



CERTIFICATION TEST REPORT

Report Number. : 4789754174-E4V2

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

Model : SCG09, SC-51B

FCC ID : A3LSMG991JPN

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

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

Date Of Issue:
February 23, 2021

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	02/08/21	Initial issue	Sungeun Lee
V2	02/23/21	Updated to address TCB's question	Sungeun Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC
MODEL: SCG09, SC-51B
SERIAL NUMBER: R3CNA0ASLED, 4845e4099c1f7ece (CONDUCTED);
R3CNC038RQH (RADIATED);
DATE TESTED: DEC 04, 2020 – FEB 03, 2021;

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

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

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

Approved & Released For
UL Korea, Ltd. By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Sungeun Lee
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	3.01 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.26 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.90 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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, WPT and NFC. This test report addresses the DTS (BLE) operational mode.

This report covers the Samsung models SCG09 and SC-51B. SCG09 and SC-51B have the same hardware. Supported band and protocol are different depending on software settings.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	1Mbps	Peak	9.910	9.795
		Average	9.365	8.640
	2Mbps	Peak	10.002	10.005
		Average	9.076	8.083

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 -6.83 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 for the worst case condition mode.

Power verification

The Output Power of all data rate are all investigated, 1 Mbps (37 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	8.663	2	2Mbps (37 pkt)	2402	8.331			
		2440	9.365			2440	9.065			
		2480	8.879			2480	8.599			
	1Mbps (255 pkt)	2402	8.579		2Mbps (255 pkt)	2402	8.391			
		2440	9.260			2440	9.076			
		2480	8.783			2480	8.560			
	125 kbps (37 pkt)	2402	8.435			1	1Mbps (37 pkt)	2402	8.331	
		2440	9.127					2Mbps (37 pkt)	2440	9.065
		2480	8.687						2480	8.599
	125 kbps (255 pkt)	2402	8.405		2Mbps (255 pkt)		2402		8.391	
		2440	9.108				2440	9.076		
		2480	8.636				2480	8.560		
	500 kbps (37 pkt)	2402	8.540	1			1Mbps (37 pkt)	2402	8.331	
		2440	9.219					2Mbps (37 pkt)	2440	9.065
		2480	8.799						2480	8.599
	500 kbps (255 pkt)	2402	8.474		2Mbps (255 pkt)		2402		8.391	
		2440	9.174				2440	9.076		
		2480	8.694				2480	8.560		

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	N/A	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A

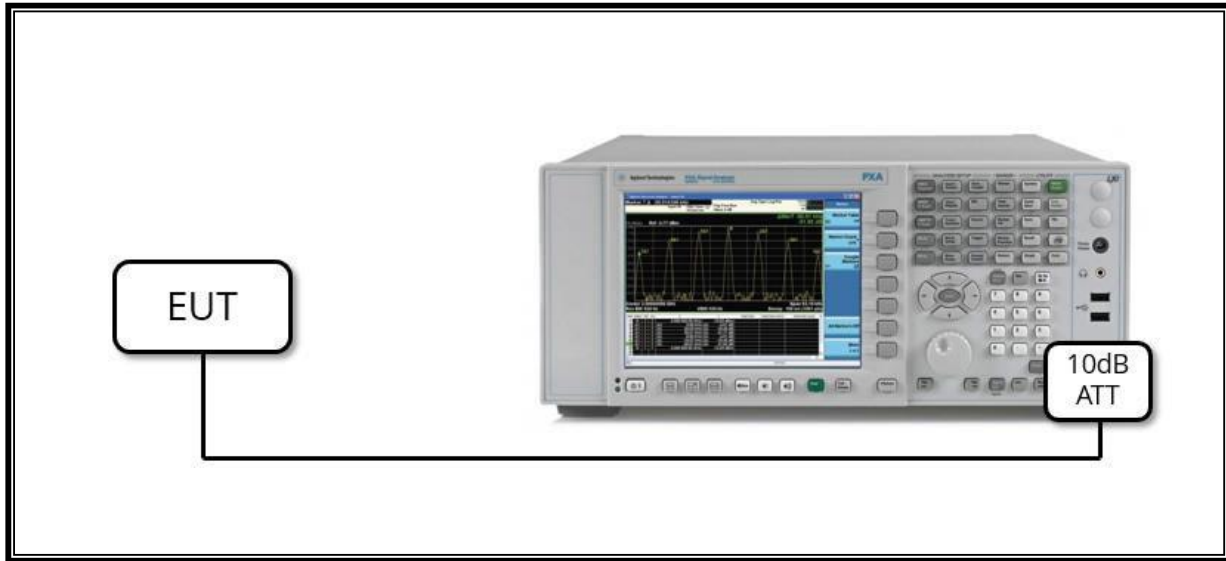
I/O CABLE

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	1.0 m	N/A

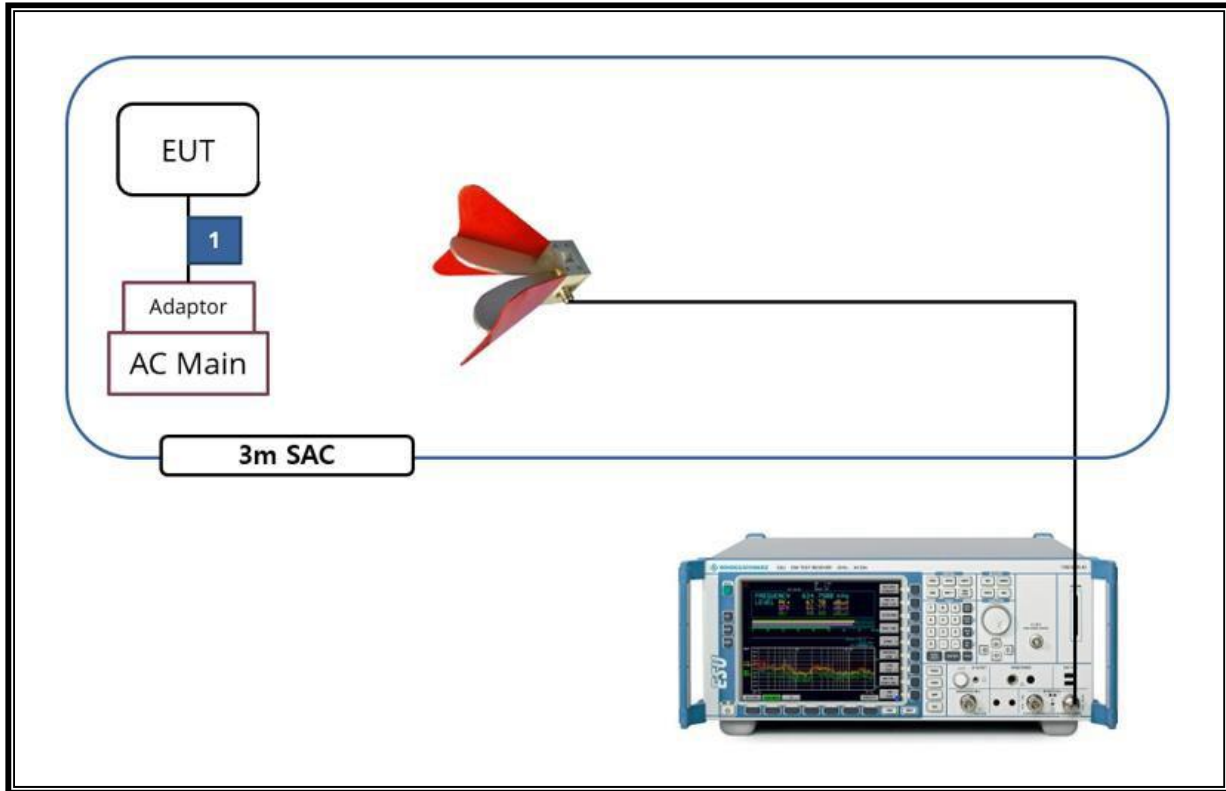
TEST SETUP

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	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-19-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-13-22
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-13-22
Antenna, Horn, 18 GHz	ETS	3115	00167211	07-27-22
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-15-22
Antenna, Horn, 18 GHz	ETS	3117	00168724	07-27-22
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-15-22
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-04-22
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-06-21
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-03-21
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-03-21
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-04-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-05-21
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-05-21
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-21
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-05-21
Attenuator	PASTERNAK	PE7087-10	A001	08-03-21
Attenuator	PASTERNAK	PE7087-10	A008	08-03-21
Attenuator	PASTERNAK	PE7004-10	2	08-04-21
Attenuator	PASTERNAK	PE7087-10	A009	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-03-21
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-03-21
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-03-21
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-04-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-03-21
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-04-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-03-21
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-04-21
LISN	R&S	ENV-216	101837	08-06-21
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

8. TEST RESULTS SUMMARY

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

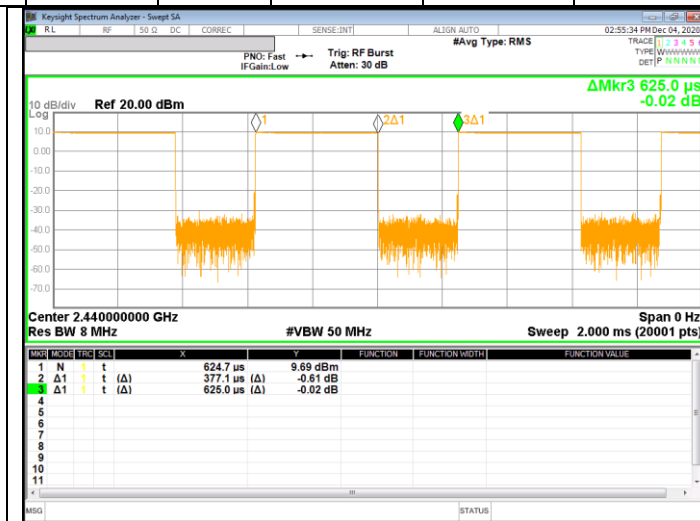
9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

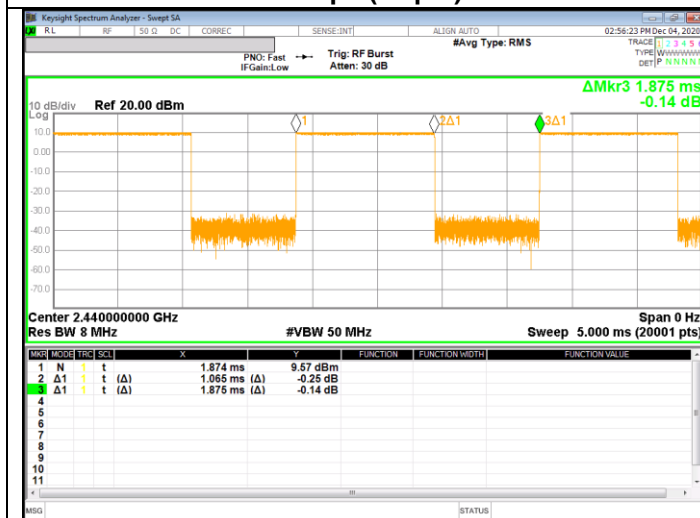
LIMITS

None; for reporting purposes only.

Mode	On time [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						
BLE 1 Mbps [37pkt]	0.377	0.625	0.603	60.34	2.20	2.65
BLE 2 Mbps [255pkt]	1.065	1.875	0.568	56.80	2.46	0.94



1 Mbps (37 pkt)



2 Mbps (255 pkt)

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

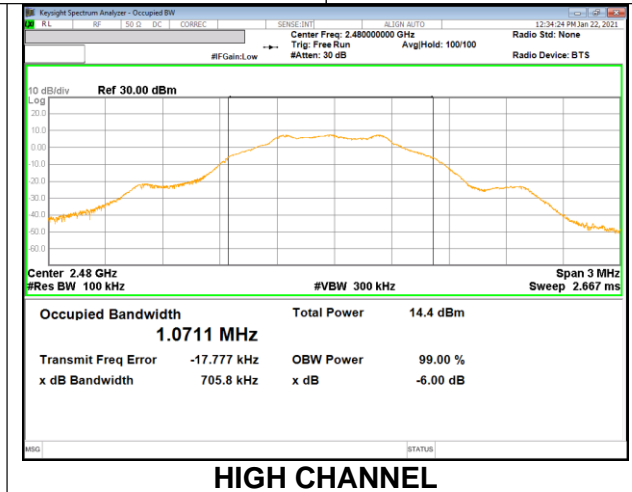
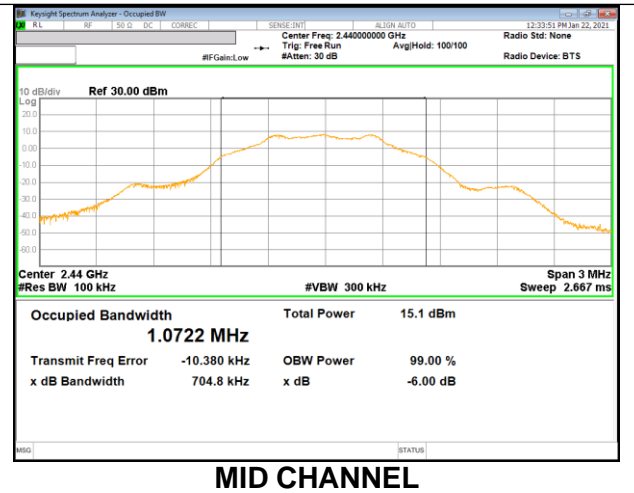
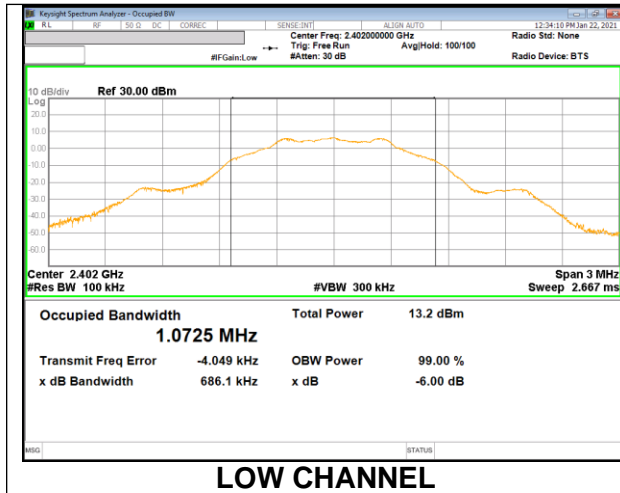
RSS-247 5.2 (a)

