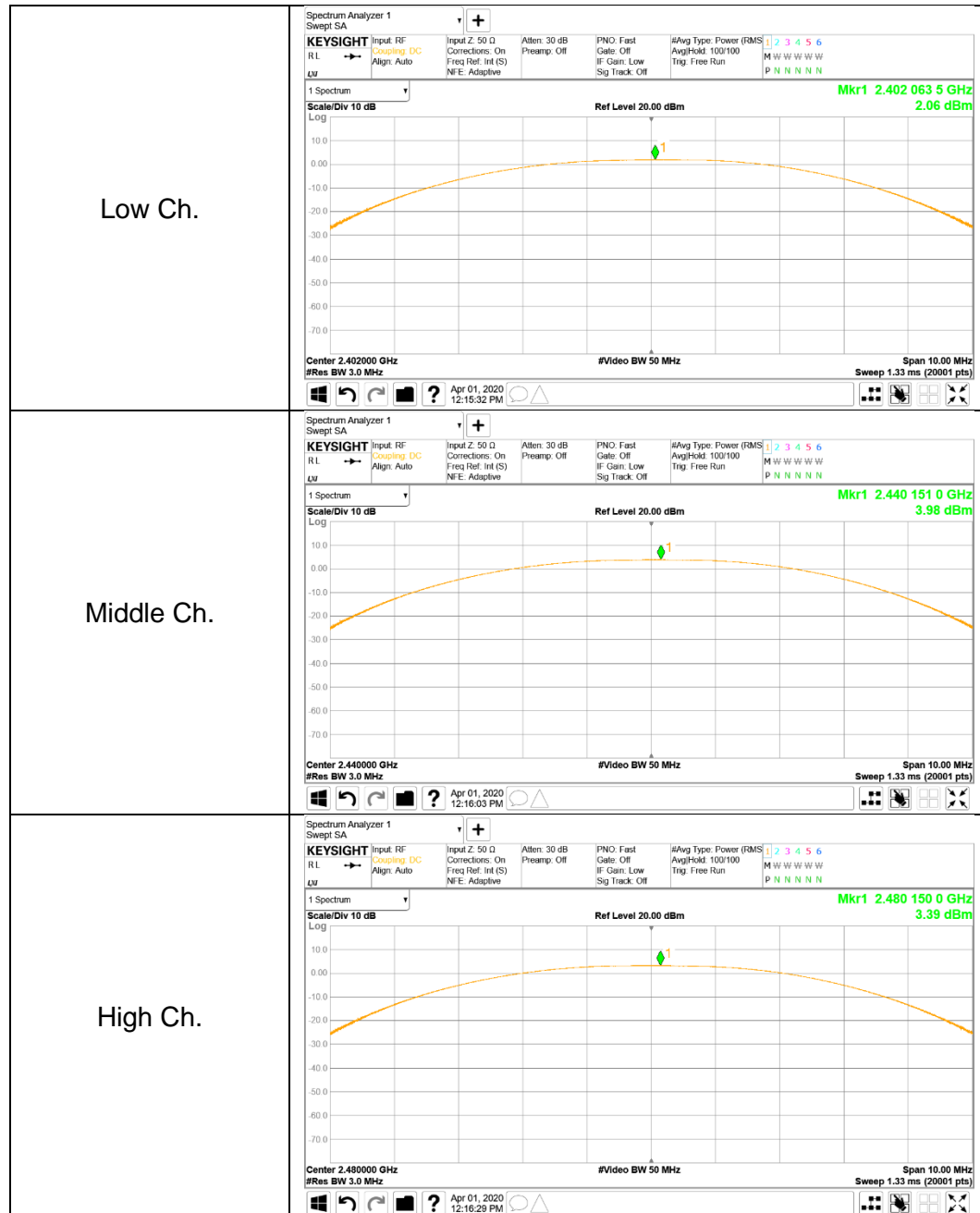
9.3.1. BLE (1 Mbps)

PEAK OUTPUT POWER PLOTS



9.3.2. BLE (2 Mbps)

PEAK OUTPUT POWER PLOTS



9.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power. The duty factor already has been added.

- 1 Mbps

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	1.598	1.445
Middle	2 440	3.528	2.253
High	2 480	2.922	1.960

- 2 Mbps

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	1.379	1.374
Middle	2 440	3.301	2.139
High	2 480	2.679	1.853

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

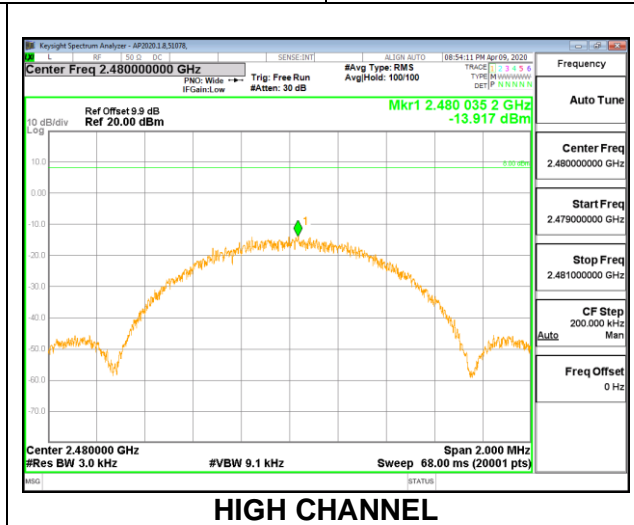
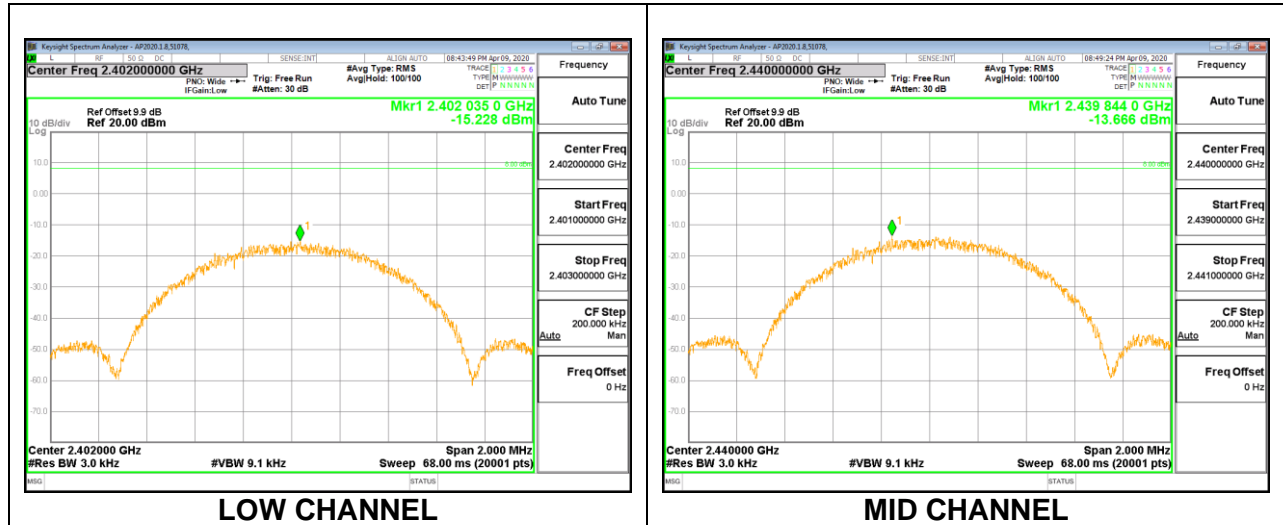
RSS-247 (5.2) (b)

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.

RESULTS

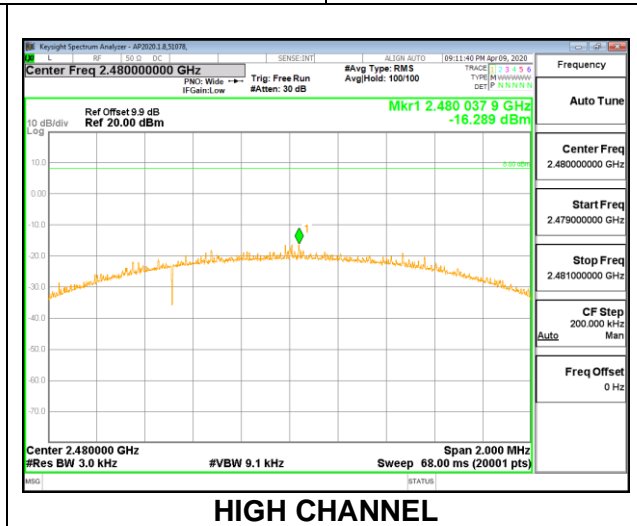
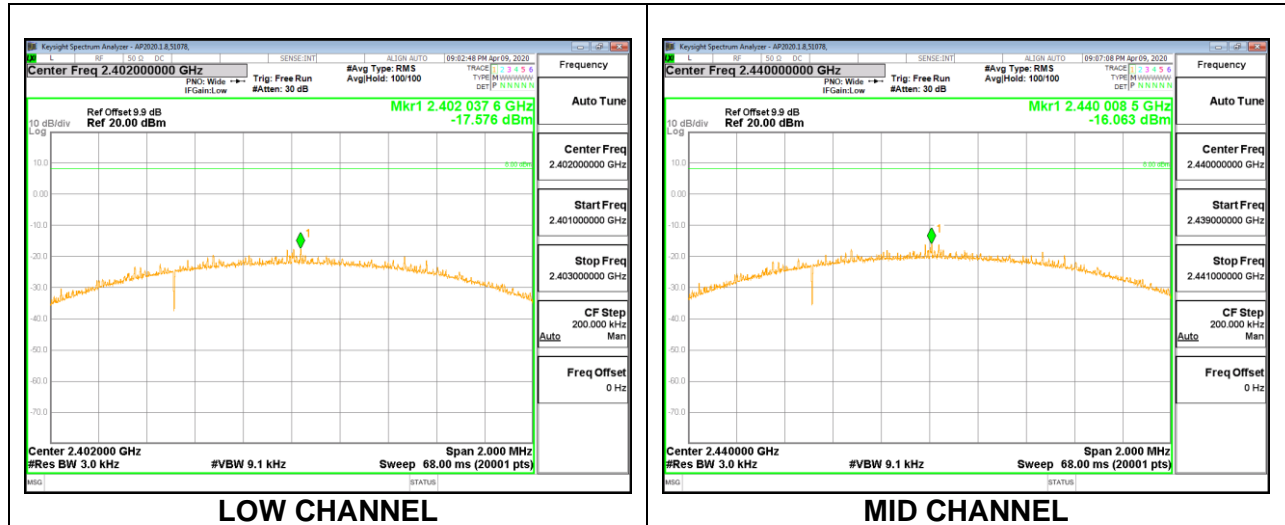
9.5.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-15.23	8	-23.23
Middle	2440	-13.67	8	-21.67
High	2480	-13.92	8	-21.92



9.5.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-17.58	8	-25.58
Middle	2440	-16.06	8	-24.06
High	2480	-16.29	8	-24.29



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

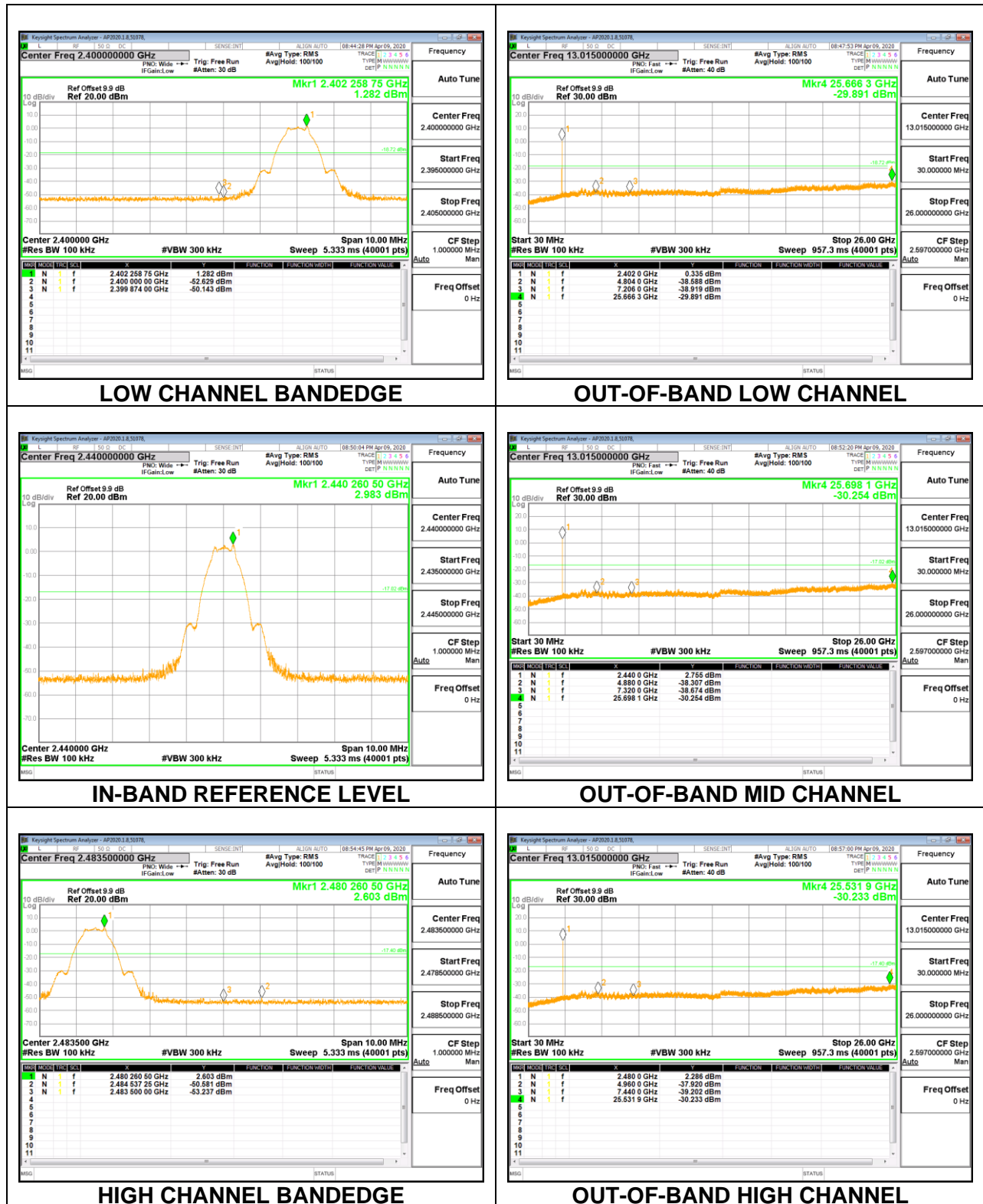
FCC §15.247 (d)

