



CERTIFICATION TEST REPORT

Report Number. : 4789582668-E4V2

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

Model : SC-54A, SCG07

FCC ID : A3LSMA516JPN

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

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

Date Of Issue:

August 28, 2020

Prepared by:

UL Korea, Ltd.

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

Suwon Test Site: UL Korea, LTD. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu

Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



REPORT REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	08/26/20	Initial issue	Sungeun Lee
V2	08/28/20	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, ANT+ and NFC

MODEL: SC-54A, SCG07

SERIAL NUMBER: R38CN709MKFY (CONDUCTED);
R3CN709MX2E (RADIATED);

DATE TESTED: AUG 05, 2020 – AUG 28, 2020;

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

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

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

Approved & Released For
UL Korea, Ltd. By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



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 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 Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC. This test report addresses the DTS (BLE) operational mode.

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

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	500kbps	Peak	8.819	7.26
		Average	8.157	6.54
	2Mbps	Peak	8.793	7.49
		Average	7.938	6.22

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.**

Bluetooth LE operates on single antenna.
 The radio utilizes an internal antenna, with a maximum gain of -2.82 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.

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, the 500 kbps(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	6.407	2	2Mbps (37 pkt)	2402	5.904	
		2440	6.685			2440	6.257	
		2480	8.093			2480	7.846	
	1Mbps (255 pkt)	2402	6.498		2Mbps (255 pkt)	2402	6.257	
		2440	6.836			2440	6.597	
		2480	8.136			2480	7.938	
	125 kbps (37 pkt)	2402	6.502					
		2440	6.839					
		2480	8.141					
	125 kbps (255 pkt)	2402	6.479					
		2440	6.814					
		2480	8.085					
	500 kbps (37 pkt)	2402	6.491					
		2440	6.826					
		2480	8.157					
	500 kbps (255 pkt)	2402	6.492					
		2440	6.826					
		2480	8.116					

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

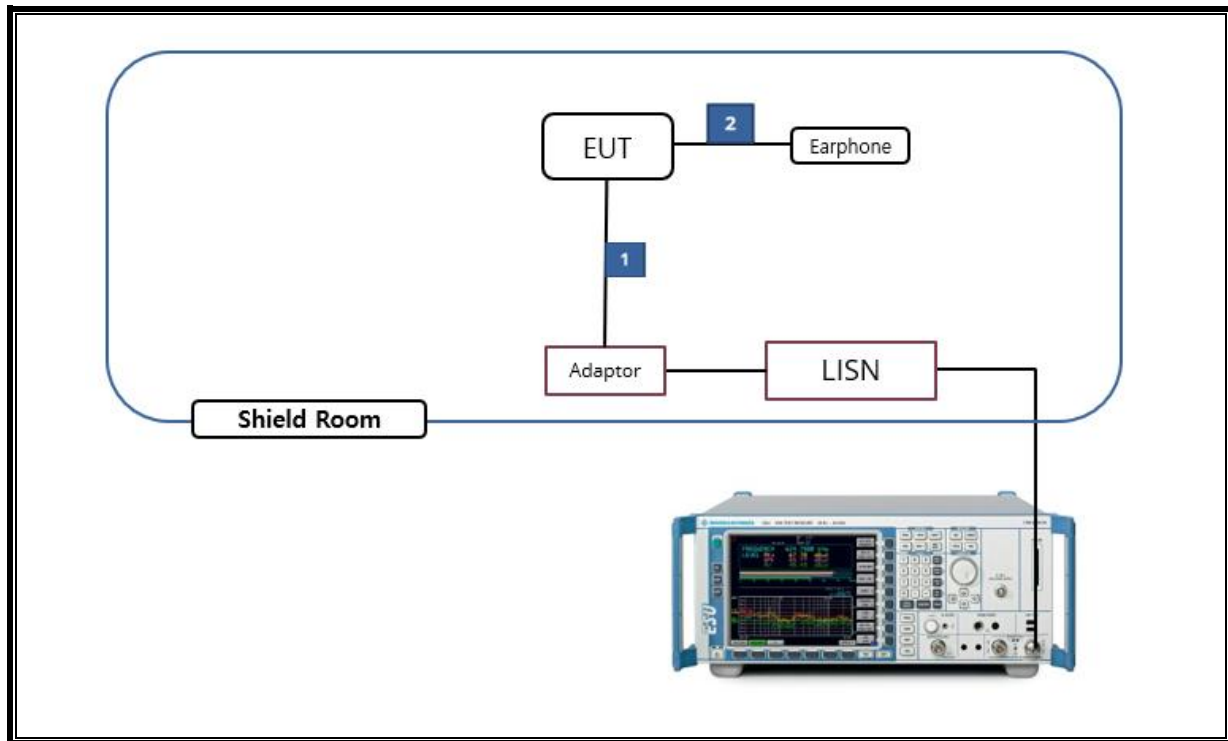
I/O CABLE

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

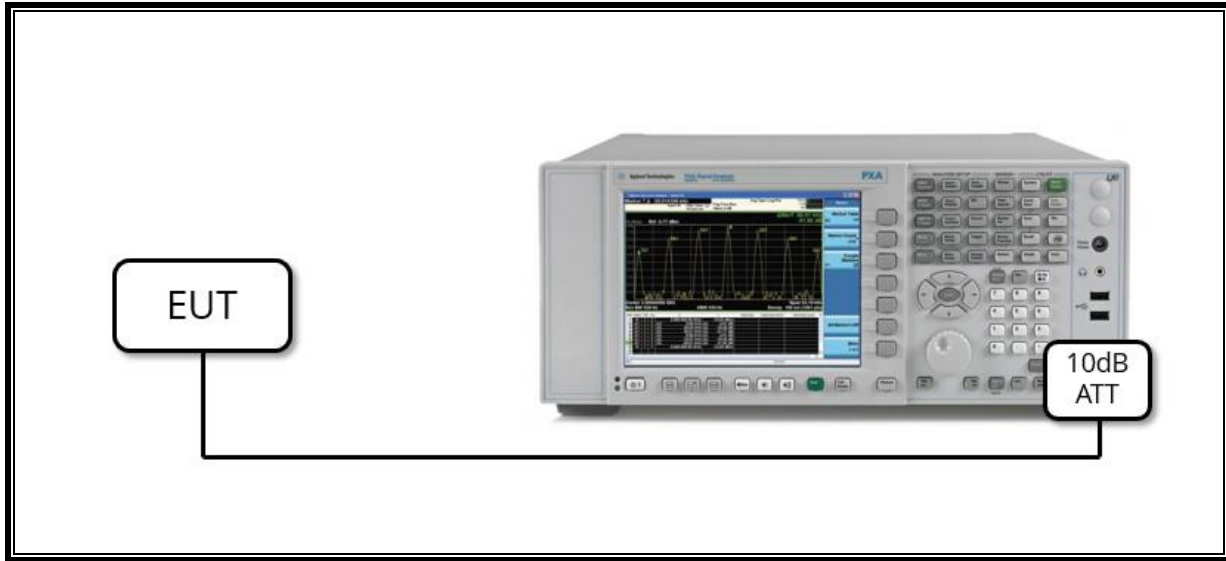
TEST SETUP

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

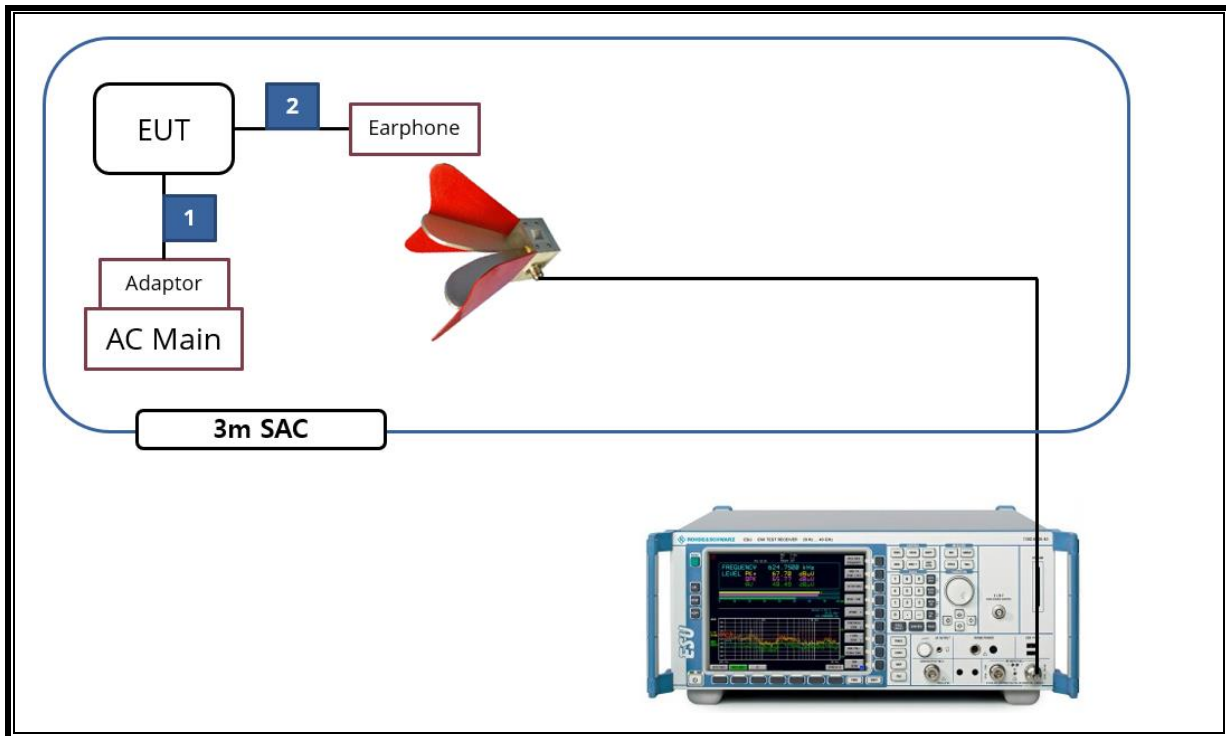
SETUP DIAGRAM FOR TESTS (AC Line Conducted)



SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

6 dB BW : KDB 558074 D01 v05r02, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05r02, Section 8.3.1.1

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

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

8. 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

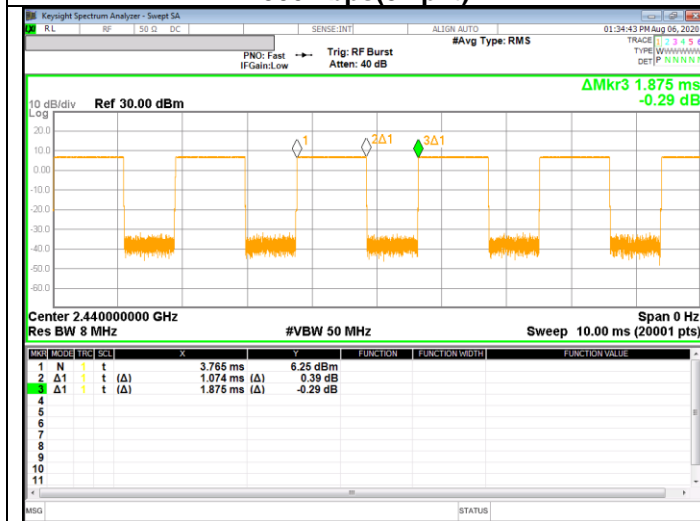
LIMITS

None; for reporting purposes only.

Mode	On time [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 500 kbps [37pkt]	1.065	1.876	0.568	56.77	2.46	0.939
BLE 2 Mbps [255pkt]	1.074	1.875	0.573	57.28	2.42	0.931



500 kbps(37 pkt)



2 Mbps(255 pkt)

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

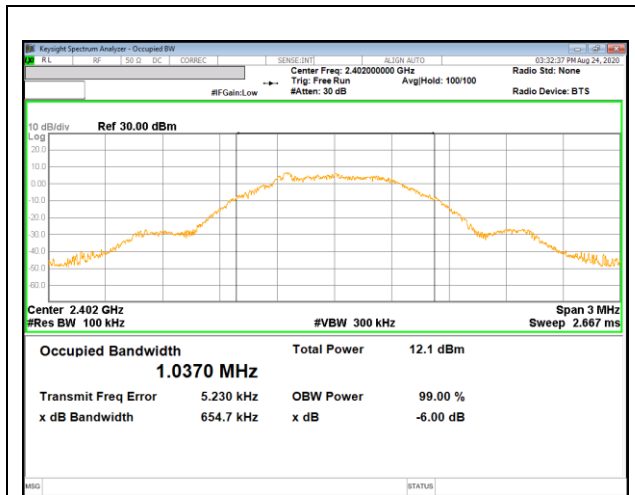
RSS-247 5.2 (a)

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

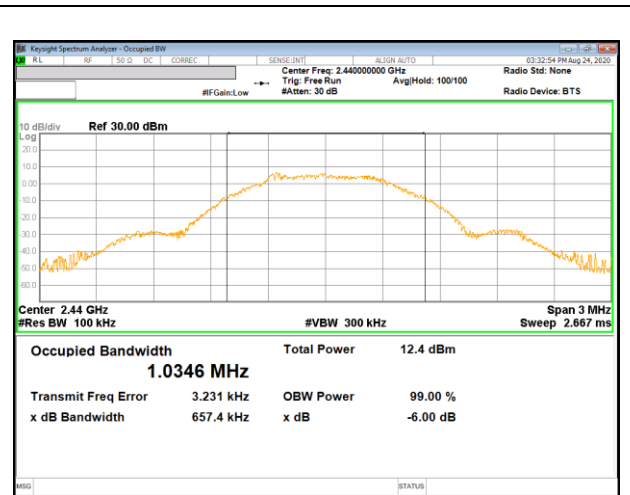
RESULTS

9.2.1. BLE (500kbps)

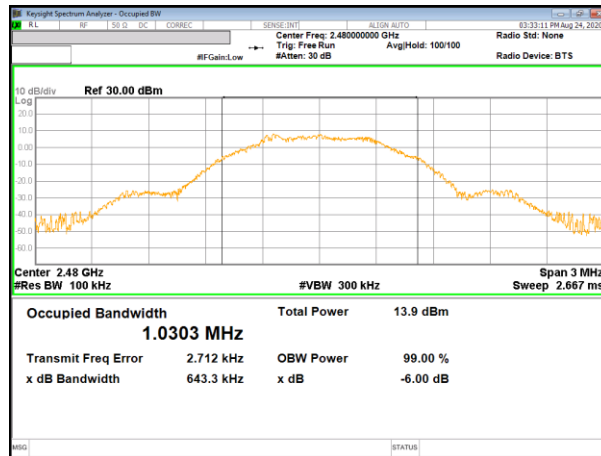
Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
0	2 402	654.7	500.0
19	2 440	657.4	500.0
39	2 480	643.3	500.0
Worst		643.3	500.0



LOW CHANNEL (0 Ch.)