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

RESULTS

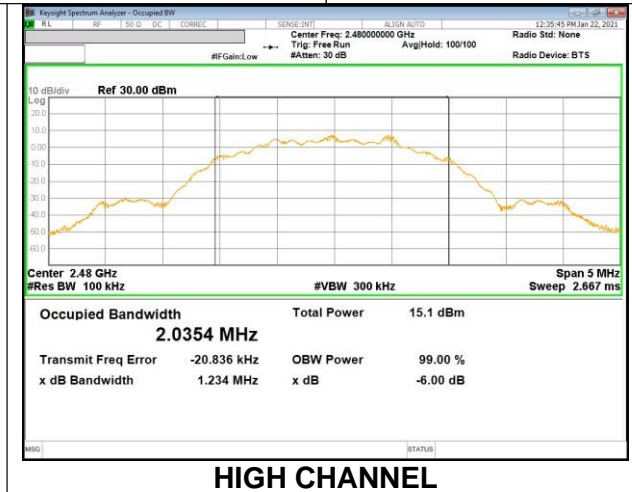
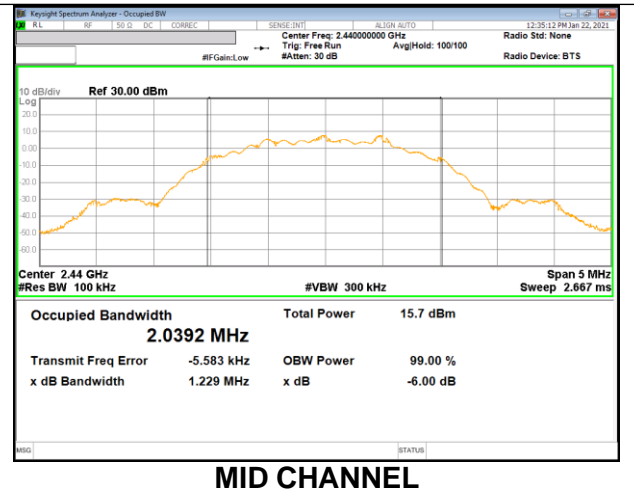
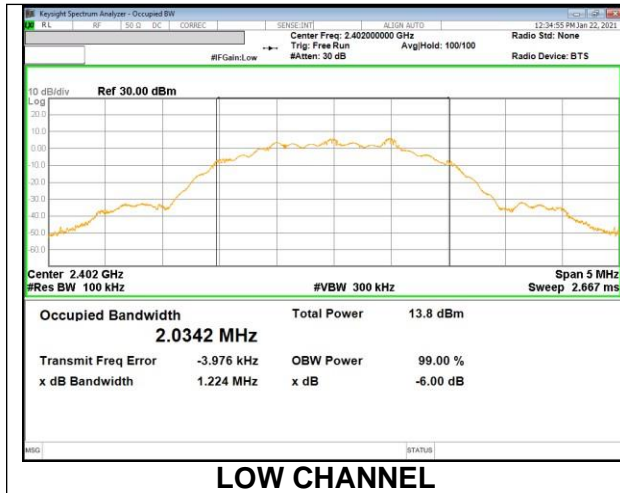
9.2.1. BLE (1 Mbps)

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2 402	686.1	500.0
Mid	2 440	704.8	500.0
High	2 480	705.8	500.0
Worst		686.1	500.0



9.2.2. BLE (2 Mbps)

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
Low	2 402	1224.0	500.0
Mid	2 440	1229.0	500.0
High	2 480	1234.0	500.0
Worst		1224.0	500.0



9.3. PEAK 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

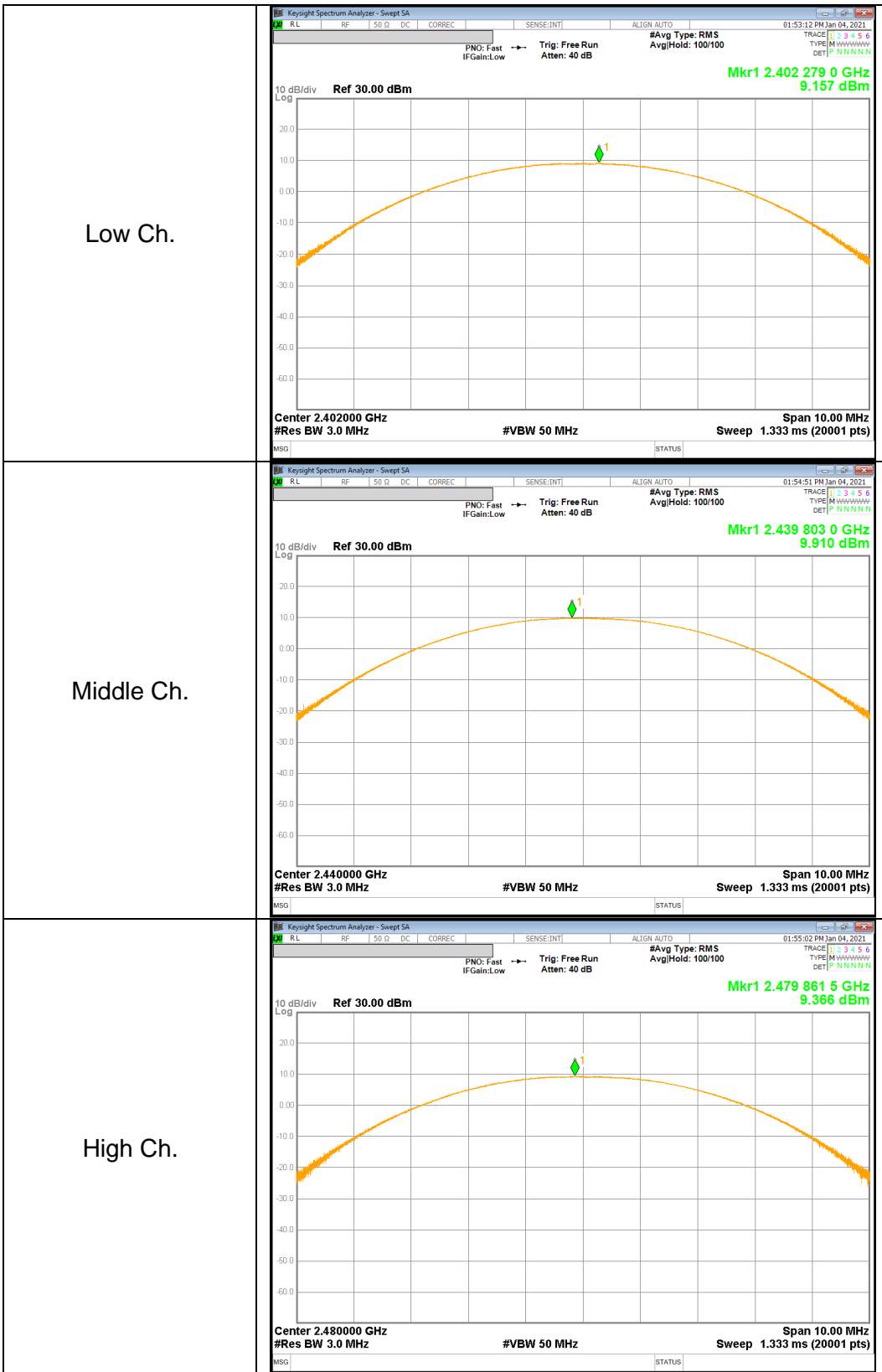
Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.157	30.000	-20.843
Mid	2440	9.910	30.000	-20.090
High	2480	9.366	30.000	-20.634
Worst		9.910	30.000	-20.090

- 2 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.400	30.000	-20.600
Mid	2440	10.002	30.000	-19.998
High	2480	9.434	30.000	-20.566
Worst		10.002	30.000	-19.998

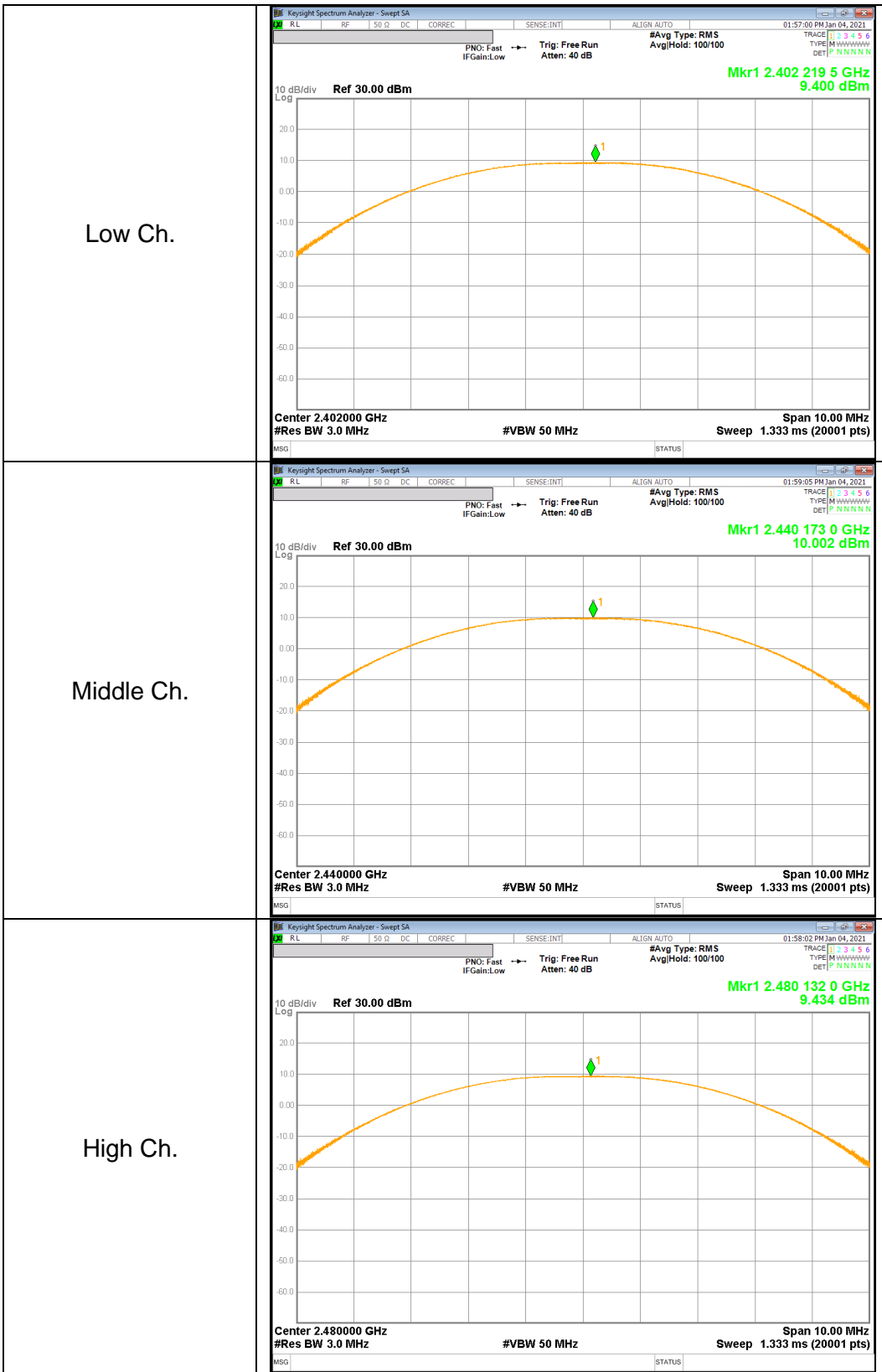
9.3.1. BLE (1 Mbps)

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	2402	8.663	7.351
Mid	2440	9.365	8.640
High	2480	8.879	7.724

- 2 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
Low	2402	8.391	6.904
Mid	2440	9.076	8.083
High	2480	8.560	7.177

