



CERTIFICATION TEST REPORT

Report Number. : 4790136529-E5V2

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

Model : SM-N985F1/DS, SM-N985F1

FCC ID : A3LSMN985F1

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

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

Date Of Issue:

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2021-11-12	Initial issue	Hyunsik Yun
V1	2021-11-19	Updated to address TCB's question	Hyunsik Yun

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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, NFC, WPT and UWB

MODEL NUMBER: SM-N985F1/DS, SM-N985F1

SERIAL NUMBER: R3CR90Y67CY (CONDUCTED, Original);
R3CR90Y687N (RADIATED, Original);
R38R900W1SZ (RADIATED, Spot-Check);

DATE TESTED: 2021-10-14 ~ 2021-11-05(Original);
2021-11-03 ~ 2021-11-12(Spot-Check);

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.

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1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMN986B1 DTS BLE(FCC CFR 47 Part 15C). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMN985F1 shares the same enclosure and circuit board as FCC ID: A3LSMN986B1. The BLE antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMN986B1 remains representative of FCC ID: A3LSMN985F1. The test data of FCC ID: A3LSMN986B1 being submitted for this application to cover BLE features.

1.3. SPOT CHECK VERIFICATION DATA

(Worst case of the radiated band-edge and radiated spurious emissions)

Band	Test Item	Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-N986B1/DS Results	SM-N985F1/DS Results		
					FCC ID : A3LSMN986B1	FCC ID : A3LSMN985F1		
DTS BLE 1M	Band Edge	1Mbps	2480 MHz	54 dBuV/m	43.02 dBuV/m	43.20 dBuV/m	0.18 dB	
	RSE	1Mbps	9608 MHz	74 dBuV/m	48.13 dBuV/m	48.63 dBuV/m	0.50 dB	Noise Floor
DTS BLE 2M	Band Edge	2Mbps	2480 MHz	54 dBuV/m	45.94 dBuV/m	43.05 dBuV/m	-2.89 dB	
	RSE	2Mbps	9760 MHz	74 dBuV/m	48.44 dBuV/m	48.30 dBuV/m	-0.14 dB	Noise Floor

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMN986B1	Original Grant	4790136523-E3	Test Report	4790136529-E3	All
DTS	A3LSMN986B1	Original Grant	4790136523-E4 (802.11b/g/n/ax)	Test Report	4790136529-E4 (802.11b/g/n/ax)	All
			4790136523-E5 Bluetooth LE	Test Report	4790136529-E5 Bluetooth LE	All
DSS	A3LSMN986B1	Original Grant	4790136523-E6 (Bluetooth)	Test Report	4790136529-E6 (Bluetooth)	All
DXX	A3LSMN986B1	Original Grant	4790136523-E7 (NFC)	Test Report	4790136529-E7 (NFC)	All
NII	A3LSMN986B1	Original Grant	4790136523-E8 (802.11a/n/ac/ax)	Test Report	4790136529-E8 (802.11a/n/ac/ax)	All
DCD	A3LSMN986B1	Original Grant	4790136523-E9 (WPT)	Test Report	4790136529-E9 (WPT)	All
UWB	A3LSMN986B1	Original Grant	4790136523-E10 (UWB)	Test Report	4790136529-E10 (UWB)	All

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. 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	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

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

4.4. DECISION RULES

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

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, NFC, WPT and UWB. This test report addresses the DTS (BLE) operational mode.

This report covers the Samsung models SM-N986B1/DS, SM-N986B1. These models are identical in hardware except SM-N986B1/DS is supported dual SIM tray and SM-N986B1 has single SIM tray. All series model was same hardware thus, SM-N986B1/DS(Dual SIM tray) was set for final test.

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	7.462	5.574
		Average	6.719	4.698
	2Mbps	Peak	8.682	7.382
		Average	7.741	5.944

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes an internal antennas, with ANT 1's maximum gain of -5.12 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.

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(37 pkt) and 2 Mbps(37 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	4.834	2	2Mbps (37 pkt)	2402	5.947
		2440	6.719			2440	7.741
		2480	5.561			2480	6.051
	1Mbps (255 pkt)	2402	4.793		2Mbps (255 pkt)	2402	5.899
		2440	6.682			2440	7.684
		2480	5.501			2480	6.016
1	125 kbps (37 pkt)	2402	4.779				
		2440	6.666				
		2480	5.505				
	125 kbps (255 pkt)	2402	4.773				
		2440	6.665				
		2480	5.458				
	500 kbps (37 pkt)	2402	4.824				
		2440	6.699				
		2480	5.539				
	500 kbps (255 pkt)	2402	4.788				
		2440	6.685				
		2480	5.489				

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37R38J4A28SE3	N/A
Data Cable	SAMSUNG	EP-DG980	N/A	N/A

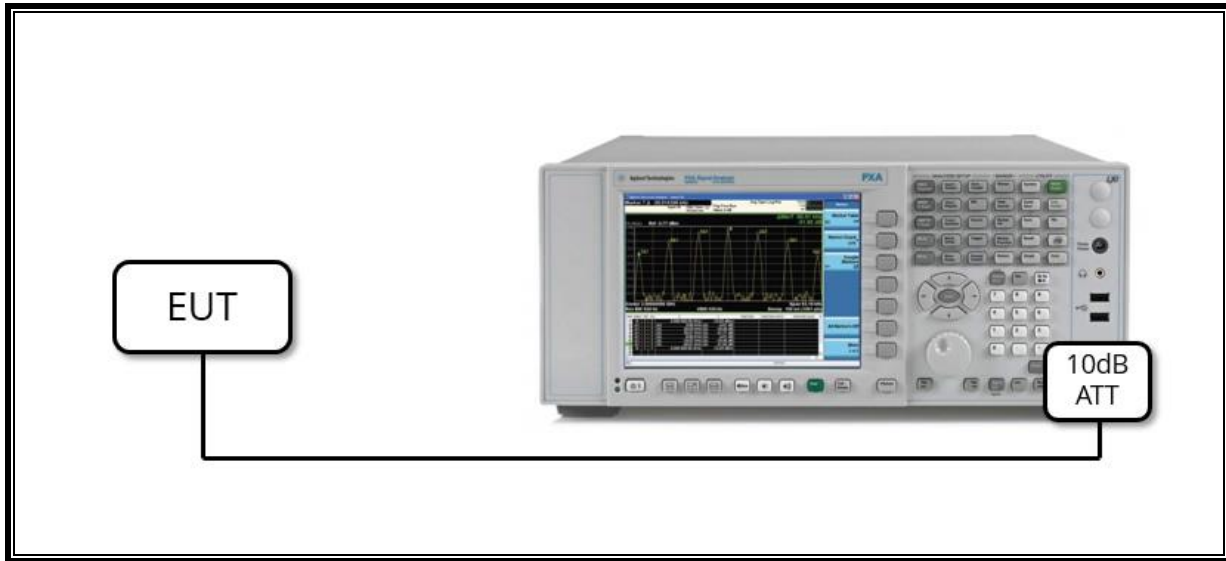
I/O CABLE

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

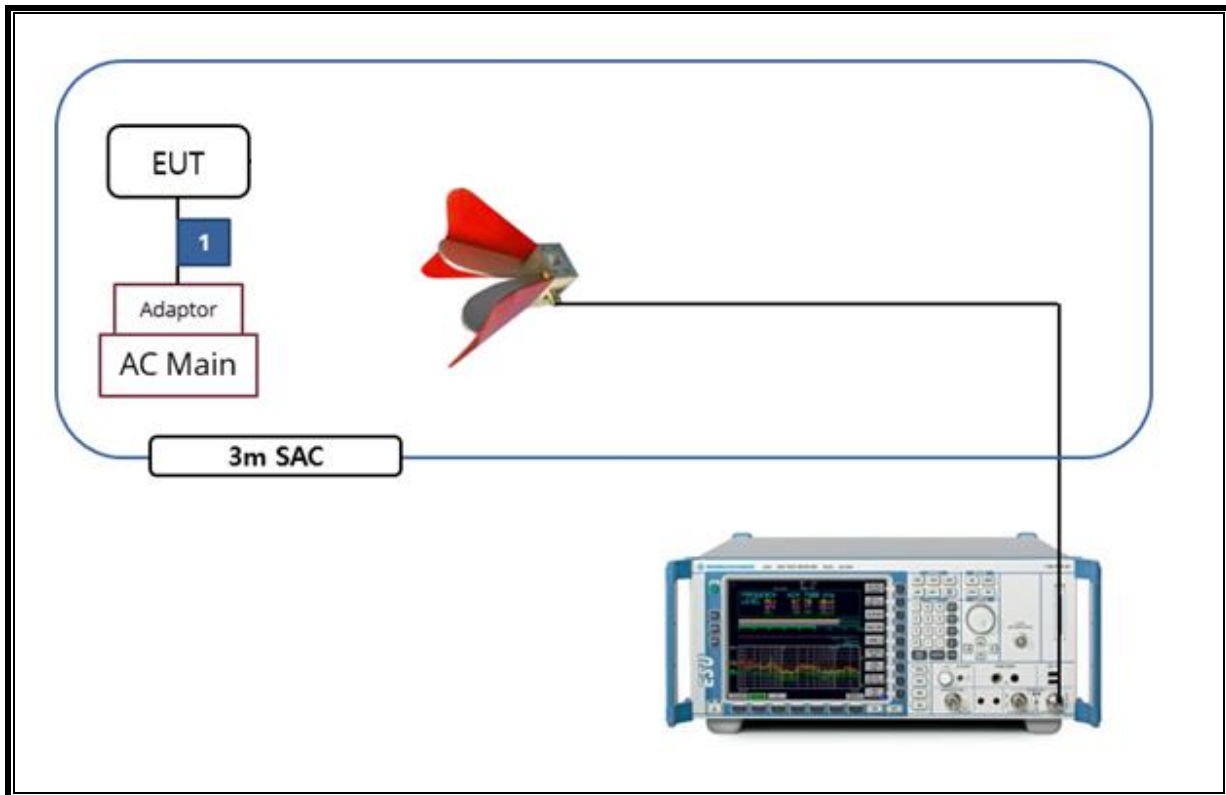
TEST SETUP

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 : ANSI C63.10-2013, Section 11.8.2 Option 2

OUTPUT POWER : ANSI C63.10-2013, Section 11.9.1.1 RBW \geq DTS bandwidth

POWER SPECTRAL DENSITY : ANSI C63.10-2013, Section 11.10.2 Method PKPSD (peak PSD)

Out-of-band Emissions (Conducted) : ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Non-restricted Bands: ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Restricted Bands : ANSI C63.10-2013, Section 11.12 Emissions in restricted frequency bands

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

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022-08-04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022-08-04
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2022-01-03
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022-08-04
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
LISN	R&S	ENV-216	101837	2022-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
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/3kHz		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

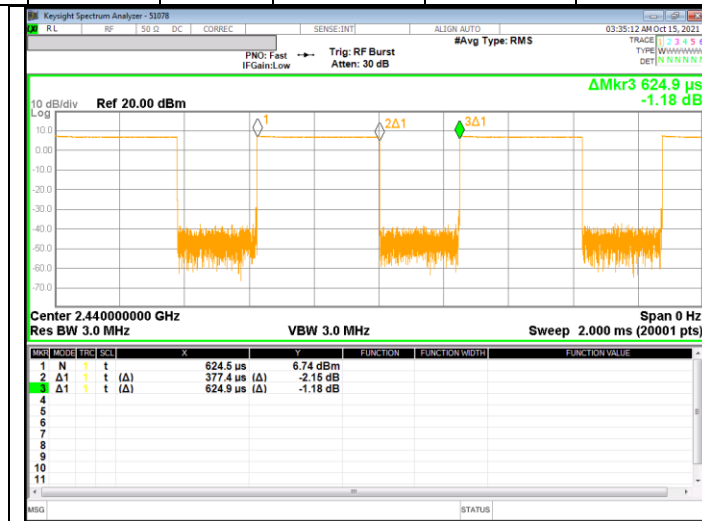
9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