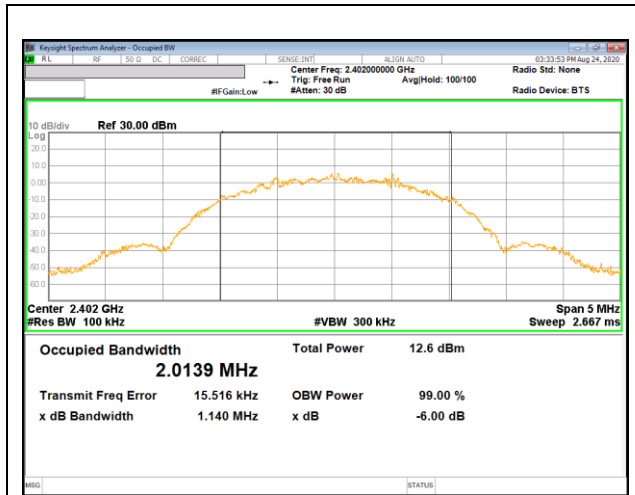
MID CHANNEL (19 Ch.)



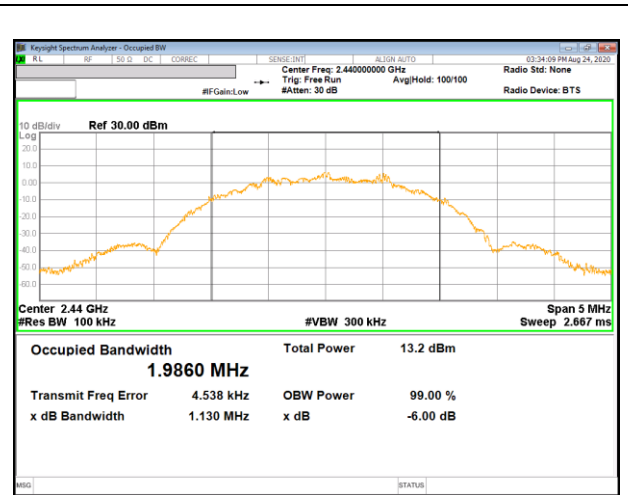
HIGH CHANNEL (39 Ch.)

9.2.2. BLE (2Mbps)

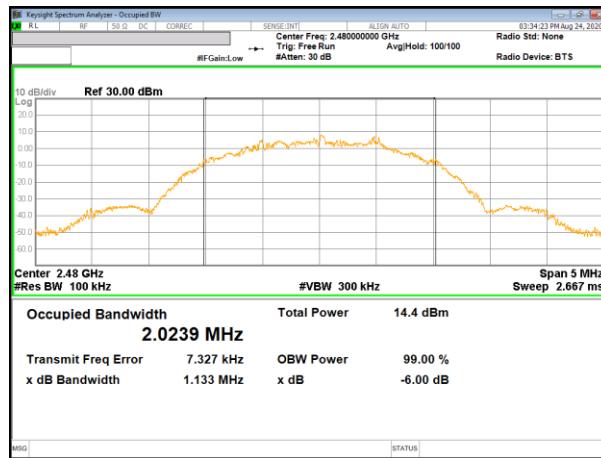
Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
0	2 402	1140	500.0
19	2 440	1130	500.0
39	2 480	1133	500.0
Worst		1130	500.0



LOW CHANNEL (0 Ch.)



MID CHANNEL (19 Ch.)



HIGH CHANNEL (39 Ch.)

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

- 500 kbps

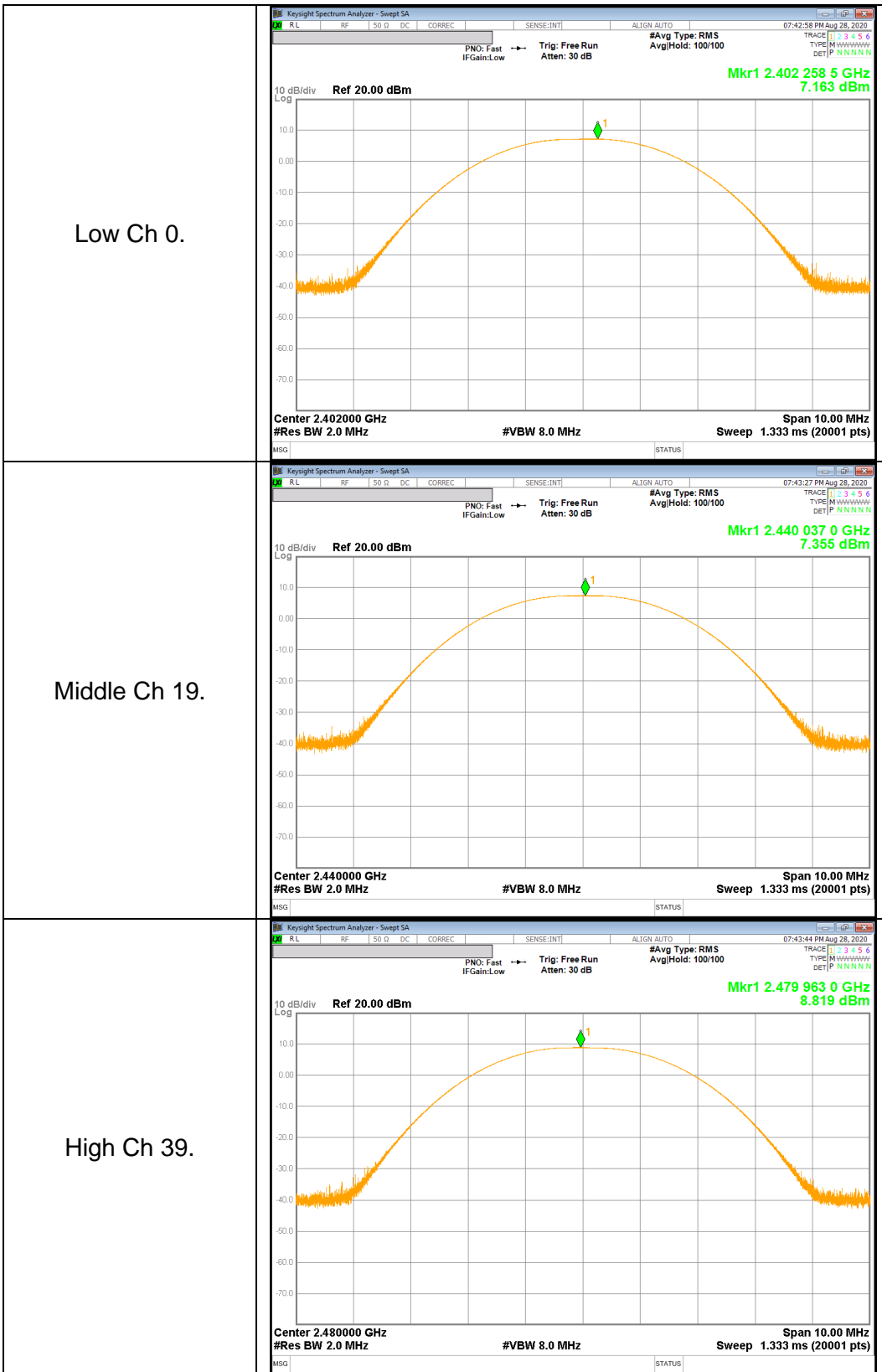
Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
0	2402	7.163	30.000	-22.837
19	2440	7.355	30.000	-22.645
39	2480	8.819	30.000	-21.181
Worst		8.819	30.000	-21.181

- 2 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
0	2402	7.236	30.000	-22.764
19	2440	7.669	30.000	-22.331
39	2480	8.793	30.000	-21.207
Worst		8.793	30.000	-21.207

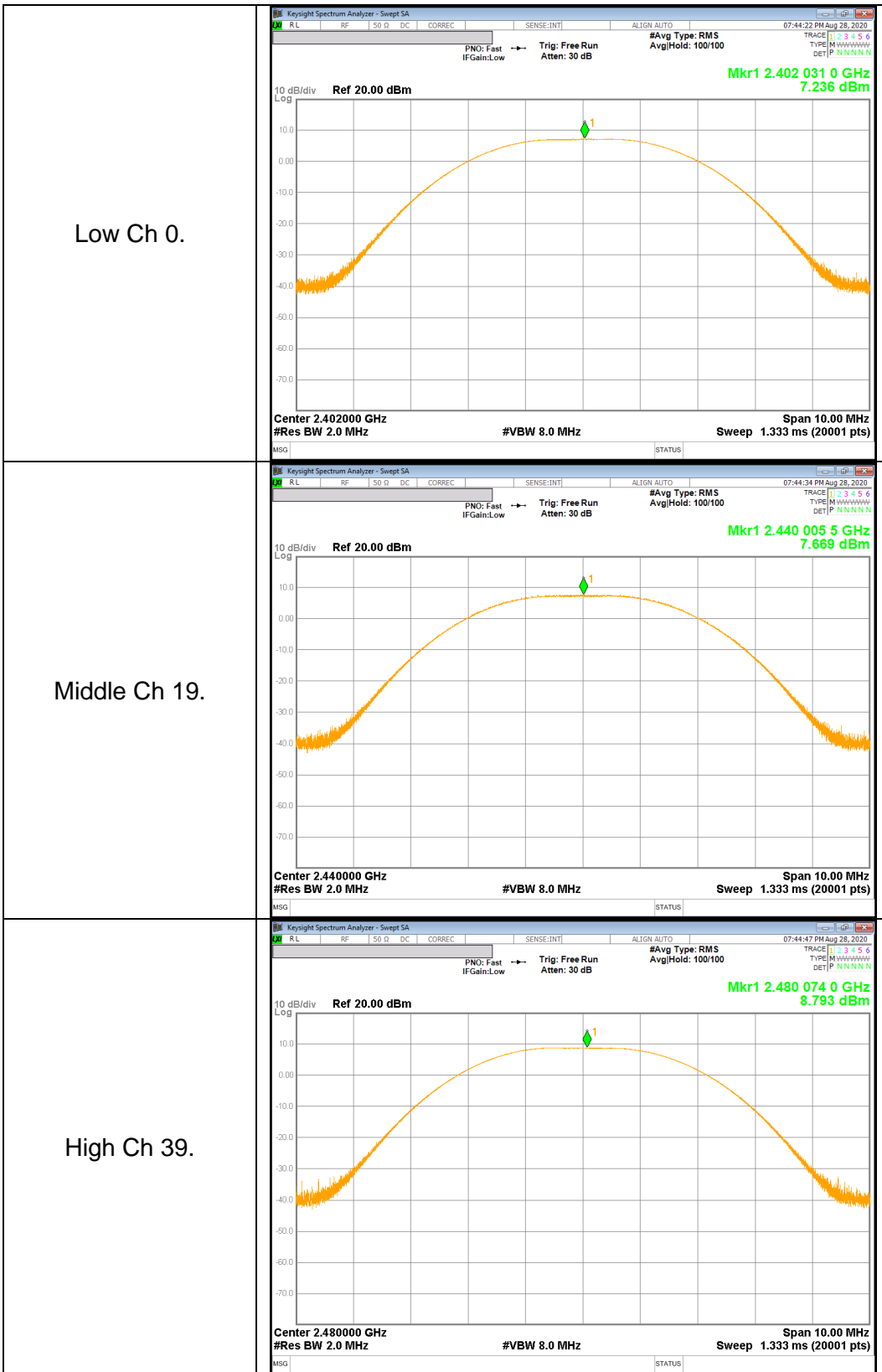
9.3.1. BLE (500 kbps)

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.

- 500 kbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
0	2402	6.491	4.46
19	2440	6.826	4.82
39	2480	8.157	6.54

- 2 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
0	2402	6.257	4.22
19	2440	6.597	4.57
39	2480	7.938	6.22

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

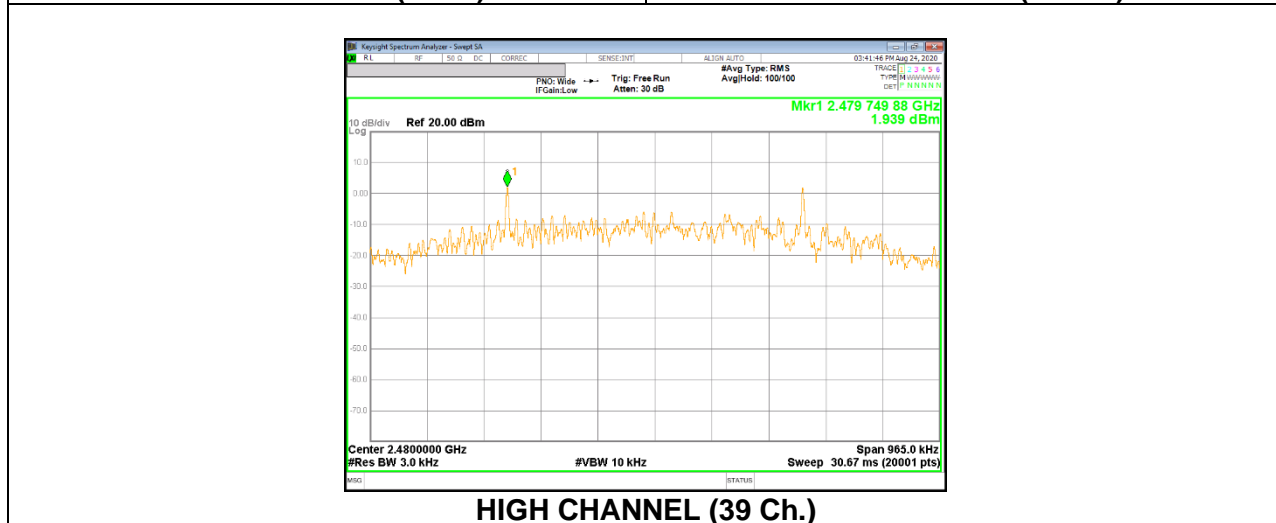
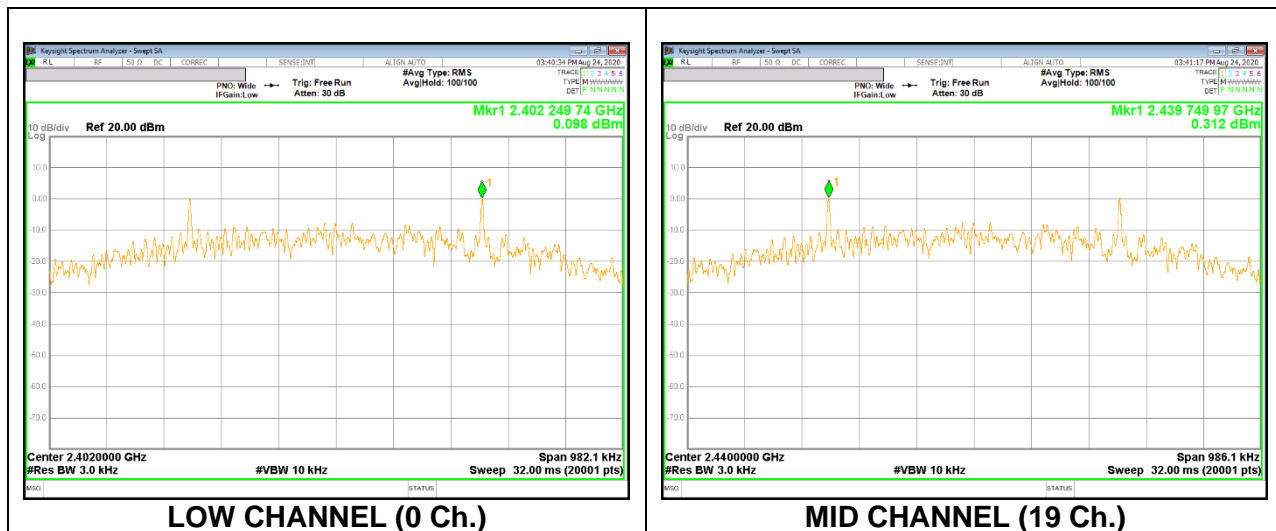
RSS-247 (5.2) (b)