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

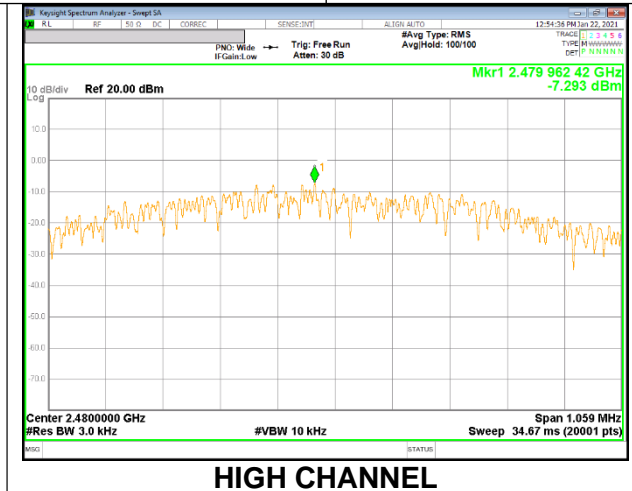
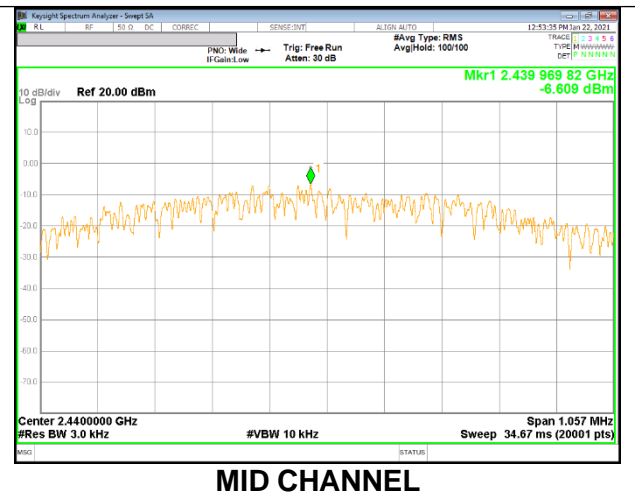
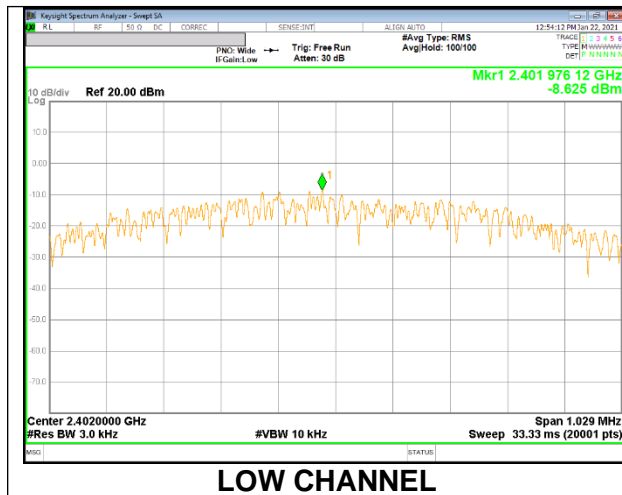
RSS-247 (5.2) (b)

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

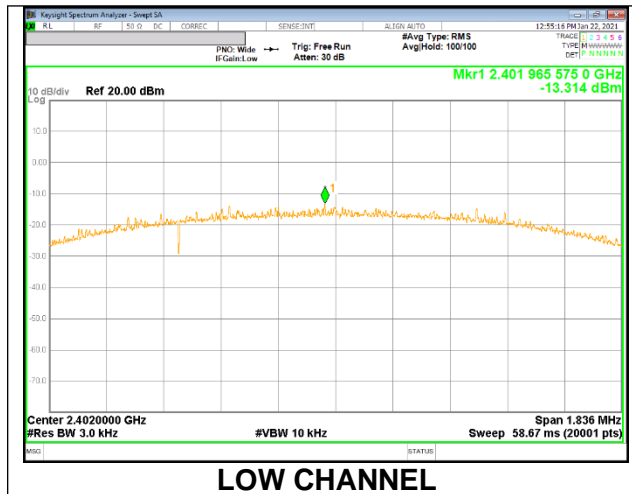
9.5.1. BLE (1 Mbps)

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	2402	-8.625	8.000	-16.625
Mid	2440	-6.609	8.000	-14.609
High	2480	-7.293	8.000	-15.293

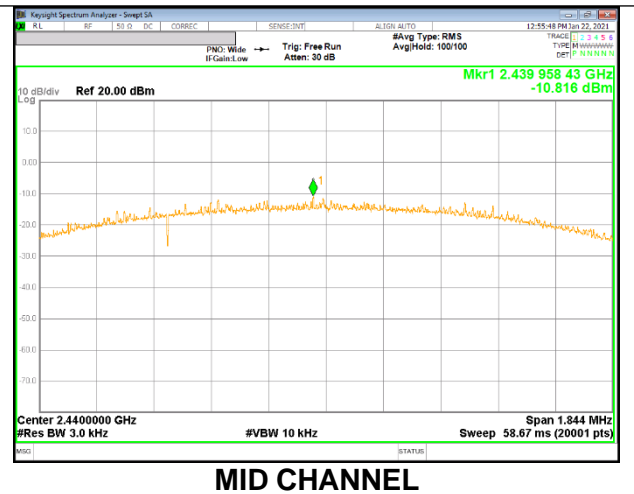


9.5.2. BLE (2Mbps)

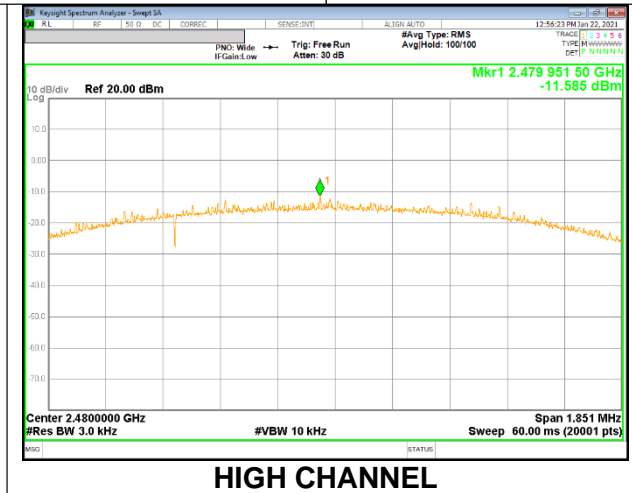
Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
Low	2402	-13.314	8.000	-21.314
Mid	2440	-10.816	8.000	-18.816
High	2480	-11.585	8.000	-19.585



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

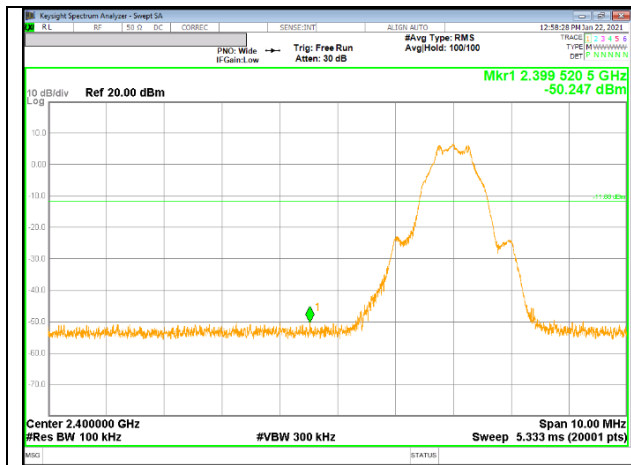
FCC §15.247 (d)

RSS-247 5.5

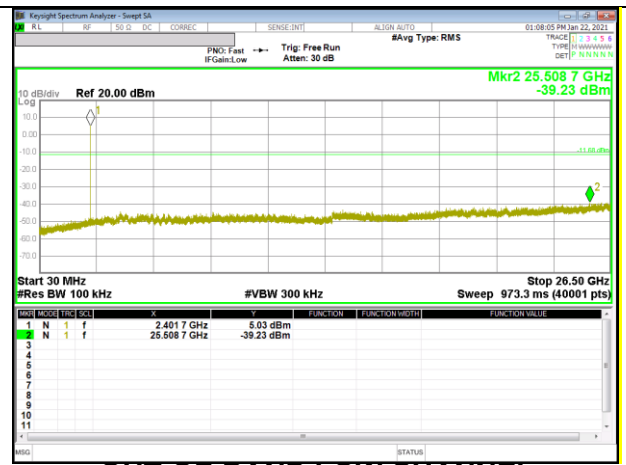
Output power was measured based on the use of a peak measurement. therefore, spurious emissions are required to be 20 dBc.

RESULTS

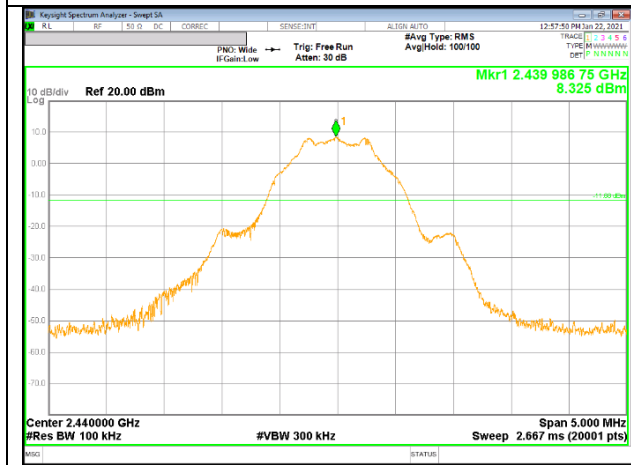
9.6.1. BLE (1 Mbps)



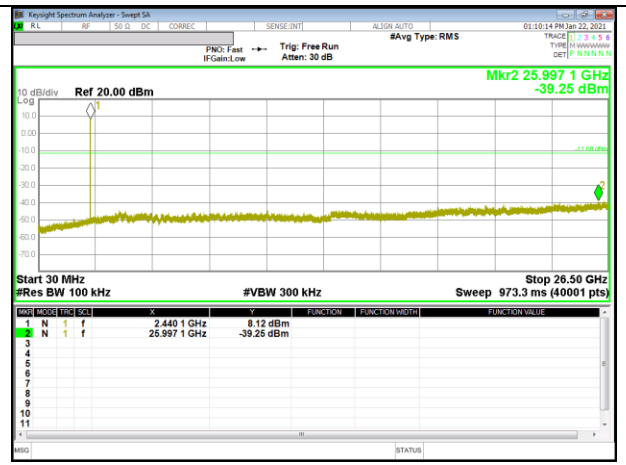
LOW CHANNEL BANDEDGE



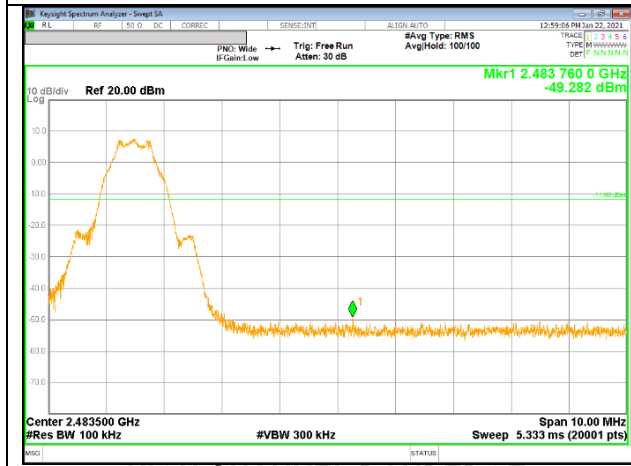
OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

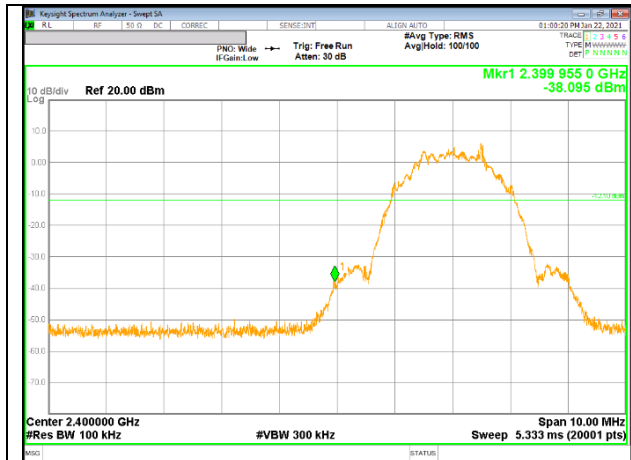


HIGH CHANNEL BANDEDGE

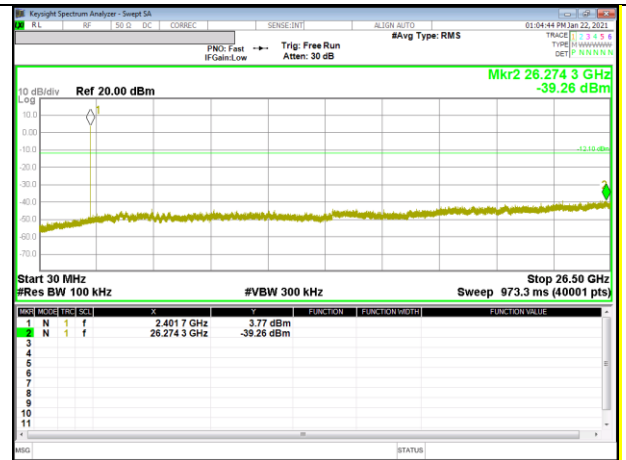


OUT-OF-BAND HIGH CHANNEL

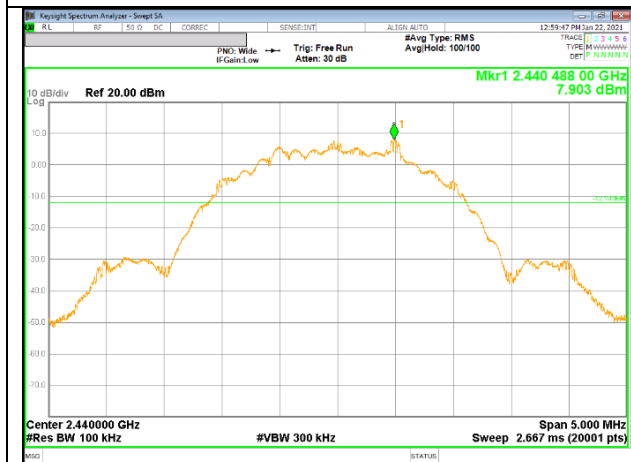
9.6.2. BLE (2 Mbps)