RSS-247 5.5

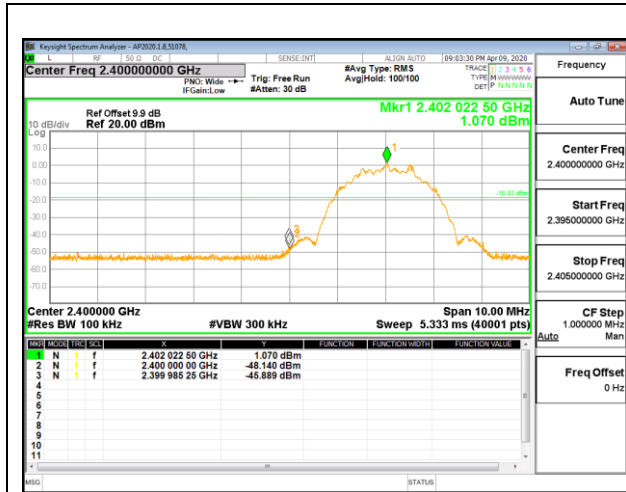
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

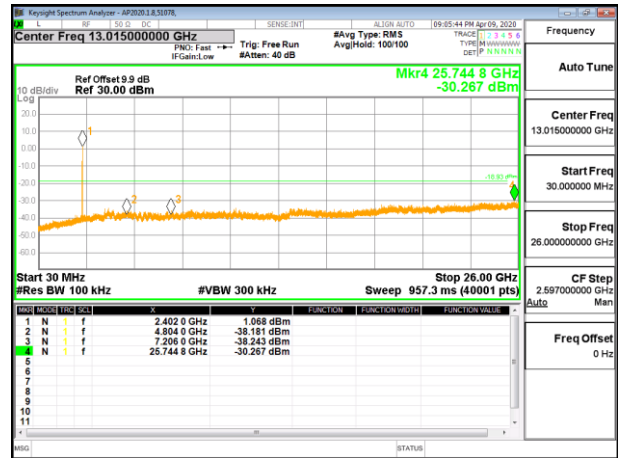
9.6.1. BLE (1Mbps)



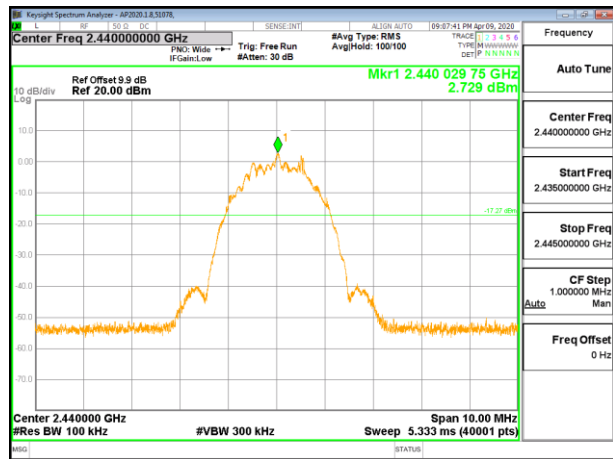
9.6.2. BLE (2Mbps)



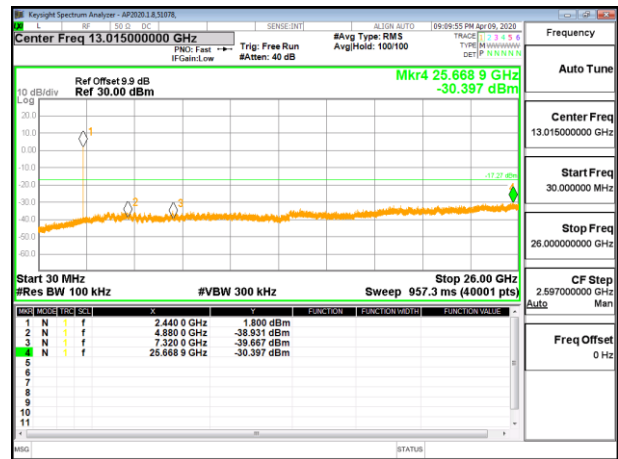
LOW CHANNEL BANDEDGE



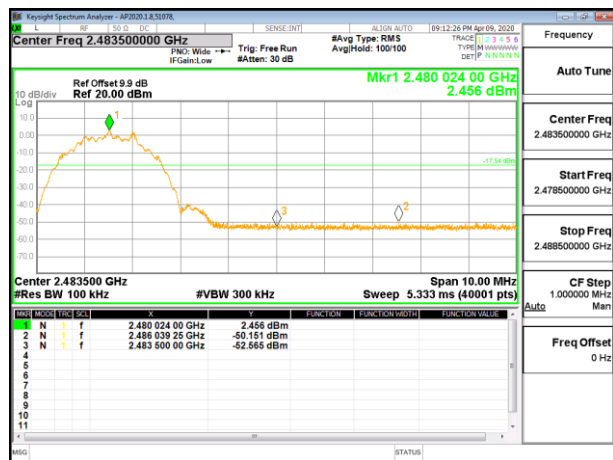
OUT-OF-BAND LOW CHANNEL



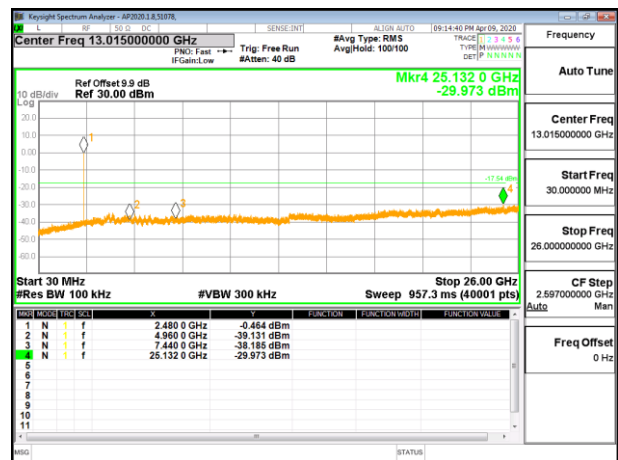
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. 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.

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 1Mbps, DCF = $10 \log(1/0.852)=0.70$ dB (Spectrum Analyzer round it up to 0.70dB) and for 2Mbps, DCF = $10 \log(1/0.573)=2.42$ dB (Spectrum Analyzer round it up to 2.42dB)

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

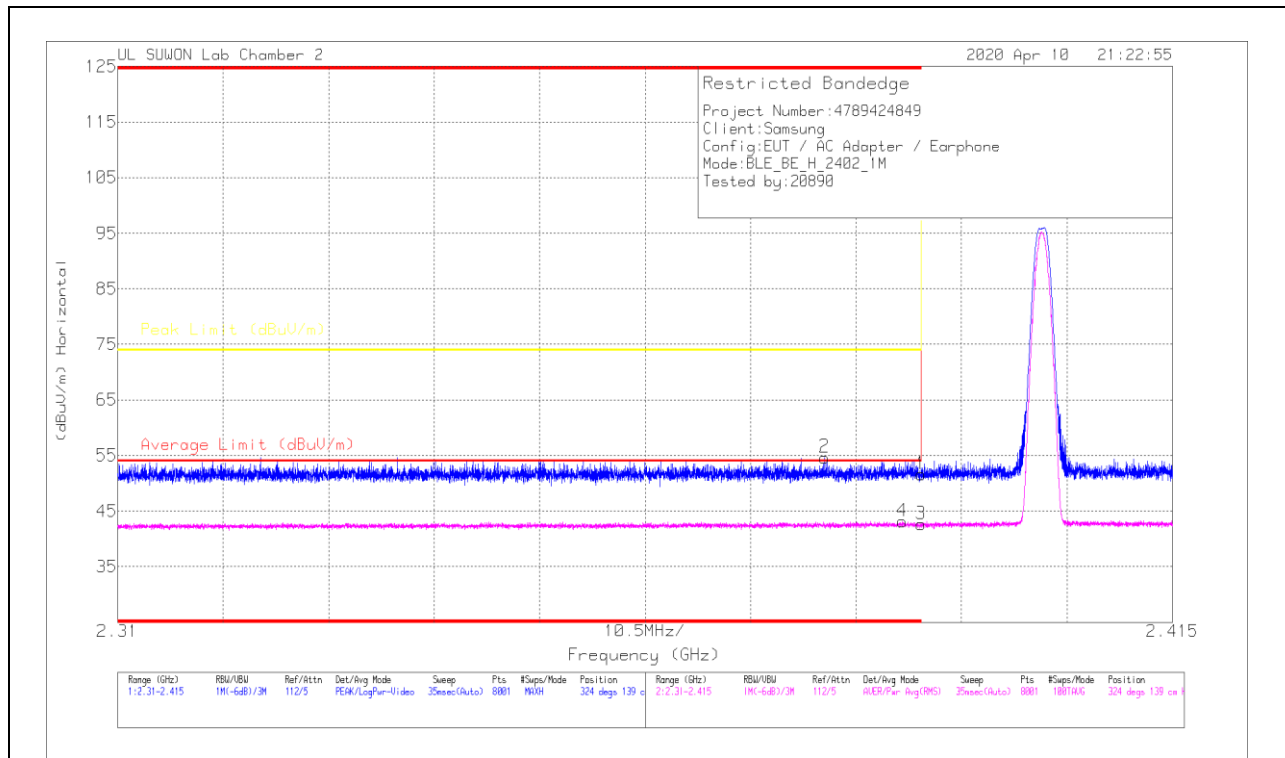
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



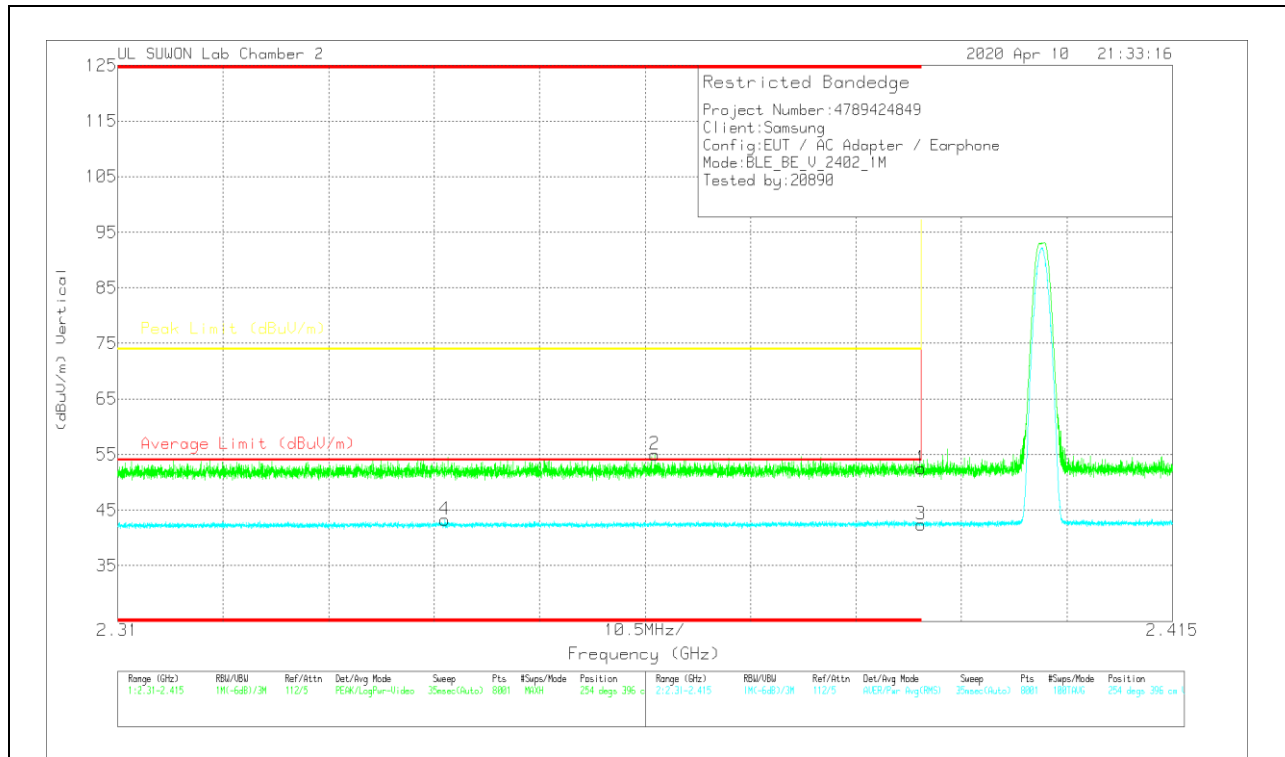
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.57	Pk	31.6	-20.6	0	51.57	-	-	74	-22.43	324	139	H
2	* 2.38038	43.68	Pk	31.6	-20.6	0	54.68	-	-	74	-19.32	324	139	H
3	* 2.39	30.91	RMS	31.6	-20.6	.7	42.61	54	-11.39	-	-	324	139	H
4	* 2.38812	31.45	RMS	31.6	-20.6	.7	43.15	54	-10.85	-	-	324	139	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