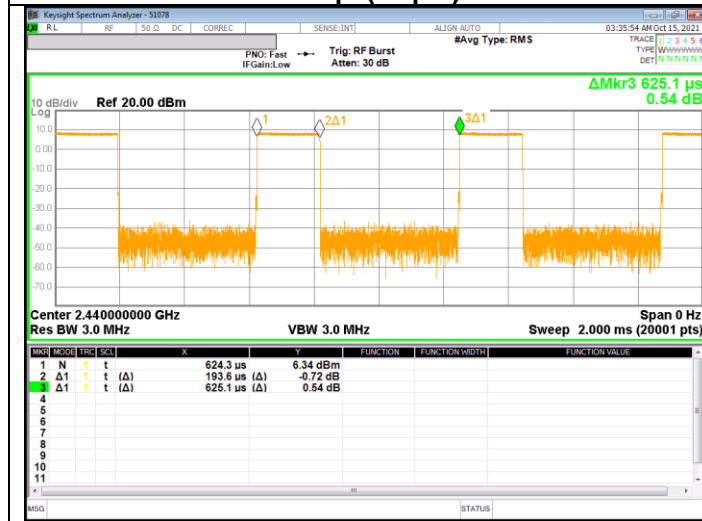
LIMITS

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						
1 Mbps [37pkt]	0.377	0.625	0.603	60.320	2.20	2.65
2 Mbps [37pkt]	0.194	0.625	0.310	31.040	5.08	5.15



1 Mbps(37 pkt)



2 Mbps(37 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

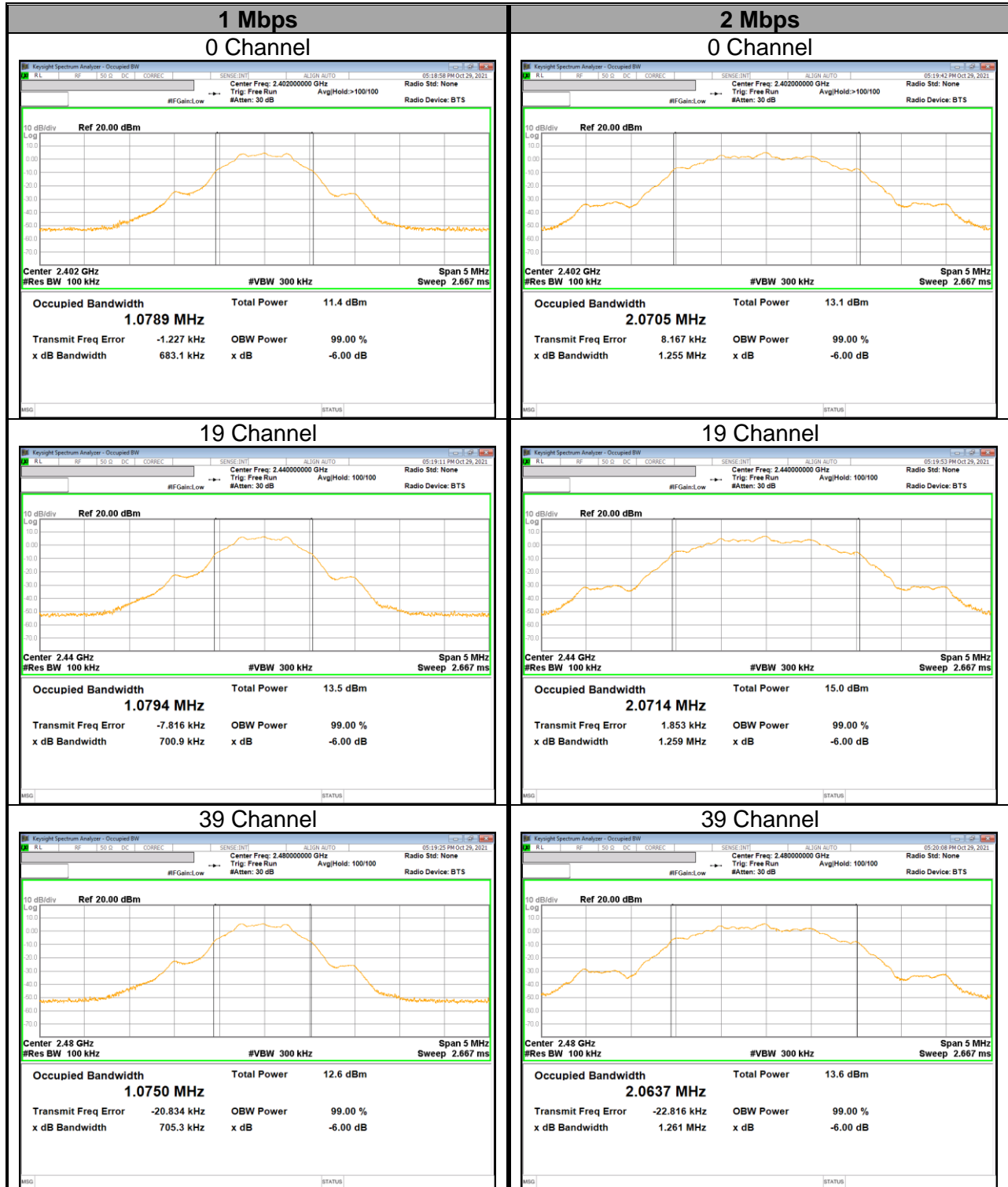
9.2.1. 1 Mbps

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
0	2 402	683.1	500.0
19	2 440	700.9	
39	2 480	705.3	
Worst		683.1	

9.2.2. 2 Mbps

Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
0	2 402	1255.0	500.0
19	2 440	1259.0	
39	2 480	1261.0	
Worst		1255.0	

9.2.3. 6 dB BANDWIDTH PLOTS



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(RBW \cong DTS bandwidth).

RESULTS

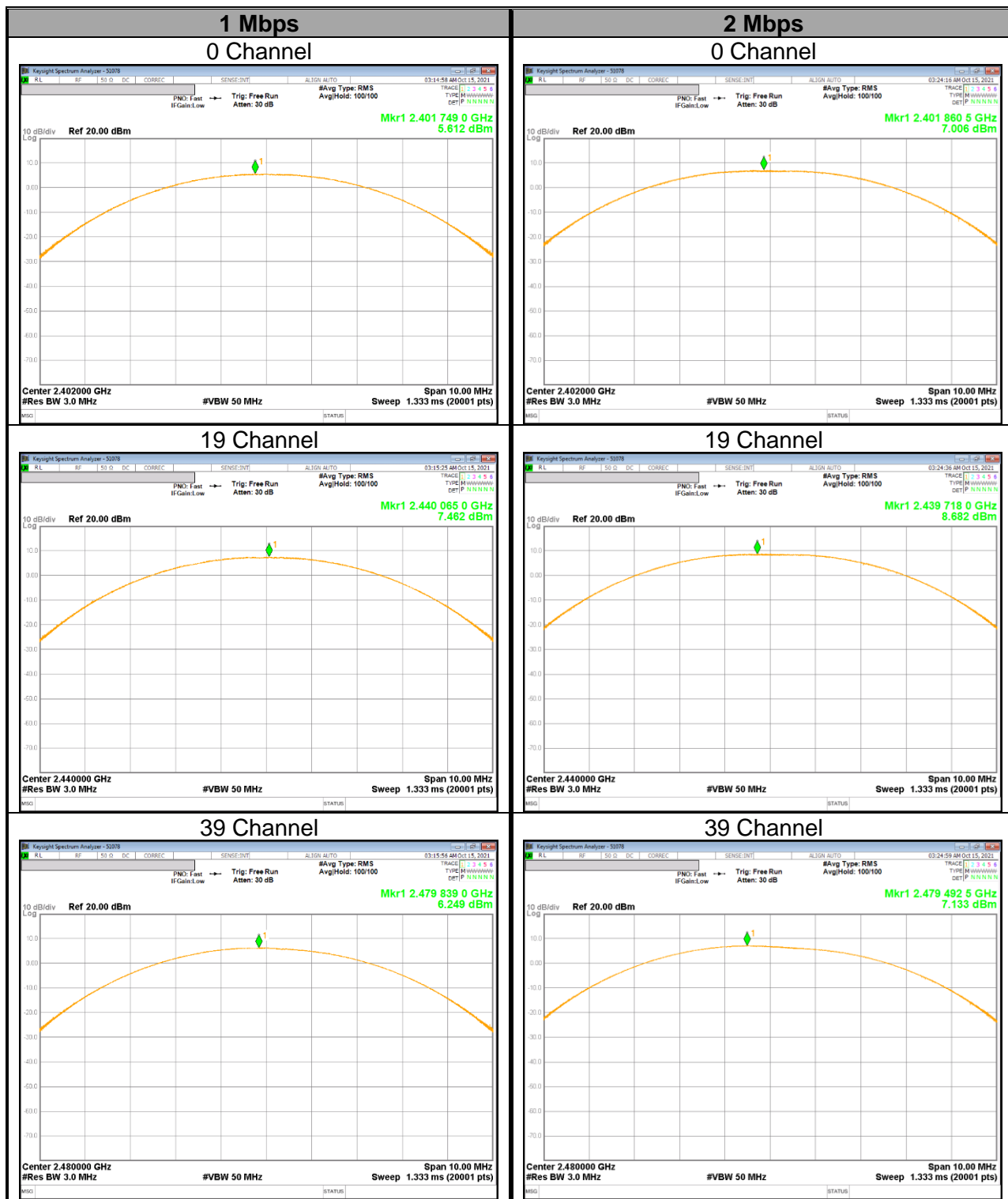
9.3.1. 1 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
0	2402	5.612	30.000	-24.388
19	2440	7.462		-22.538
39	2480	6.249		-23.751
Worst		7.462		-22.538

9.3.2. 2 Mbps

Channel	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin [dB]
0	2402	7.006	30.000	-22.994
19	2440	8.682		-21.318
39	2480	7.133		-22.867
Worst		8.682		-21.318

9.3.3. PEAK POWER PLOTS



9.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

9.4.1. 1 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
0	2402	4.834	3.043
19	2440	6.719	4.698
39	2480	5.561	3.598

9.4.2. 2 Mbps

Channel	Frequency [MHz]	AV Power [dBm]	AV Power [mW]
0	2402	5.947	3.932
19	2440	7.741	5.944
39	2480	6.051	4.028

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
 RSS-247 (5.2) (b)

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

TEST PROCEDURE

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

RESULTS

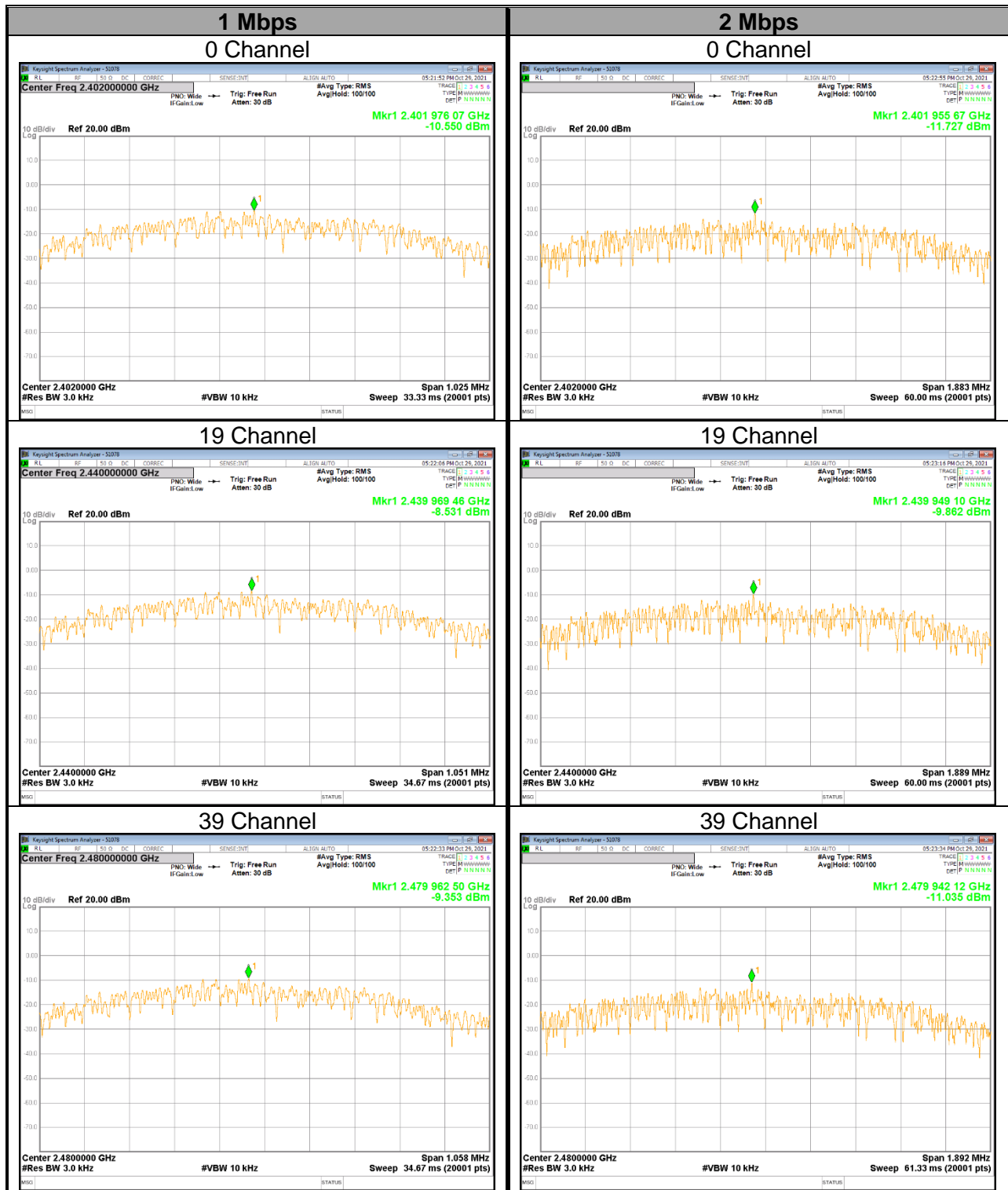
9.5.1. 1 Mbps

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
0	2402	-10.550	8.000	-18.550
19	2440	-8.531		-16.531
39	2480	-9.353		-17.353