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

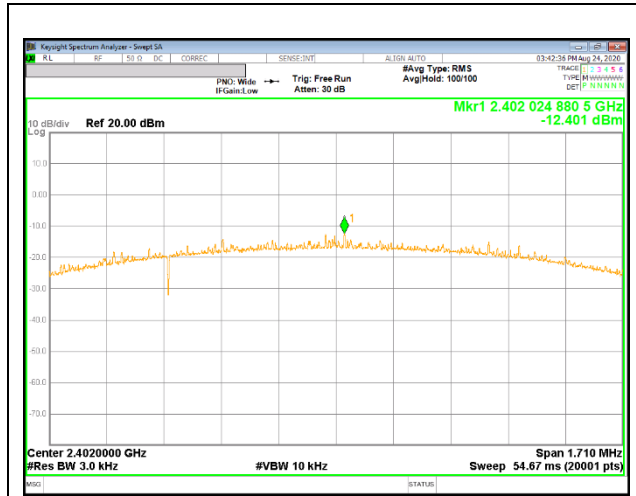
9.5.1. BLE (500 kbps)

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
0	2402	0.098	8.000	-7.902
19	2440	0.312	8.000	-7.688
39	2480	1.939	8.000	-6.061

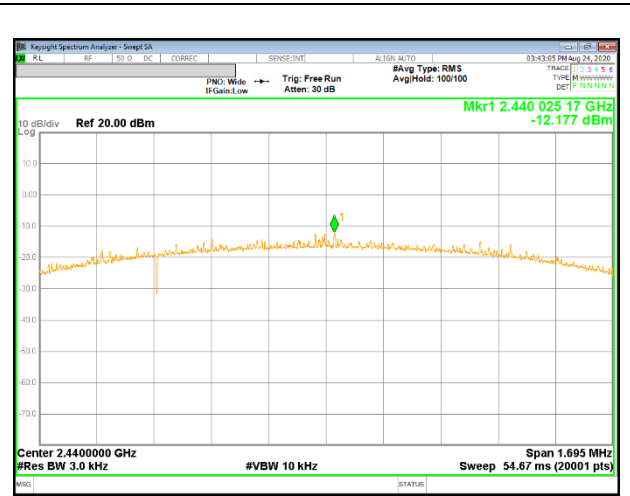


9.5.2. BLE (2Mbps)

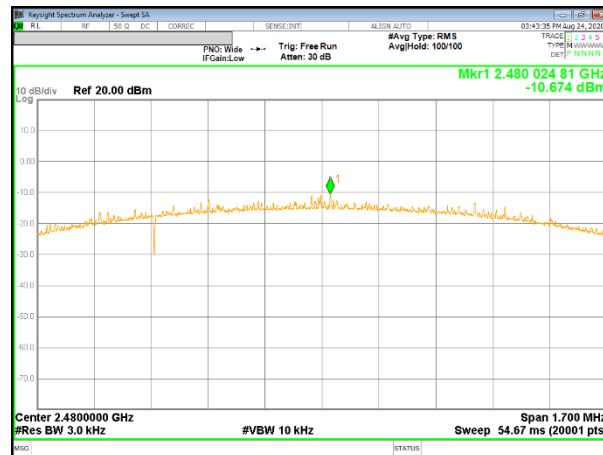
Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
0	2402	-12.401	8.000	20.401
19	2440	-12.177	8.000	20.177
39	2480	-10.674	8.000	18.674



LOW CHANNEL (0 Ch.)



MID CHANNEL (19 Ch.)



HIGH CHANNEL (39 Ch.)

9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

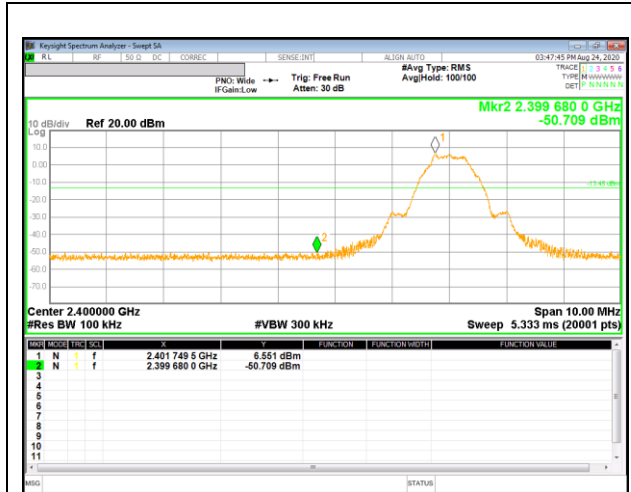
FCC §15.247 (d)

RSS-247 5.5

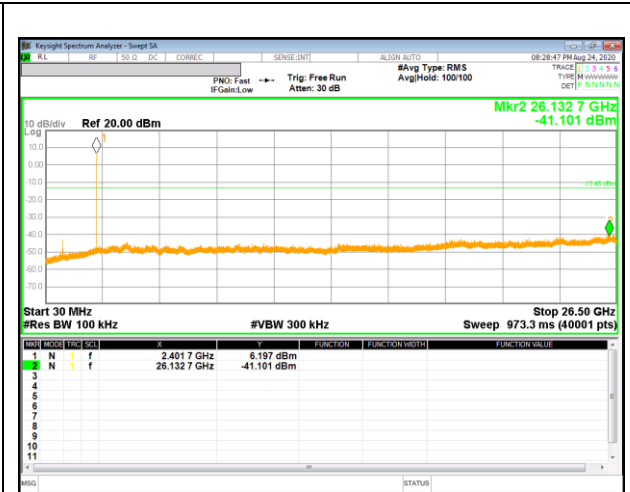
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

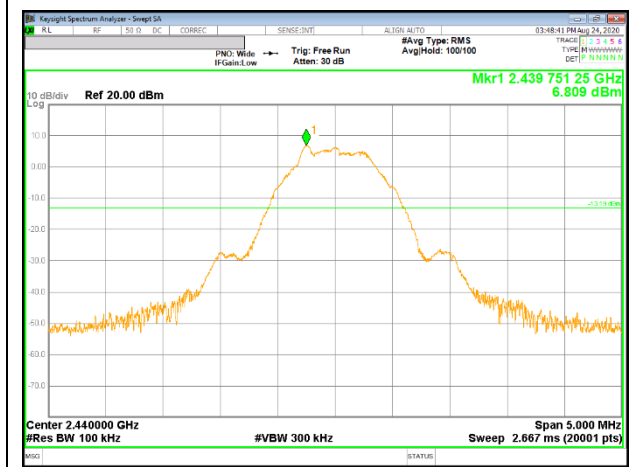
9.6.1. BLE (500 kbps)



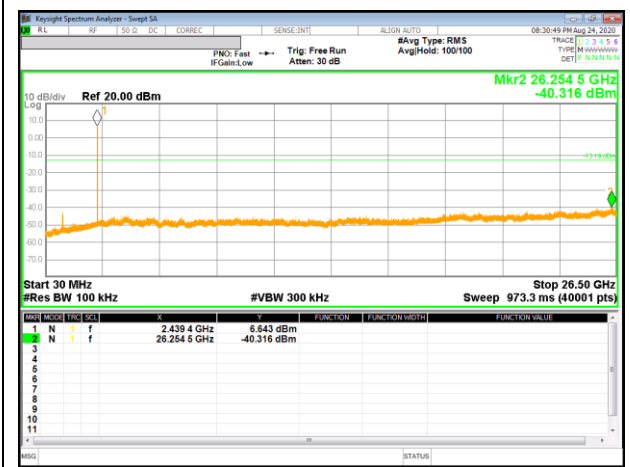
LOW CHANNEL(0 Ch.) BANDEDGE



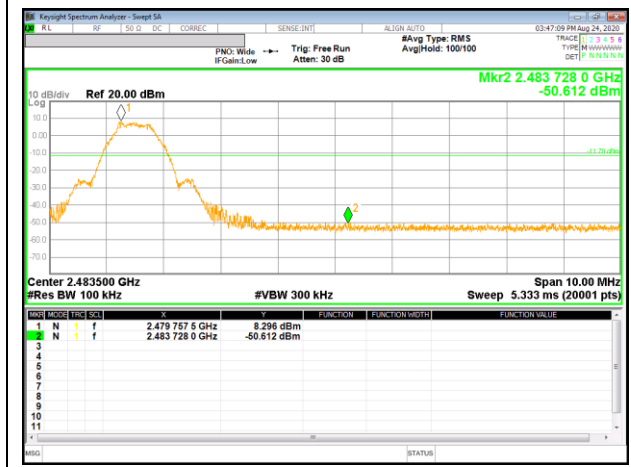
OUT-OF-BAND LOW CHANNEL(0 Ch.)



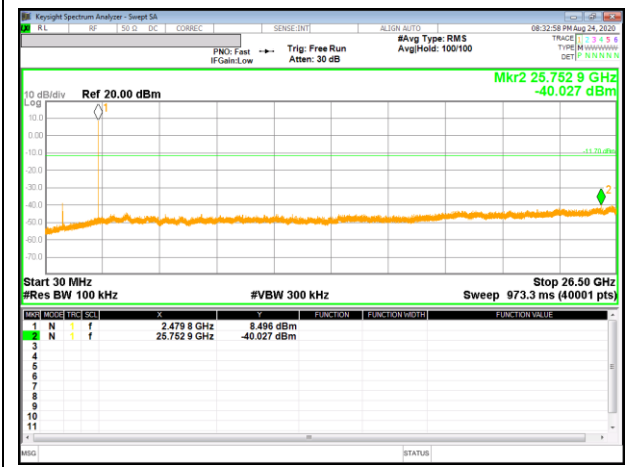
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL(19 Ch.)

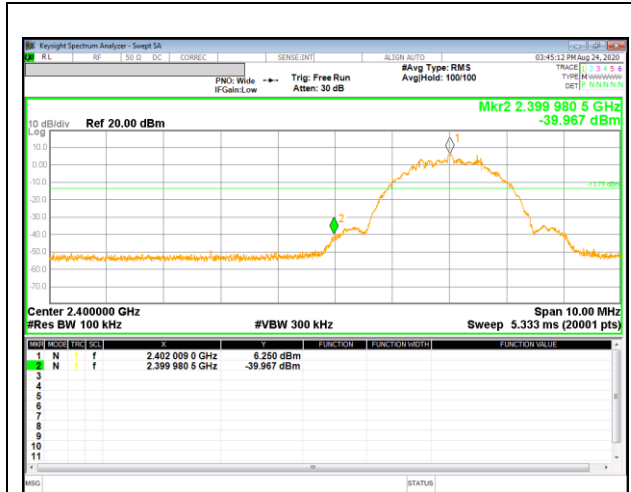


HIGH CHANNEL BANDEDGE(39 Ch.)

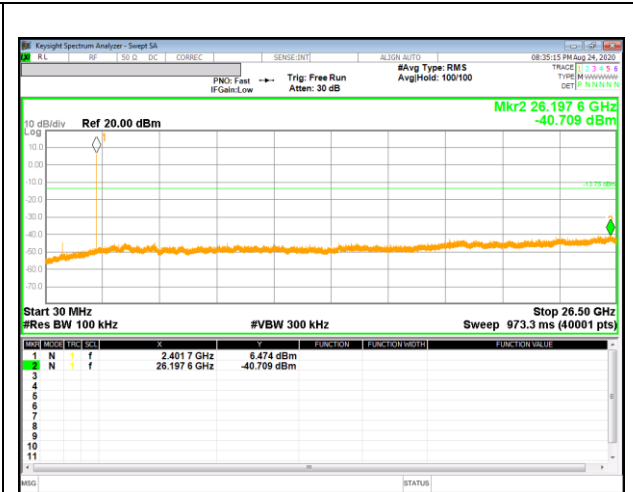


OUT-OF-BAND HIGH CHANNEL(39 Ch.)