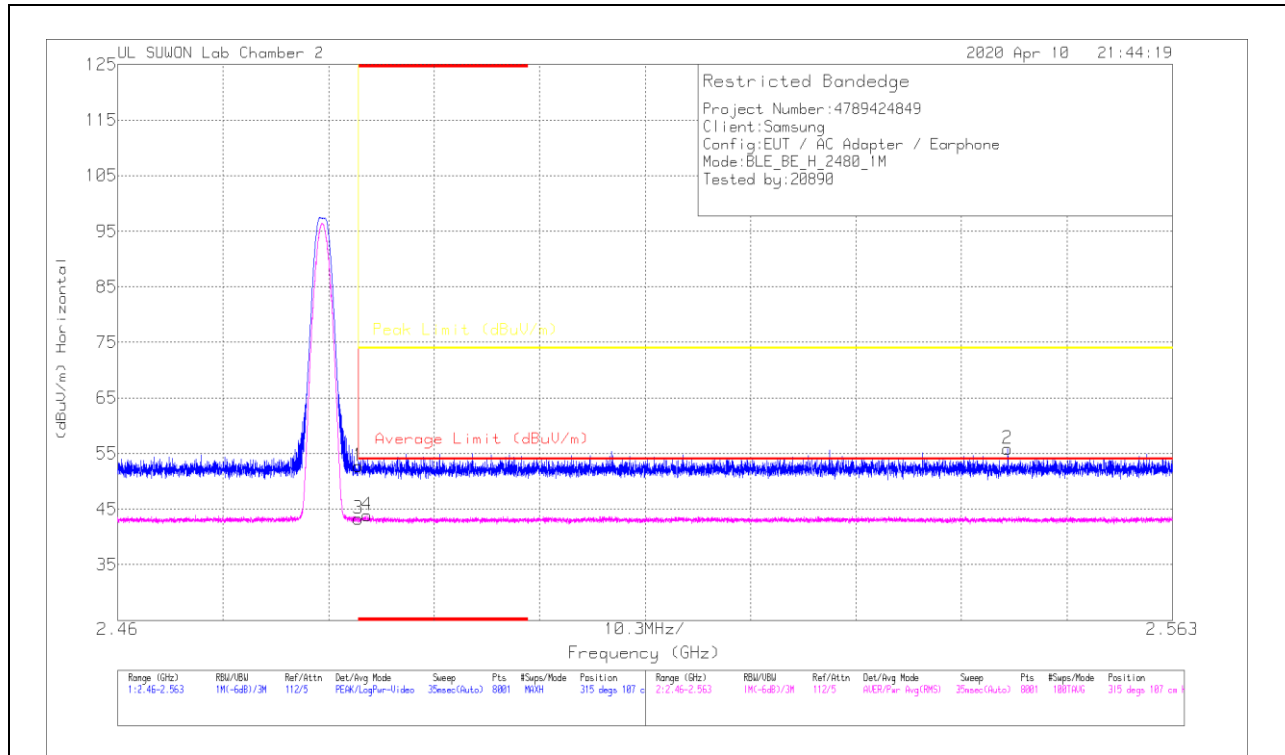


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.49	Pk	31.6	-20.6	0	52.49	-	-	74	-21.51	254	396	V
2	* 2.36348	44.09	Pk	31.6	-20.7	0	54.98	-	-	74	-19.01	254	396	V
3	* 2.39	30.71	RMS	31.6	-20.6	.7	42.41	54	-11.59	-	-	254	396	V
4	* 2.34258	31.79	RMS	31.5	-20.7	.7	43.29	54	-10.71	-	-	254	396	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



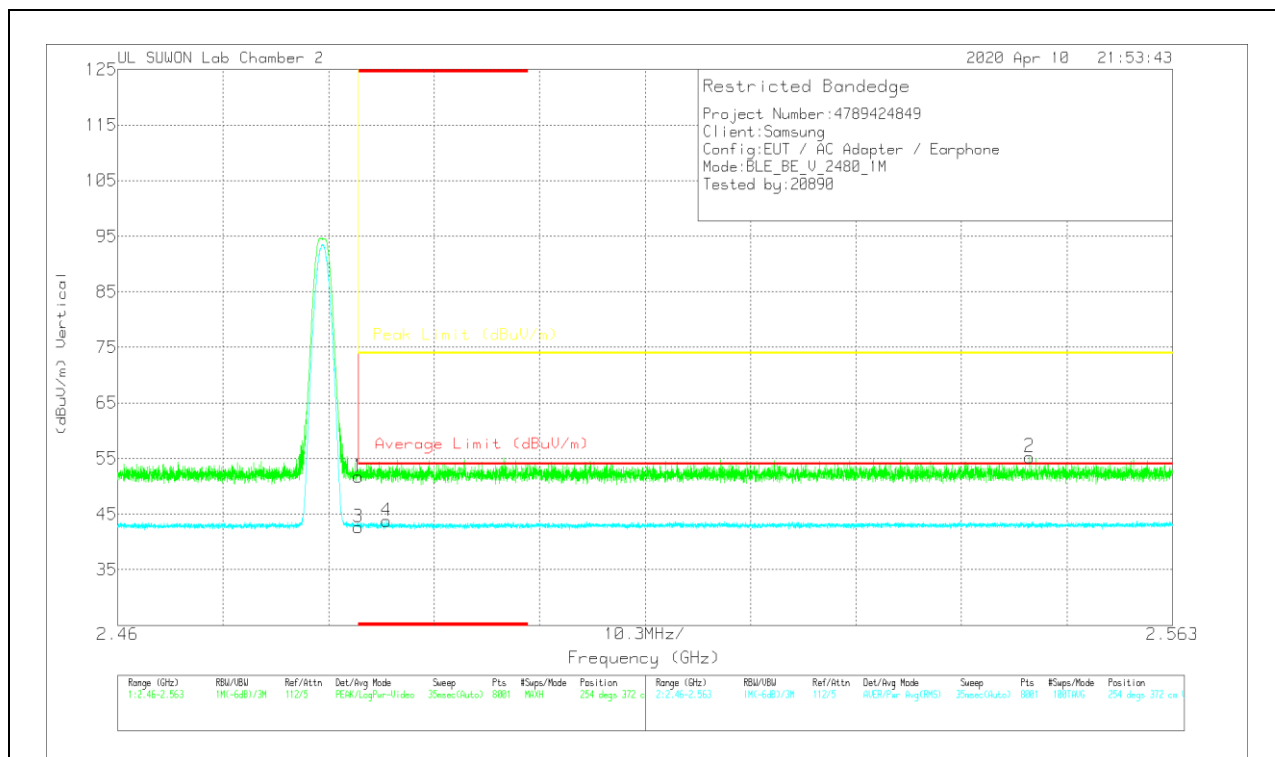
Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.24	Pk	31.9	-20.4	0	52.74	-	-	74	-21.26	315	107	H
2	2.54689	44.27	Pk	32	-20.4	0	55.87	-	-	74	-18.13	315	107	H
3	* 2.48351	31.04	RMS	31.9	-20.4	-7	43.24	54	-10.76	-	-	315	107	H
4	* 2.48437	31.65	RMS	31.9	-20.4	-7	43.85	54	-10.15	-	-	315	107	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBu/m)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.25	Pk	31.9	-20.4	0	51.75	-	-	74	-22.25	254	372	V
2	2.54903	43.8	Pk	32	-20.5	0	55.3	-	-	74	-18.7	254	372	V
3	* 2.48351	30.44	RMS	31.9	-20.4	.7	42.64	54	-11.36	-	-	254	372	V
4	* 2.48628	31.64	RMS	31.9	-20.5	.7	43.74	54	-10.26	-	-	254	372	V

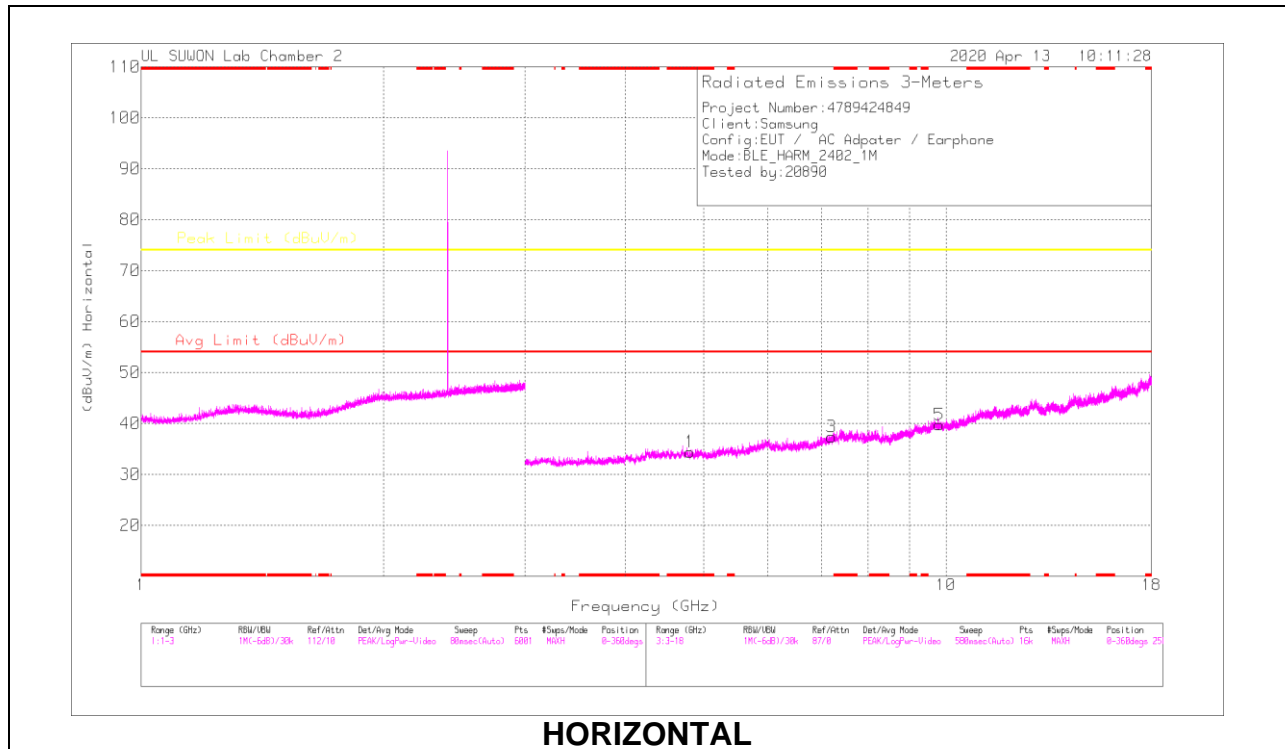
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