LOW CHANNEL BANDEDGE



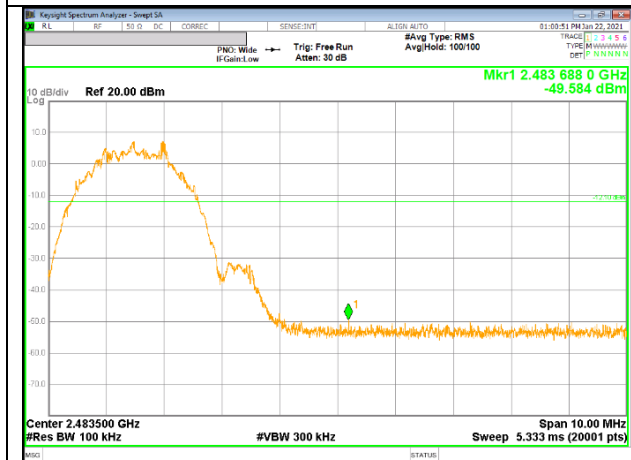
OUT-OF-BAND LOW CHANNEL



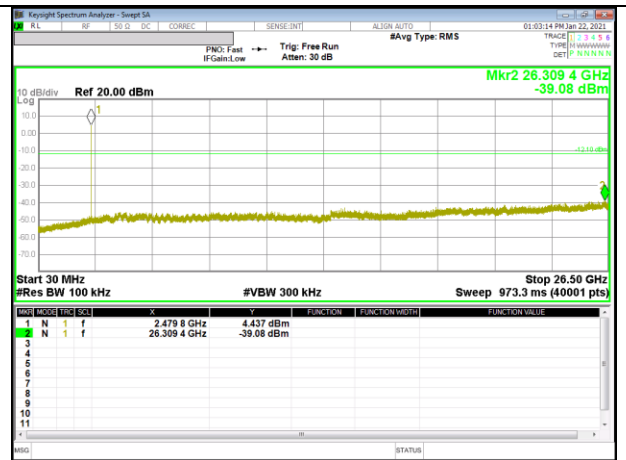
IN-BAND REFERENCE LEVEL



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 ($\mu\text{V}/\text{m}$)	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 = $10 \log(1/0.603) = 2.194$ dB (Spectrum Analyzer round it up to 2.20 dB) and for 2Mbps, DCF = $10 \log(1/0.568) = 2.457$ dB (Spectrum Analyzer round it up to 2.46 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.

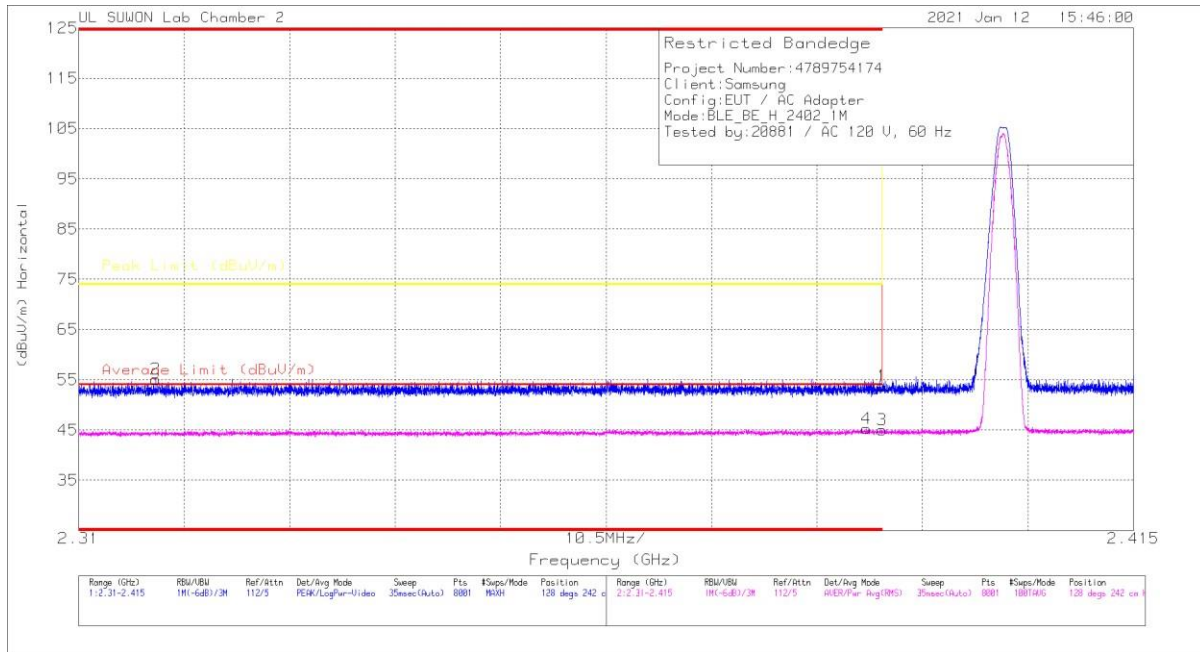
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

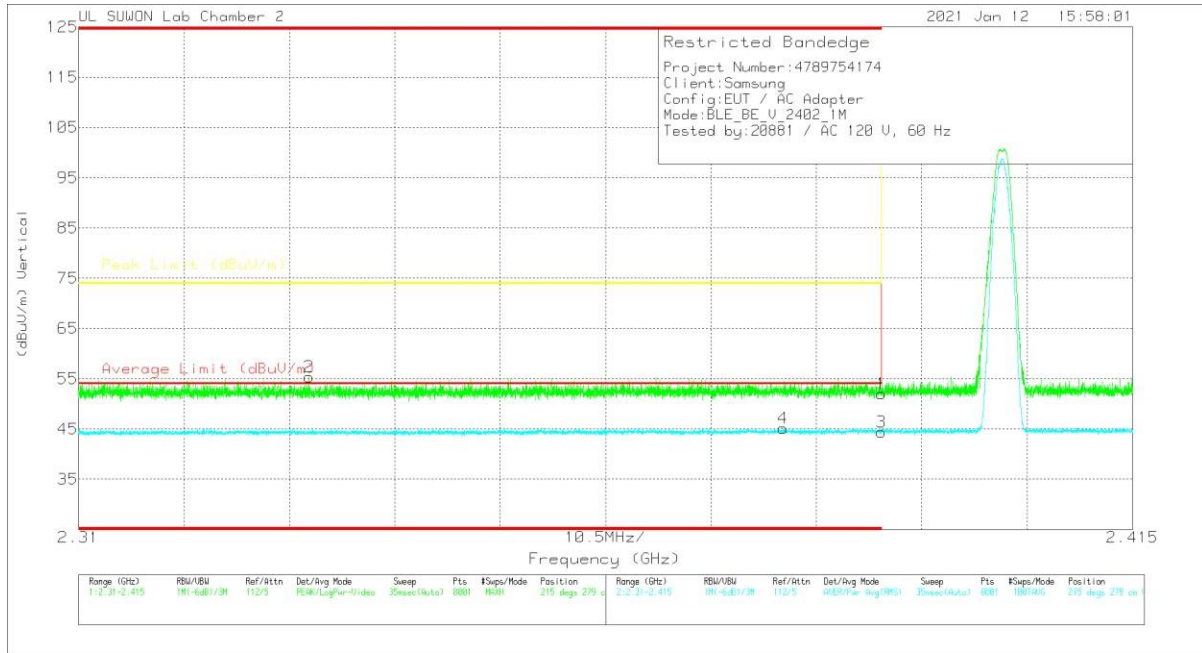


Trace Markers

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	* 2.39	42.13	PK	31.9	-20.3	0	55.18	-	-	74	-20.21	128	242	H
2	* 2.31765	43.86	PK	31.7	-20.4	0	55.16	-	-	74	-18.84	128	242	H
3	* 2.39	31.22	RMS	31.9	-20.3	2.2	45.02	54	-8.98	-	-	128	242	H
4	* 2.38842	31.47	RMS	31.9	-20.3	2.2	45.27	54	-8.73	-	-	128	242	H

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

VERTICAL RESULT



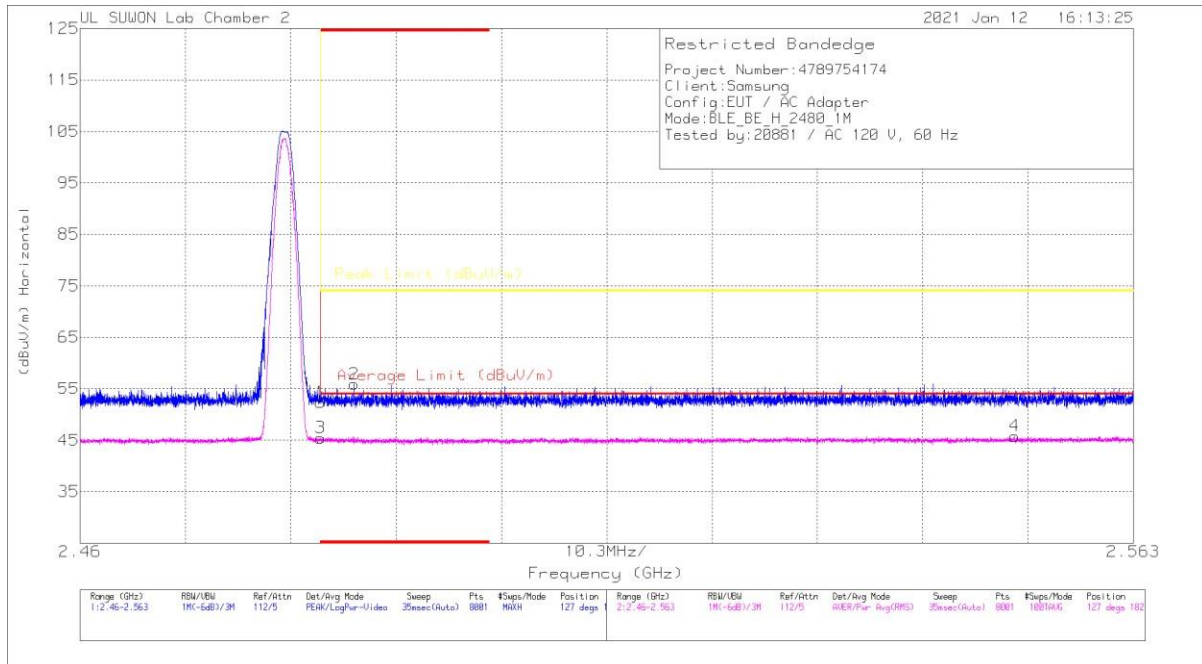
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.44	PK	31.9	-20.3	0	52.04	-	-	74	-21.96	215	279	V
2	* 2.33294	44.12	PK	31.9	-20.5	0	55.42	-	-	74	-18.58	215	279	V
3	* 2.39	30.58	RMS	31.9	-20.3	2.2	44.38	54	-9.62	-	-	215	279	V
4	* 2.38021	31.35	RMS	31.9	-20.3	2.2	45.15	54	-8.85	-	-	215	279	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