9.5.2. 2 Mbps

Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
0	2402	-11.727	8.000	-19.727
19	2440	-9.862		-17.862
39	2480	-11.035		-19.035

9.5.3. PSD TEST PLOTS



9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

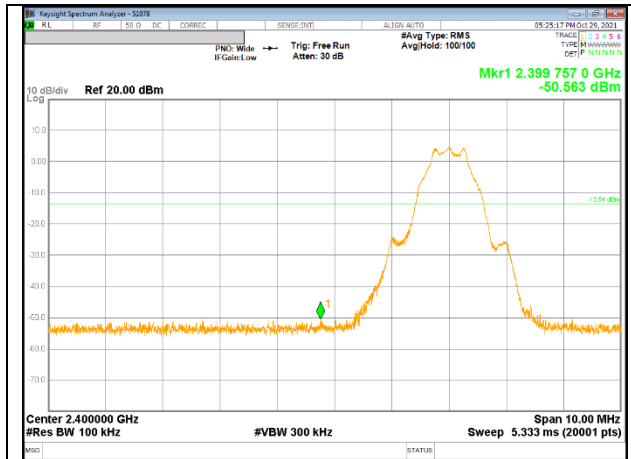
FCC §15.247 (d)

RSS-247 5.5

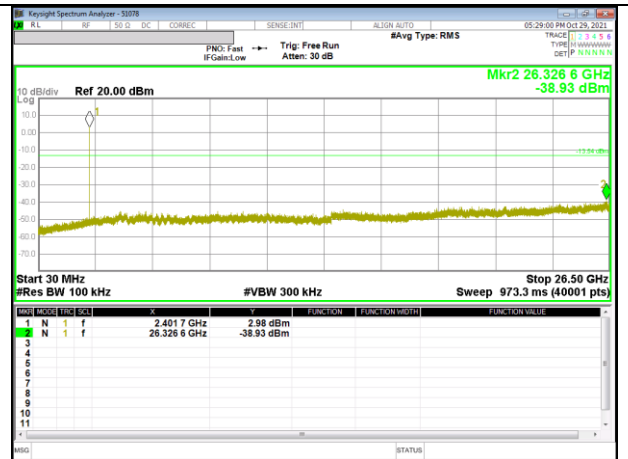
Output power was measured based on the use of a peak measurement.
Therefore, spurious emissions are required to be 20 dBc.

RESULTS

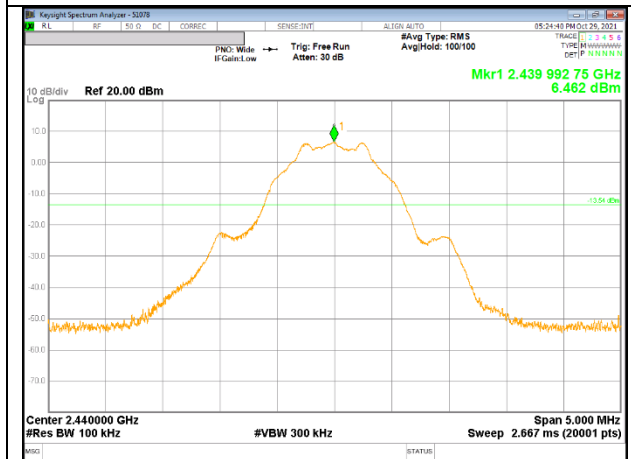
9.6.1. 1 Mbps



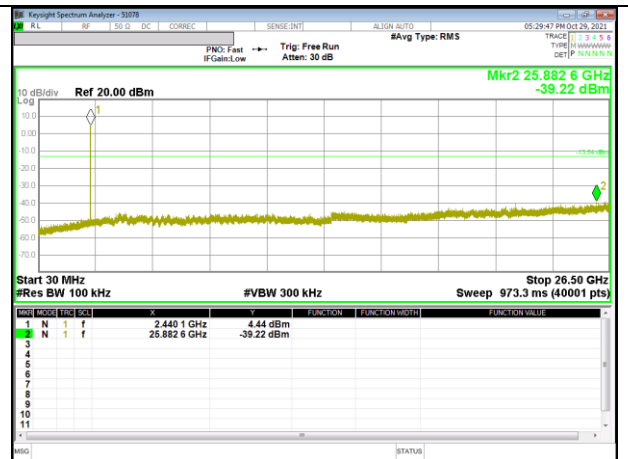
0 CHANNEL BANDEDGE



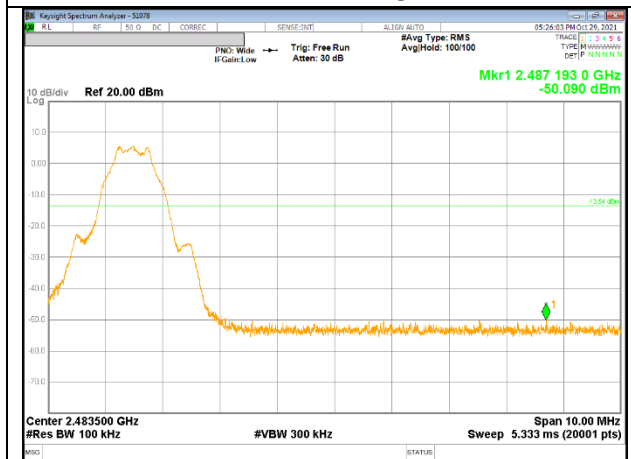
OUT-OF-BAND 0 CHANNEL



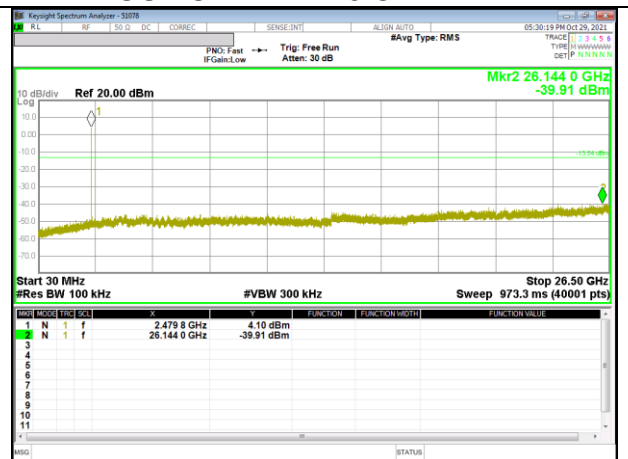
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 19 CHANNEL

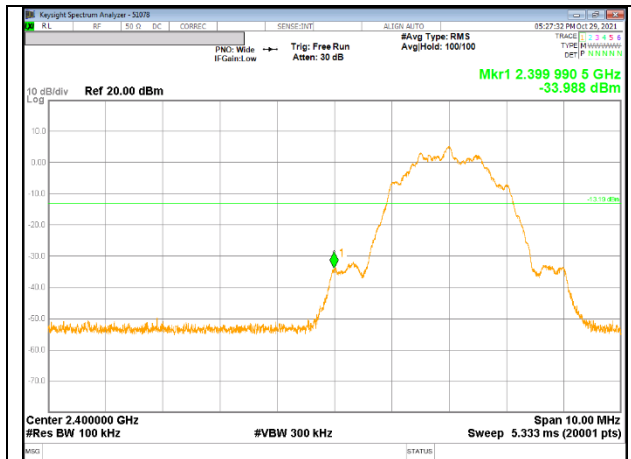


39 CHANNEL BANDEDGE

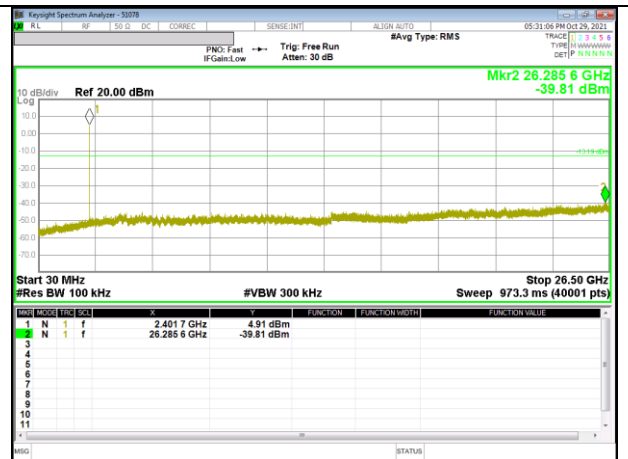


OUT-OF-BAND 39 CHANNEL

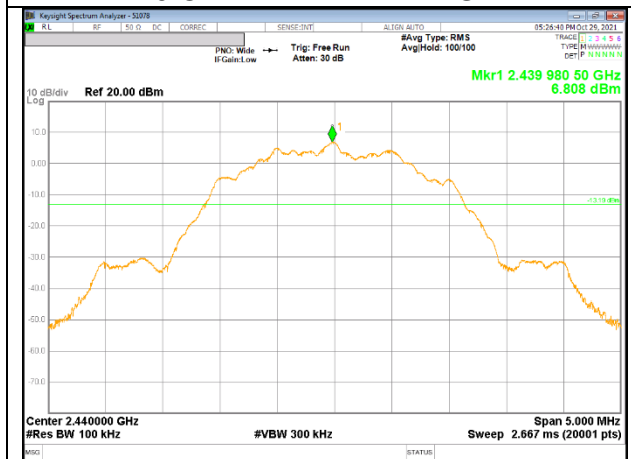
9.6.2. 2Mbps



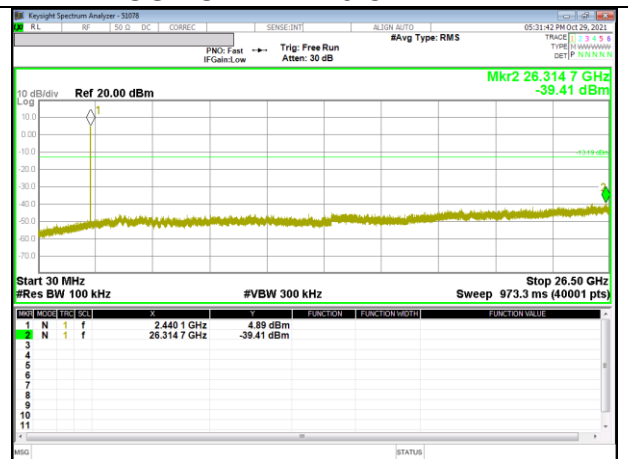
0 CHANNEL BANDEDGE



OUT-OF-BAND 0 CHANNEL



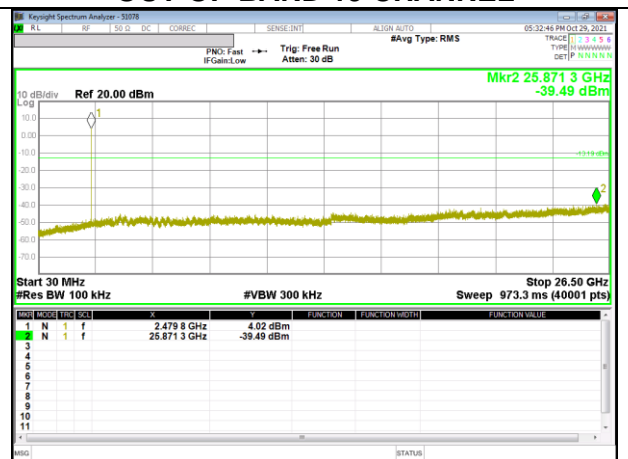
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 19 CHANNEL



39 CHANNEL BANDEDGE



OUT-OF-BAND 39 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 band-edge, Final detection of spurious harmonic emissions)
Duty cycle factor = $10 \log(1/x)$. For this sample: For 1 Mbps, DCF = $10\log(1/0.6032)=2.195$ dB (Spectrum Analyzer round it up to 2.20 dB) and for 2 Mbps, DCF = $10\log(1/0.3104)=5.081$ dB (Spectrum Analyzer round it up to 5.08 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.