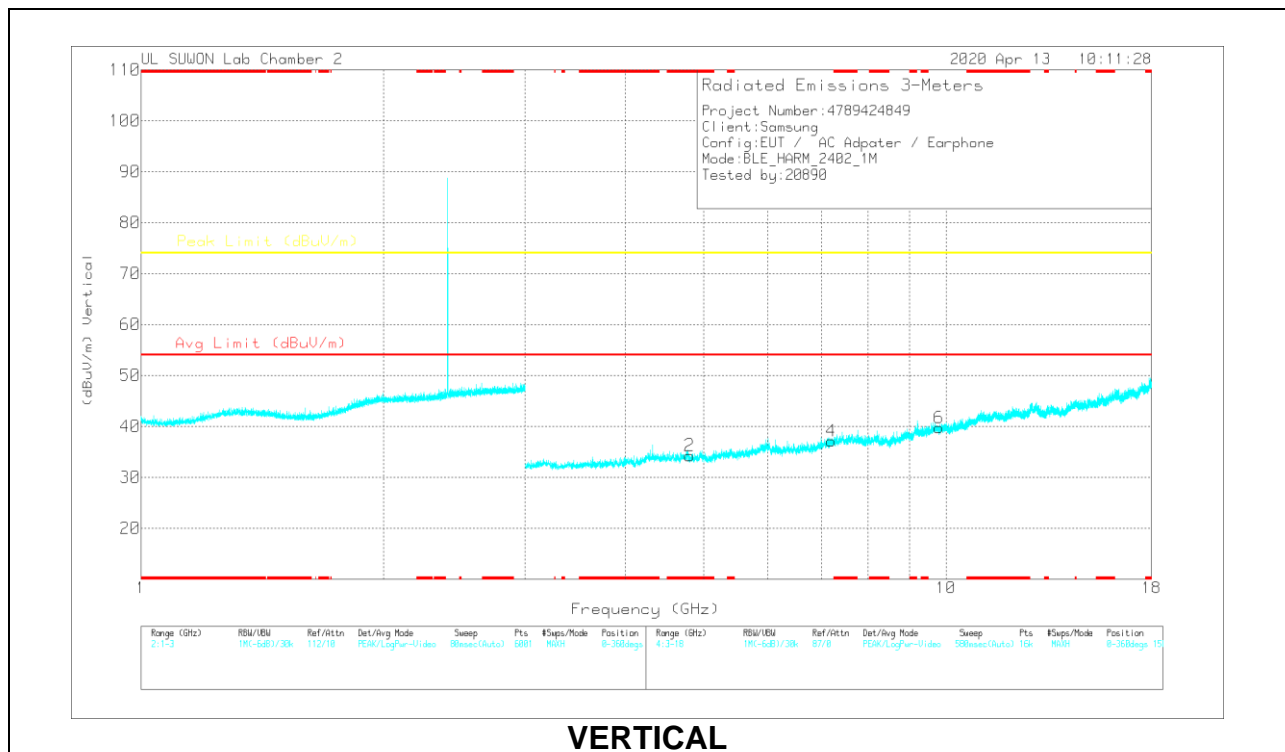
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



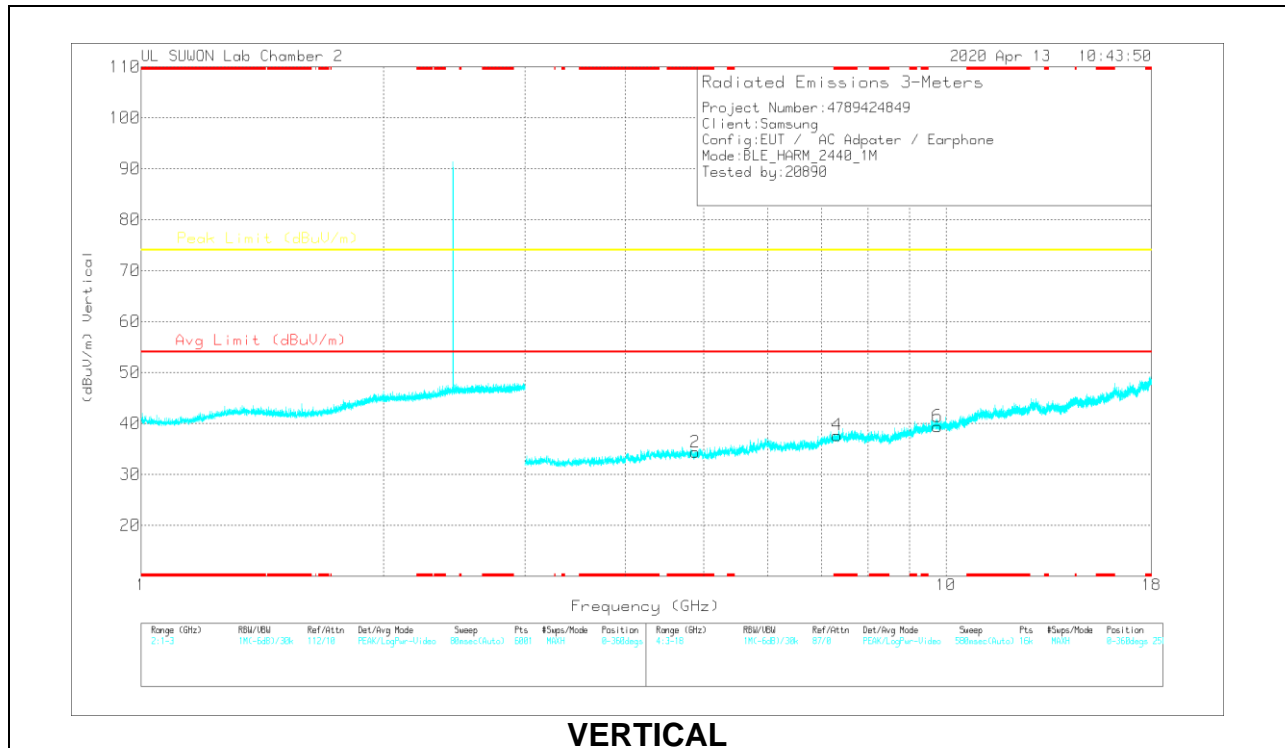
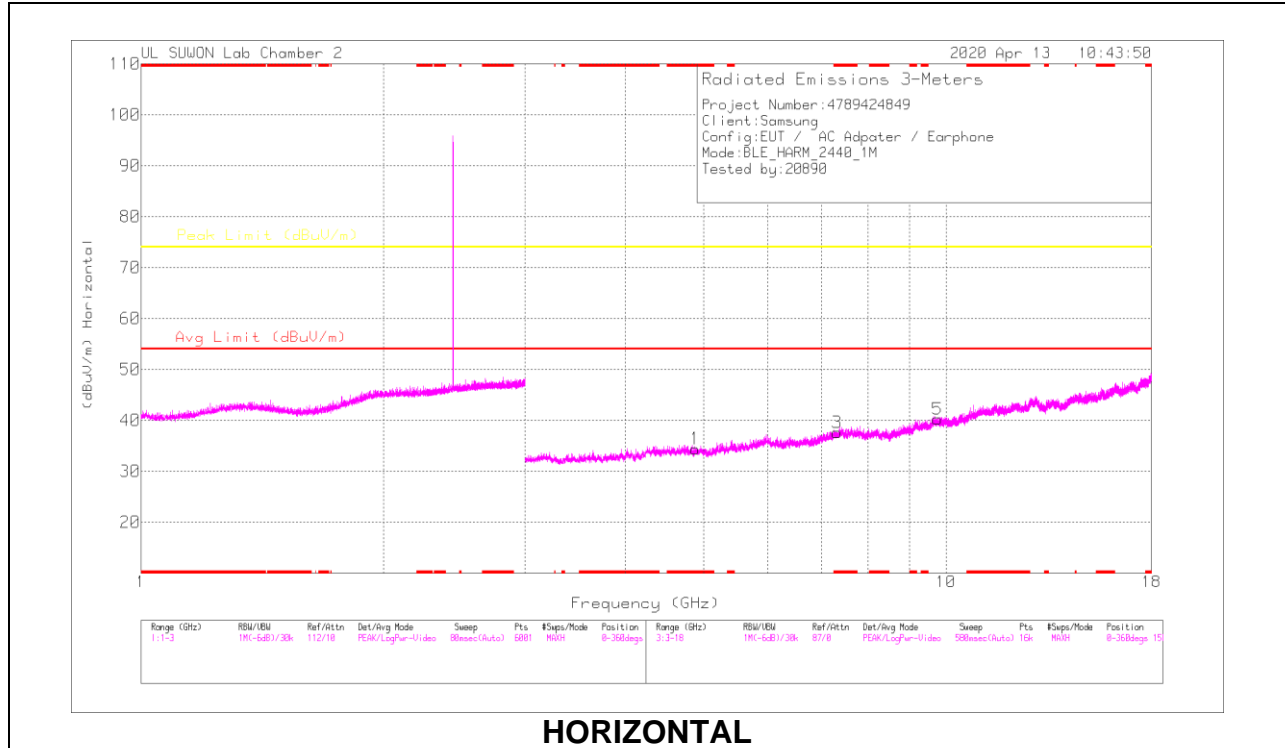
VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80243	36.62	PK2	34	-27.9	0	42.72	-	-	74	-31.28	360	100	H
* 4.80836	36.66	PK2	34	-28	0	42.66	-	-	74	-31.34	360	100	V
7.20556	35.55	PK2	36.1	-25.3	0	46.35	-	-	74	-27.65	360	100	H
7.20229	35.48	PK2	36.1	-25.2	0	46.38	-	-	74	-27.62	360	100	V
9.80779	32.47	PK2	37.3	-21.6	0	48.17	-	-	74	-25.83	360	100	H
9.81027	32.97	PK2	37.3	-21.6	0	48.67	-	-	74	-25.33	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL RESULTS

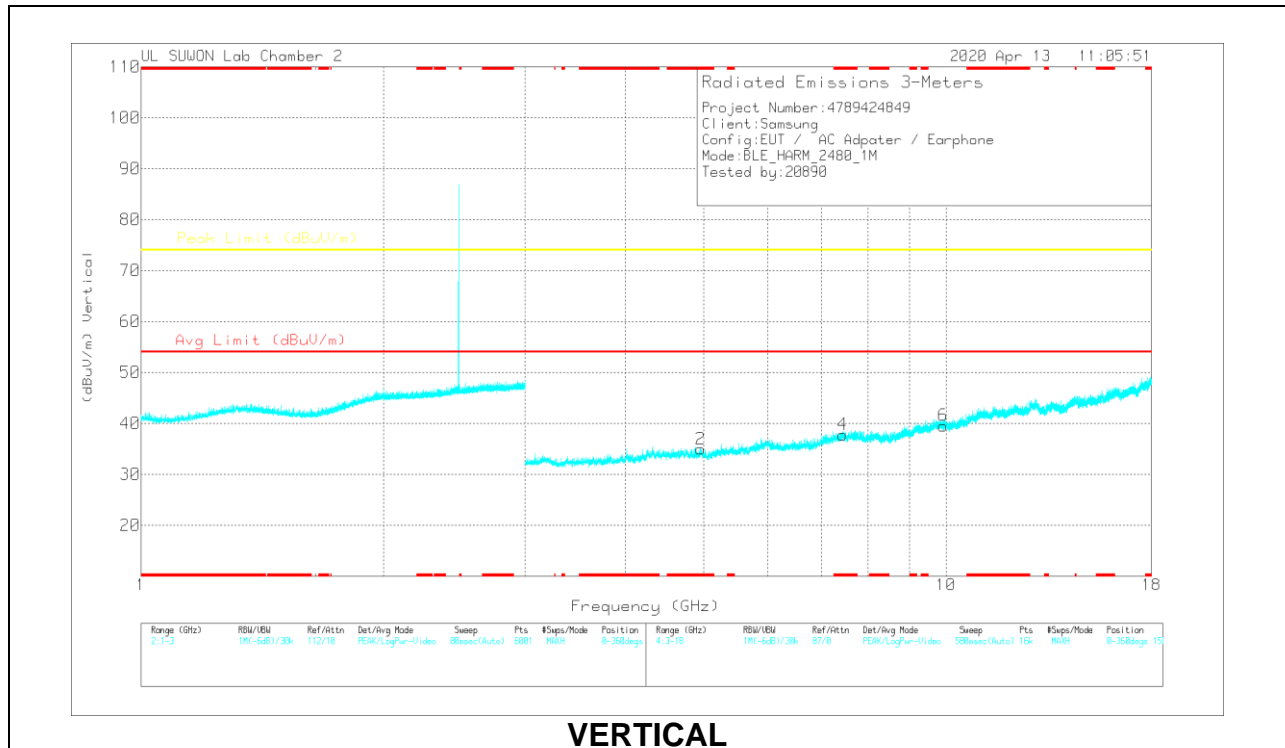
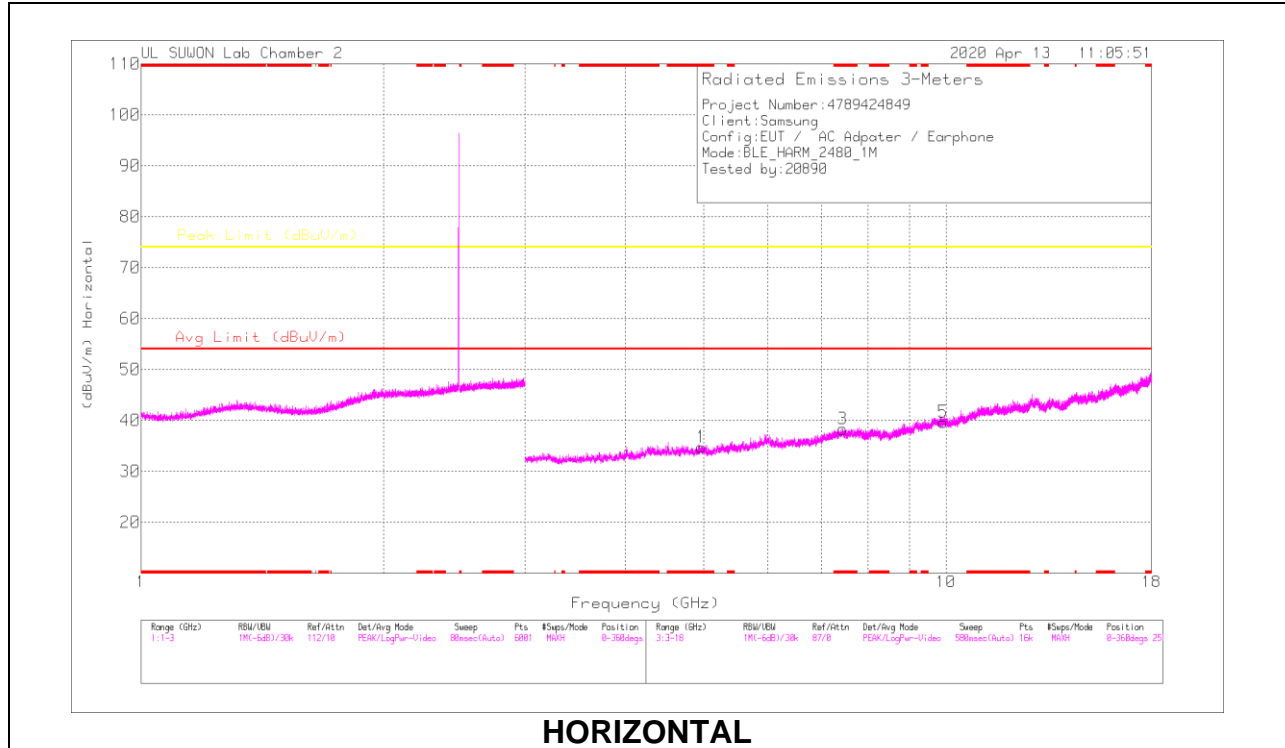


RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88049	36.87	PK2	34	-27.8	0	43.07	-	-	74	-30.93	360	100	H
* 4.88482	36.71	PK2	34	-27.7	0	43.01	-	-	74	-30.99	360	100	V
* 7.3232	35.43	PK2	36.2	-24.8	0	46.83	-	-	74	-27.17	360	100	H
* 7.31982	35.5	PK2	36.2	-24.8	0	46.9	-	-	74	-27.1	360	100	V
9.75909	32.99	PK2	37.2	-21.2	0	48.99	-	-	74	-25.01	360	100	H
9.75891	32.55	PK2	37.2	-21.2	0	48.55	-	-	74	-25.45	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96234	36.06	PK2	34.1	-27	0	43.16	-	-	74	-30.84	360	100	H
* 4.96398	36.56	PK2	34.1	-27	0	43.66	-	-	74	-30.34	360	100	V
* 7.44161	34.81	PK2	36.2	-23.9	0	47.11	-	-	74	-26.89	360	100	H
* 7.43902	34.81	PK2	36.2	-23.9	0	47.11	-	-	74	-26.89	360	100	V
9.91905	32.15	PK2	37.4	-20.9	0	48.65	-	-	74	-25.35	360	100	H
9.92021	32.92	PK2	37.4	-21	0	49.32	-	-	74	-24.68	360	100	V

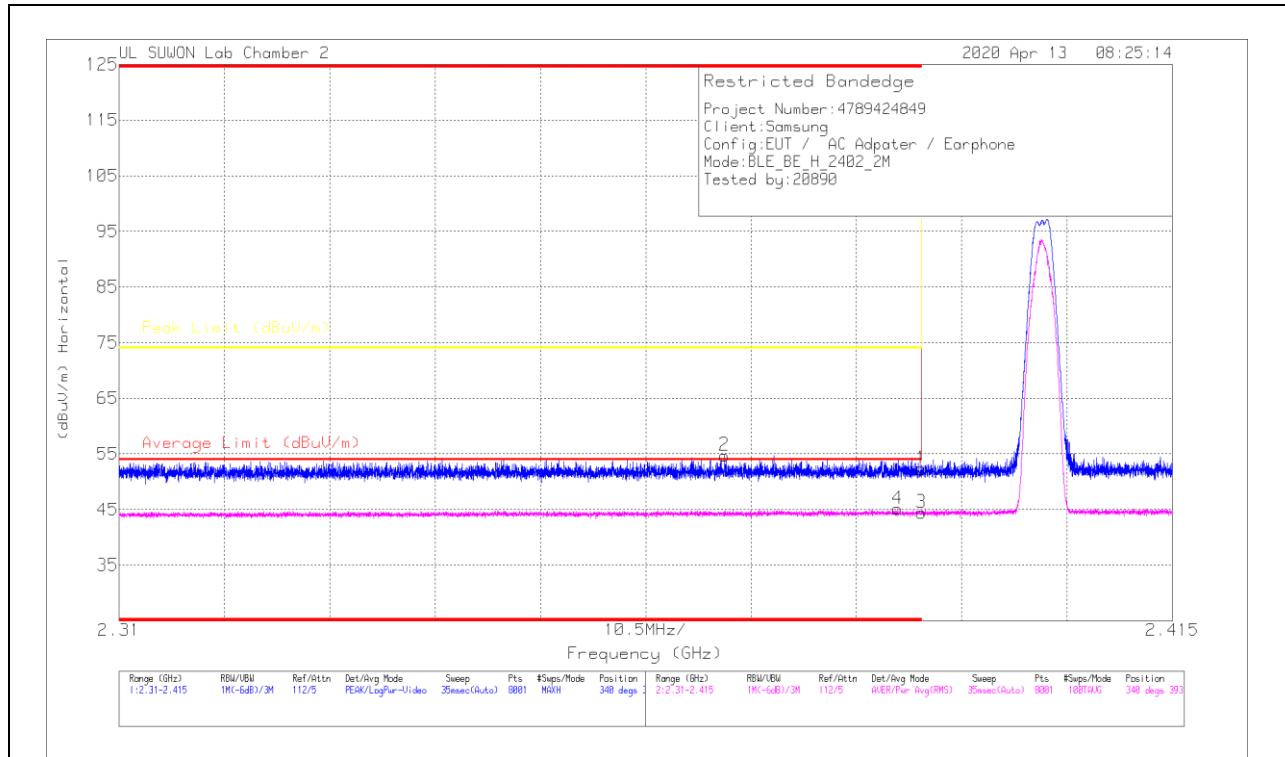
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

10.2.2. BLE (2Mbps)

Antenna 1

BANDEDGE (LOW CHANNEL)

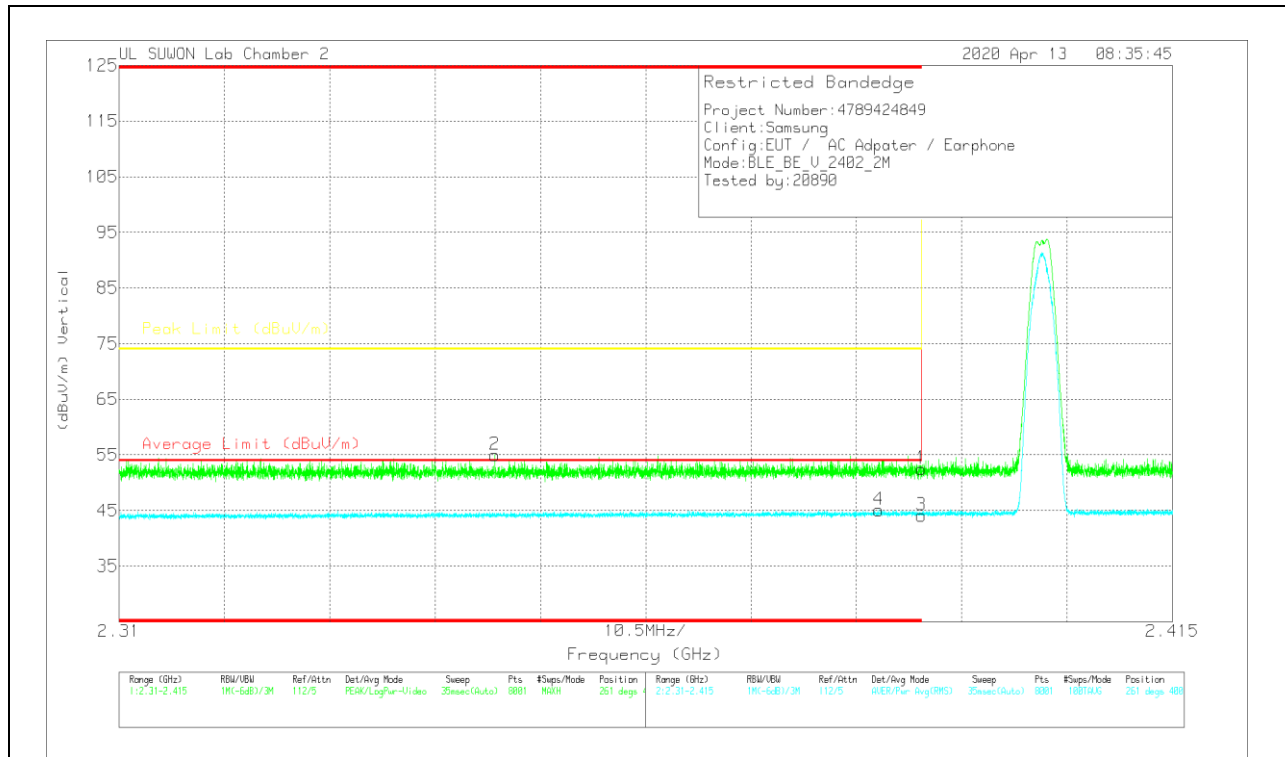
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.31	Pk	31.6	-20.6	0	52.31	-	-	74	-21.69	340	393	H
2	* 2.37034	43.81	Pk	31.6	-20.7	0	54.71	-	-	74	-19.29	340	393	H
3	* 2.39	31	RMS	31.6	-20.6	2.42	44.42	54	-9.58	-	-	340	393	H
4	* 2.38762	31.72	RMS	31.6	-20.6	2.42	45.14	54	-8.86	-	-	340	393	H

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

VERTICAL RESULT

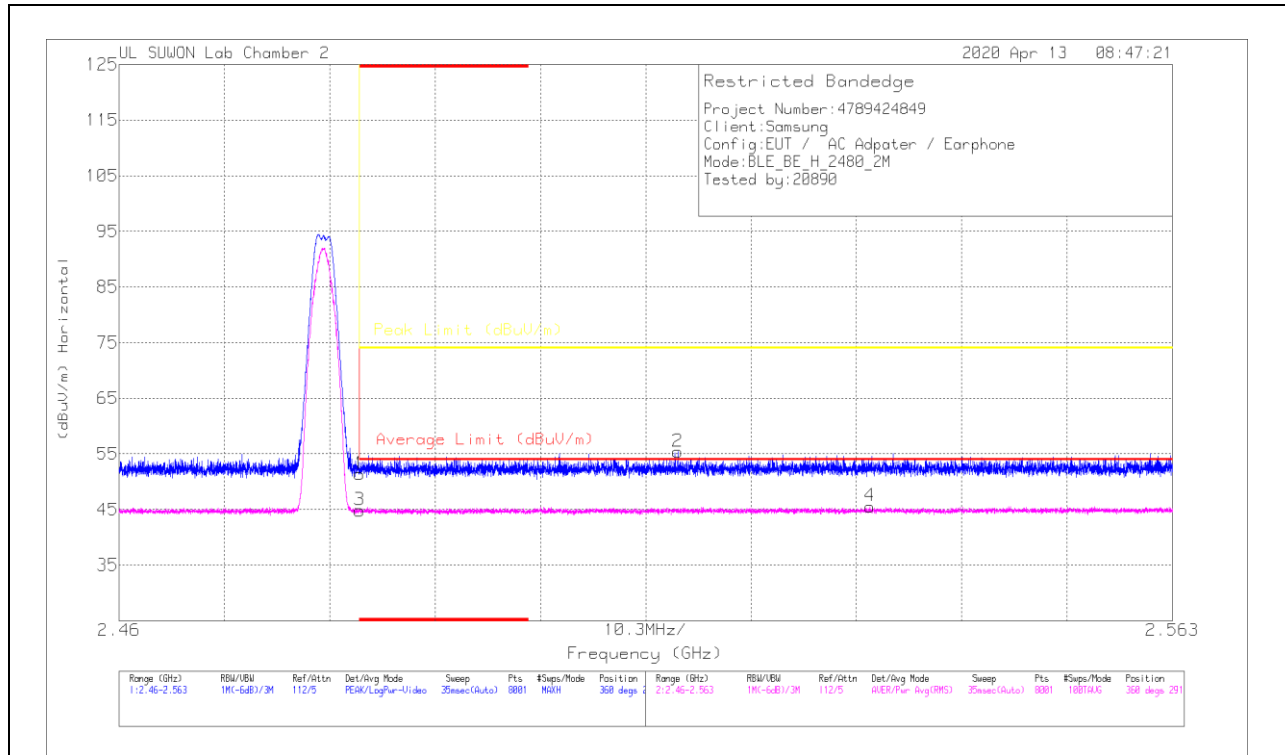


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.52	Pk	31.6	-20.6	0	52.52	-	-	74	-21.48	261	400	V
2	* 2.34746	44.11	Pk	31.6	-20.7	0	55.01	-	-	74	-18.99	261	400	V
3	* 2.39	30.71	RMS	31.6	-20.6	2.42	44.13	54	-9.87	-	-	261	400	V
4	* 2.38573	31.68	RMS	31.6	-20.6	2.42	45.1	54	-8.9	-	-	261	400	V

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

BANDEDGE (HIGH CHANNEL)