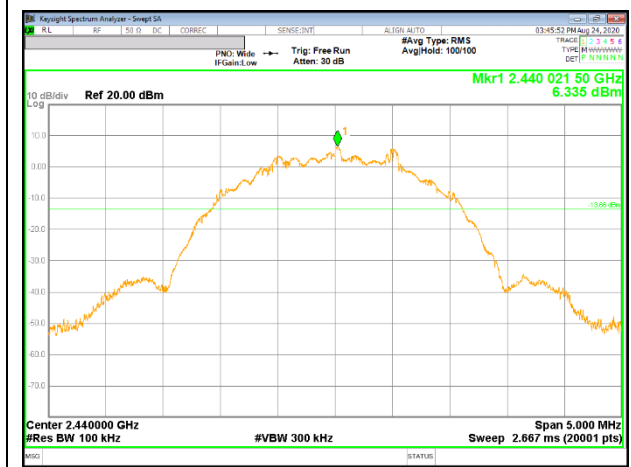
9.6.2. BLE (2Mbps)



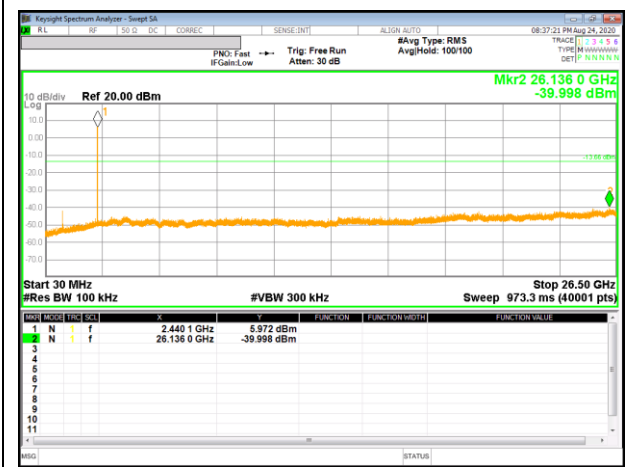
LOW CHANNEL(0 Ch.) BANDEDGE



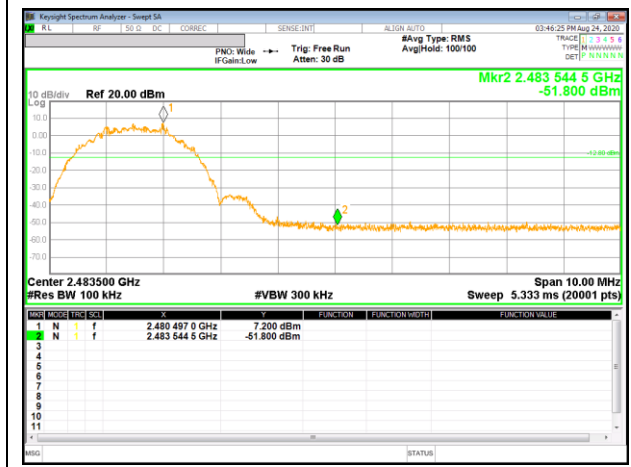
OUT-OF-BAND LOW CHANNEL(0 Ch.)



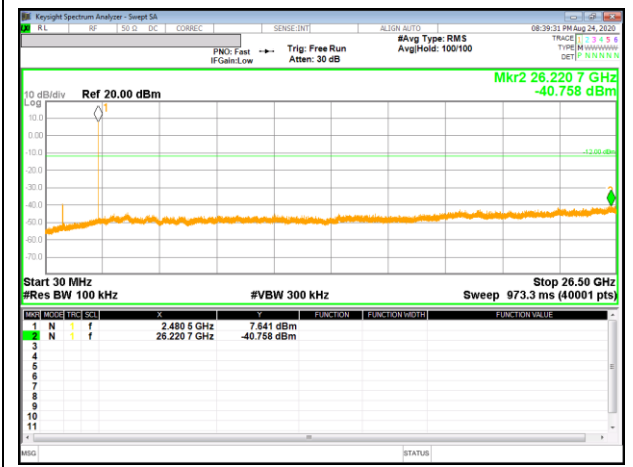
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL(19 Ch.)



HIGH CHANNEL BANDEDGE(39 Ch.)



OUT-OF-BAND HIGH CHANNEL(39 Ch.)

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 500 kbps, DCF = $10 \log(1/0.568) = 2.457$ dB (Spectrum Analyzer round it up to 2.46 dB) and for 2 Mbps, DCF = $10 \log(1/0.573) = 2.418$ dB (Spectrum Analyzer round it up to 2.42 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 9 kHz to 30 MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

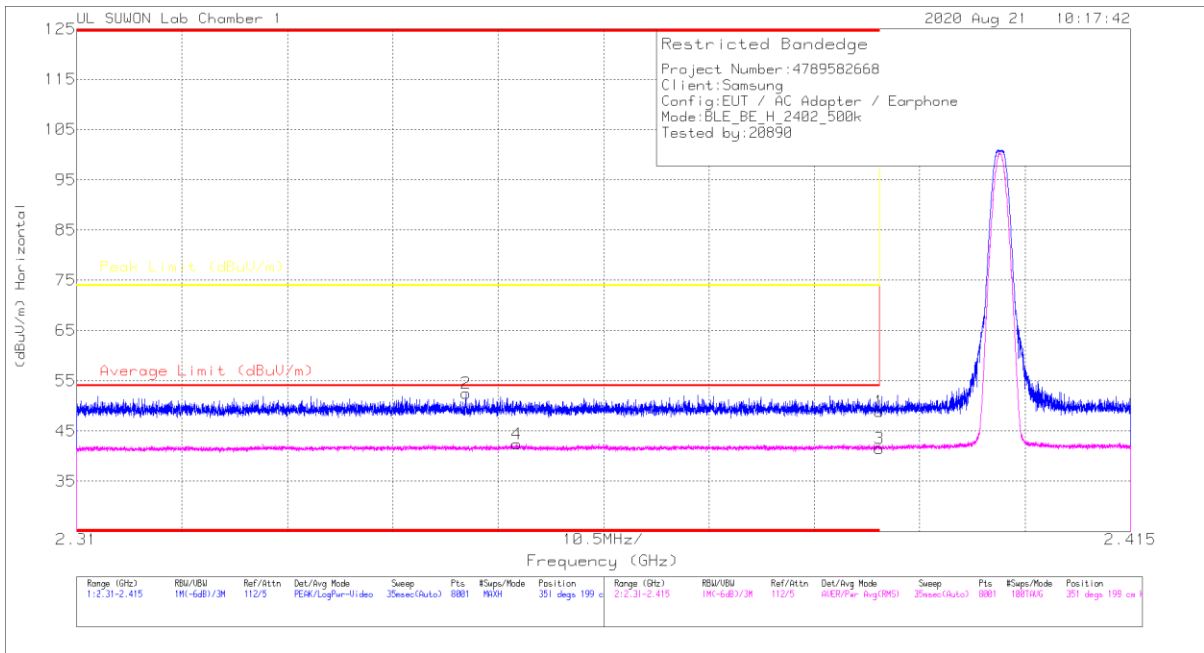
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (500kbps)

BANDEDGE (LOW CHANNEL 0)

HORIZONTAL RESULT

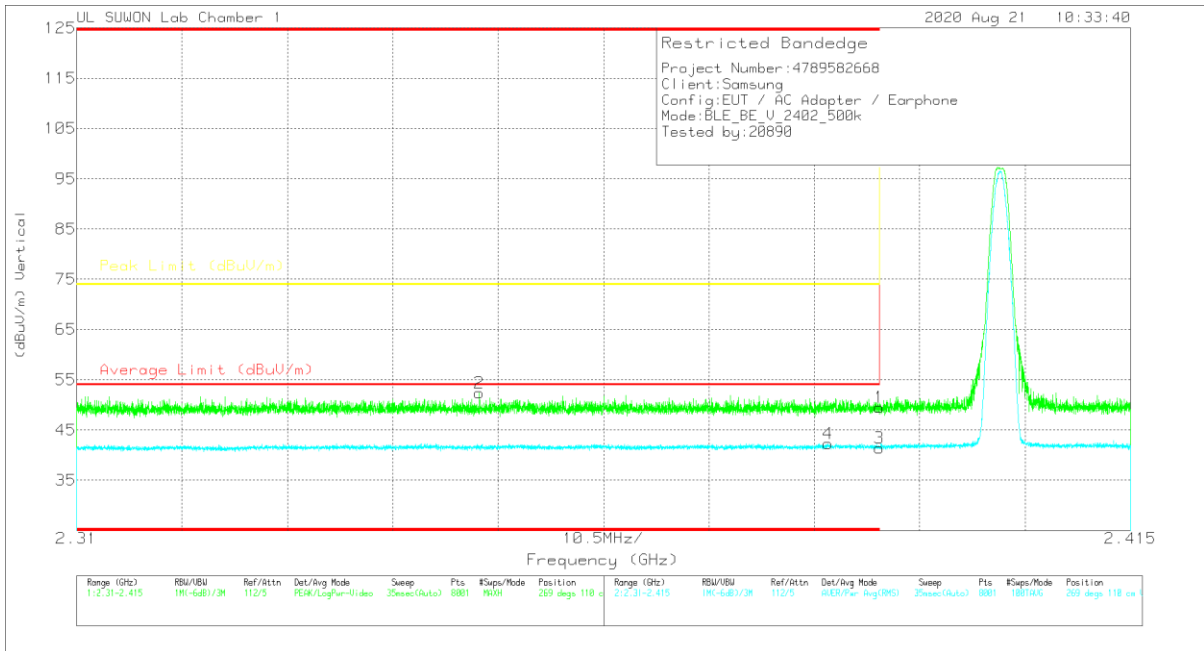


Trace Markers

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	42.27	PK	32.1	-25.5	0	48.87	-	-	74	-25.13	351	199	H
2	* 2.34881	46.18	PK	32	-25.7	0	52.48	-	-	74	-21.52	351	199	H
3	* 2.39	32.44	RMS	32.1	-25.5	2.46	41.5	54	-12.5	-	-	351	199	H
4	* 2.35382	33.43	RMS	32	-25.5	2.46	42.39	54	-11.61	-	-	351	199	H

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

VERTICAL RESULT



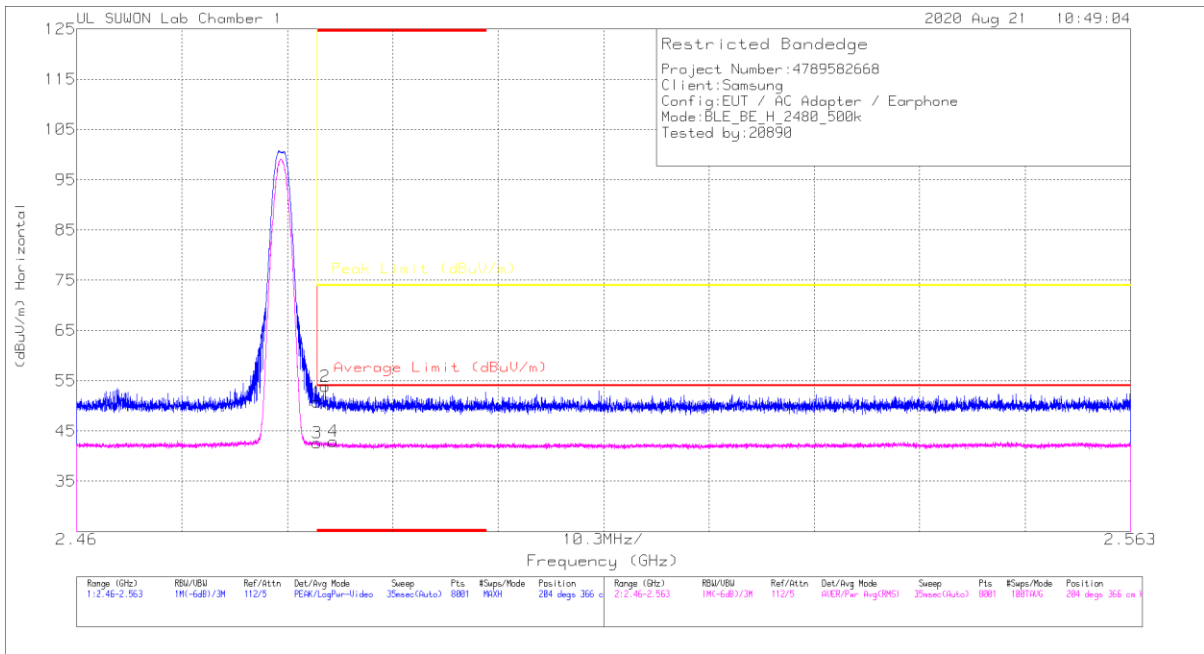
Trace Markers

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)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.96	Pk		-25.5	0	49.56	-	-	74	-24.44	269	110	V
2	* 2.35014	45.97	Pk		-25.6	0	52.37	-	-	74	-21.63	269	110	V
3	* 2.39	32.32	RMS		-25.5	2.46	41.38	54	-12.62	-	-	269	110	V
4	* 2.38487	33.24	RMS		-25.5	2.46	42.3	54	-11.7	-	-	269	110	V

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

BANDEDGE (HIGH CHANNEL 39)

HORIZONTAL RESULT

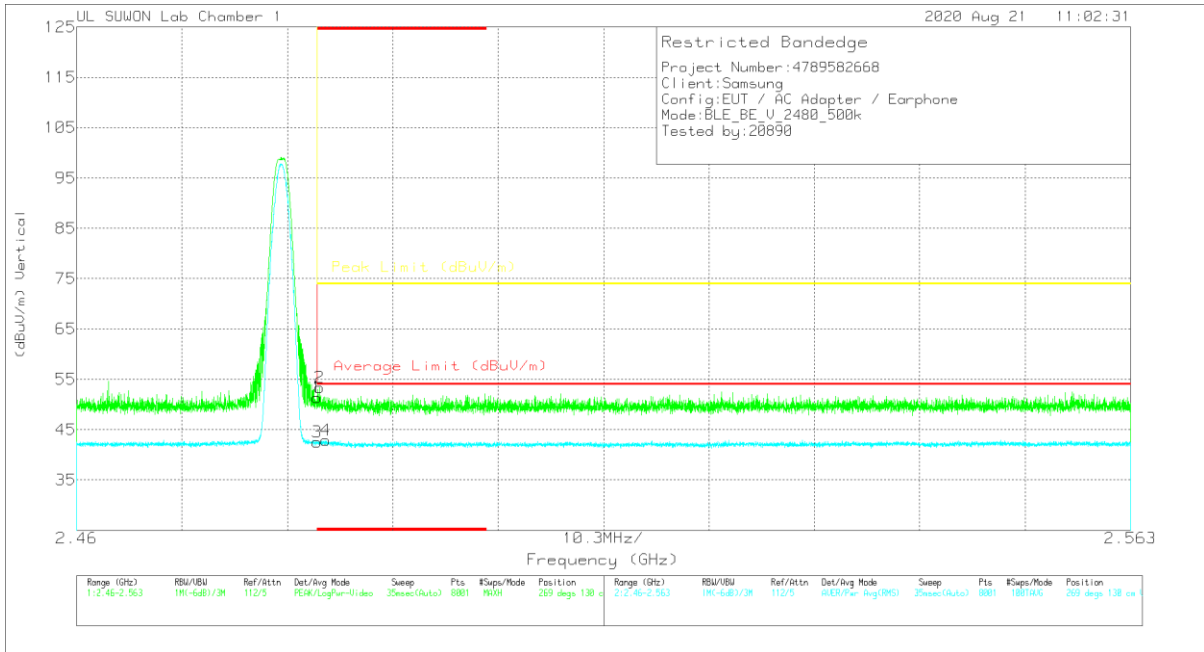


Trace Markers

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	* 2.48351	43.72	PK	32.2	-25.2	0	50.72	-	-	74	-23.28	204	366	H
2	* 2.48311	46.73	PK	32.2	-25.1	0	53.83	-	-	74	-20.17	204	366	H
3	* 2.48351	33.14	RMS	32.2	-25.2	2.46	42.6	54	-11.4	-	-	204	366	H
4	* 2.48508	33.49	RMS	32.2	-25.2	2.46	42.95	54	-11.05	-	-	204	366	H