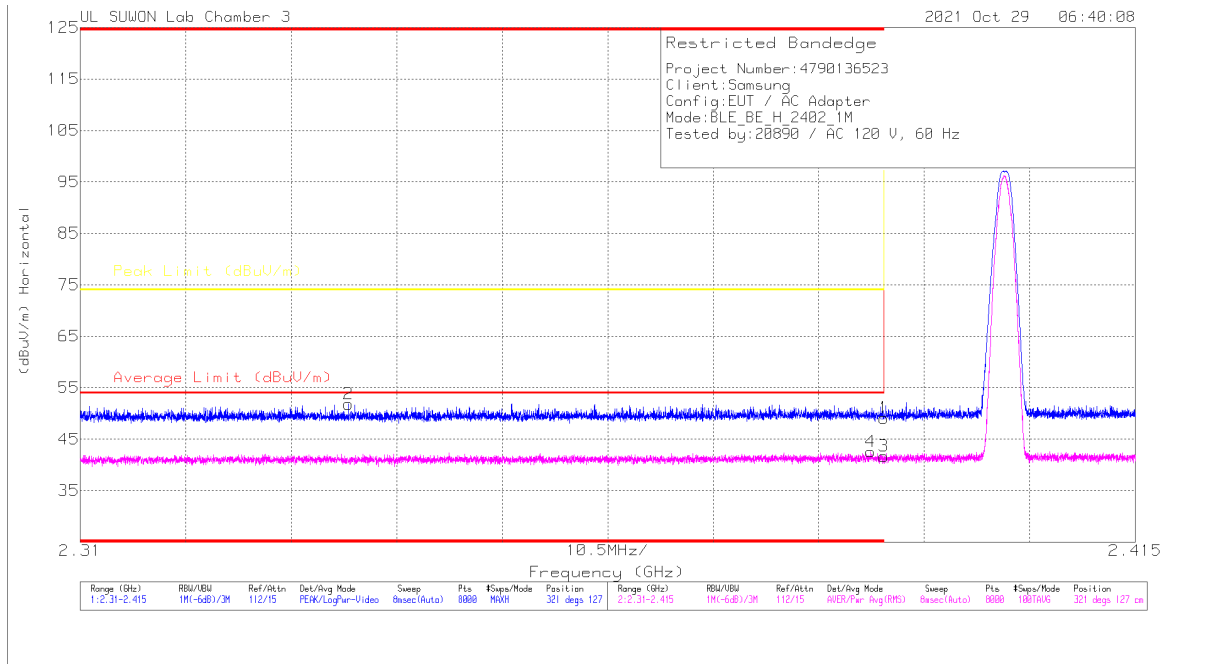
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. 1 Mbps

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

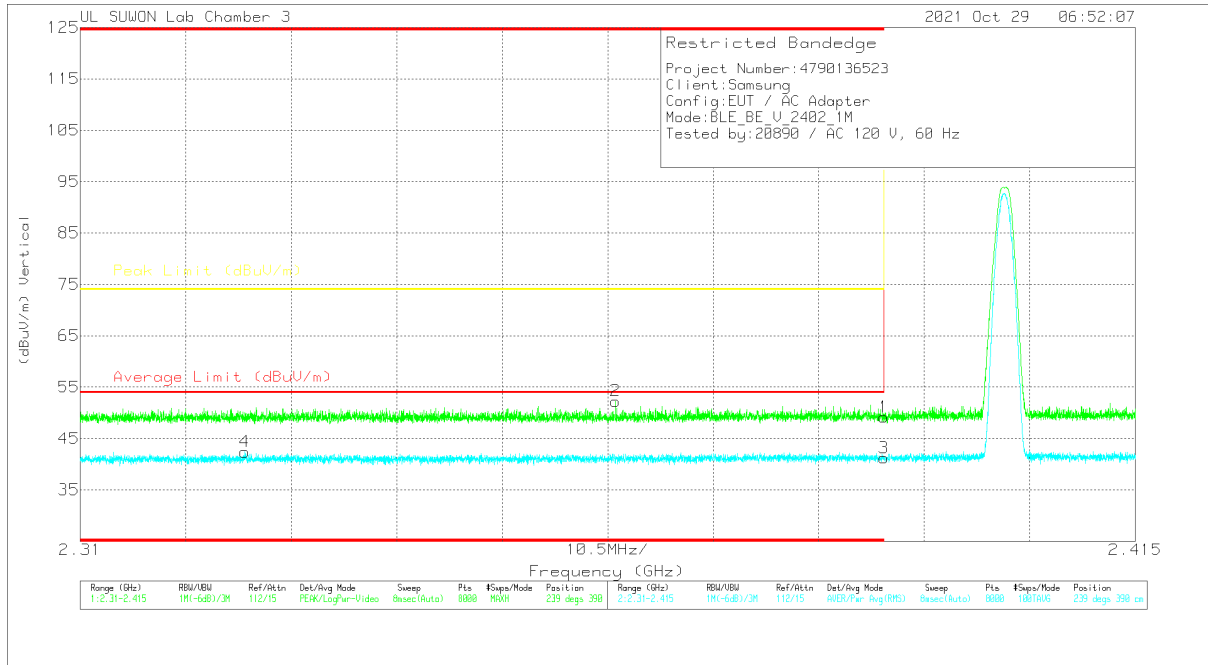


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Cor (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.73	Pk	32.8	-25.4	0	49.13	-	-	74	-24.87	321	127	H
2	* 2.38669	44.74	Pk	32.5	-25.4	0	51.84	-	-	74	-22.16	321	127	H
3	* 2.39	32.08	RMS	32.8	-25.4	2.2	41.68	54	-12.32	-	-	321	127	H
4	* 2.38867	32.96	RMS	32.8	-25.4	2.2	42.56	54	-11.44	-	-	321	127	H

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

VERTICAL RESULT



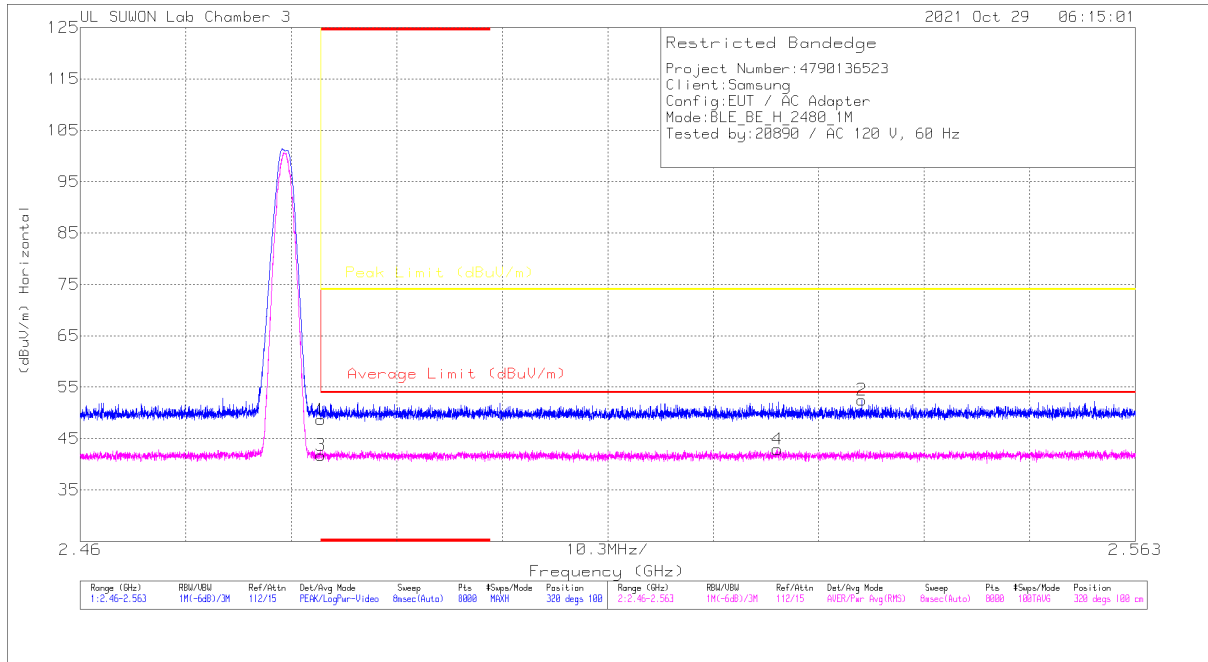
Trace Markers

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	41.78	PK		-25.4	0	49.18	-	-	74	-24.82	239	390	V
2	2.36328	45.1	PK		-25.5	0	52.3	-	-	74	-21.7	239	390	V
3	* 2.39	31.83	RMS		-25.4	2.2	41.23	54	-12.77	-	-	239	390	V
4	* 2.3264	33.12	RMS		-25.4	2.2	42.42	54	-11.58	-	-	239	390	V

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

BANDEDGE (39 CHANNEL)

HORIZONTAL RESULT

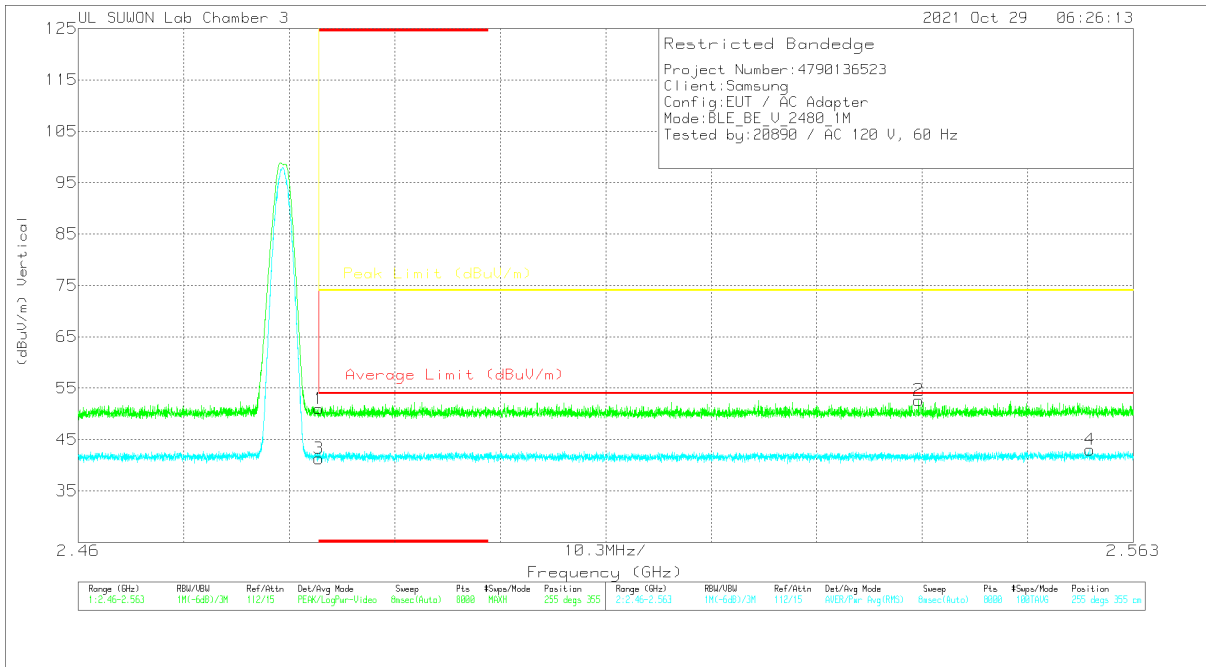


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Pk Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	41.07	Pk	32.9	-25.3	0	48.67	-	-	74	-25.33	320	100	H
2	2.53631	44.8	Pk	32.9	-25.2	0	52.5	-	-	74	-21.5	320	100	H
3	* 2.4835	31.95	RMS	32.9	-25.3	2.2	41.75	54	-12.25	-	-	320	100	H
4	2.52805	32.9	RMS	32.9	-25.1	2.2	42.9	54	-11.1	-	-	320	100	H