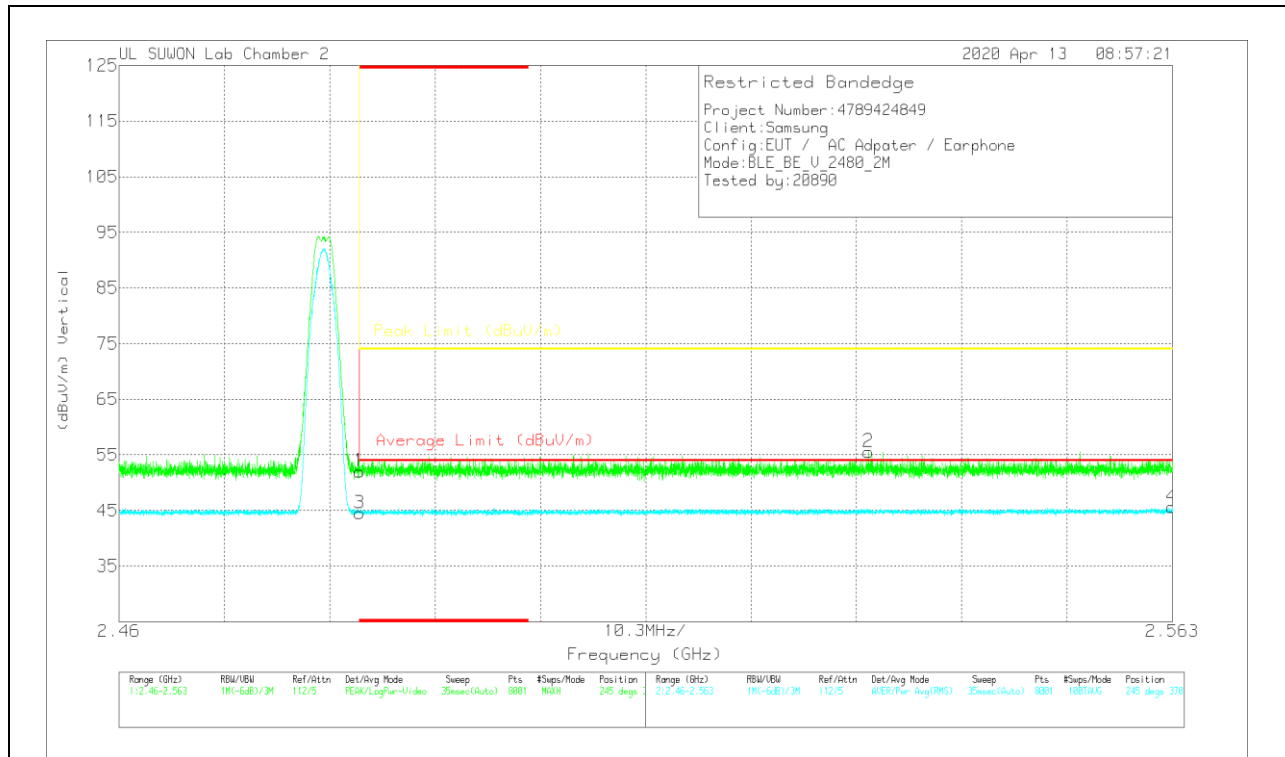
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	39.86	PK	31.9	-20.4	0	51.36	-	-	74	-22.64	360	291	H
2	2.51463	43.91	PK	31.9	-20.4	0	55.41	-	-	74	-18.59	360	291	H
3	* 2.48351	30.94	RMS	31.9	-20.4	2.42	44.86	54	-9.14	-	-	360	291	H
4	2.53344	31.55	RMS	32	-20.4	2.42	45.57	54	-8.43	-	-	360	291	H

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

VERTICAL RESULT

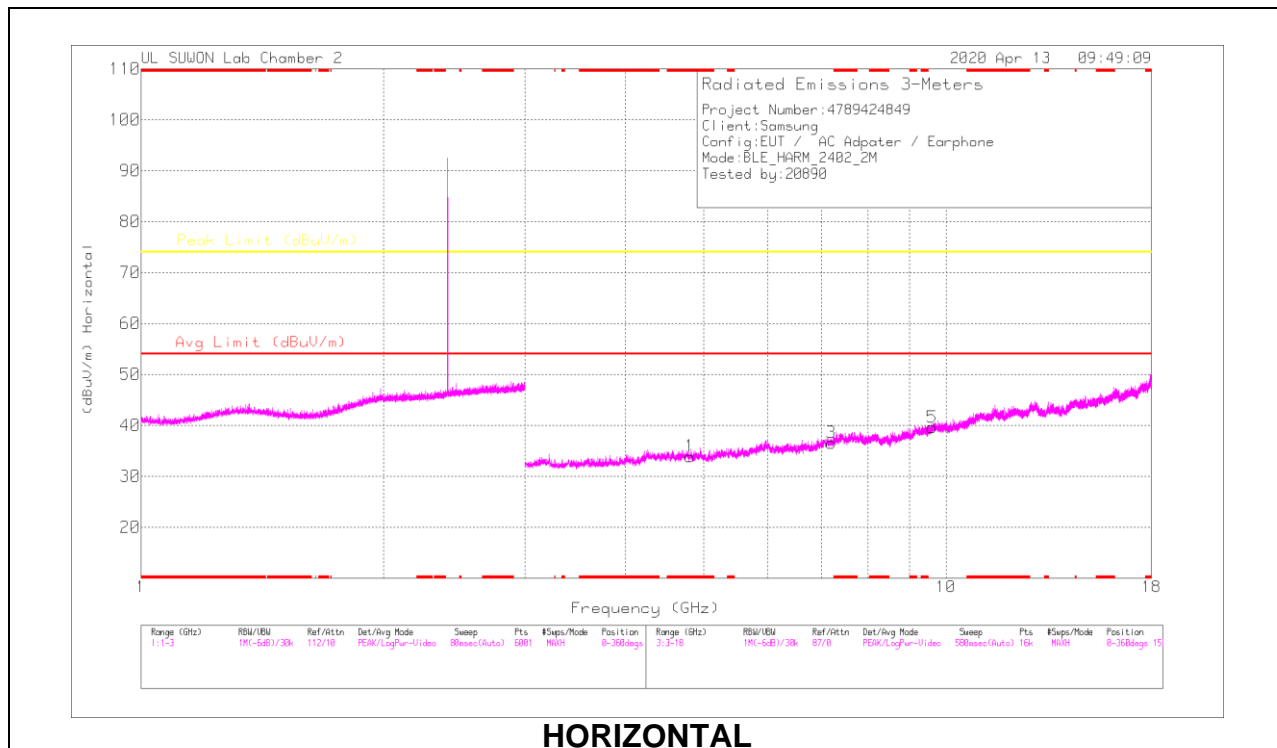


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.51	Pk	31.9	-20.4	0	52.01	-	-	74	-21.99	245	370	V
2	2.53327	43.85	Pk	32	-20.4	0	55.55	-	-	74	-18.45	245	370	V
3	* 2.48351	30.62	RMS	31.9	-20.4	2.42	44.54	54	-9.46	-	-	245	370	V
4	2.56296	31.52	RMS	32	-20.3	2.42	45.64	54	-8.36	-	-	245	370	V

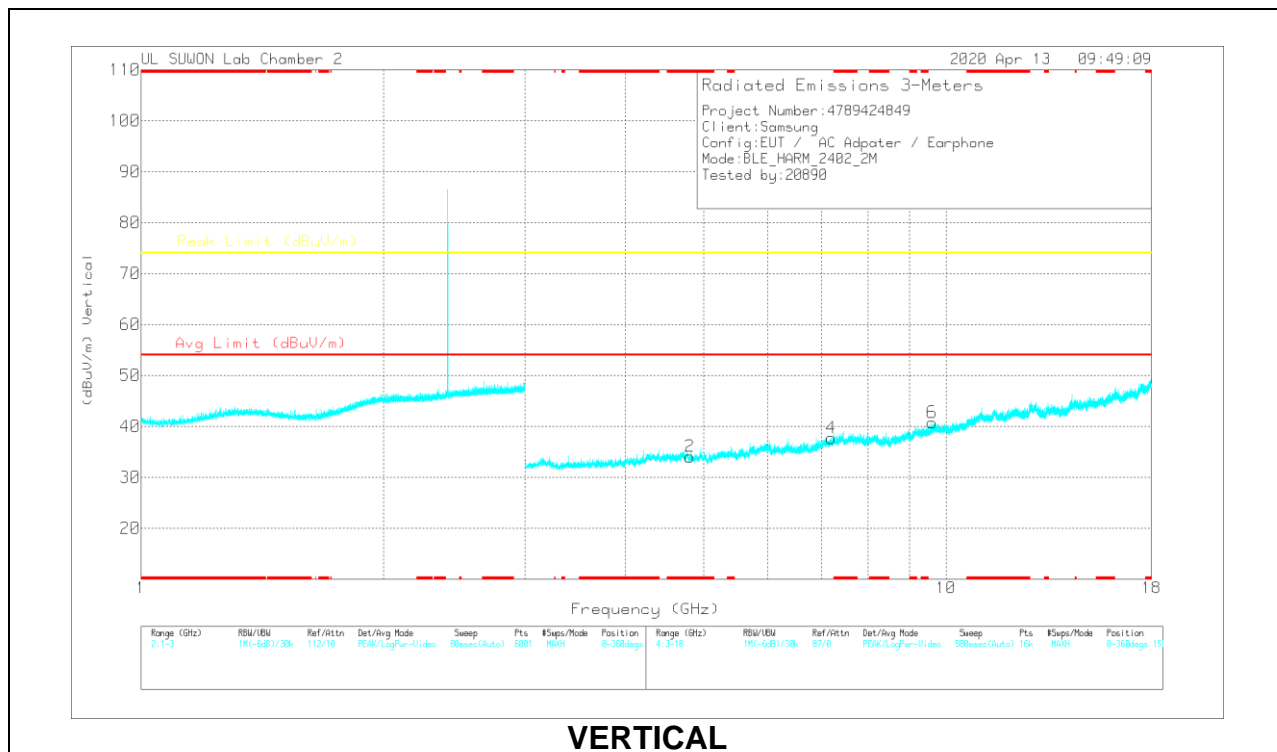
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