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

VERTICAL RESULT



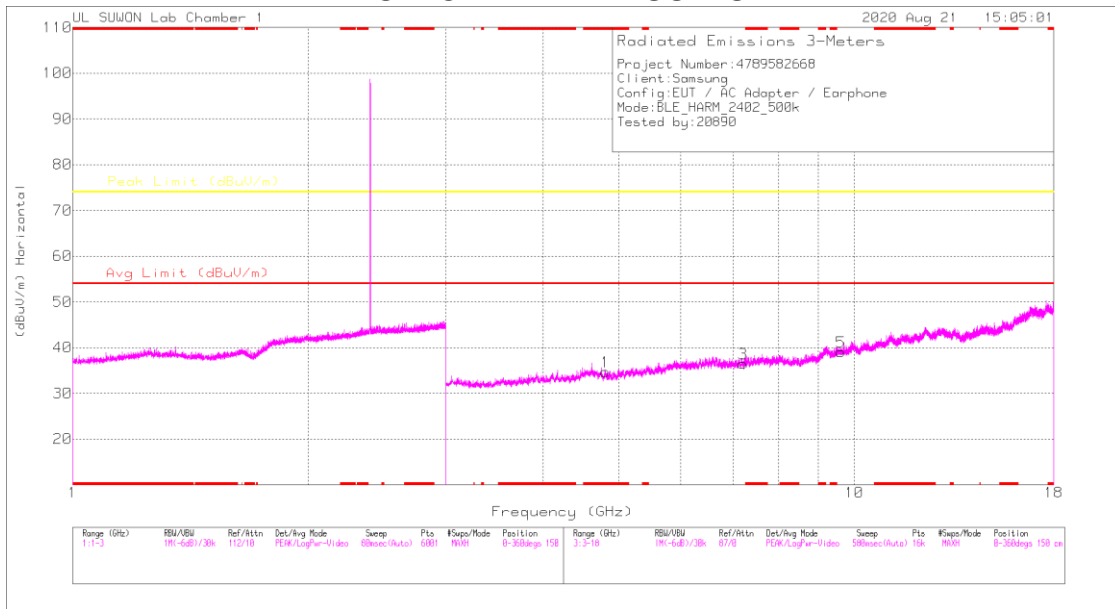
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBu/m)	Det	3117_00218957	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	44.33	Pk	32.2	-25.2	0	51.33	-	-	74	-22.67	269	130	V
2	* 2.48373	46.32	Pk	32.2	-25.2	0	53.32	-	-	74	-20.68	269	130	V
3	* 2.48351	33.02	RMS	32.2	-25.2	2.46	42.48	54	-11.52	-	-	269	130	V
4	* 2.48437	33.42	RMS	32.2	-25.2	2.46	42.88	54	-11.12	-	-	269	130	V

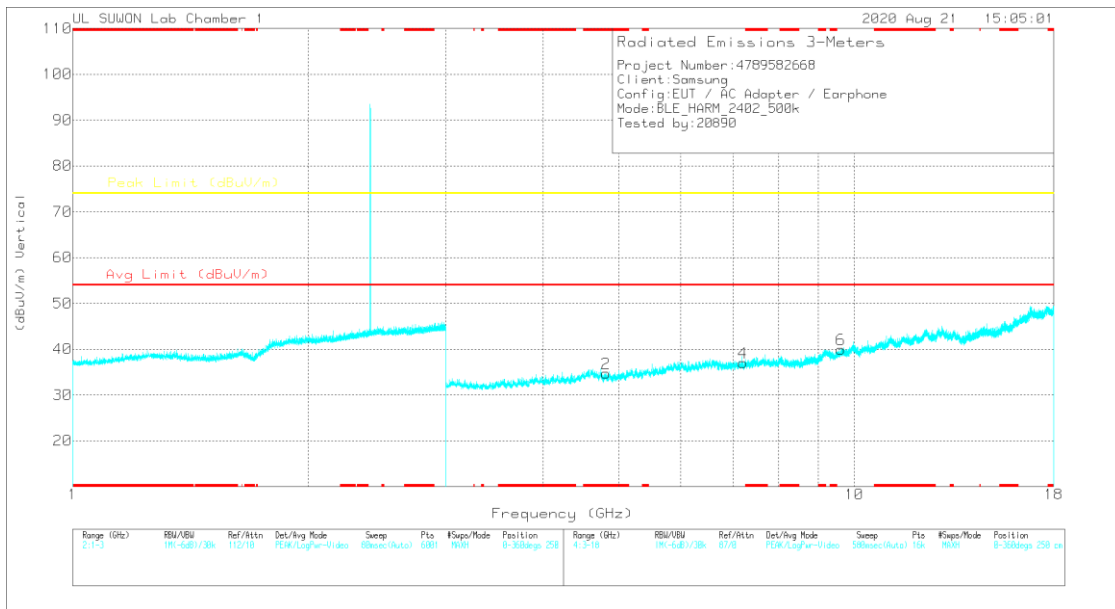
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



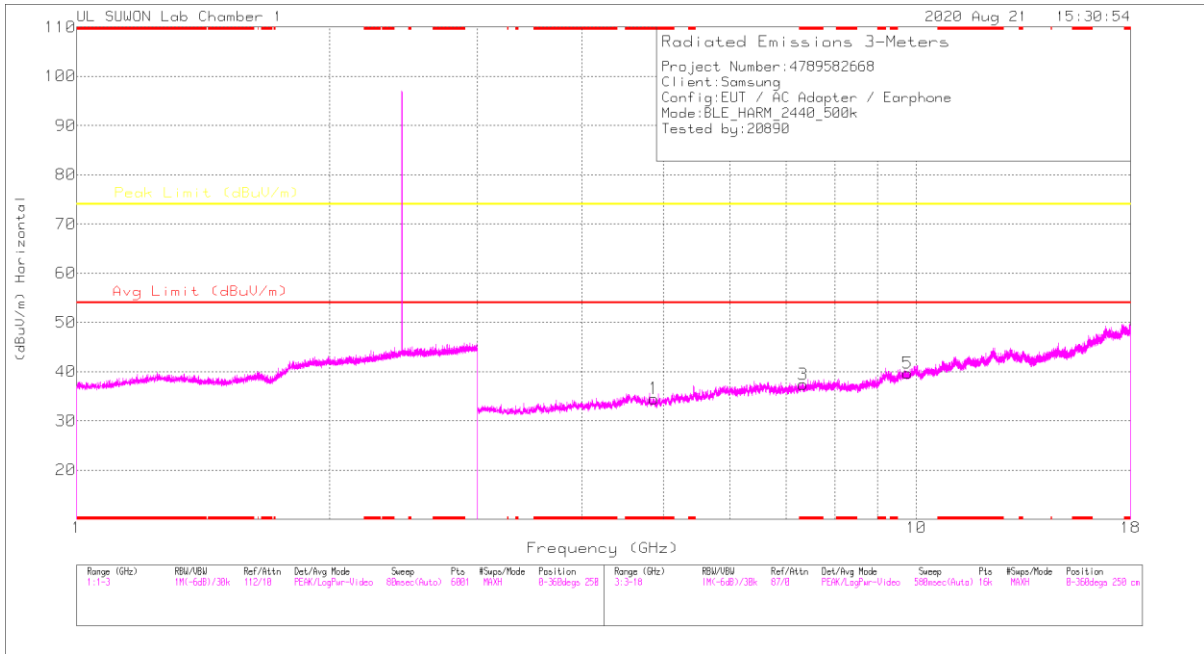
VERTICAL

Radiated Emissions

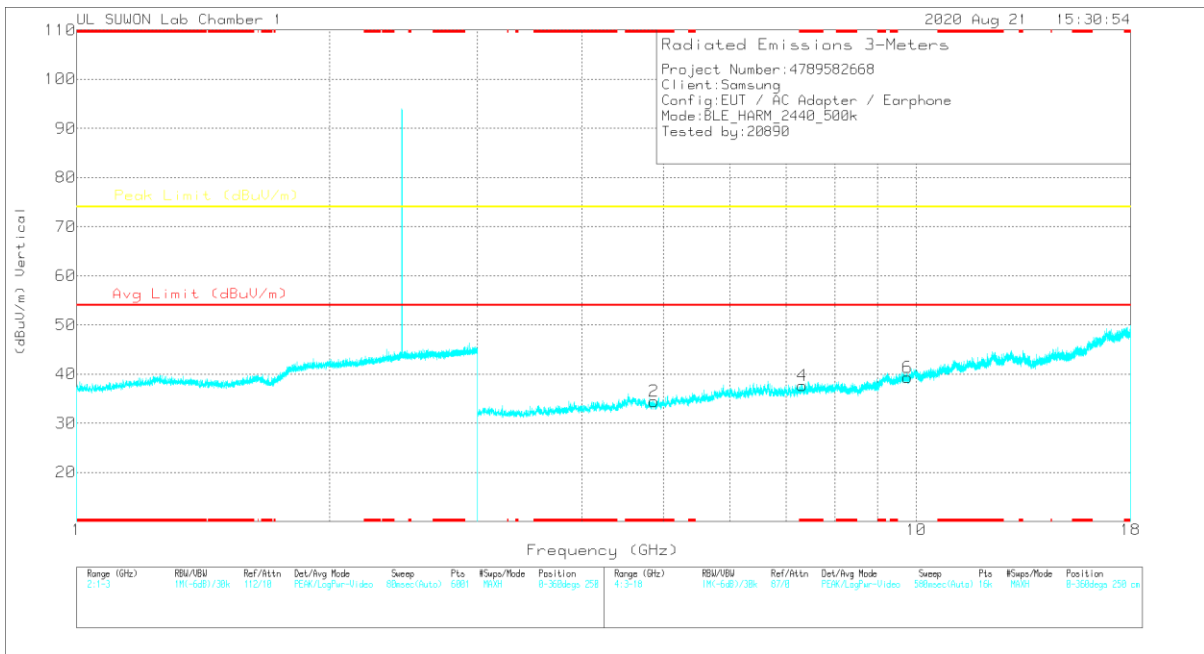
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.81715	41.36	PK2	34.2	-31.6	0	43.96	-	-	74	-30.04	360	100	H
* 4.80474	41.12	PK2	34.2	-31.5	0	43.82	-	-	74	-30.18	360	100	V
7.2003	37.56	PK2	35.9	-27.8	0	45.66	-	-	74	-28.34	360	100	H
7.20066	37.13	PK2	35.9	-27.8	0	45.23	-	-	74	-28.77	360	100	V
9.60237	35.05	PK2	36.8	-23.2	0	48.65	-	-	74	-25.35	360	100	H
9.61009	34.41	PK2	36.8	-23.2	0	48.01	-	-	74	-25.99	360	100	V

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

MID CHANNEL RESULTS



HORIZONTAL



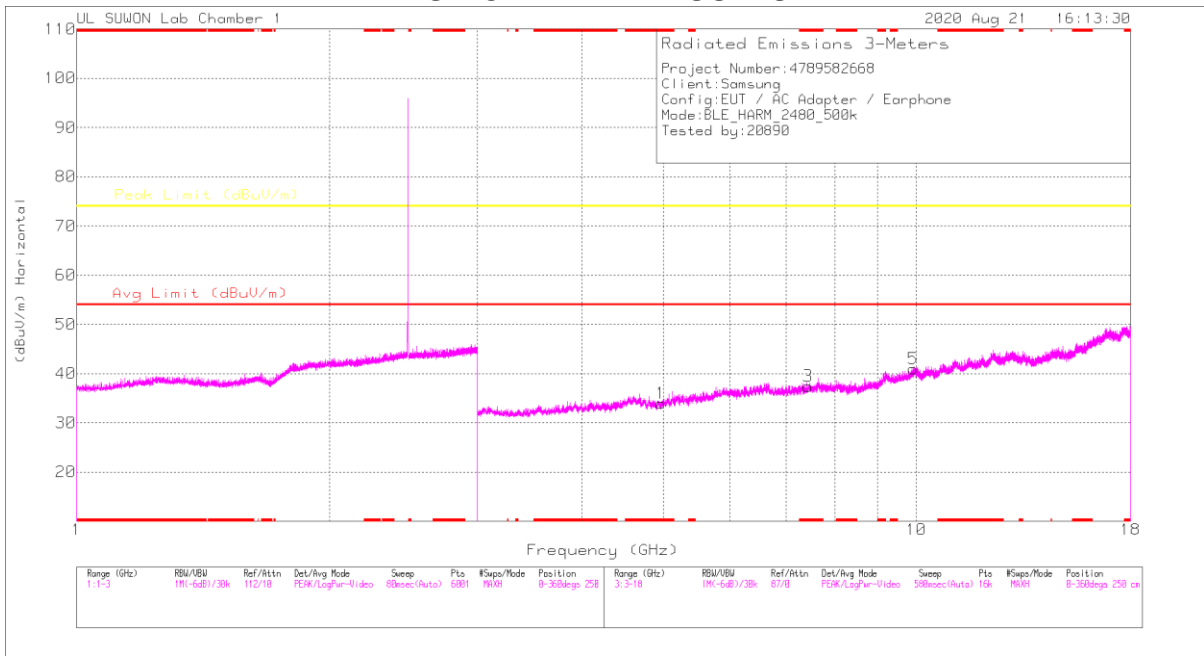
VERTICAL

Radiated Emissions

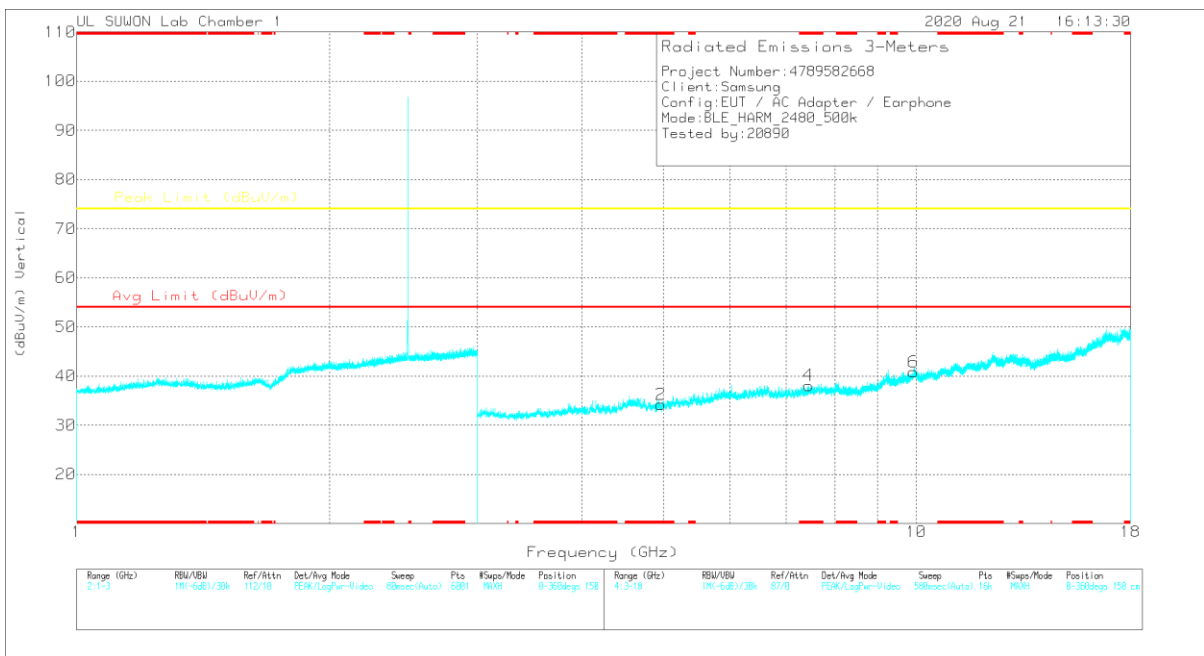
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HPI(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88193	40.71	PK2	34.1	-31.6	0	43.21	-	-	74	-30.79	360	100	H
* 4.86839	40.99	PK2	34.2	-31.6	0	43.59	-	-	74	-30.41	360	100	V
* 7.32808	37.71	PK2	35.9	-27.3	0	46.31	-	-	74	-27.69	360	100	H
* 7.31941	37.65	PK2	35.9	-27.3	0	46.25	-	-	74	-27.75	360	100	V
9.75213	35.43	PK2	37	-23.8	0	48.63	-	-	74	-25.37	360	100	H
9.76172	34.79	PK2	37	-23.9	0	47.89	-	-	74	-26.11	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