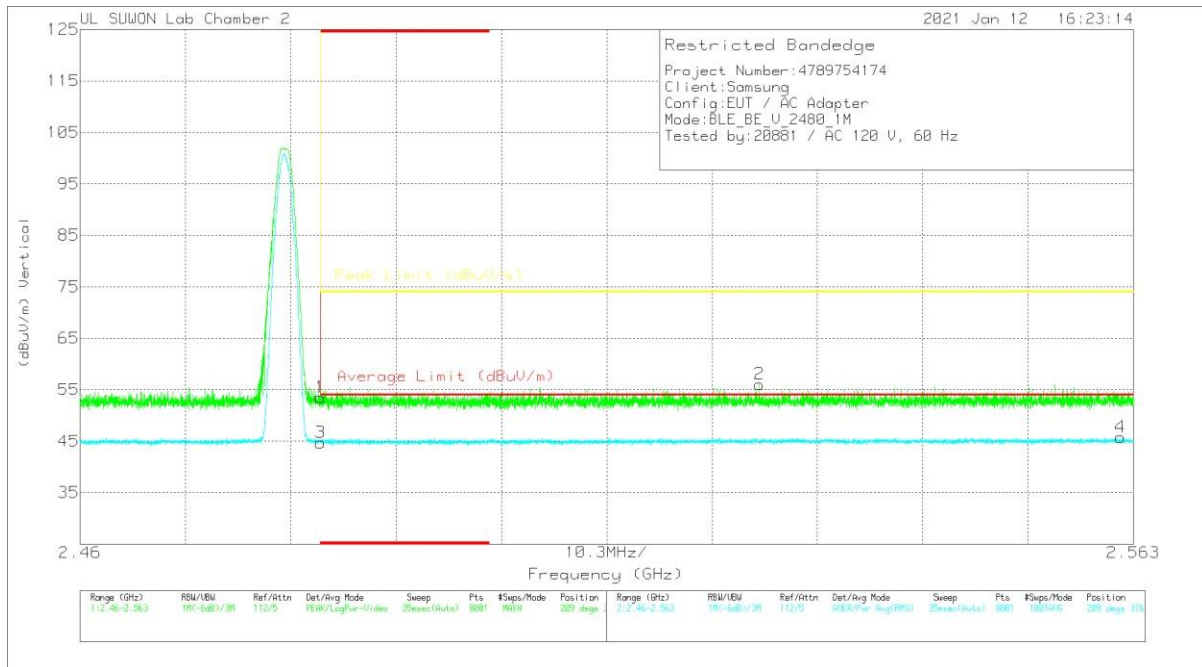


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	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	* 2.48351	40.55	PK	32	-20.2	0	52.35	-	-	74	-21.65	127	182	H
2	* 2.48279	44.08	PK	32	-20.2	0	55.88	-	-	74	-18.12	127	182	H
3	* 2.48351	31.45	RMS	32	-20.2	2.2	45.45	54	-8.55	-	-	127	182	H
4	2.5514	31.41	RMS	32.2	-20	2.2	45.81	54	-8.19	-	-	127	182	H

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

VERTICAL RESULT

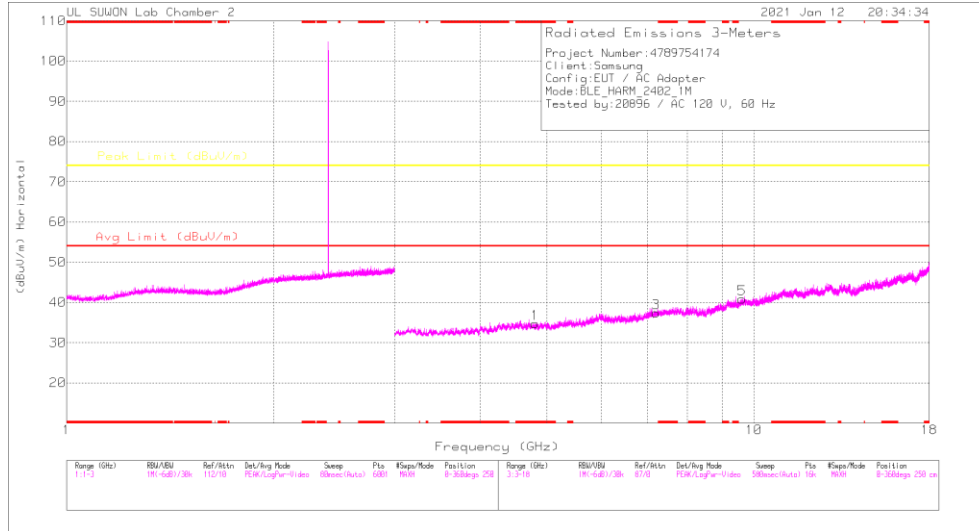


Trace Markers

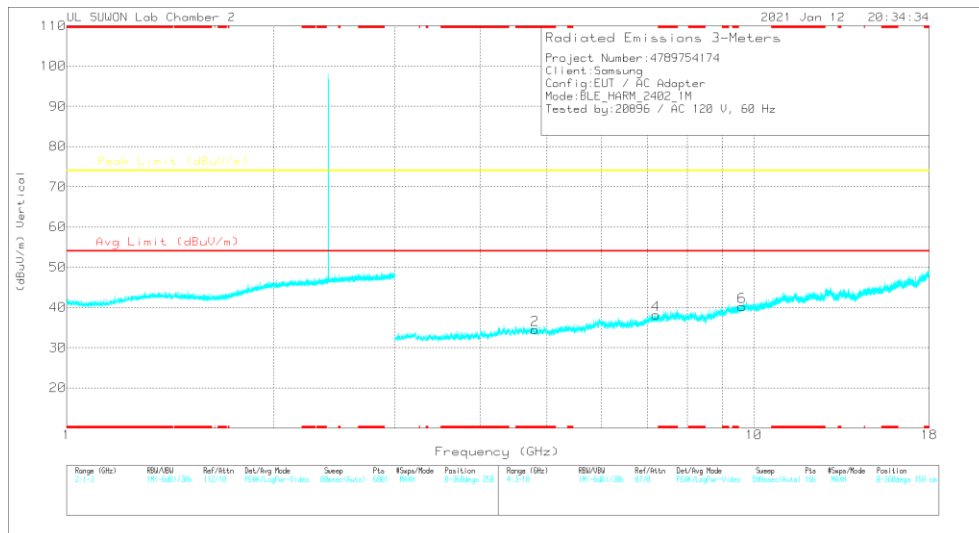
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.72	PK	32	-20.2	0	33.32	-	-	74	-20.48	209	376	V
2	2.52642	44.08	PK	32.1	-20.1	0	56.08	-	-	74	-17.92	209	376	V
3	* 2.48351	30.73	RMS	32	-20.2	2.2	44.73	54	-9.27	-	-	209	376	V
4	2.56174	31.39	RMS	32.2	-20	2.2	45.79	54	-8.21	-	-	209	376	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



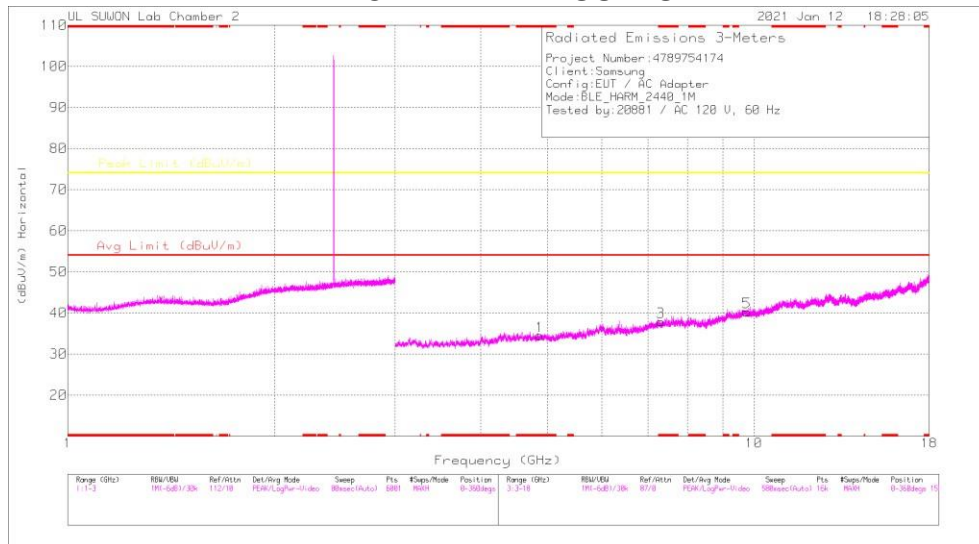
VERTICAL

Radiated Emissions

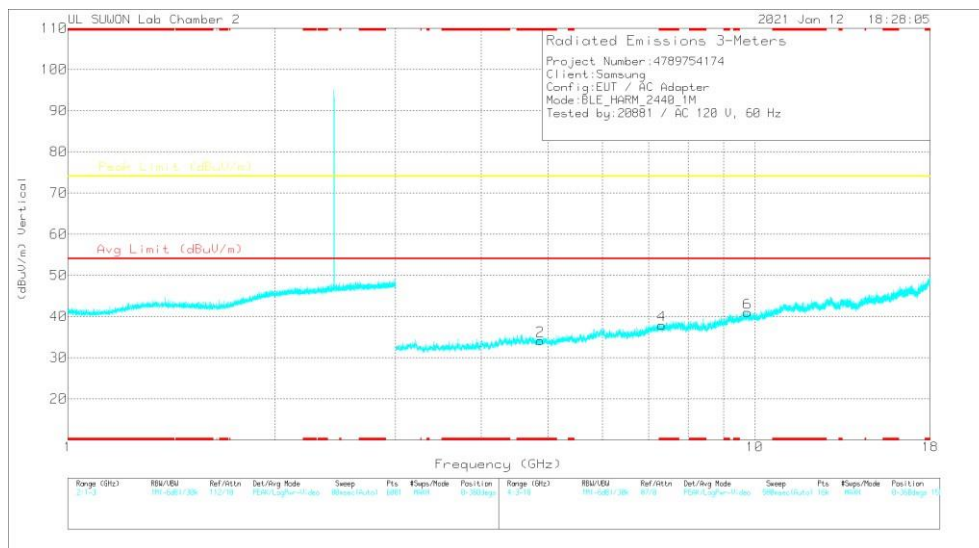
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80332	36.93	PK2	34.1	-27.7	0	43.33	-	-	74	-30.67	360	100	H
* 4.80874	36.43	PK2	34.1	-27.7	0	42.83	-	-	74	-31.17	360	100	V
7.20889	35.45	PK2	36.2	-24.9	0	46.75	-	-	74	-27.25	360	100	H
7.20801	34.74	PK2	36.2	-24.9	0	46.04	-	-	74	-27.96	360	100	V
9.60881	32.42	PK2	37	-20.8	0	48.62	-	-	74	-25.38	360	100	H
9.60813	32.84	PK2	37	-20.8	0	49.04	-	-	74	-24.96	360	100	V

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

MID CHANNEL RESULTS



HORIZONTAL



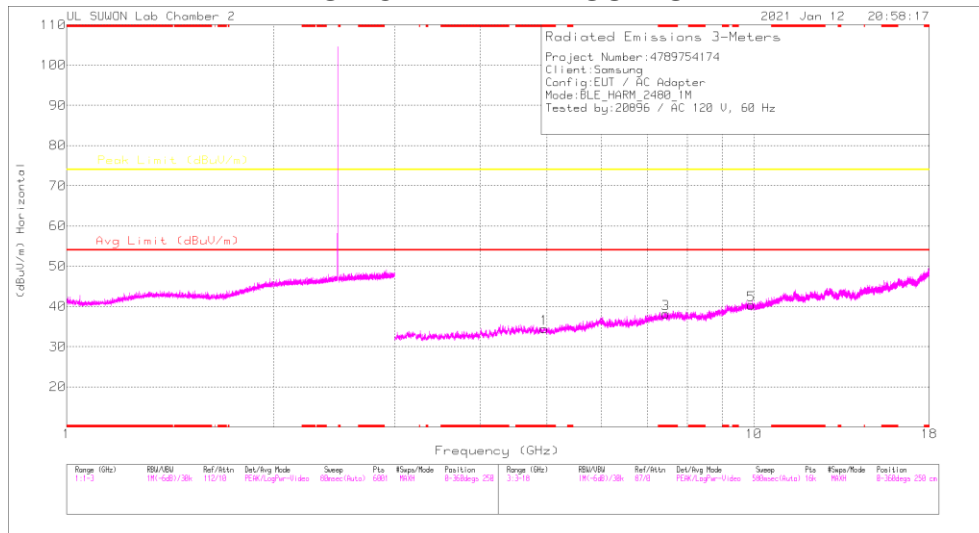
VERTICAL

Radiated Emissions

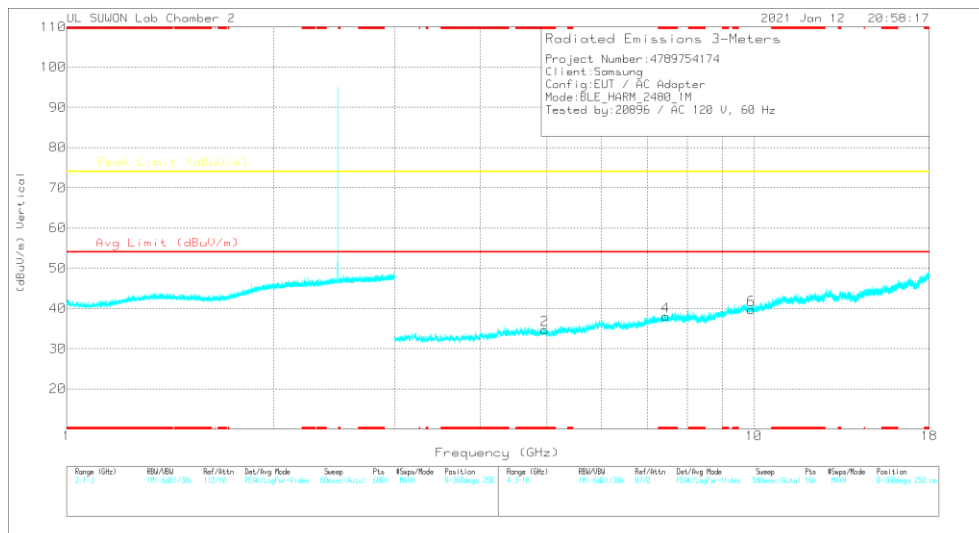
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87301	29.39	PK2	34.1	-27.8	0	35.69	-	-	74	-38.31	360	100	H
* 4.87341	31.43	PK2	34.1	-27.7	0	37.83	-	-	74	-36.17	360	100	V
* 7.31635	28.3	PK2	36.1	-24.6	0	39.8	-	-	74	-34.2	360	100	H
* 7.32009	25.51	PK2	36.1	-24.6	0	37.01	-	-	74	-36.99	360	100	V
9.75938	23.47	PK2	37.2	-20.4	0	40.27	-	-	74	-33.73	360	100	H
9.75959	22.28	PK2	37.2	-20.4	0	39.08	-	-	74	-34.92	360	100	V