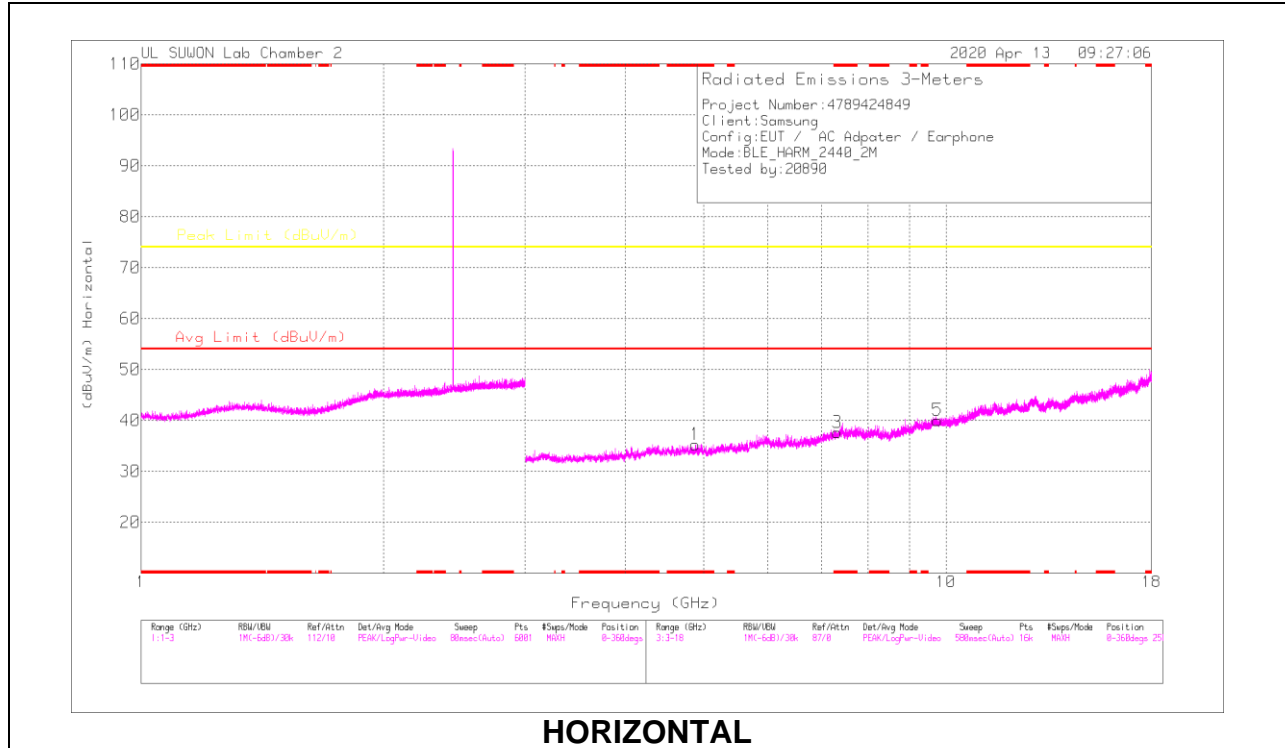
VERTICAL

RADIATED EMISSIONS

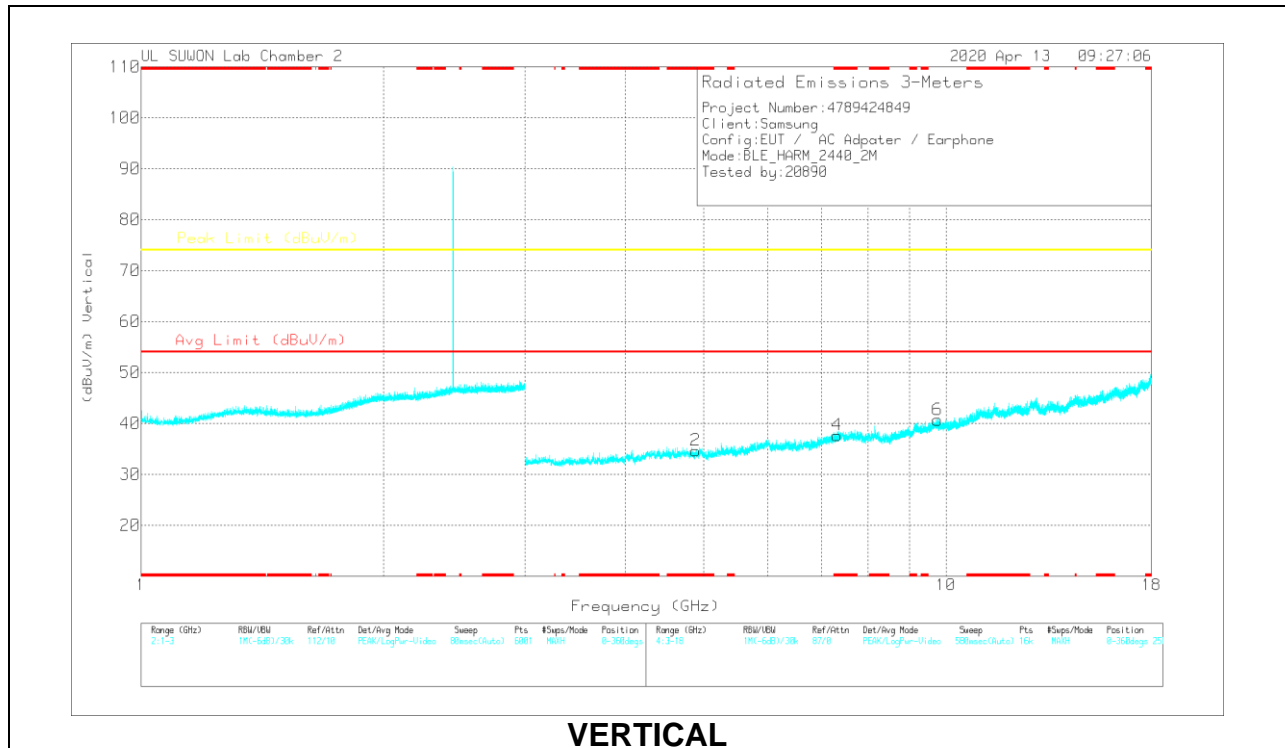
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80135	36.93	PK2	34	-27.9	0	43.03	-	-	74	-30.97	360	100	H
* 4.80075	36.37	PK2	34	-27.9	0	42.47	-	-	74	-31.53	360	100	V
7.20747	35.57	PK2	36.1	-25.2	0	46.47	-	-	74	-27.53	360	100	H
7.20601	35.98	PK2	36.1	-25.2	0	46.88	-	-	74	-27.12	360	100	V
9.60716	33.48	PK2	37	-21.6	0	48.88	-	-	74	-25.12	360	100	H
9.60332	32.89	PK2	37	-21.7	0	48.19	-	-	74	-25.81	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

MID CHANNEL RESULTS



HORIZONTAL



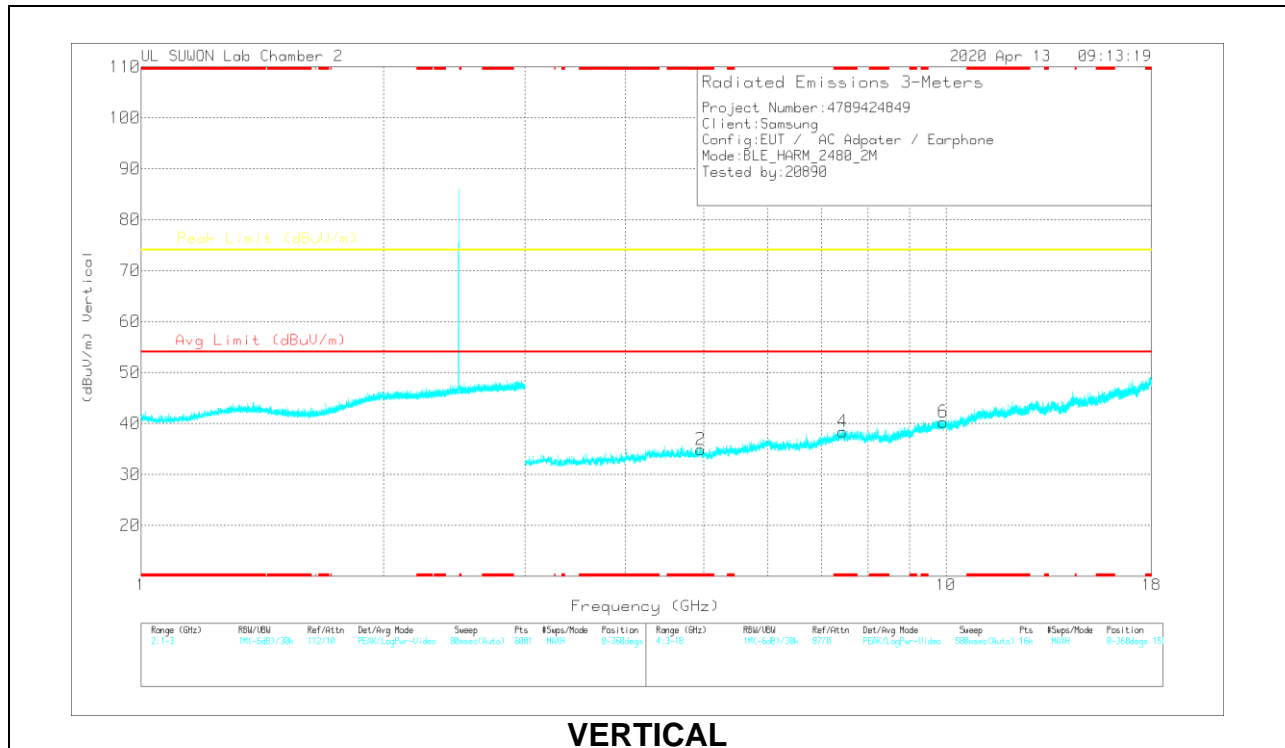
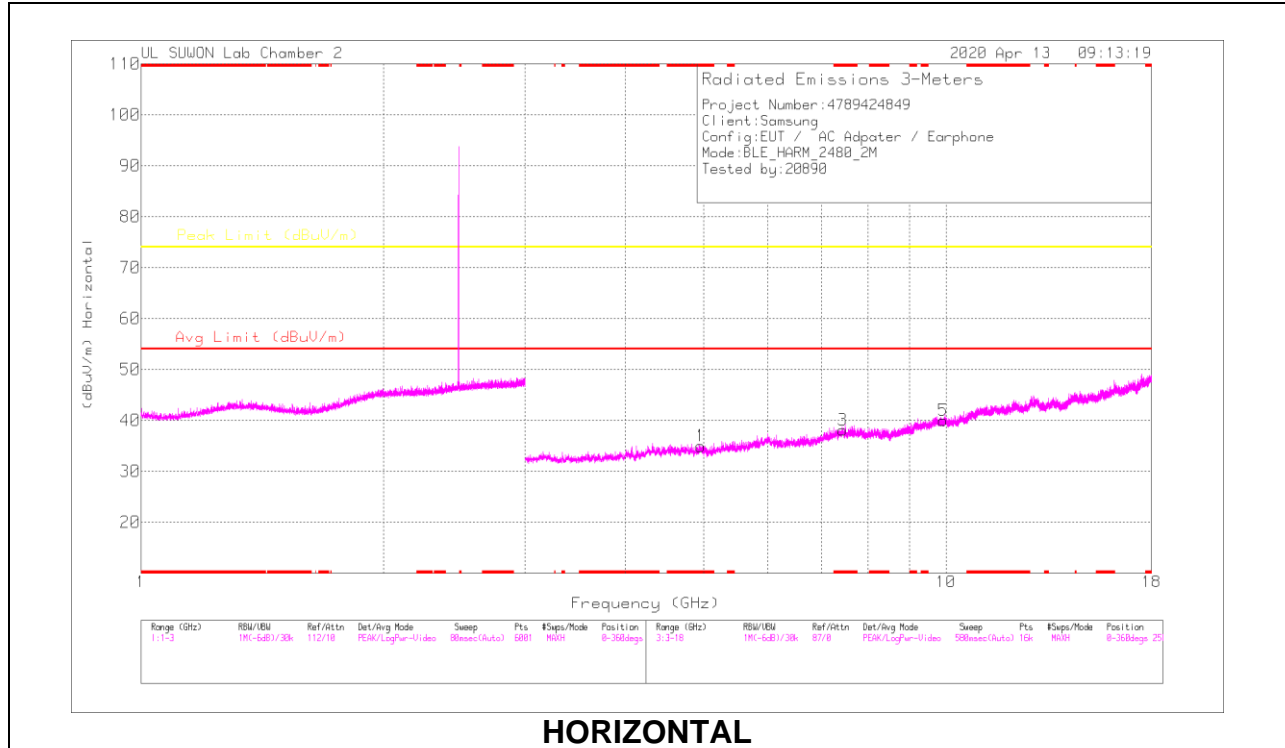
VERTICAL

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87866	37.25	PK2	34	-27.8	0	43.45	-	-	74	-30.55	360	100	H
* 4.88053	36.67	PK2	34	-27.8	0	42.87	-	-	74	-31.13	360	100	V
* 7.31577	35.22	PK2	36.2	-24.8	0	46.62	-	-	74	-27.38	360	100	H
* 7.31858	35.45	PK2	36.2	-24.8	0	46.85	-	-	74	-27.15	360	100	V
9.76011	32.8	PK2	37.2	-21.2	0	48.8	-	-	74	-25.2	360	100	H
9.75814	32.7	PK2	37.2	-21.2	0	48.7	-	-	74	-25.3	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