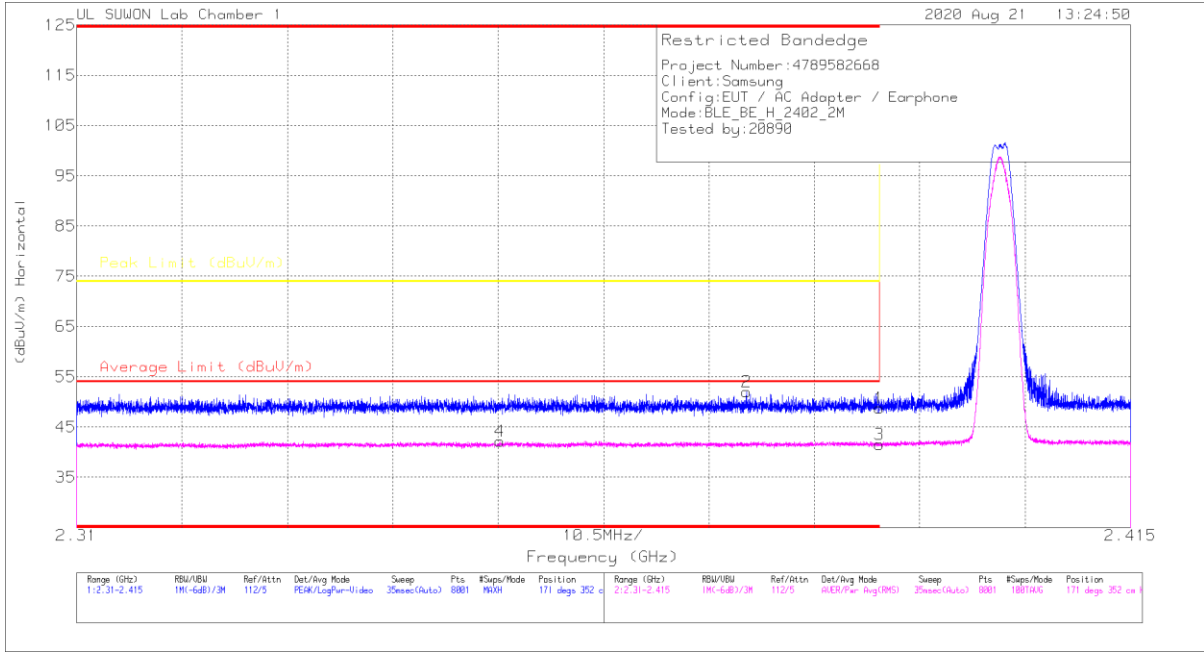
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HPI(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95587	40.24	PK2	34.1	-31.6	0	42.74	-	-	74	-31.26	360	100	H
* 4.97033	40.43	PK2	34.1	-31.5	0	43.03	-	-	74	-30.97	360	100	V
* 7.44016	37.62	PK2	35.9	-27.1	0	46.42	-	-	74	-27.58	360	100	H
* 7.43226	37.22	PK2	35.9	-27.2	0	45.92	-	-	74	-28.08	360	100	V
9.90686	33.9	PK2	37.2	-22.1	0	49	-	-	74	-25	360	100	H
9.90799	34.35	PK2	37.2	-22	0	49.55	-	-	74	-24.45	360	100	V

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

10.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL 0)

HORIZONTAL RESULT

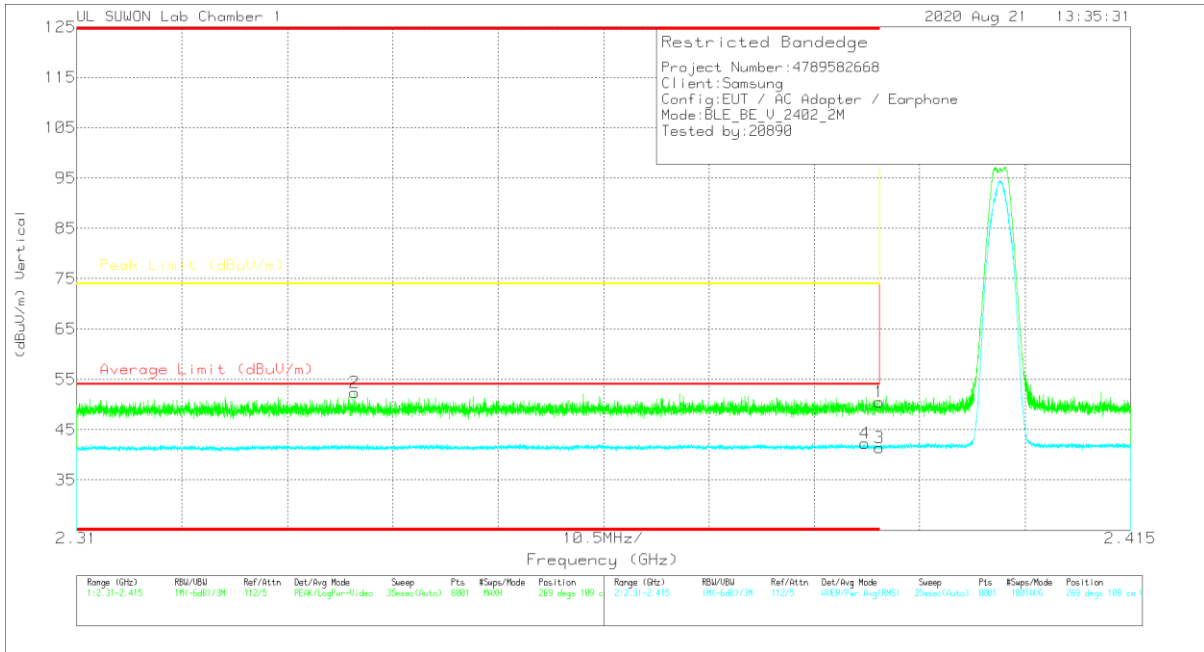


Trace Markers

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	42.15	Pk	32.1	-25.5	0	48.75	-	-	74	-25.25	171	352	H
2	* 2.37673	45.52	Pk	32.1	-25.6	0	52.02	-	-	74	-21.98	171	352	H
3	* 2.39	32.51	RMS	32.1	-25.5	2.42	41.53	54	-12.47	-	-	171	352	H
4	* 2.35217	33.39	RMS	32	-25.6	2.42	42.21	54	-11.79	-	-	171	352	H

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

VERTICAL RESULT



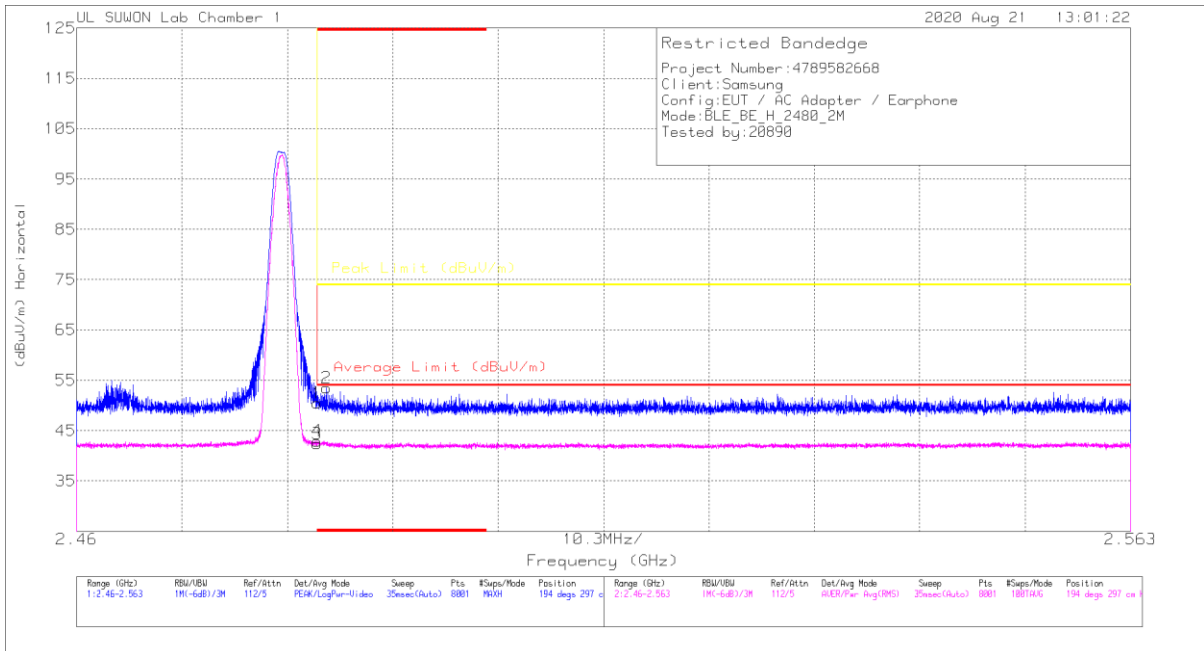
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218857	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	43.92	Pk	32.1	-25.5	0	50.52	-	-	74	-23.48	269	109	V
2	* 2.3767	45.92	Pk	32	-25.6	0	52.32	-	-	74	-21.68	269	109	V
3	* 2.39	32.36	RMS	32.1	-25.5	2.42	41.38	54	-12.62	-	-	269	109	V
4	* 2.38851	33.22	RMS	32.1	-25.5	2.42	42.24	54	-11.76	-	-	269	109	V

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

BANDEDGE (HIGH CHANNEL 39)

HORIZONTAL RESULT

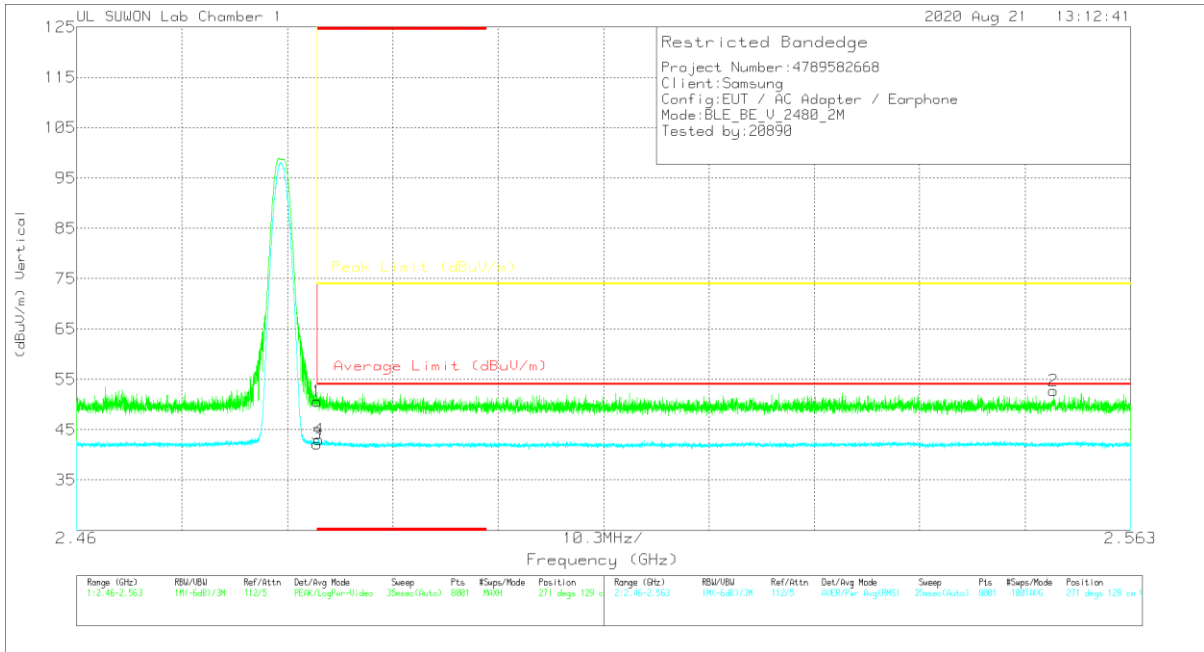


Trace Markers

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	* 2.48351	43.46	Pk	32.2	-25.2	0	50.46	-	-	74	-23.54	194	297	H
2	* 2.48441	46.44	Pk	32.2	-25.2	0	53.44	-	-	74	-20.56	194	297	H
3	* 2.48351	32.98	RMS	32.2	-25.2	2.42	42.4	54	-11.6	-	-	194	297	H
4	* 2.48352	33.54	RMS	32.2	-25.2	2.42	42.96	54	-11.04	-	-	194	297	H