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

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Radiated Emissions

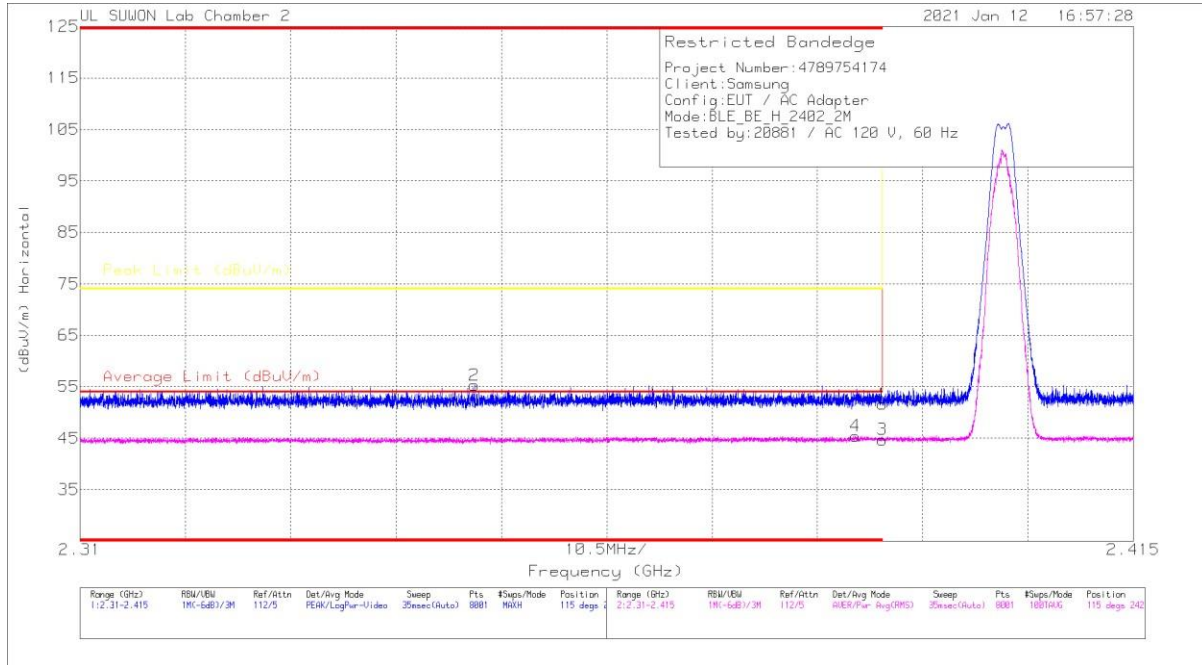
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95275	36.3	PK2	34.1	-26.8	0	43.6	-	-	74	-30.4	360	100	H
* 4.9626	36.39	PK2	34.1	-26.8	0	43.69	-	-	74	-30.31	360	100	V
* 7.4414	34.9	PK2	36	-23.5	0	47.4	-	-	74	-26.6	360	100	H
* 7.43683	35.42	PK2	36	-23.6	0	47.82	-	-	74	-26.18	360	100	V
9.92681	31.88	PK2	37.4	-20.4	0	48.88	-	-	74	-25.12	360	100	H
9.92449	32.08	PK2	37.4	-20.2	0	49.28	-	-	74	-24.72	360	100	V

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

10.2.2. BLE (2 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

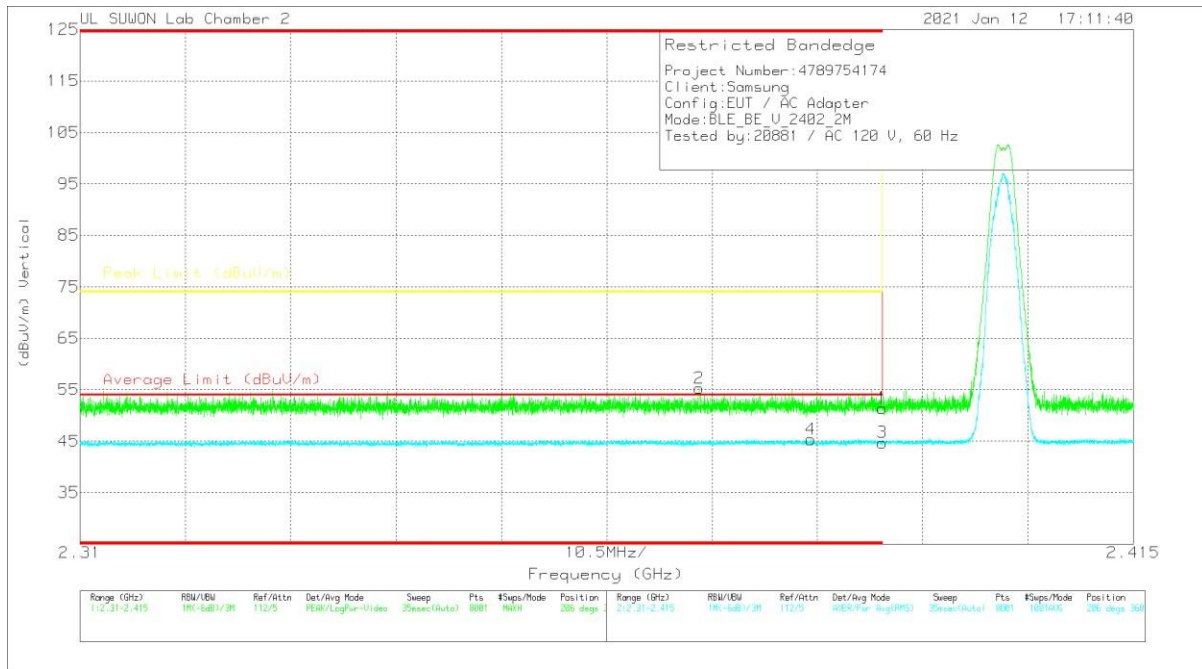


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.03	PK	31.9	-20.3	0	51.63	-	-	74	-22.37	115	242	H
2	* 2.3493	44	PK	31.8	-20.5	0	55.3	-	-	74	-18.7	115	242	H
3	* 2.39	30.66	RMS	31.9	-20.3	2.46	44.72	54	-9.28	-	-	115	242	H
4	* 2.38727	31.24	RMS	31.9	-20.2	2.46	45.4	54	-8.6	-	-	115	242	H

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

VERTICAL RESULT



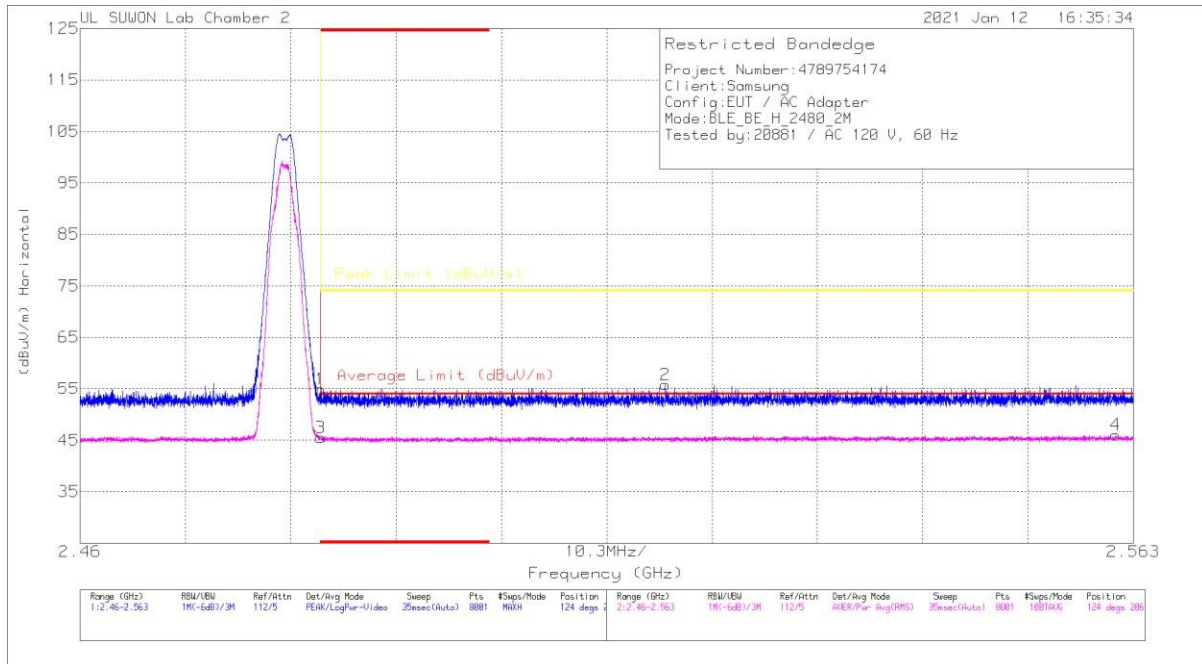
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.83	PK	31.9	-20.3	0	51.45	-	-	74	-22.57	206	360	V
2	* 2.3717	43.88	PK	31.9	-20.4	0	55.28	-	-	74	-18.72	206	360	V
3	* 2.39	30.86	RMS	31.9	-20.3	2.46	44.72	54	-9.28	-	-	206	360	V
4	* 2.38284	31.4	RMS	31.9	-20.4	2.46	45.36	54	-8.64	-	-	206	360	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

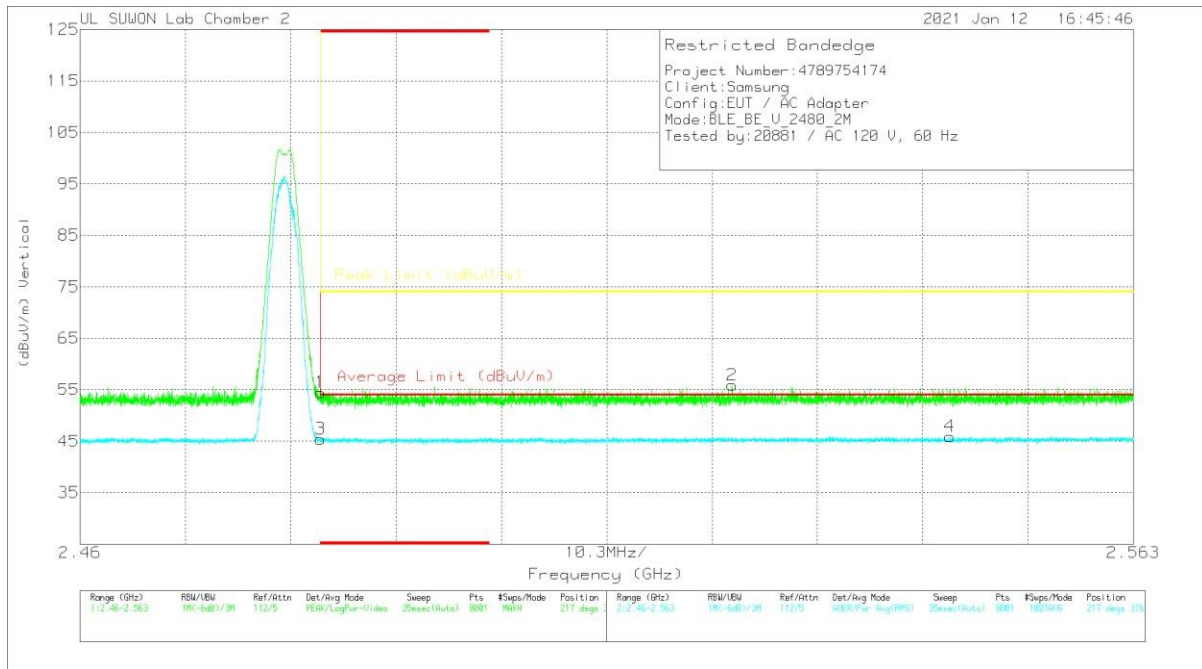


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	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	2.48351	43.09	PK	-32	-20.2	0	54.89	-	-	74	-19.11	124	206	H
2	2.51724	43.86	PK	-32.1	-20.2	0	55.76	-	-	74	-18.24	124	206	H
3	* 2.48351	31.25	RMS	-32	-20.2	2.46	45.51	54	-8.49	-	-	124	206	H
4	2.56129	31.36	RMS	-32.2	-20	2.46	46.02	54	-7.98	-	-	124	206	H