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

VERTICAL RESULT



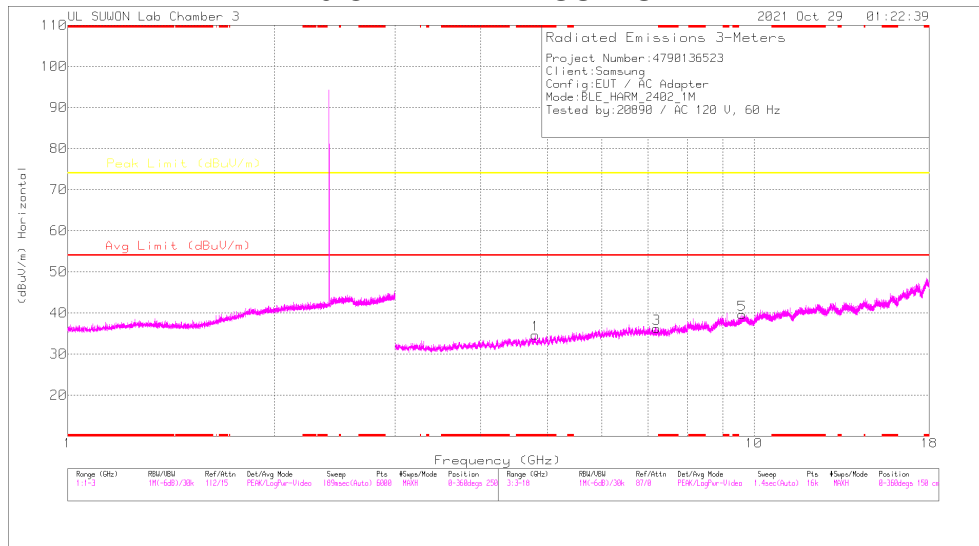
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218667	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	43.39	PK	32.9	-25.3	0	50.99	-	-	74	-23.01	255	355	V
2	2.54204	44.85	PK	32.9	-25.1	0	52.65	-	-	74	-21.35	255	355	V
3	* 2.4835	31.51	RMS	32.9	-25.3	2.2	41.31	54	-12.69	-	-	255	355	V
4	2.55877	33.12	RMS	32.9	-25.2	2.2	43.02	54	-10.98	-	-	255	355	V

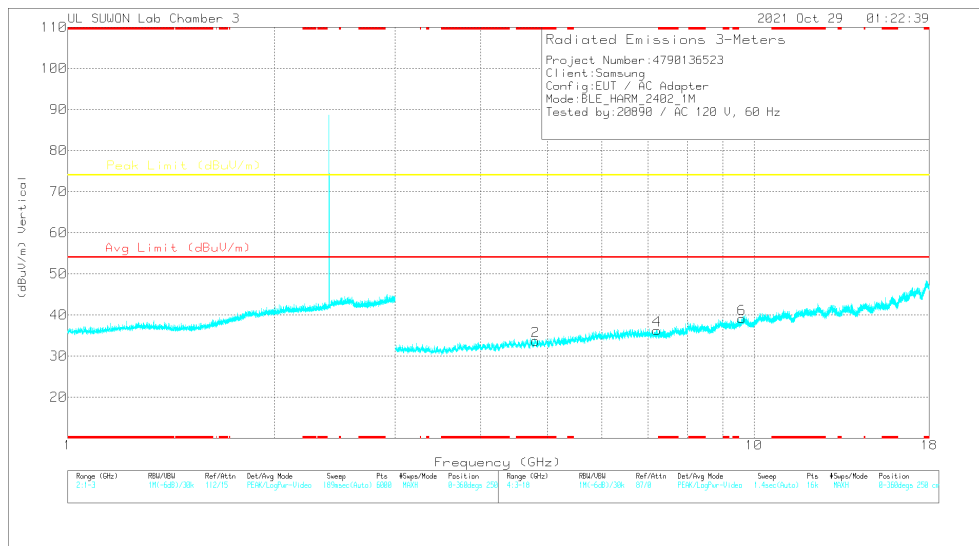
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

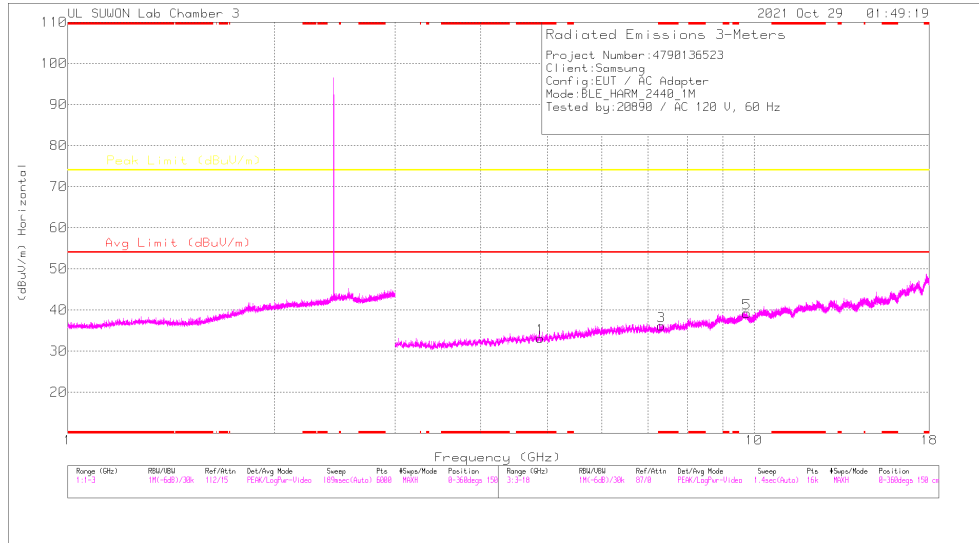
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

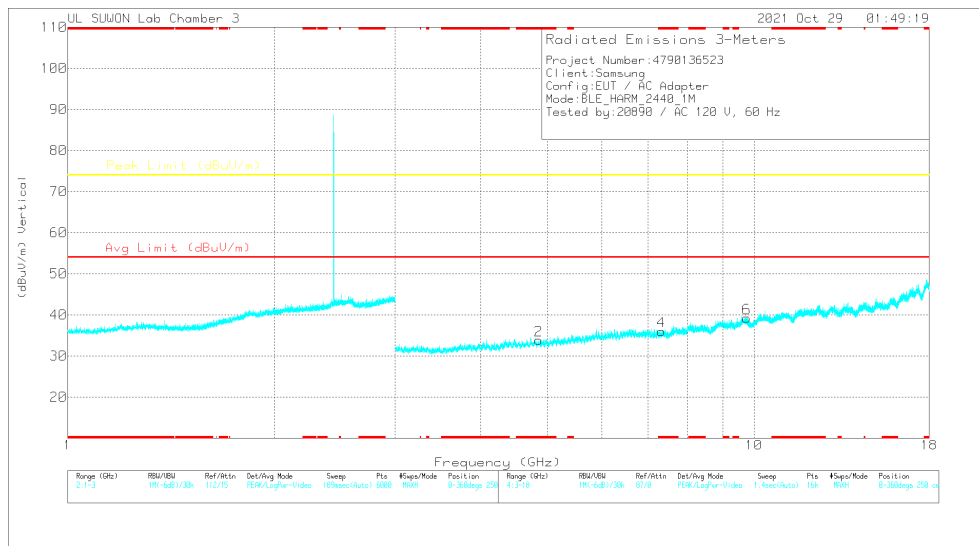
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80642	39.4	PK2	34.6	-30.5	0	43.5	-	-	74	-30.5	360	100	H
* 4.80554	39.63	PK2	34.6	-30.5	0	43.73	-	-	74	-30.27	360	100	V
7.21671	35.27	PK2	36.1	-26.1	0	45.27	-	-	74	-28.73	360	100	H
7.21488	35.63	PK2	36.1	-26.2	0	45.53	-	-	74	-28.47	360	100	V
9.60514	32.85	PK2	37.3	-22.1	0	48.05	-	-	74	-25.95	360	100	H
9.6087	32.93	PK2	37.3	-22.1	0	48.13	-	-	74	-25.87	360	100	V

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

19 CHANNEL RESULTS



HORIZONTAL



VERTICAL

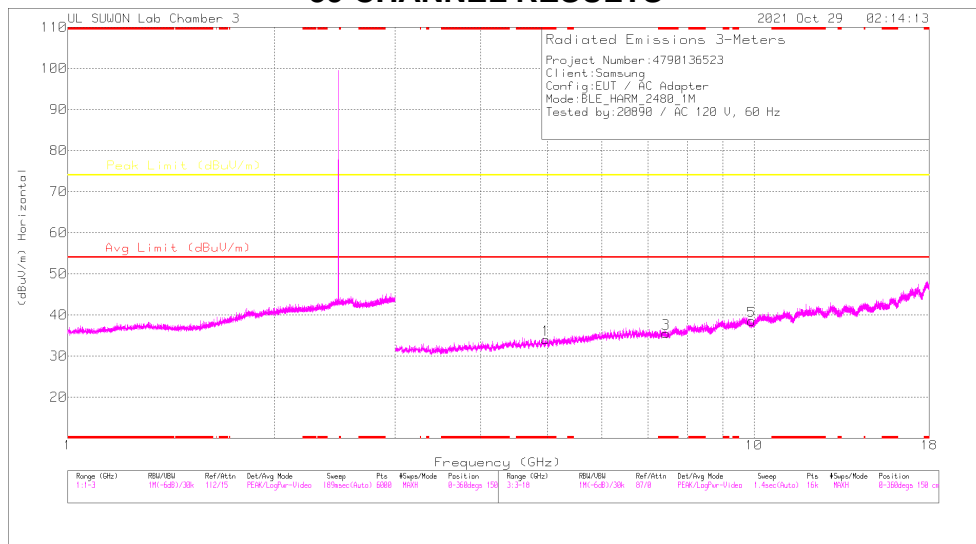
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

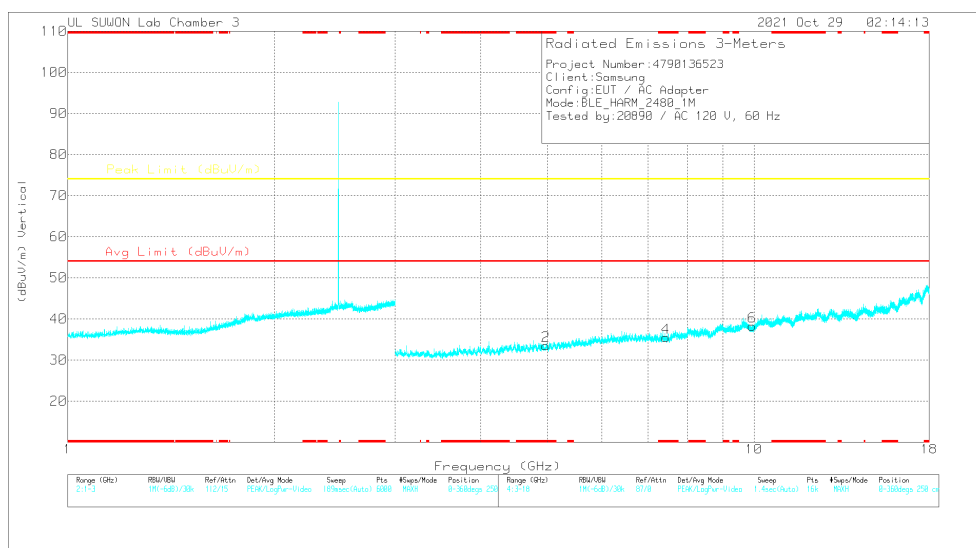
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87678	40.09	PK2	34.7	-31.1	0	43.69	-	-	74	-30.31	360	100	H
* 4.88526	39.85	PK2	34.7	-31.3	0	43.25	-	-	74	-30.75	360	100	V
* 7.31547	34.93	PK2	36	-25.5	0	45.43	-	-	74	-28.57	360	100	H
* 7.32767	34.75	PK2	36	-25.4	0	45.35	-	-	74	-28.65	360	100	V
9.76694	32.17	PK2	37.5	-21.8	0	47.87	-	-	74	-26.13	360	100	H
9.75132	32.16	PK2	37.5	-21.7	0	47.96	-	-	74	-26.04	360	100	V