HIGH CHANNEL RESULTS



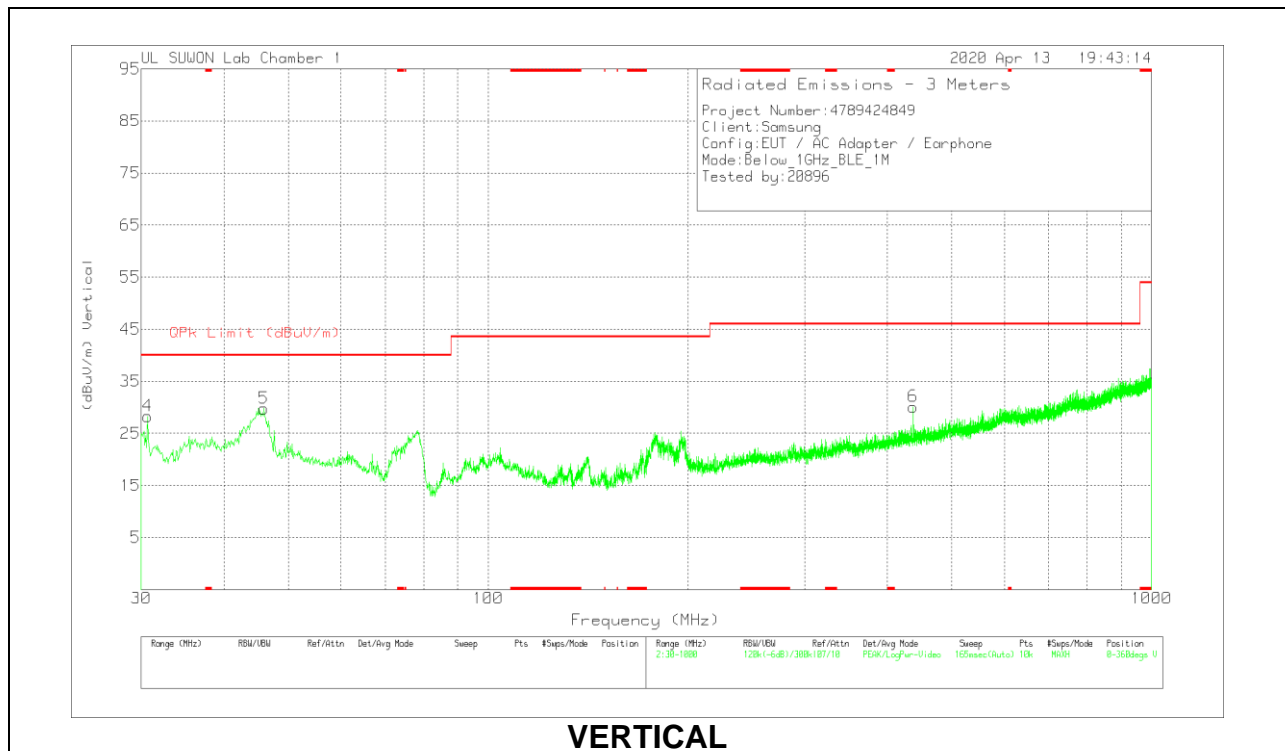
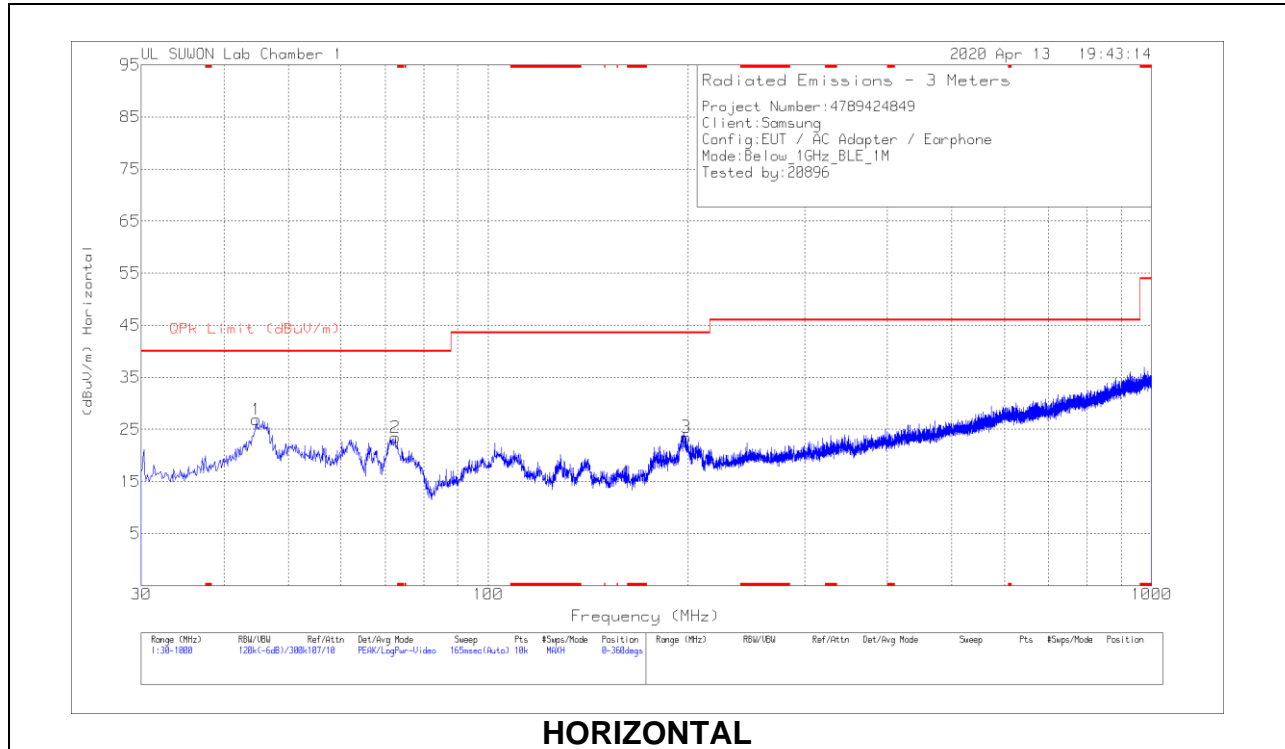
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96009	36.4	PK2	34.1	-27	0	43.5	-	-	74	-30.5	360	100	H
* 4.96079	36.61	PK2	34.1	-27	0	43.71	-	-	74	-30.29	360	100	V
* 7.43804	35.14	PK2	36.2	-23.9	0	47.44	-	-	74	-26.56	360	100	H
* 7.44006	34.35	PK2	36.2	-23.9	0	46.65	-	-	74	-27.35	360	100	V
9.91844	32.06	PK2	37.4	-20.9	0	48.56	-	-	74	-25.44	360	100	H
9.91882	32.35	PK2	37.4	-20.9	0	48.85	-	-	74	-25.15	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

10.3. WORST CASE BELOW 1 GHZ

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



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	44.744	37.79	Pk	19.6	-30.5	26.89	40	-13.11	0-360	300	H
2	72.486	39.05	Pk	14.6	-30.2	23.45	40	-16.55	0-360	300	H
3	198.877	34.17	Pk	17.9	-28.6	23.47	43.52	-20.05	0-360	100	H
4	30.679	42.4	Pk	15.9	-30	28.3	40	-11.7	0-360	100	V
5	45.908	39.77	Pk	19.7	-29.7	29.77	40	-10.23	0-360	100	V
6	437.497	34.02	PK	22	-25.9	30.12	46.02	-15.9	0-360	200	V

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

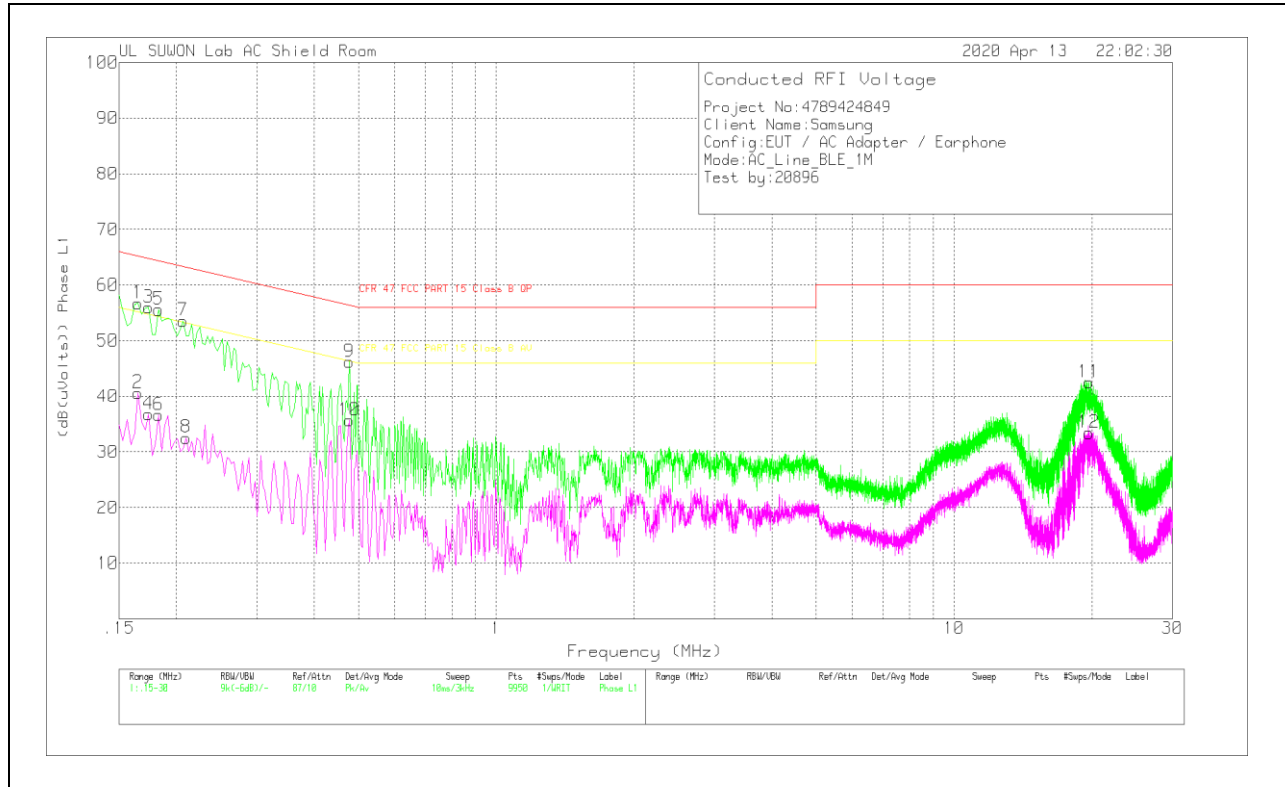
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



Trace Markers

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h Ex_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.165	46.65	Pk	10	.1	56.75	65.21	-8.46	-	-
2	.165	30.49	Av	10	.1	40.59	-	-	55.21	-14.62
3	.174	45.64	Pk	10.1	.2	55.94	64.77	-8.83	-	-
4	.174	26.51	Av	10.1	.2	36.81	-	-	54.77	-17.96
5	.183	45.37	Pk	10	.2	55.57	64.35	-8.78	-	-
6	.183	26.45	Av	10	.2	36.65	-	-	54.35	-17.7
7	.207	43.48	Pk	9.9	.2	53.58	63.32	-9.74	-	-
8	.21	22.45	Av	9.9	.2	32.55	-	-	53.21	-20.66
9	.477	36.07	Pk	9.9	.2	46.17	56.39	-10.22	-	-
10	.477	25.56	Av	9.9	.2	35.66	-	-	46.39	-10.73
11	19.704	31.81	Pk	10.3	.4	42.51	60	-17.49	-	-

Pk - Peak detector

Av - Average detection

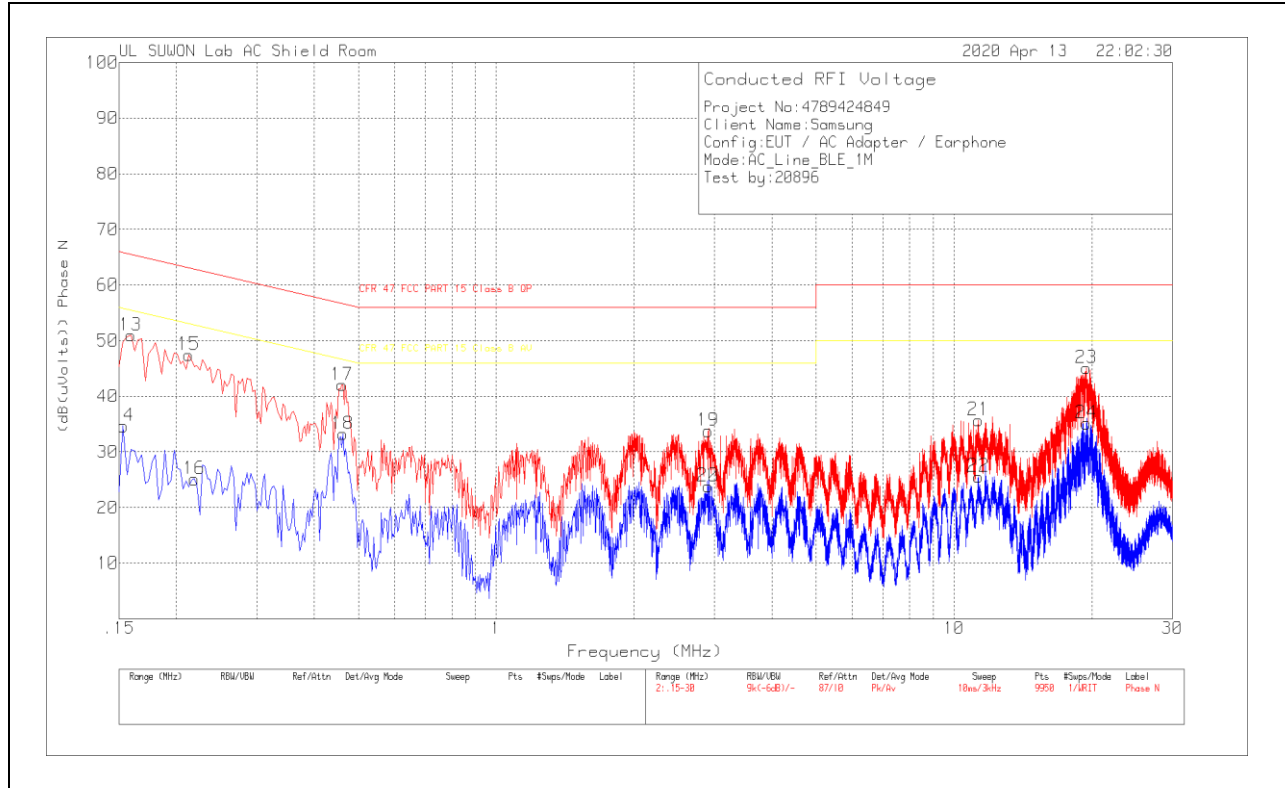
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h Ex_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.16425	38.1	Qp	10	.1	48.2	65.25	-17.05	-	-
.17325	37.73	Qp	10.1	.2	48.03	64.8	-16.77	-	-
.18375	36.45	Qp	10	.2	46.65	64.31	-17.66	-	-
.20775	35.42	Qp	9.9	.2	45.52	63.29	-17.77	-	-

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.159	40.95	Pk	9.9	.1	50.95	65.52	-14.57	-	-
14	.153	24.75	Av	9.8	.1	34.65	-	-	55.84	-21.19
15	.213	37.35	Pk	9.9	.2	47.45	63.09	-15.64	-	-
16	.219	15.12	Av	9.8	.2	25.12	-	-	52.86	-27.74
17	.4605	31.92	Pk	9.9	.2	42.02	56.68	-14.66	-	-
18	.462	23.11	Av	9.9	.2	33.21	-	-	46.66	-13.45
19	2.904	23.69	Pk	9.8	.3	33.79	56	-22.21	-	-
20	2.901	13.75	Av	9.8	.3	23.85	-	-	46	-22.15
21	11.313	25.41	Pk	10	.3	35.71	60	-24.29	-	-
22	11.304	15.27	Av	10	.3	25.57	-	-	50	-24.43
23	19.461	34.37	Pk	10.3	.4	45.07	60	-14.93	-	-
24	19.47	24.44	Av	10.3	.4	35.14	-	-	50	-14.86

Pk - Peak detector
 Av - Average detection

END OF TEST REPORT