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

VERTICAL RESULT

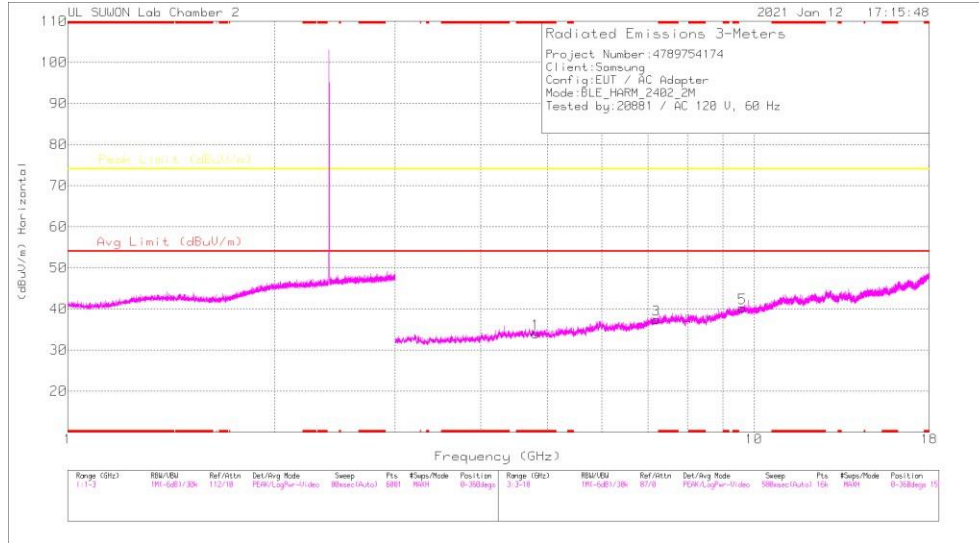


Trace Markers

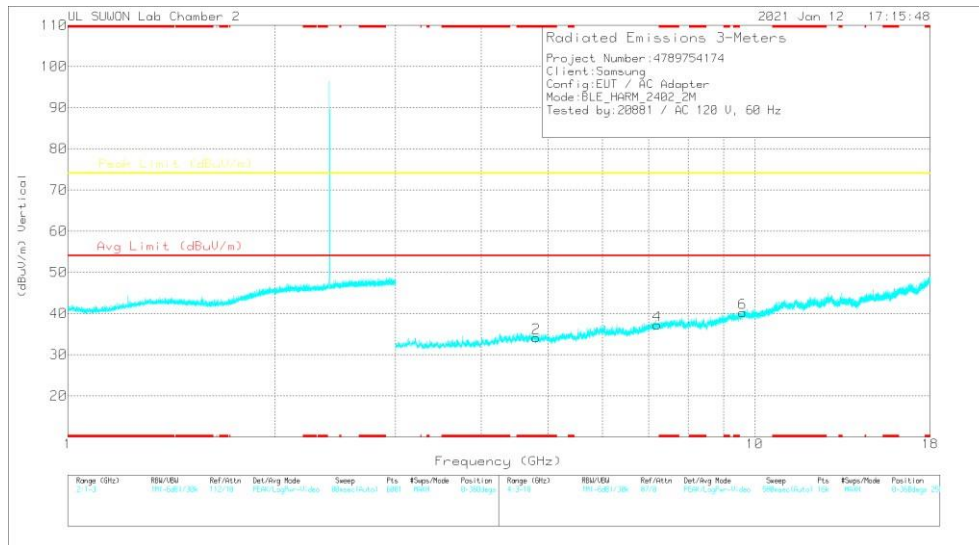
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	42.89	PK	-32	-20.2	0	24.49	-	-	74	-19.51	217	376	V
2	2.52376	43.89	PK	-32.1	-20.1	0	25.89	-	-	74	-18.11	217	376	V
3	* 2.48351	31.18	RMS	-32	-20.2	2.46	45.44	54	-8.56	-	-	217	376	V
4	2.54505	31.56	RMS	-32.1	-20.2	2.46	45.92	54	-8.08	-	-	217	376	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



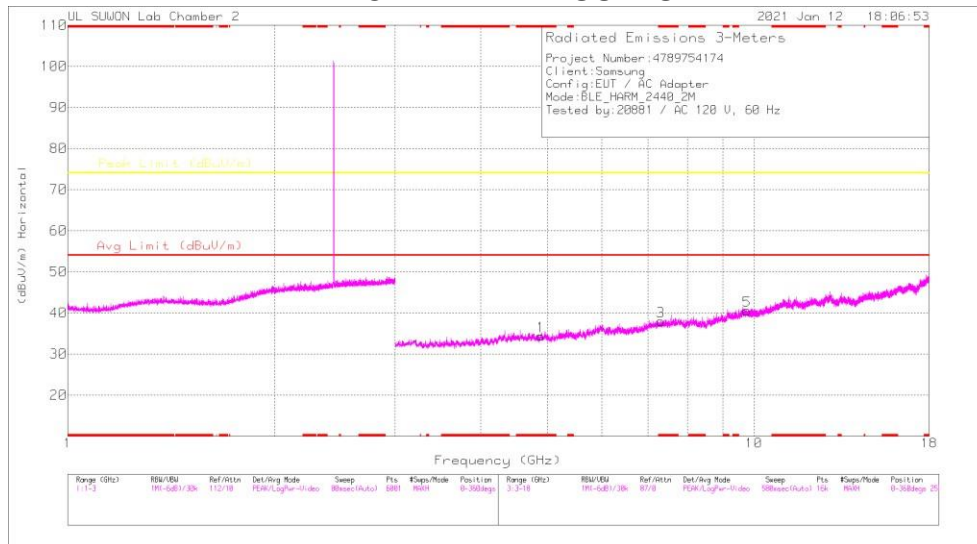
VERTICAL

Radiated Emissions

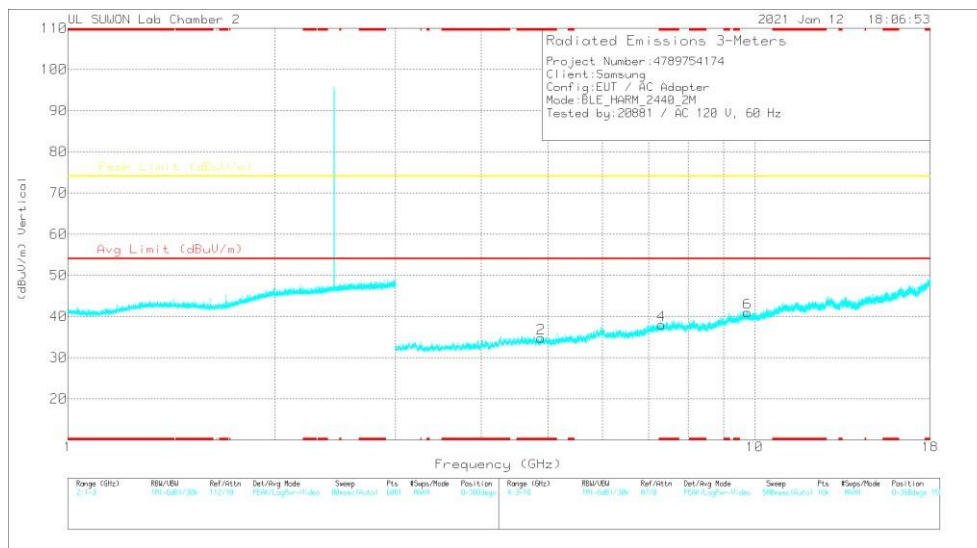
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.8077	23.91	PK2	34.1	-27.7	0	30.31	-	-	74	-43.69	360	100	H
* 4.80876	31.3	PK2	34.1	-27.7	0	37.7	-	-	74	-36.3	360	100	V
7.20577	24.93	PK2	36.2	-25	0	36.13	-	-	74	-37.87	360	100	H
7.20771	27.44	PK2	36.2	-24.9	0	38.74	-	-	74	-35.26	360	100	V
9.61001	28.44	PK2	37	-20.8	0	44.64	-	-	74	-29.36	360	100	H
9.61235	23.14	PK2	37	-20.8	0	39.34	-	-	74	-34.66	360	100	V

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

MID CHANNEL RESULTS



HORIZONTAL



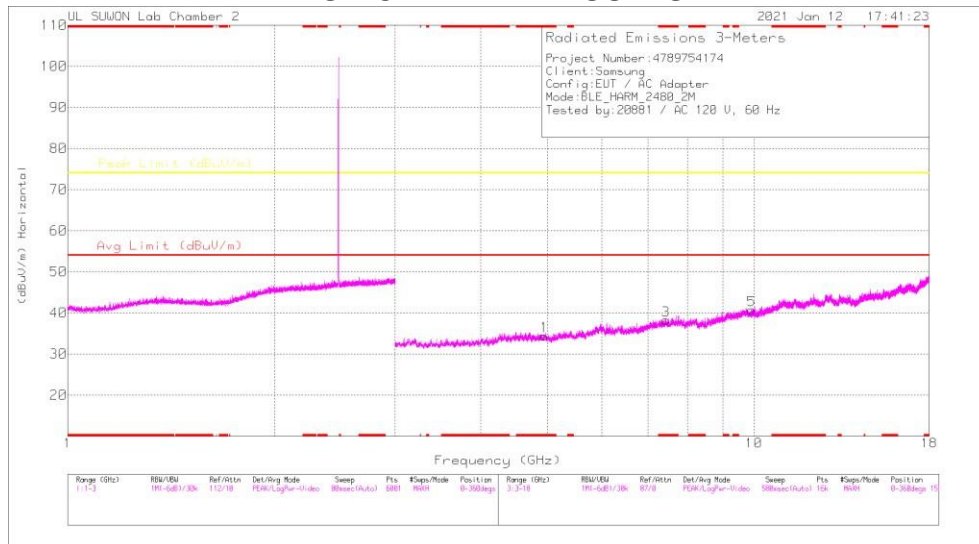
VERTICAL

Radiated Emissions

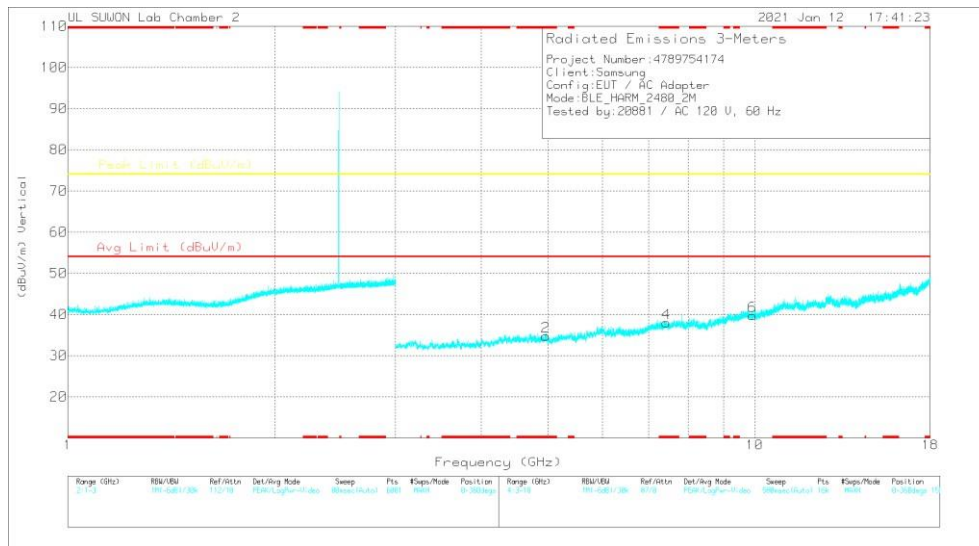
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88751	24.35	PK2	34.1	-27.5	0	30.95	-	-	74	-43.05	360	100	H
* 4.88379	26.78	PK2	34.1	-27.6	0	33.28	-	-	74	-40.72	360	100	V
* 7.31837	25.14	PK2	36.1	-24.5	0	36.74	-	-	74	-37.26	360	100	H
* 7.31705	27.48	PK2	36.1	-24.6	0	38.98	-	-	74	-35.02	360	100	V
9.76751	19.67	PK2	37.2	-20.5	0	36.37	-	-	74	-37.63	360	100	H
9.76803	23.34	PK2	37.2	-20.5	0	40.04	-	-	74	-33.96	360	100	V