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

39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

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

RADIATED EMISSIONS

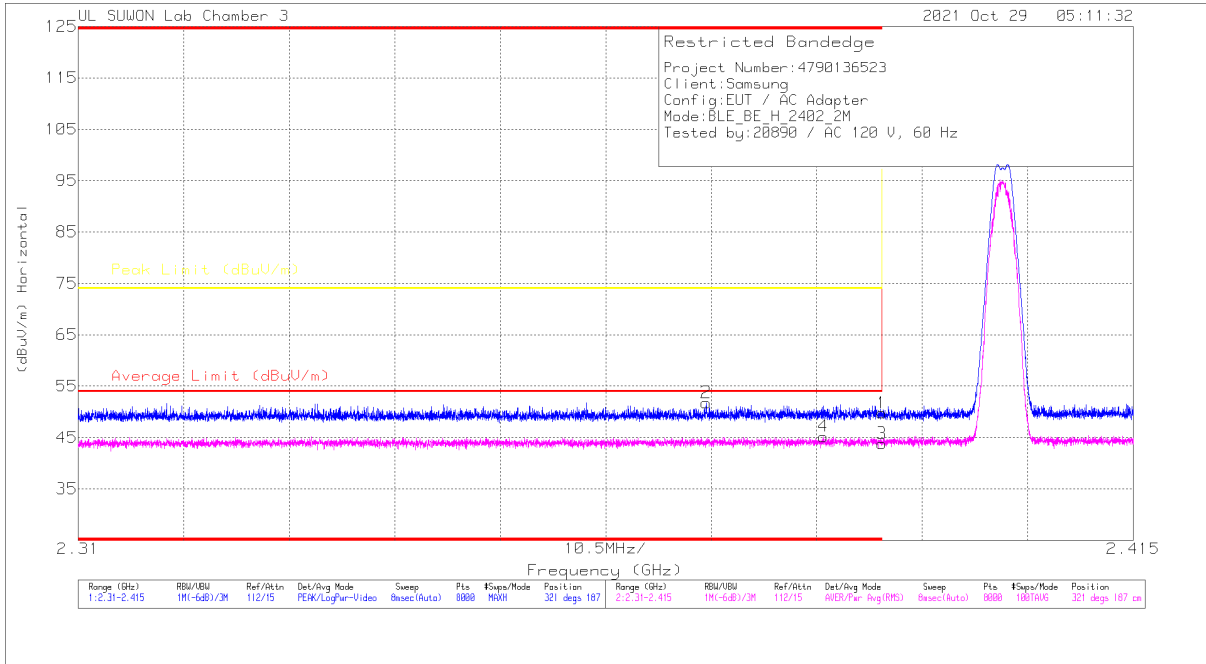
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.97443	39.88	PK2	34.7	-30.7	0	43.88	-	-	74	-30.12	360	100	H
* 4.98304	39.65	PK2	34.7	-30.6	0	43.75	-	-	74	-30.25	360	100	V
* 7.43358	34.6	PK2	36	-25.3	0	45.3	-	-	74	-28.7	360	100	H
* 7.44539	35.23	PK2	36	-25.4	0	45.83	-	-	74	-28.17	360	100	V
9.92788	32.09	PK2	37.8	-21.8	0	48.09	-	-	74	-25.91	360	100	H
9.92799	32.04	PK2	37.8	-21.8	0	48.04	-	-	74	-25.96	360	100	V

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

10.2.2. 2 Mbps

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

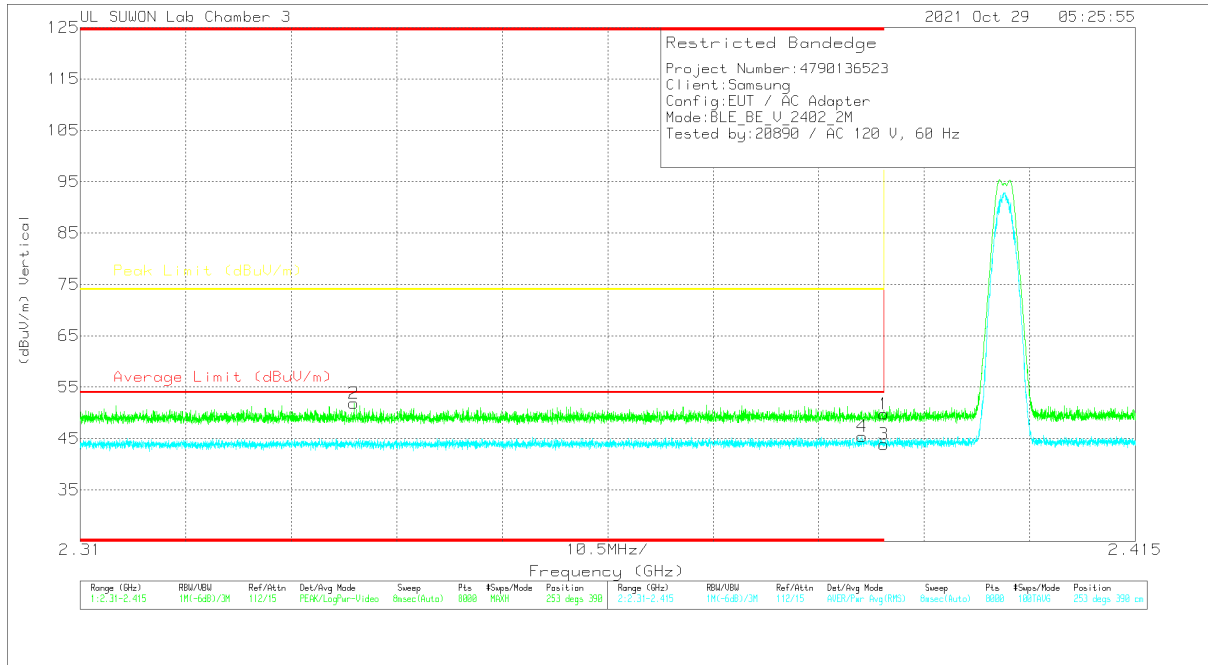


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218657	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	42.39	Pk	32.8	-25.4	0	49.79	-	-	74	-24.21	321	187	H
2	* 2.3725	44.49	Pk	32.7	-25.4	0	51.79	-	-	74	-22.21	321	187	H
3	* 2.39	31.33	RMS	32.8	-25.4	5.08	43.81	54	-10.19	-	-	321	187	H
4	* 2.38417	32.83	RMS	32.7	-25.4	5.08	45.21	54	-8.79	-	-	321	187	H

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

VERTICAL RESULT



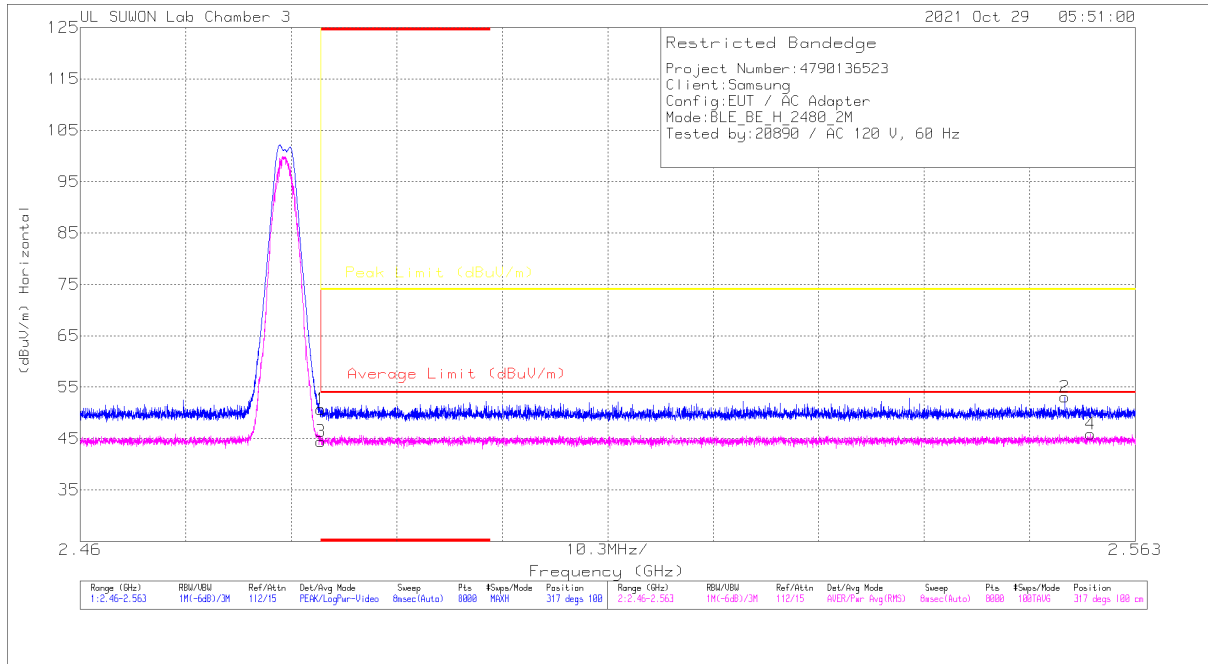
Trace Markers

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	42.37	PK		-25.4	0	49.77	-	-	74	-24.23	253	390	V
2	* 2.33723	44.76	PK		-25.4	0	51.86	-	-	74	-22.14	253	390	V
3	* 2.39	31.4	RMS		-25.4	5.08	43.88	54	-10.12	-	-	253	390	V
4	* 2.38782	32.84	RMS		-25.3	5.08	45.42	54	-8.58	-	-	253	390	V

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

BANDEDGE (39 CHANNEL)

HORIZONTAL RESULT

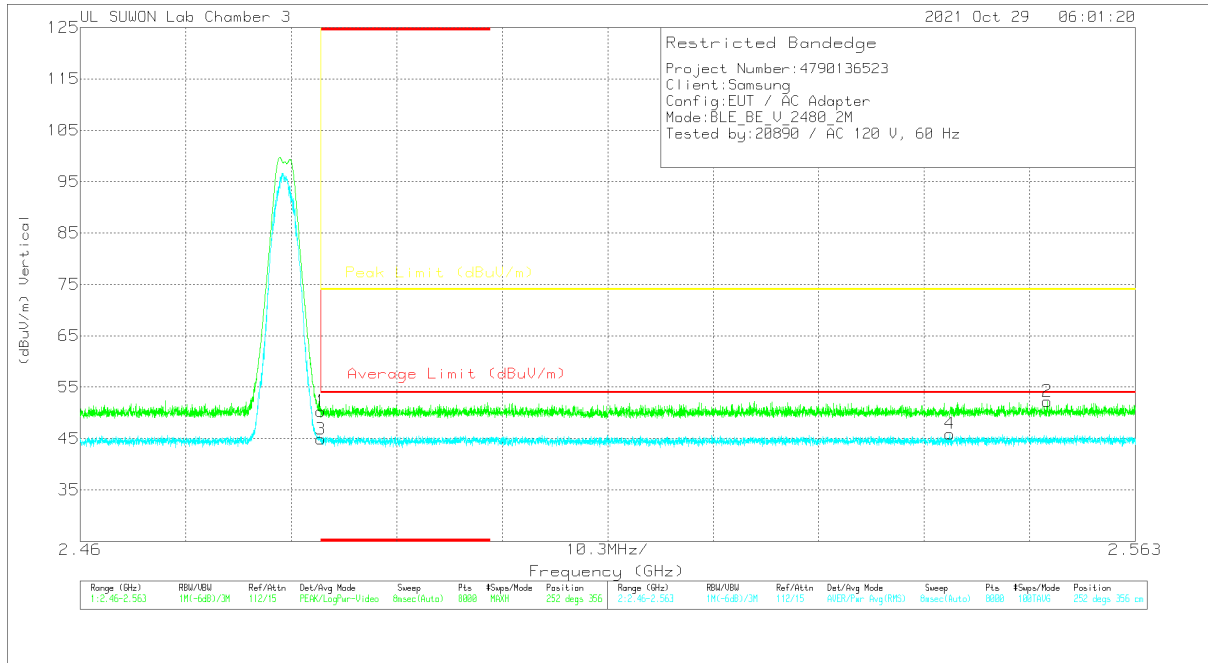


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Pk Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	43.12	Pk	32.9	-25.3	0	50.72	-	-	74	-23.28	317	100	H
2	2.56613	45.27	Pk	32.9	-25.1	0	53.07	-	-	74	-20.93	317	100	H
3	* 2.4835	31.74	RMS	32.9	-25.3	5.08	44.42	54	-9.58	-	-	317	100	H
4	2.55864	33.12	RMS	32.9	-25.2	5.08	45.9	54	-8.1	-	-	317	100	H

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

VERTICAL RESULT



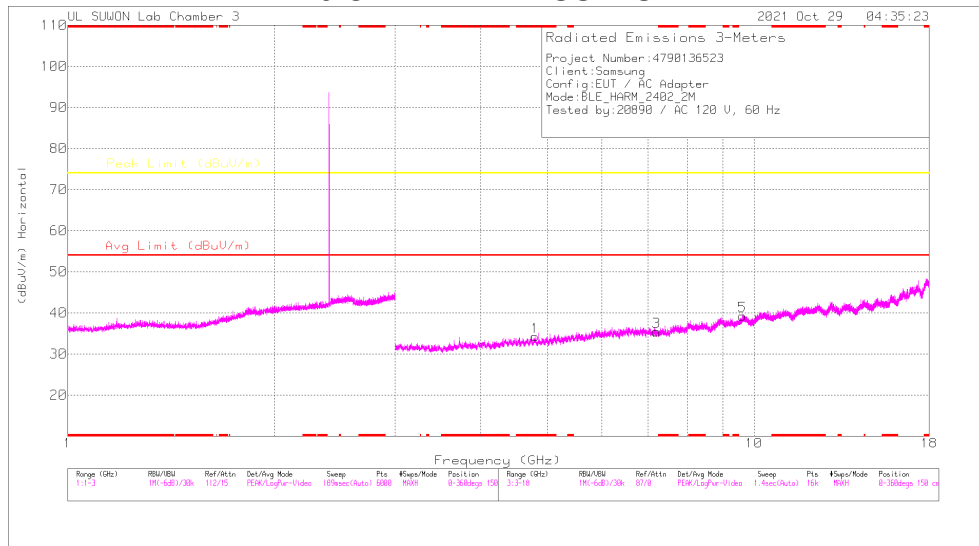
Trace Markers

Marker	Frequency (GHz)	Meas Reading (dBuV)	Det	3117_00218957	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.4835	42.71	PK	32.9	-25.3	0	50.31	-	-	74	-23.69	252	356	V
2	2.54443	44.58	PK	32.9	-25.2	0	52.28	-	-	74	-21.72	252	356	V
3	* 2.4835	32.2	RMS	32.9	-25.3	5.08	44.88	54	-9.12	-	-	252	356	V
4	2.54489	33.16	RMS	32.9	-25.2	5.08	45.94	54	-8.06	-	-	252	356	V

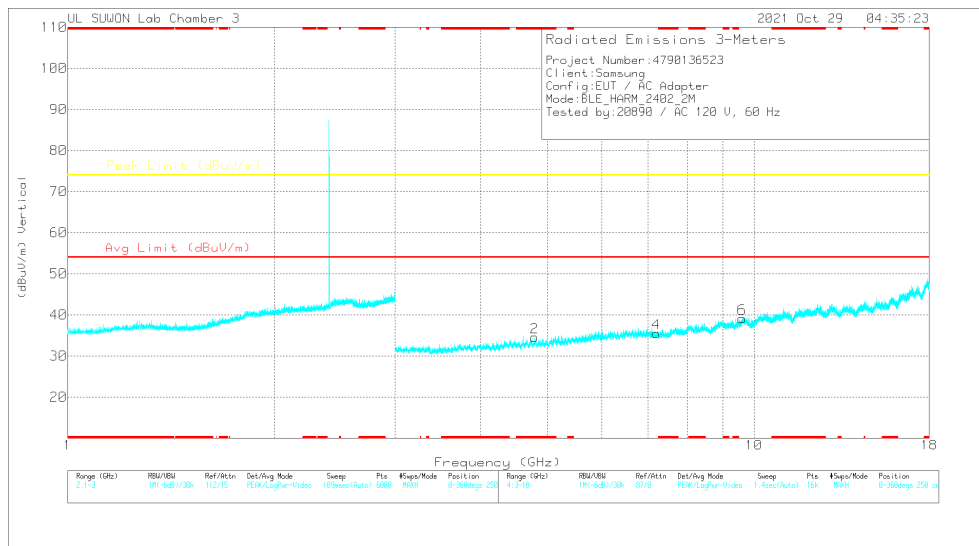
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

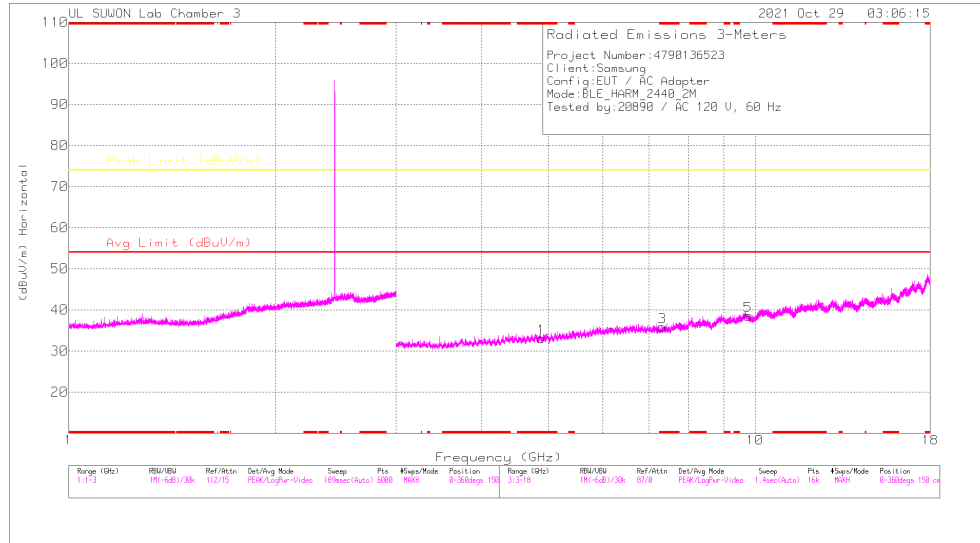
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

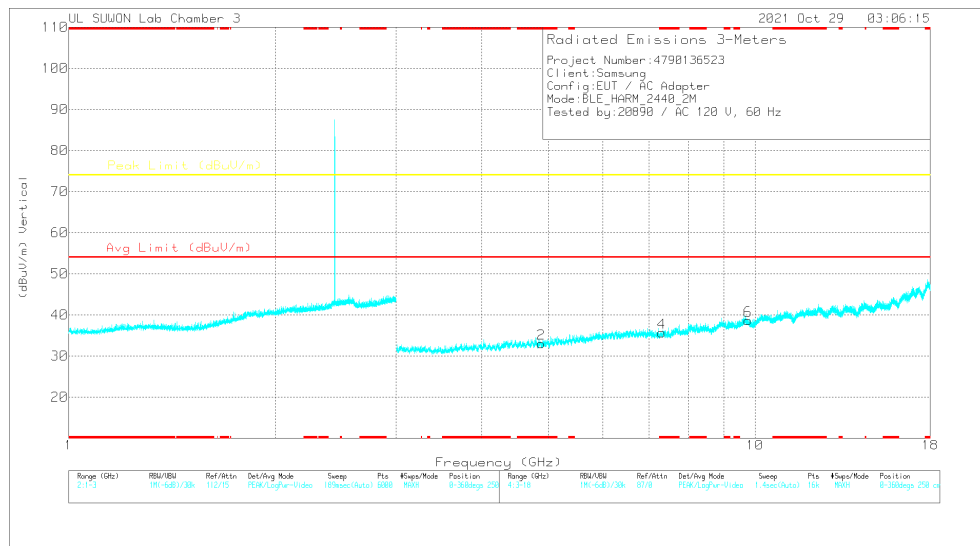
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.801	39.73	PK2	34.6	-30.4	0	43.93	-	-	74	-30.07	360	100	H
* 4.79444	39.32	PK2	34.6	-30.3	0	43.62	-	-	74	-30.38	360	100	V
7.20641	35.23	PK2	36.1	-26.1	0	45.23	-	-	74	-28.77	360	100	H
7.21125	35.49	PK2	36.1	-26.1	0	45.49	-	-	74	-28.51	360	100	V
9.61597	32.64	PK2	37.3	-22.1	0	47.84	-	-	74	-26.16	360	100	H
9.61756	33.02	PK2	37.3	-22.1	0	48.22	-	-	74	-25.78	360	100	V

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

19 CHANNEL RESULTS



HORIZONTAL



VERTICAL

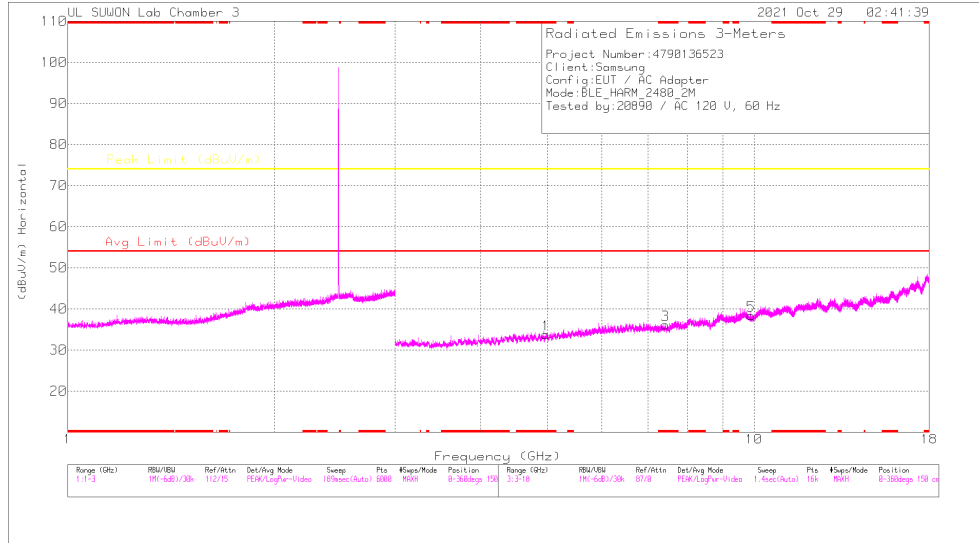
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RADIATED EMISSIONS

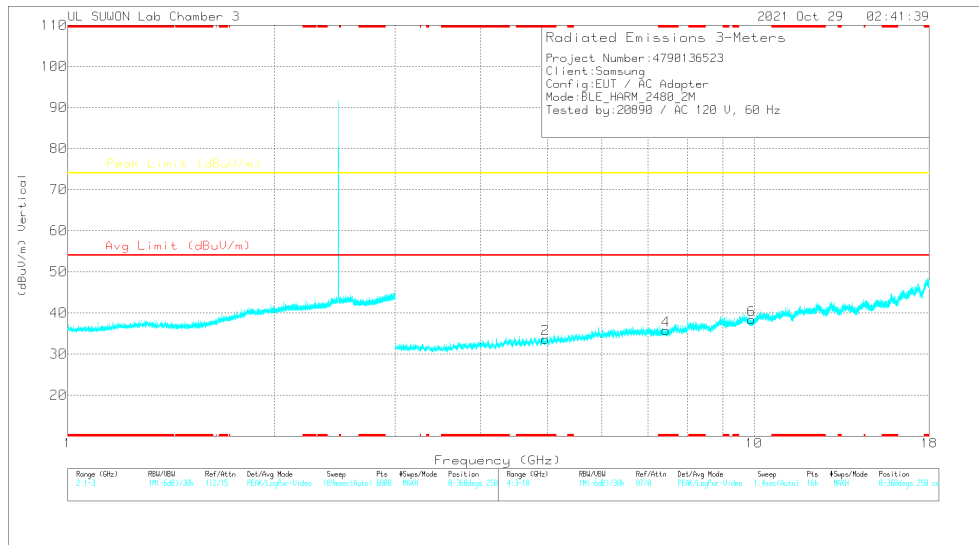
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HPI(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.87448	40.15	PK2	34.6	-31.1	0	43.65	-	-	74	-30.35	360	100	H
* 4.87647	40.07	PK2	34.7	-31.1	0	43.67	-	-	74	-30.33	360	100	V
* 7.31379	34.95	PK2	36	-25.6	0	45.35	-	-	74	-28.65	360	100	H
* 7.32669	34.64	PK2	36	-25.4	0	45.24	-	-	74	-28.76	360	100	V
9.7725	32.6	PK2	37.5	-21.8	0	48.3	-	-	74	-25.7	360	100	H
9.7579	32.64	PK2	37.5	-21.7	0	48.44	-	-	74	-25.56	360	100	V

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

39 CHANNEL RESULTS



HORIZONTAL



VERTICAL

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

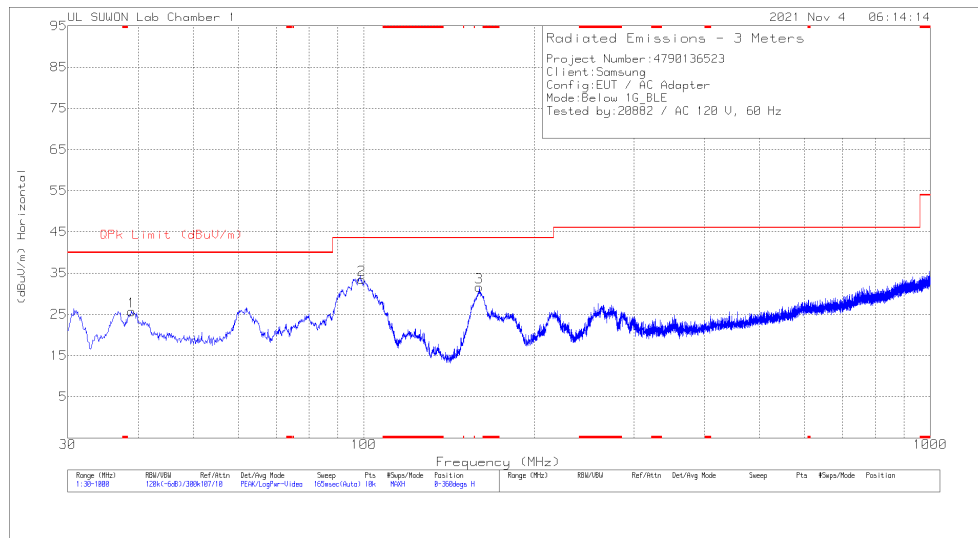
RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_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
* 4.97814	39.6	PK2	34.7	-30.7	0	43.6	-	-	74	-30.4	360	100	H
* 4.96692	39.39	PK2	34.7	-30.8	0	43.29	-	-	74	-30.71	360	100	V
* 7.43032	34.74	PK2	36	-25.3	0	45.44	-	-	74	-28.56	360	100	H
* 7.43538	35.14	PK2	36	-25.3	0	45.84	-	-	74	-28.16	360	100	V
9.89943	31.63	PK2	37.7	-22	0	47.33	-	-	74	-26.67	360	100	H
9.9048	31.48	PK2	37.7	-21.9	0	47.28	-	-	74	-26.72	360	100	V

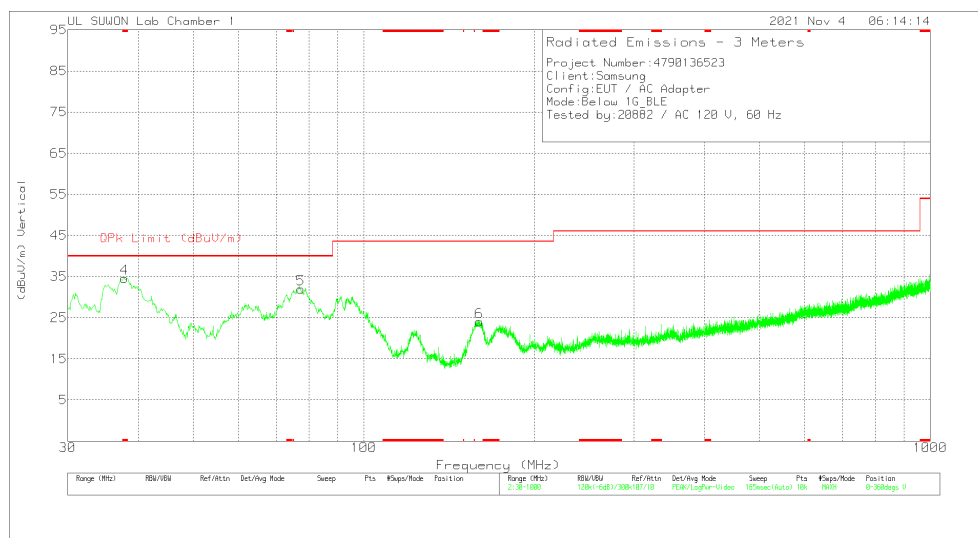
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak

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_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	38.924	38.28	Pk	18.4	-31	25.68	40	-14.32	0-360	200	H
2	99.161	46.21	Pk	17.4	-30.2	33.41	43.52	-10.11	0-360	200	H
3	159.98	46.96	Pk	14.3	-29.7	31.56	43.52	-11.96	0-360	100	H
4	* 37.76	47.88	Pk	17.8	-31.1	34.58	40	-5.42	0-360	200	V
5	77.336	49.77	Pk	12.7	-30.5	31.97	40	-8.03	0-360	200	V
6	159.689	39.34	Pk	14.3	-29.6	24.04	43.52	-19.48	0-360	300	V

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

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

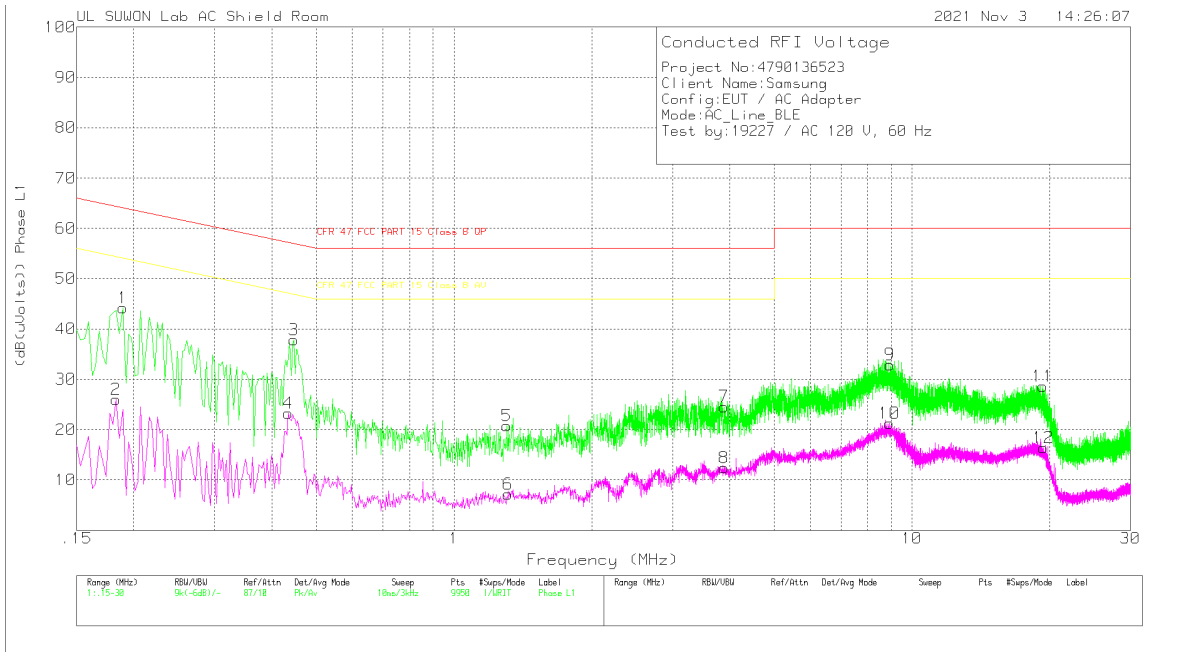
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



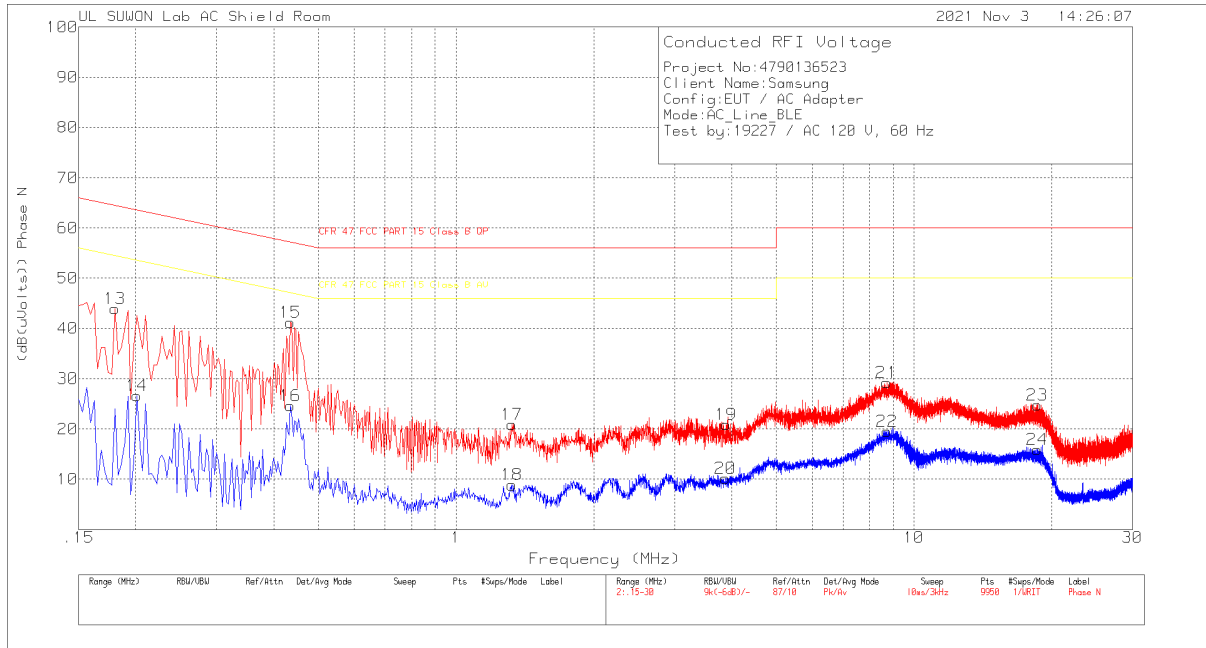
Trace Markers

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	.189	34.15	Pk	9.9	.2	44.25	64.08	-19.83	-	-
2	.183	15.96	Av	9.9	.2	26.06	-	-	54.35	-28.29
3	.447	27.85	Pk	9.8	.2	37.85	56.93	-19.08	-	-
4	.435	13.3	Av	9.8	.2	23.3	-	-	47.16	-23.86
5	1.305	10.75	Pk	9.7	.3	20.75	56	-35.25	-	-
6	1.311	-2.8	Av	9.7	.3	7.2	-	-	46	-38.8
7	3.885	14.57	Pk	9.7	.3	24.57	56	-31.43	-	-
8	3.888	2.42	Av	9.7	.3	12.42	-	-	46	-33.58
9	8.952	22.72	Pk	9.8	.4	32.92	60	-27.08	-	-
10	8.928	11.11	Av	9.8	.4	21.31	-	-	50	-28.69
11	19.311	18.14	Pk	10.1	.4	28.64	60	-31.36	-	-
12	19.359	5.86	Av	10.1	.4	16.36	-	-	50	-33.64

Pk - Peak detector
 Av - Average detection

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	.18	33.89	Pk	9.9	.2	43.99	64.49	-20.5	-	-
14	.201	16.63	Av	9.8	.2	26.63	-	-	53.57	-26.94
15	.435	31.07	Pk	9.9	.2	41.17	57.16	-15.99	-	-
16	.435	14.49	Av	9.9	.2	24.59	-	-	47.16	-22.57
17	1.326	10.91	Pk	9.7	.3	20.91	56	-35.09	-	-
18	1.326	-1.13	Av	9.7	.3	8.87	-	-	46	-37.13
19	3.888	10.9	Pk	9.7	.3	20.9	56	-35.1	-	-
20	3.879	.18	Av	9.7	.3	10.18	-	-	46	-35.82
21	8.718	18.99	Pk	9.8	.4	29.19	60	-30.81	-	-
22	8.73	9.31	Av	9.8	.4	19.51	-	-	50	-30.49
23	18.6	14.13	Pk	10.2	.4	24.73	60	-35.27	-	-
24	18.6	5.29	Av	10.2	.4	15.89	-	-	50	-34.11

Pk - Peak detector
 Av - Average detection

END OF TEST REPORT