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

VERTICAL RESULT



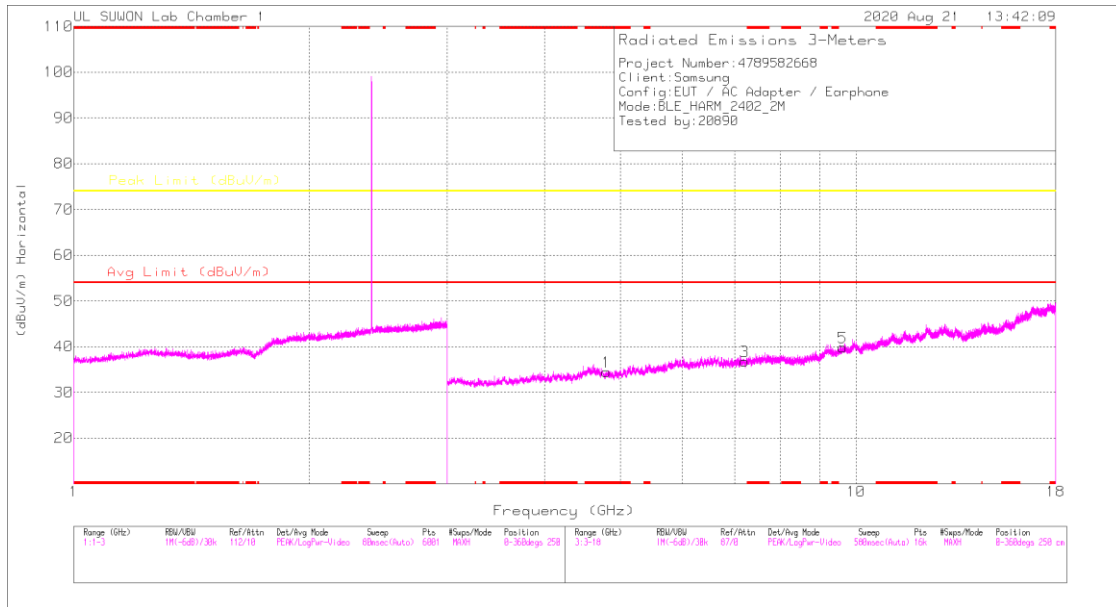
Trace Markers

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)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.58	Pk	32.2	-25.2	0	50.58	-	-	74	-23.42	271	129	V
2	2.55549	45.6	Pk	32.3	-25.1	0	52.8	-	-	74	-21.2	271	129	V
3	* 2.48351	32.79	RMS	32.2	-25.2	2.42	42.21	54	-11.79	-	-	271	129	V
4	* 2.48368	33.57	RMS	32.2	-25.2	2.42	42.99	54	-11.01	-	-	271	129	V

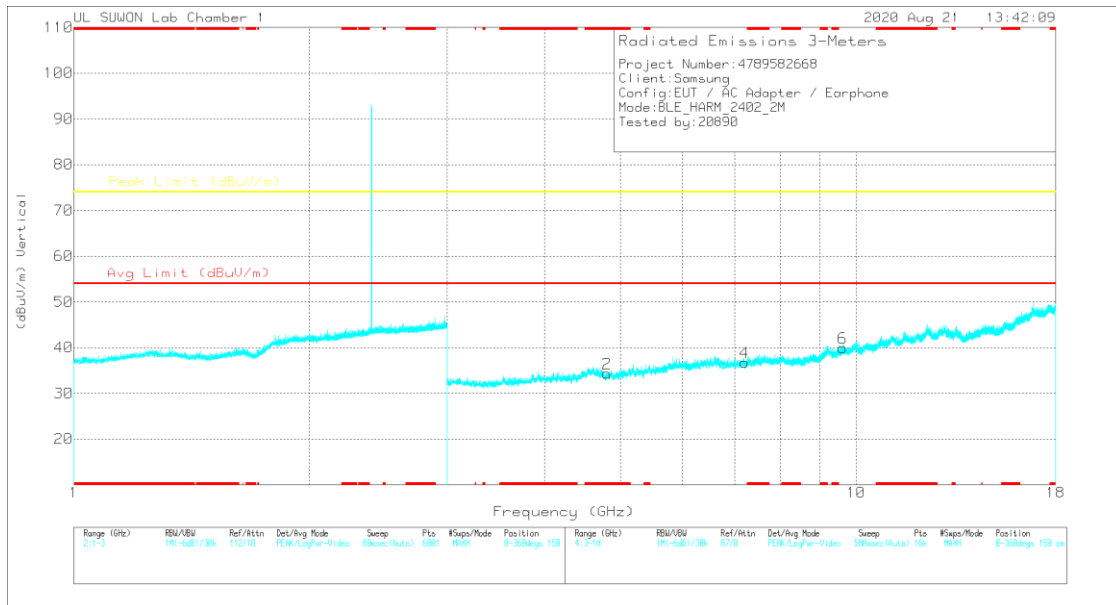
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL

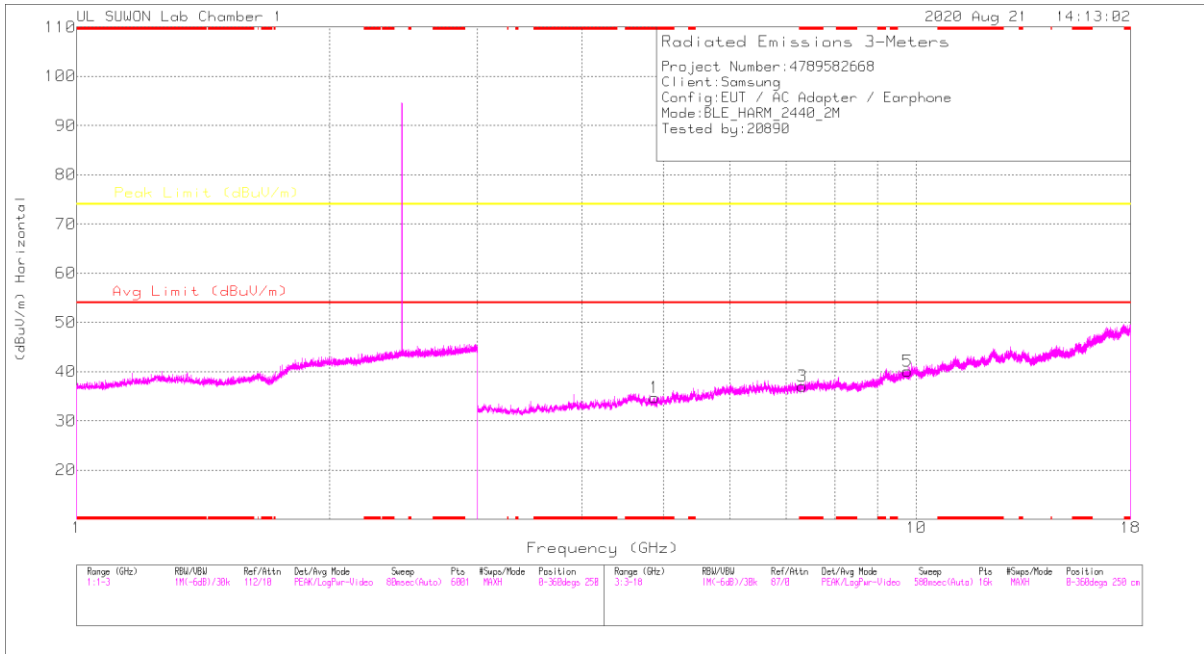


**VERTICAL
 RADIATED EMISSIONS**

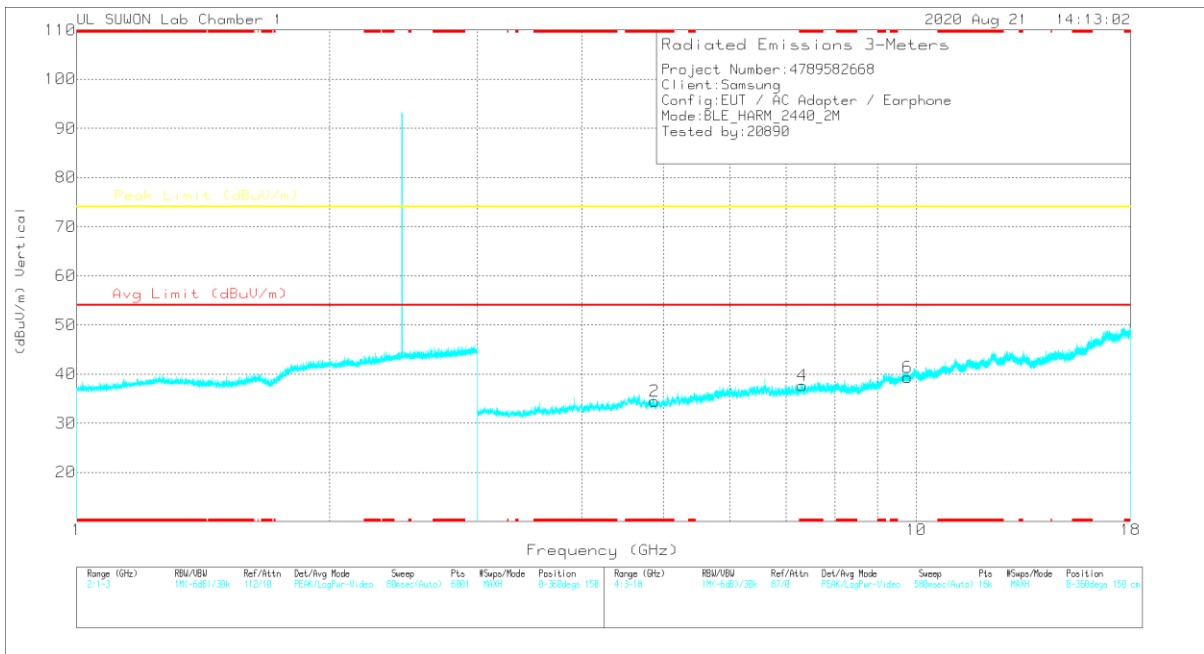
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80405	41.07	PK2	34.2	-31.5	0	43.77	-	-	74	-30.23	360	100	H
* 4.79855	41.36	PK2	34.2	-31.6	0	43.96	-	-	74	-30.04	360	100	V
7.20124	37.78	PK2	35.9	-27.8	0	45.88	-	-	74	-28.12	360	100	H
7.20937	37.56	PK2	35.9	-27.9	0	45.56	-	-	74	-28.44	360	100	V
9.62135	34.9	PK2	36.8	-23.1	0	48.6	-	-	74	-25.4	360	100	H
9.6213	35.09	PK2	36.8	-23.1	0	48.79	-	-	74	-25.21	360	100	V

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

MID CHANNEL RESULTS



HORIZONTAL



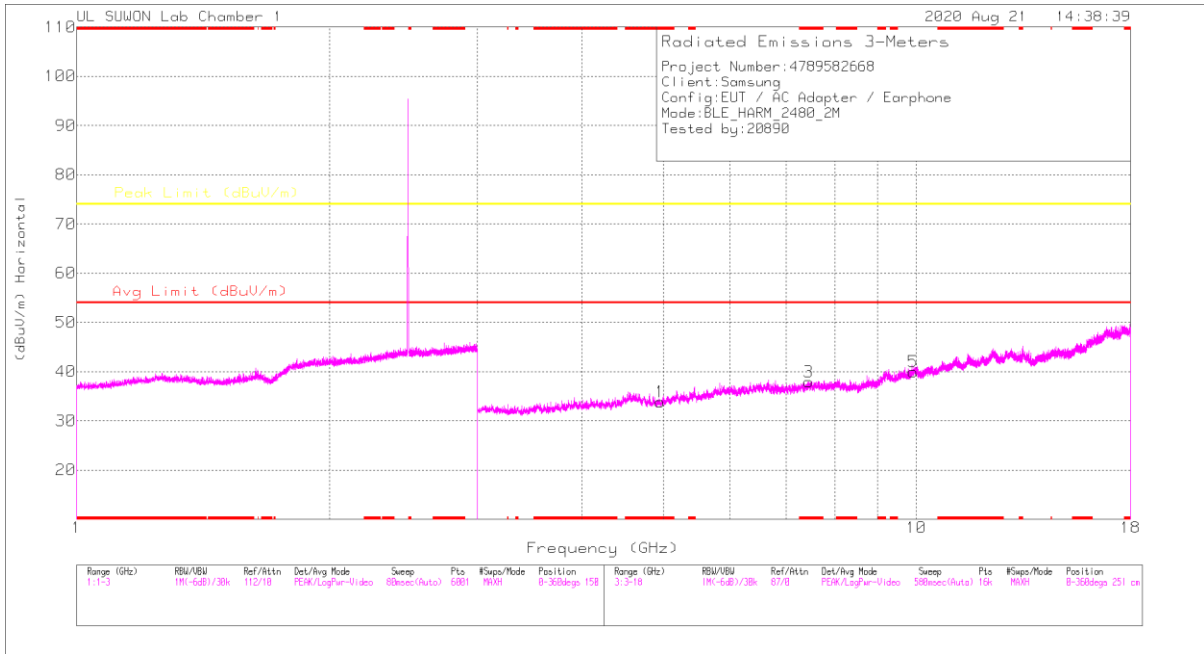
VERTICAL

RADIATED EMISSIONS

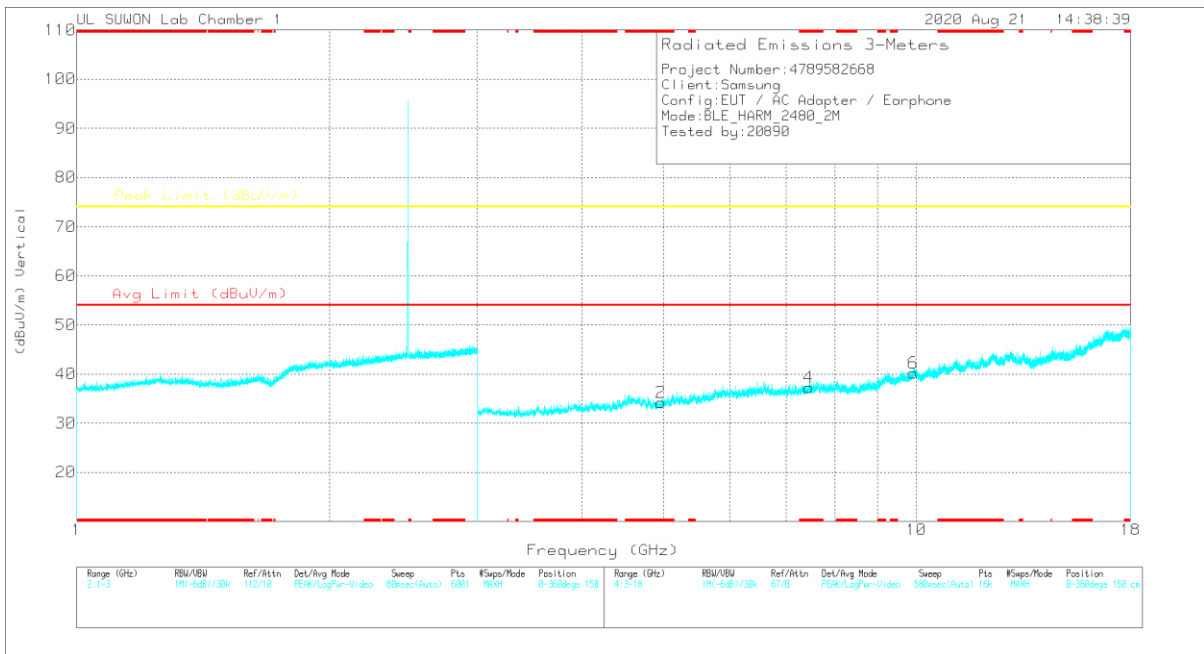
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87253	42.12	PK2	34.2	-31.6	0	44.72	-	-	74	-29.28	360	100	H
* 4.87714	40.61	PK2	34.1	-31.5	0	43.21	-	-	74	-30.79	360	100	V
* 7.32072	38.28	PK2	35.9	-27.2	0	46.98	-	-	74	-27.02	360	100	H
* 7.32093	37.92	PK2	35.9	-27.2	0	46.62	-	-	74	-27.38	360	100	V
9.75405	34.7	PK2	37	-23.8	0	47.9	-	-	74	-26.1	360	100	H
9.75535	35.39	PK2	37	-23.8	0	48.59	-	-	74	-25.41	360	100	V

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

HIGH CHANNEL RESULTS



HORIZONTAL



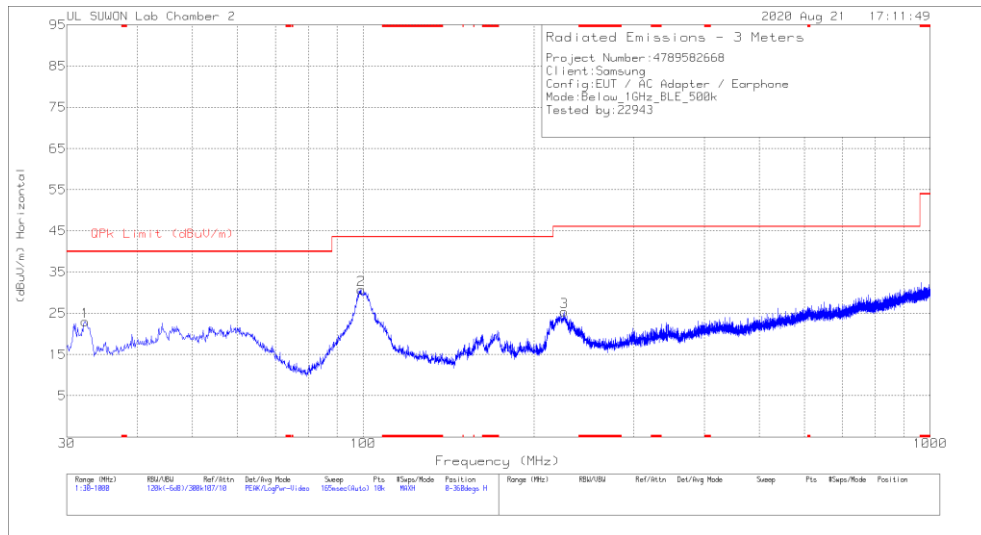
VERTICAL RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	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
* 4.94774	40.51	PK2	34.1	-31.6	0	43.01	-	-	74	-30.99	360	100	H
* 4.95233	40.57	PK2	34.1	-31.7	0	42.97	-	-	74	-31.03	360	100	V
* 7.44579	37.13	PK2	35.9	-27	0	46.03	-	-	74	-27.97	360	100	H
* 7.44143	37.82	PK2	35.9	-27.1	0	46.62	-	-	74	-27.38	360	100	V
9.91914	33.78	PK2	37.2	-22.1	0	48.88	-	-	74	-25.12	360	100	H
9.9183	34.17	PK2	37.2	-22.1	0	49.27	-	-	74	-24.73	360	100	V

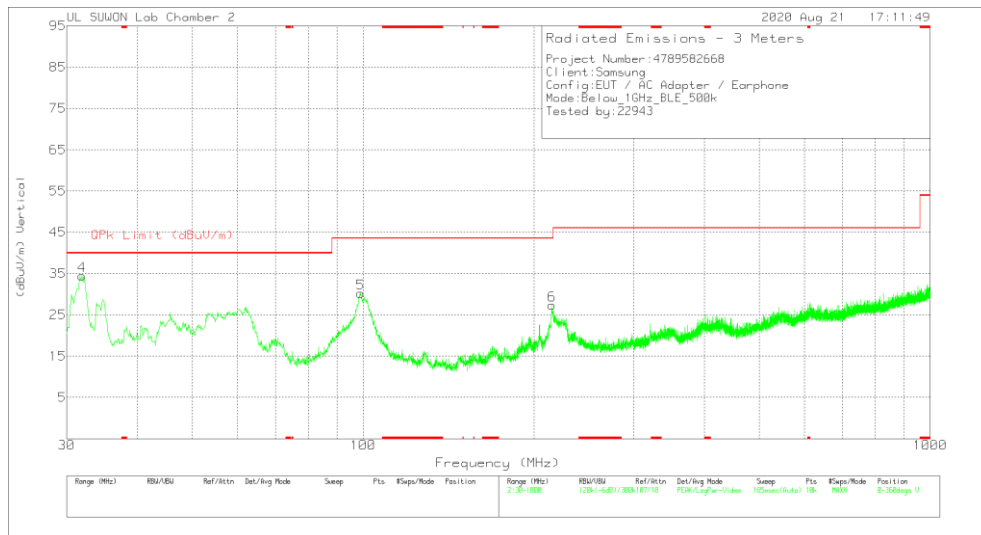
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

10.3. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_749	Below_1G[dB]	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.328	39.53	Pk	15.5	-32	23.03	40	-16.97	0-360	400	H
2	99.161	44.68	Pk	17.3	-31.3	30.68	43.52	-12.84	0-360	300	H
3	226.425	38.62	Pk	17.4	-30.7	25.32	46.02	-20.7	0-360	200	H
4	31.94	50.96	Pk	15.4	-31.9	34.46	40	-5.54	0-360	100	V
5	99.064	44.3	Pk	17.3	-31.4	30.2	43.52	-13.32	0-360	100	V
6	215.173	41.25	Pk	16.8	-30.7	27.35	43.52	-16.17	0-360	100	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

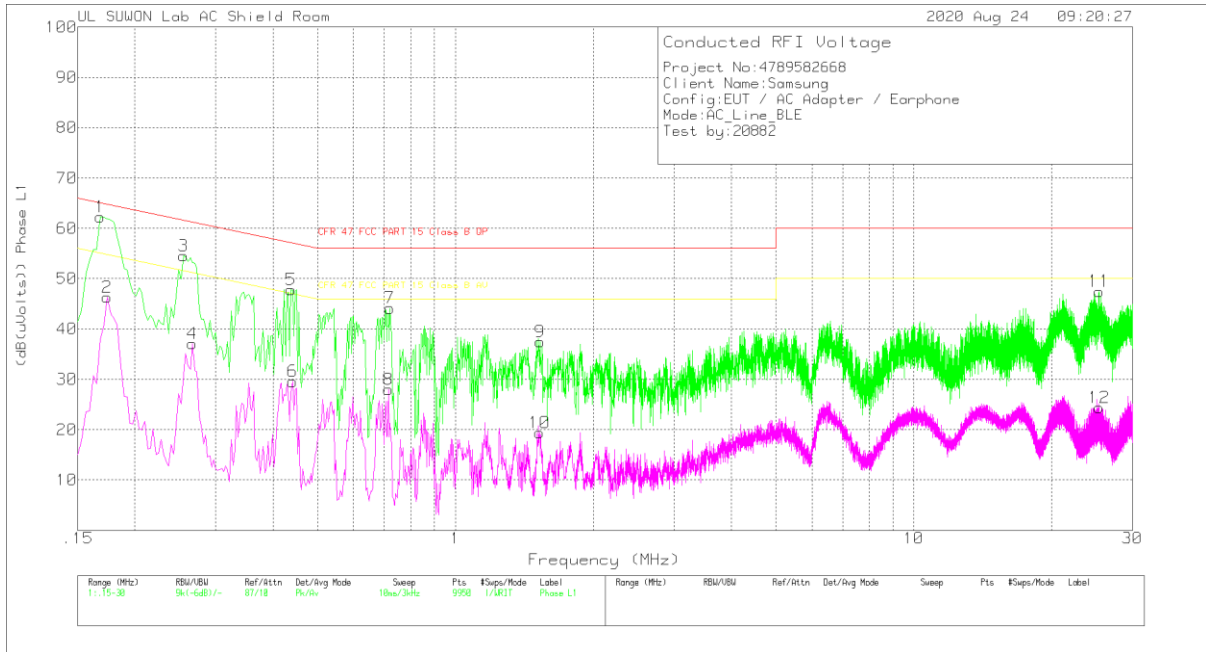
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

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	.168	52.14	Pk	10	.1	62.24	65.06	-2.82	-	-
2	.174	36.16	Av	10	.2	46.36	-	-	54.77	-8.41
3	.255	44.66	Pk	9.7	.2	54.56	61.59	-7.03	-	-
4	.267	27.14	Av	9.7	.2	37.04	-	-	51.21	-14.17
5	.438	37.76	Pk	9.9	.2	47.86	57.1	-9.24	-	-
6	.441	19.46	Av	9.9	.2	29.56	-	-	47.04	-17.48
7	.72	34.04	Pk	9.9	.2	44.14	56	-11.86	-	-
8	.714	17.86	Av	9.9	.2	27.96	-	-	46	-18.04
9	1.53	27.5	Pk	9.7	.3	37.5	56	-18.5	-	-
10	1.527	9.42	Av	9.7	.3	19.42	-	-	46	-26.58
11	25.353	36.7	Pk	10.5	.3	47.5	60	-12.5	-	-
12	25.383	13.61	Av	10.5	.3	24.41	-	-	50	-25.59

Pk - Peak detector

Av - Average detection

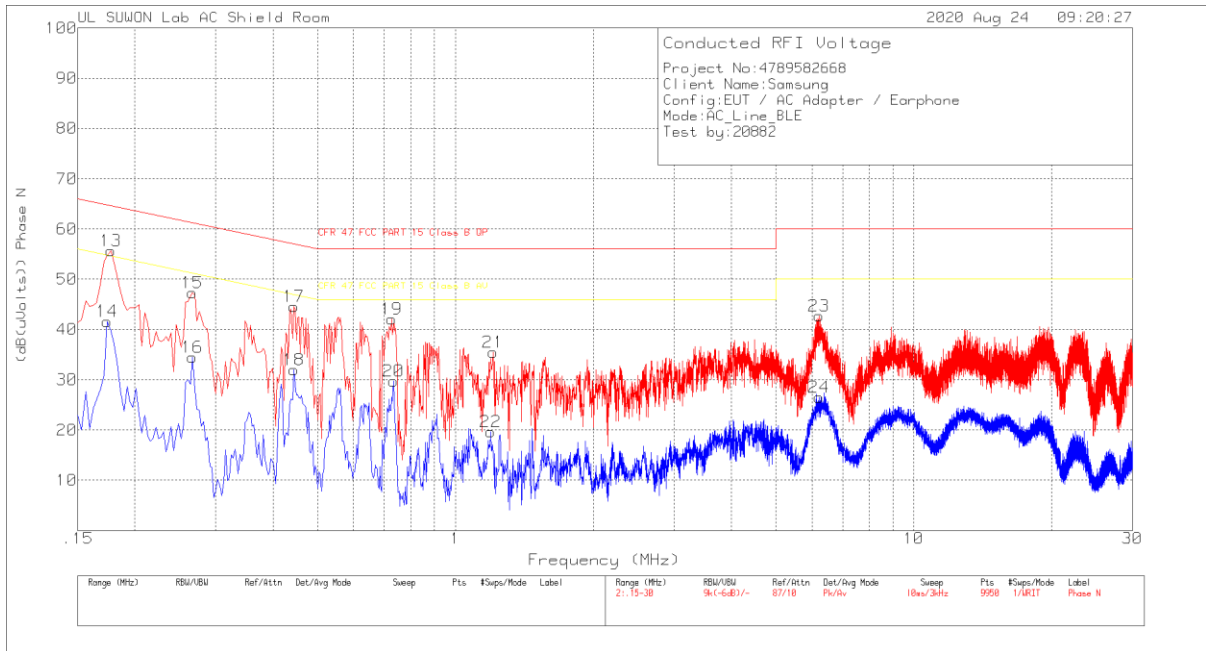
Quasi-Peak Emissions

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)
.16725	33.55	Qp	10	.1	43.65	65.1	-21.45	-	-
.17415	26.26	Qp	10	.2	36.46	64.76	-28.3	-	-
.25515	26.41	Qp	9.7	.2	36.31	61.59	-25.28	-	-
.43875	17.93	Qp	9.9	.2	28.03	57.09	-29.06	-	-

Qp - Quasi-Peak detector

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[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)
13	.177	45.47	Pk	10	.2	55.67	64.63	-8.96	-	-
14	.174	31.34	Av	10.1	.2	41.64	-	-	54.77	-13.13
15	.267	37.41	Pk	9.7	.2	47.31	61.21	-13.9	-	-
16	.267	24.57	Av	9.7	.2	34.47	-	-	51.21	-16.74
17	.444	34.46	Pk	9.9	.2	44.56	56.99	-12.43	-	-
18	.444	21.91	Av	9.9	.2	32.01	-	-	46.99	-14.98
19	.726	31.95	Pk	9.9	.2	42.05	56	-13.95	-	-
20	.732	19.67	Av	9.9	.2	29.77	-	-	46	-16.23
21	1.209	25.4	Pk	9.8	.3	35.5	56	-20.5	-	-
22	1.194	9.55	Av	9.8	.3	19.65	-	-	46	-26.35
23	6.207	32.6	Pk	9.8	.3	42.7	60	-17.3	-	-
24	6.207	16.43	Av	9.8	.3	26.53	-	-	50	-23.47

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Range 2: Phase N .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[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)
.17715	22.87	Qp	10	.2	33.07	64.62	-31.55	-	-

Qp - Quasi-Peak detector

END OF TEST REPORT