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

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

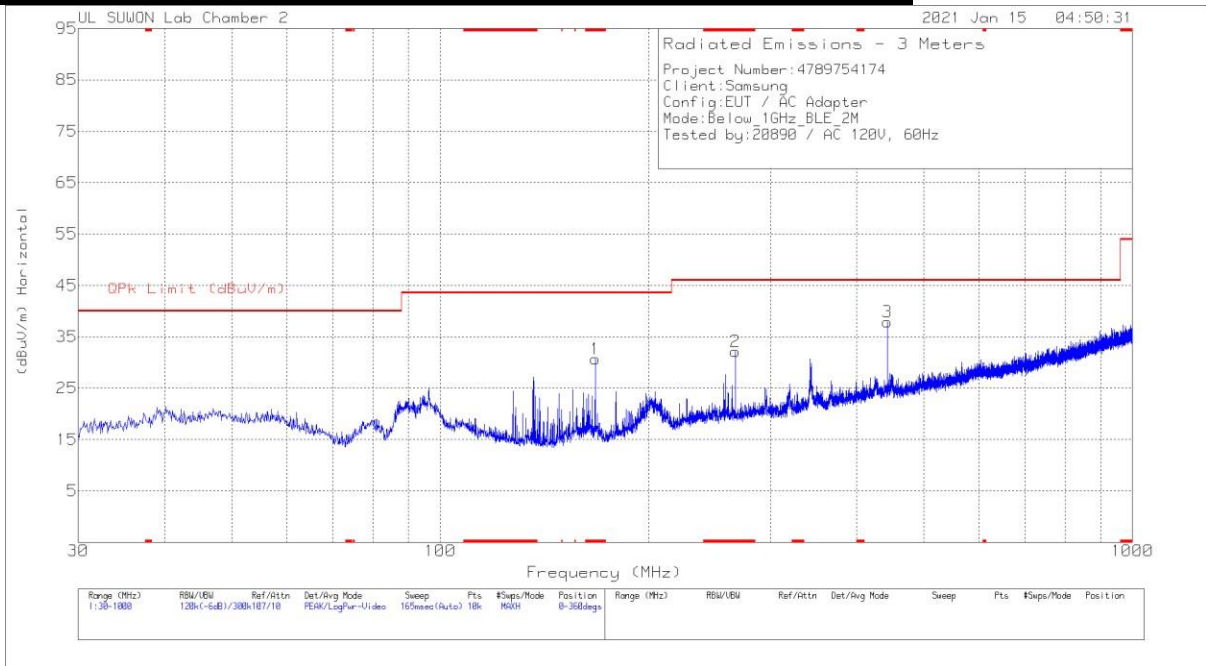
Radiated Emissions

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
* 4.94897	26.99	PK2	34.1	-26.8	0	-34.29	-	-	74	-39.71	360	100	H
* 4.96168	28.02	PK2	34.1	-26.8	0	-35.32	-	-	74	-38.68	360	100	V
* 7.43981	27.91	PK2	36	-23.7	0	-40.21	-	-	74	-33.79	360	100	H
* 7.43591	24.58	PK2	36	-23.5	0	-37.08	-	-	74	-36.92	360	100	V
9.92618	23.65	PK2	37.4	-20.4	0	-40.65	-	-	74	-33.35	360	100	H
9.92481	24.99	PK2	37.4	-20.3	0	-42.09	-	-	74	-31.91	360	100	V

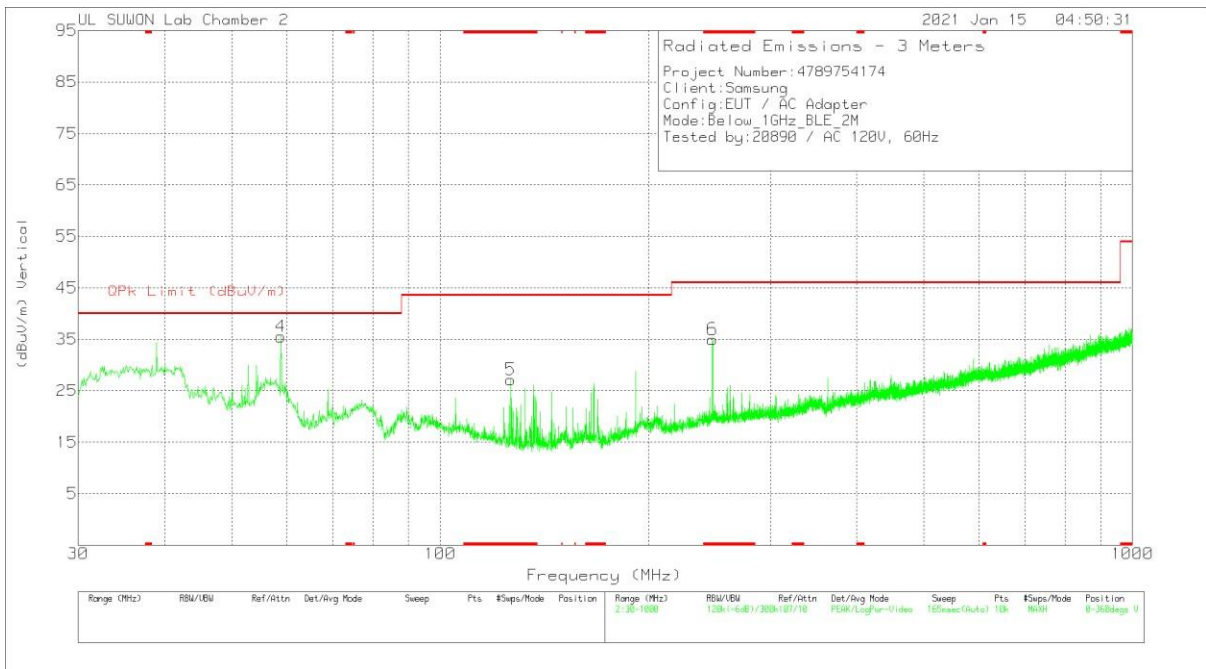
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

10.3. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

Below 1GHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	167.643	44.95	Pk	14.5	-28.8	0	30.65	43.52	-12.87	0-360	100	H
2	* 267.165	41.33	Pk	18.6	-27.8	0	32.13	46.02	-13.89	0-360	100	H
3	442.541	42.37	Pk	22.1	-26.6	0	37.87	46.02	-8.15	0-360	200	H
4	58.906	46.92	Pk	18.8	-30.2	0	35.52	40	-4.48	0-360	300	V
5	* 126.515	41.95	Pk	14.6	-29.4	0	27.15	43.52	-16.37	0-360	100	V
6	* 247.474	44.58	PK	18.4	-28	0	34.98	46.02	-11.04	0-360	100	V

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

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
58.906	33.19	Qp	18.8	-30.2	0	21.79	40	-18.21	213	100	V

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

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

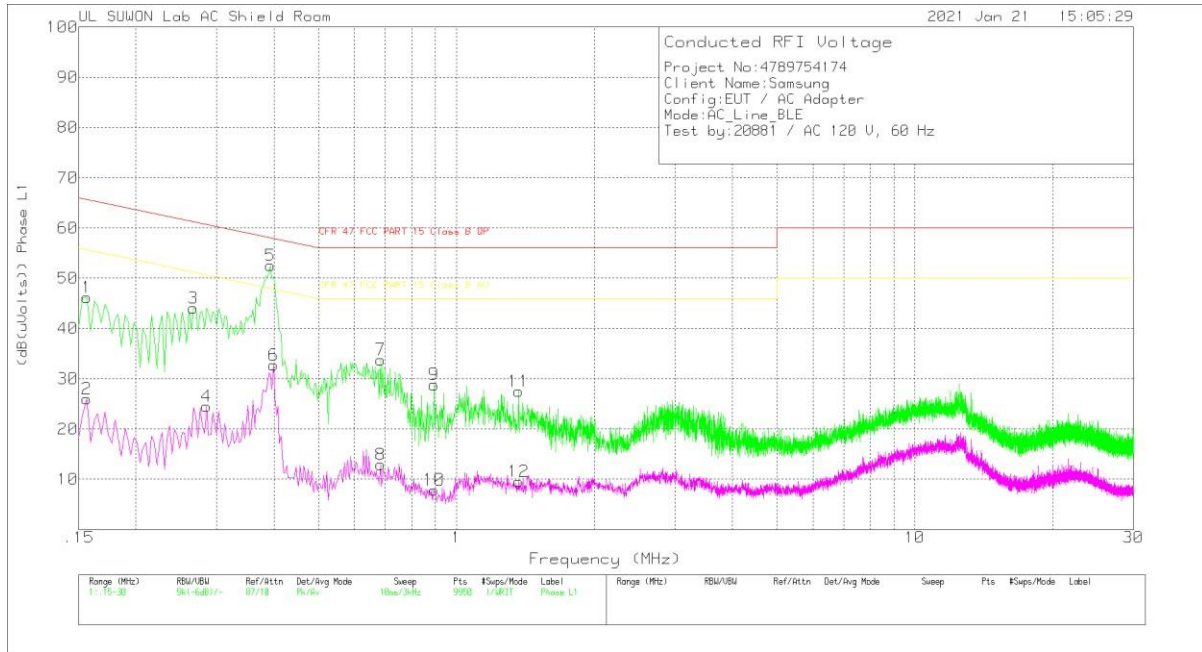
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

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_With EX_L1[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.156	36.2	Pk	9.9	.1	46.2	65.67	-19.47	-	-
2	.156	16.02	Av	9.9	.1	26.02	-	-	55.67	-29.65
3	.267	34.23	Pk	9.7	.2	44.13	61.21	-17.08	-	-
4	.285	14.58	Av	9.7	.2	24.48	-	-	50.67	-26.19
5	.393	42.43	Pk	9.9	.2	52.53	58	-5.47	-	-
6	.399	22.59	Av	9.9	.2	32.69	-	-	47.87	-15.18
7	.684	23.69	Pk	9.9	.2	33.79	56	-22.21	-	-
8	.684	2.84	Av	9.9	.2	12.94	-	-	46	-33.06
9	.894	18.71	Pk	9.8	.3	28.81	56	-27.19	-	-
10	.894	-2.23	Av	9.8	.3	7.87	-	-	46	-38.13
11	1.365	17.39	Pk	9.8	.3	27.49	56	-28.51	-	-
12	1.365	-5	Av	9.8	.3	9.6	-	-	46	-36.4

Pk - Peak detector

Av - Average detection

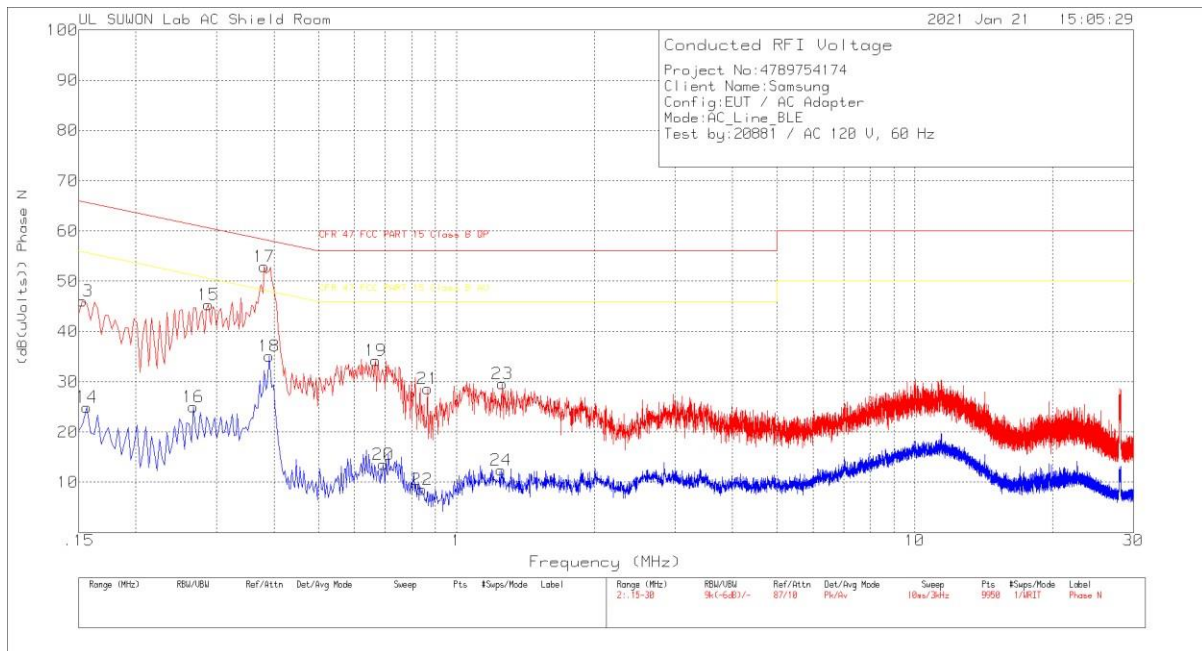
Quasi-Peak Emissions

Range 1: Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_L1[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.39225	40.53	Qp	9.9	.2	50.63	58.02	-7.39	-	-

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 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)
13	.153	36.14	Pk	9.8	.1	46.04	65.84	-19.8	-	-
14	.156	14.94	Av	9.9	.1	24.94	-	-	55.67	-30.73
15	.288	35.46	Pk	9.7	.2	45.36	60.58	-15.22	-	-
16	.267	15.16	Av	9.7	.2	25.06	-	-	51.21	-26.15
17	.381	42.87	Pk	9.9	.2	52.97	58.26	-5.29	-	-
18	.39	25.04	Av	9.9	.2	35.14	-	-	48.06	-12.92
19	.666	24.18	Pk	9.9	.2	34.28	56	-21.72	-	-
20	.693	3.42	Av	9.9	.2	13.52	-	-	46	-32.48
21	.867	18.54	Pk	9.8	.3	28.64	56	-27.36	-	-
22	.843	-1.56	Av	9.8	.3	8.54	-	-	46	-37.46
23	1.26	19.52	Pk	9.8	.3	29.62	56	-26.38	-	-
24	1.251	2.29	Av	9.8	.3	12.39	-	-	46	-33.61

Pk - Peak detector
 Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
.38175	39.8	Qp	9.9	.2	49.9	58.24	-8.34	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT