CERTIFICATION TEST REPORT

Report Number. : 4790776103-E5V2

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-X716B
FCC ID	:	A3LSMX716B
EUT Description	:	GSM/WCDMA/LTE 5G NR Tablet + BT/BLE, DTS/UNII a/b/g/n/ac/ax and WPT.
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2023-05-31

Prepared by:
UL KOREA LTD.
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Suwon Test Site: UL KOREA LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
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ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2023-05-12	Initial issue	Minju Cha
V2	2023-05-31	Updated to address TCB's question	Minju Cha

UL KOREA LTD. Suwon Laboratory FORM ID: FCC_15C(05)
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218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE 5G NR Tablet + BT/BLE, DTS/UNII a/b/g/n/ac/ax and WPT.

MODEL NUMBER: SM-X716B

SERIAL NUMBER: R32W300FP4W (CONDUCTED);
R32W300H3JA, R32W300FT2F (RADIATED);

DATE TESTED: 2023-04-03 ~ 2023-05-12

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
47 CFR 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:

Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:

Minju Cha
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

1. FCC 47 CFR Part 2.
2. FCC 47 CFR 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
☒ Chamber 1(3m semi-anechoic chamber)
☒ Chamber 2(3m semi-anechoic chamber)
☒ Chamber 3(3m semi-anechoic chamber)
☐ Chamber 4(3m Full-anechoic chamber)
☐ Chamber 5(3m Full-anechoic chamber)

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
28.9 dBuV/m = 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB

AC Corrected Reading (dBuV) = Measured Voltage (dBuV) + Extension Cord Loss (dB) + Cable Loss (dB)
44.72 dBuV = 34.72 dBuV + 9.9 dB + 0.1 dB

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.80 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.06 dB
Radiated Disturbance, Above 18 GHz	6.02 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 115:2021.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

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

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	1 Mbps	Peak	13.588	22.845
		Average	13.305	21.404
	2 Mbps	Peak	13.732	23.616
		Average	13.100	20.417

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 “BT/WIFI 1 (ANT 1)” maximum gain of 0.43 dBi and “BT/WIFI 2 (ANT 2)” maximum gain of 0.64 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.

- Worst axis: X

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 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	Freq. [MHz]	Conducted Burst Avg [dBm]	Symbol Rate [Ms/s]	Mode	Freq. [MHz]	Conducted Burst Avg [dBm]
1	1 Mbps 37 pkt ANT1	2 402	12.847	2	2 Mbps 37 pkt ANT1	2 402	12.637
		2 440	**13.305**			**2 440**	**13.100**
		2 480	12.069			2 480	11.843
	1 Mbps 37 pkt ANT2	2 402	11.206		2 Mbps 37 pkt ANT2	2 402	10.977
		2 440	11.542			2 440	11.315
		2 480	10.921			2 480	10.704
	1 Mbps 255 pkt ANT1	2 402	12.666		2 Mbps 255 pkt ANT1	2 402	12.498
		2 440	13.117			2 440	12.927
		2 480	11.900			2 480	11.702
	1 Mbps 255 pkt ANT2	2 402	11.037		2 Mbps 255 pkt ANT2	2 402	10.799
		2 440	11.281			2 440	11.073
		2 480	10.636			2 480	10.416
1 Coded S=8	125 kbps 37 pkt ANT1	2 402	8.677	1 Coded S=2	500 kbps 37 pkt ANT1	2 402	8.688
		2 440	8.901			2 440	8.910
		2 480	7.100			2 480	7.106
	125 kbps 37 pkt ANT2	2 402	6.984		500 kbps 37 pkt ANT2	2 402	7.011
		2 440	7.296			2 440	7.315
		2 480	5.881			2 480	5.893
	125 kbps 255 pkt ANT1	2 402	8.640		500 kbps 255 pkt ANT1	2 402	8.655
		2 440	8.862			2 440	8.882
		2 480	7.063			2 480	7.068
	125 kbps 255 pkt ANT2	2 402	6.971		500 kbps 255 pkt ANT2	2 402	6.978
		2 440	7.290			2 440	7.278
		2 480	5.877			2 480	5.858

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacture**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37TCCV0K9ASEA	N/A
Data Cable	SAMSUNG	EP-DW767	GH39-02132A	N/A

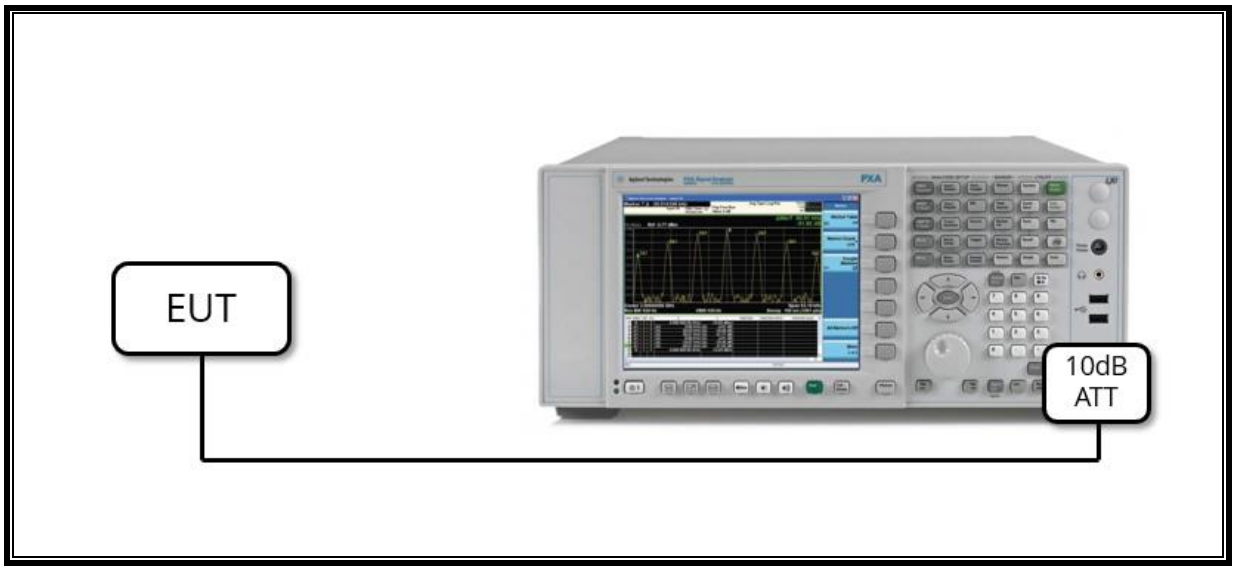
I/O CABLE

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	1.8 m	N/A

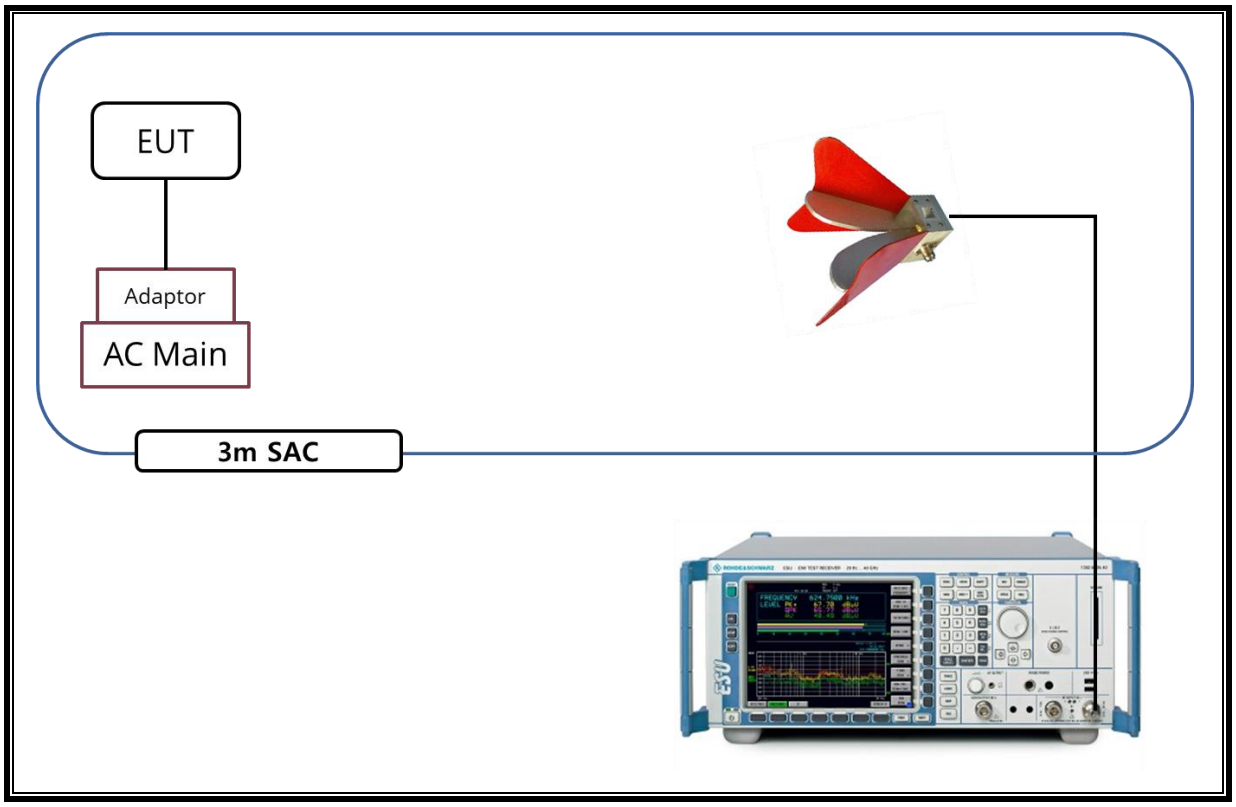
TEST SETUP

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. 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	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	2024-08-04
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
Antenna, Horn, 18 GHz	ETS	3117	00168724	2024-08-04
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2024-08-02
Preamplifier	ETS	3115-PA	00167475	2023-08-04
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2023-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2023-08-01
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2024-01-09
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2024-01-09
Average Power Sensor	Agilent / HP	U2000A	MY54270007	2023-08-03
Average Power Sensor	Agilent / HP	U2000A	MY54260010	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNACK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNACK	PE7004-10	2	2023-08-01
Attenuator	PASTERNACK	PE7087-10	A009	2023-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2023-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2023-08-01
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2023-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2023-08-01
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2023-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2023-08-01
LISN	R&S	ENV-216	101837	2023-08-04
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

7. TEST RESULTS SUMMARY

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

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8. 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 ≥ 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

9. ANTENNA PORT TEST RESULTS

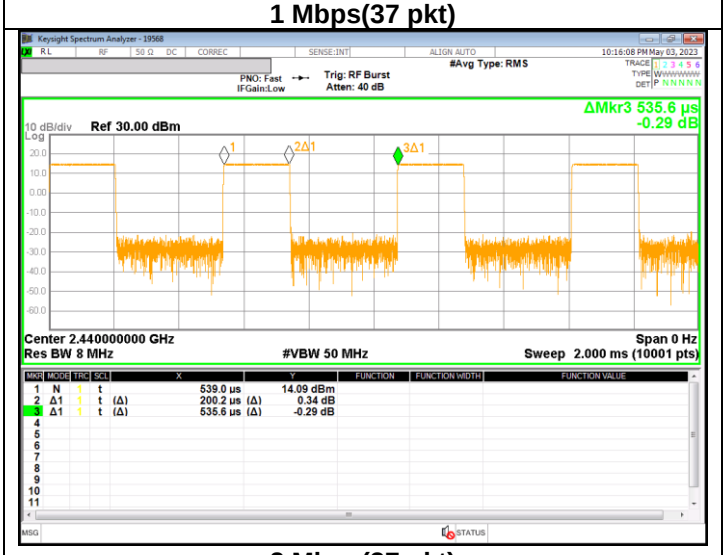
9.1. ON TIME AND DUTY CYCLE

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 [37 pkt]	0.385	0.756	0.510	50.952	2.928	2.597
2 Mbps [37 pkt]	0.200	0.536	0.373	37.341	4.278	5.000

1 Mbps(37 pkt)



2 Mbps(37 pkt)

9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

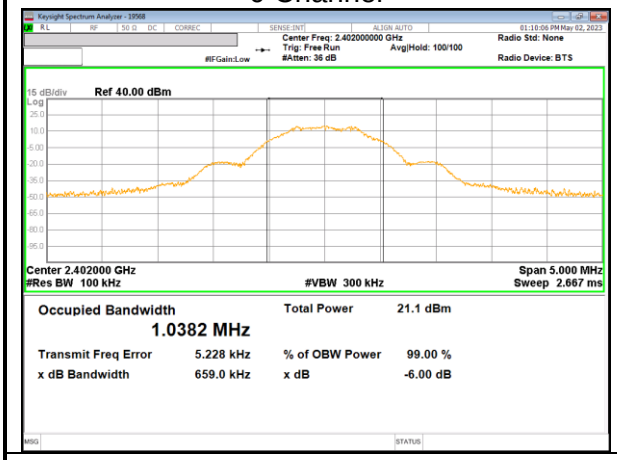
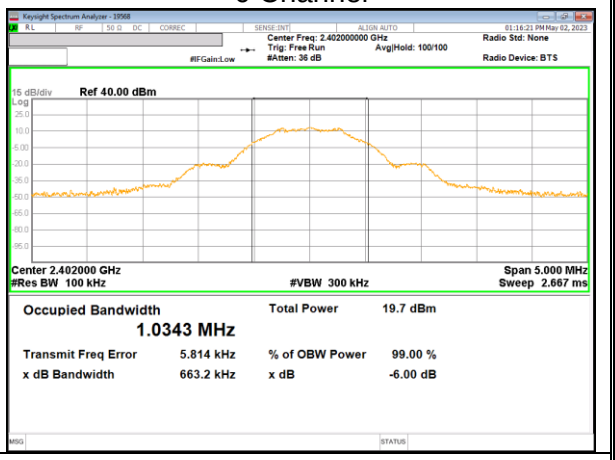
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

9.2.1. Test data

Mode	Antenna	Channel	Frequency [MHz]	6 dB Bandwidth [kHz]	Minimum Limit [kHz]
1 Mbps (37pkt)	ANT1	0	2 402	659.0	500.0
		19	2 440	695.9	500.0
		39	2 480	664.0	500.0
	ANT2	0	2 402	663.2	500.0
		19	2 440	651.9	500.0
		39	2 480	647.0	500.0
2 Mbps (37pkt)	ANT1	0	2 402	1132.0	500.0
		19	2 440	1157.0	500.0
		39	2 480	1104.0	500.0
	ANT2	0	2 402	1132.0	500.0
		19	2 440	1125.0	500.0
		39	2 480	1130.0	500.0
Worst				**647.0**	**500.0**

9.2.2. 6 dB BANDWIDTH PLOTS

1 Mbps ANT1	1 Mbps ANT2
0 Channel	0 Channel
	
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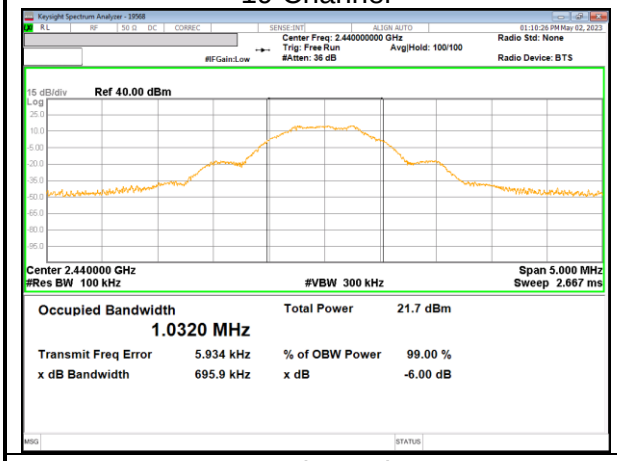	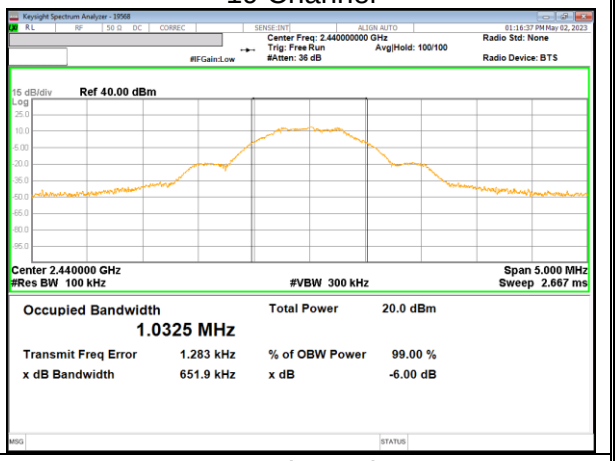
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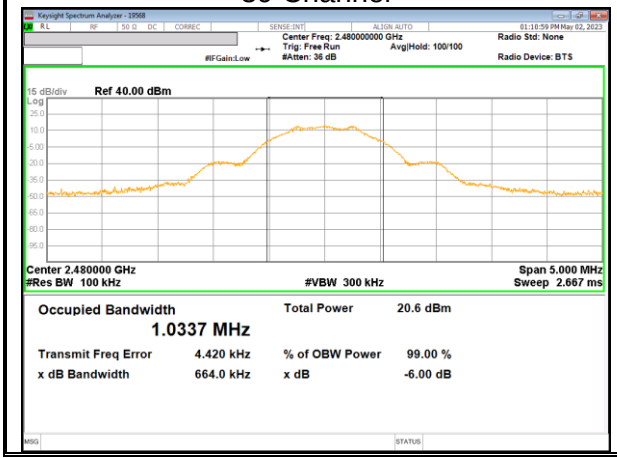
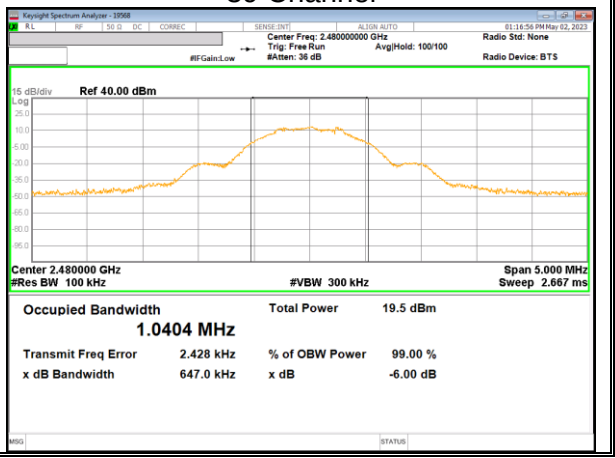
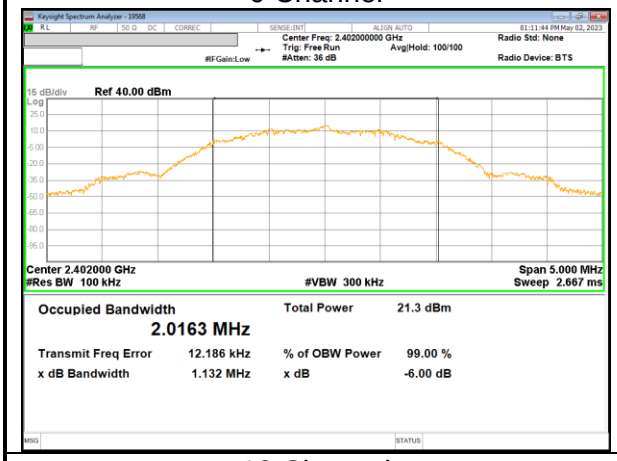
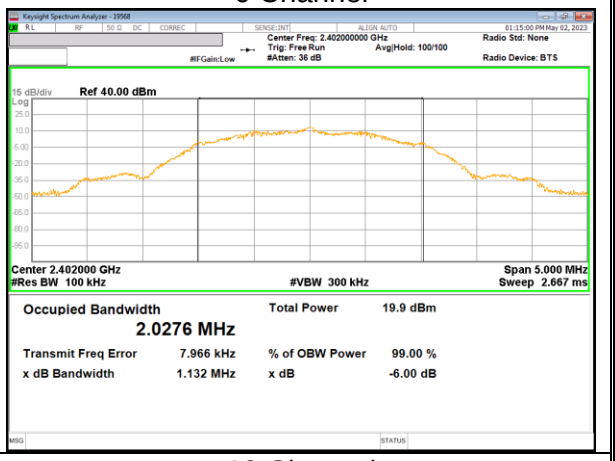
	

2 Mbps ANT1	2 Mbps ANT2
0 Channel	0 Channel
	
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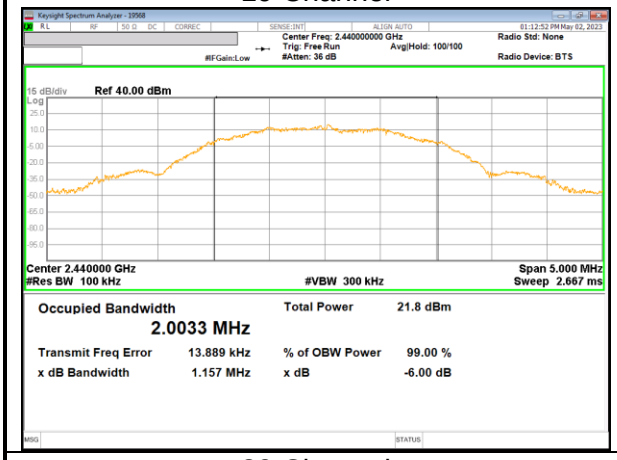	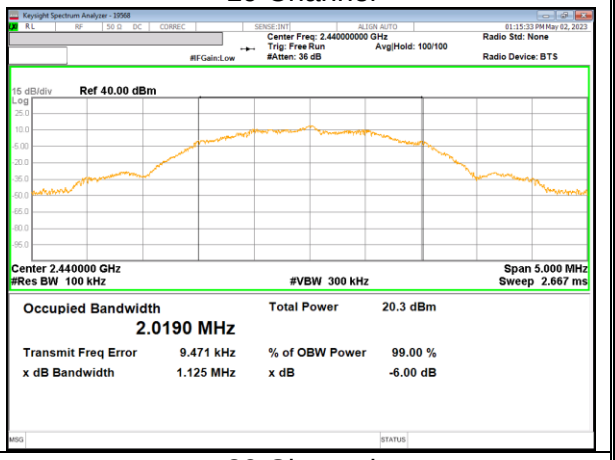
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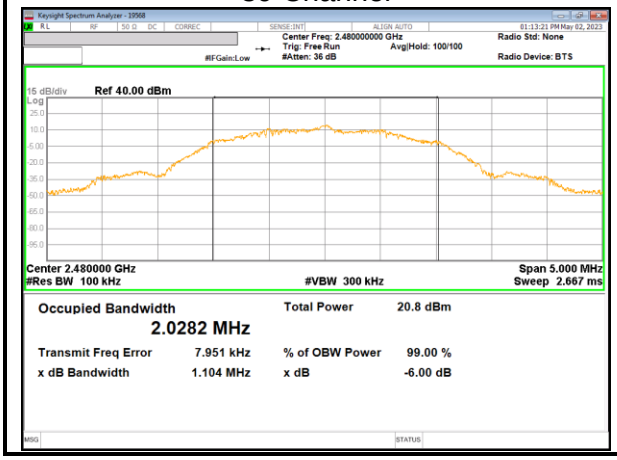
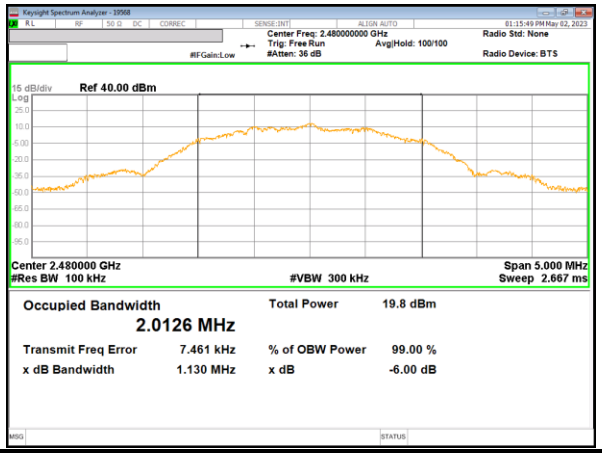
	

9.3. OUTPUT POWER

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

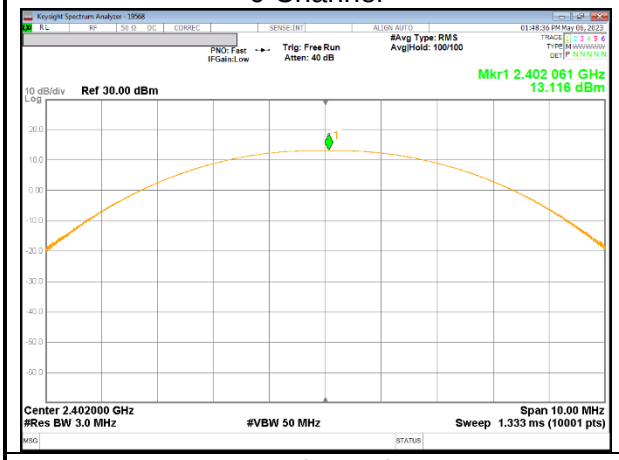
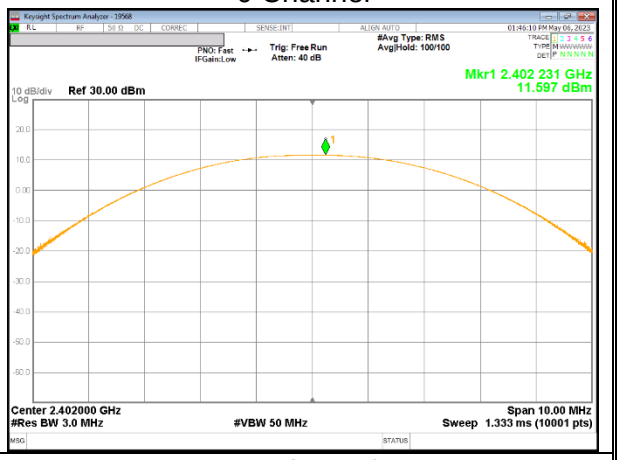
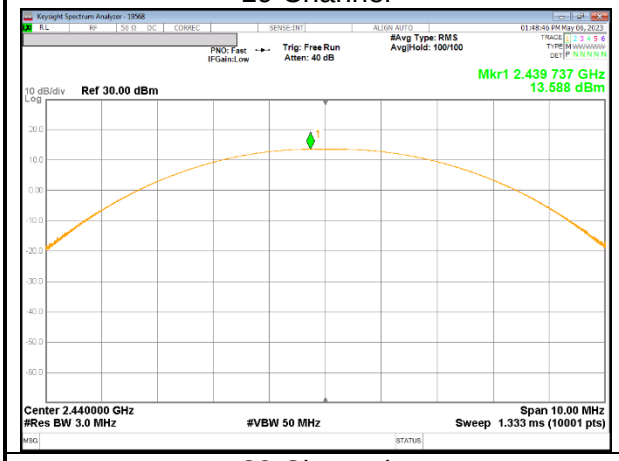
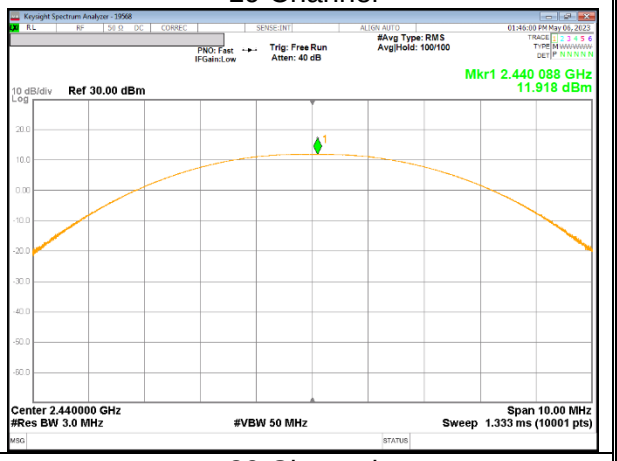
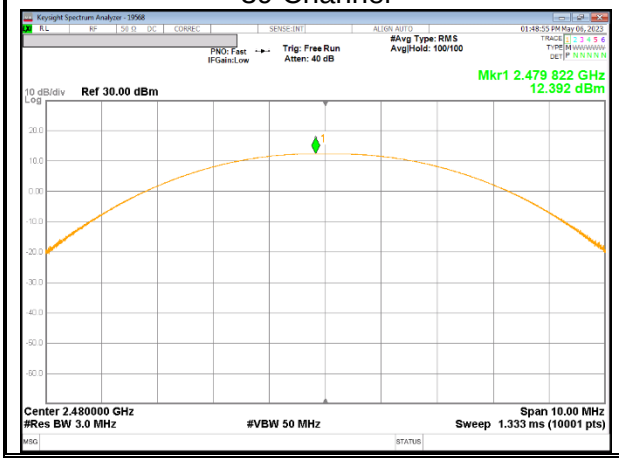
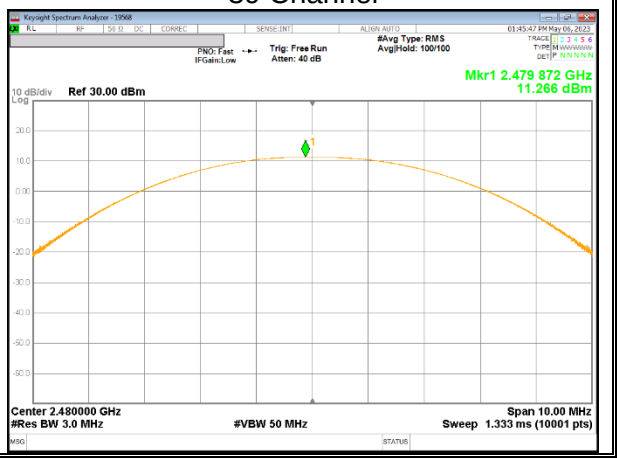
Peak power is measured using ANSI C63.10(2013) under section 11.9.1.1 utilizing spectrum analyzer.

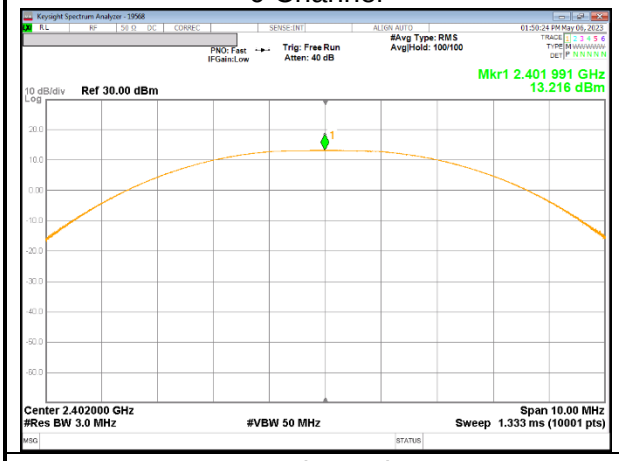
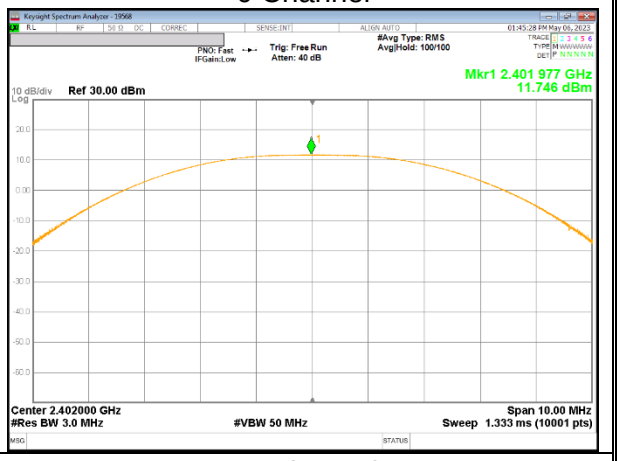
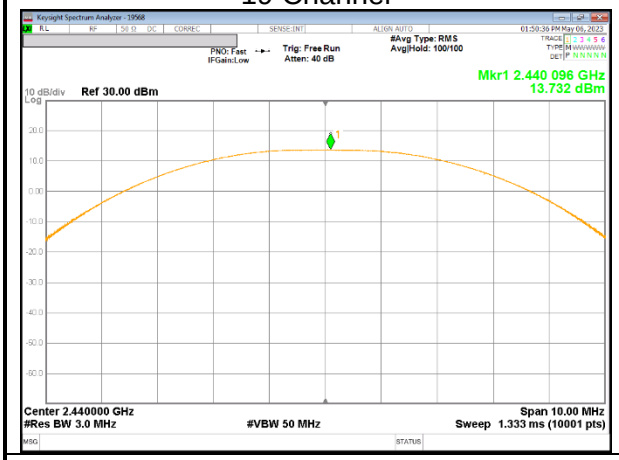
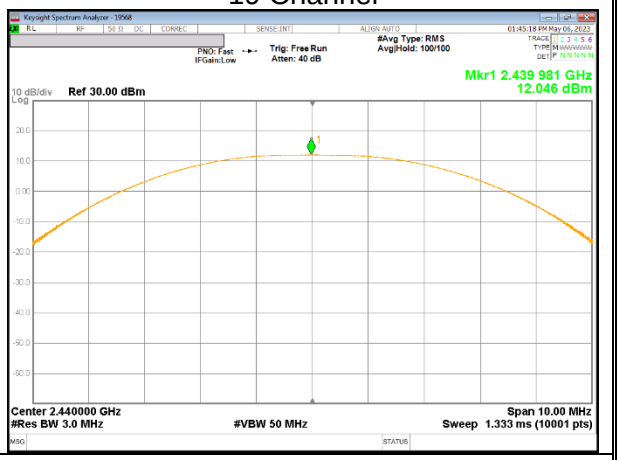
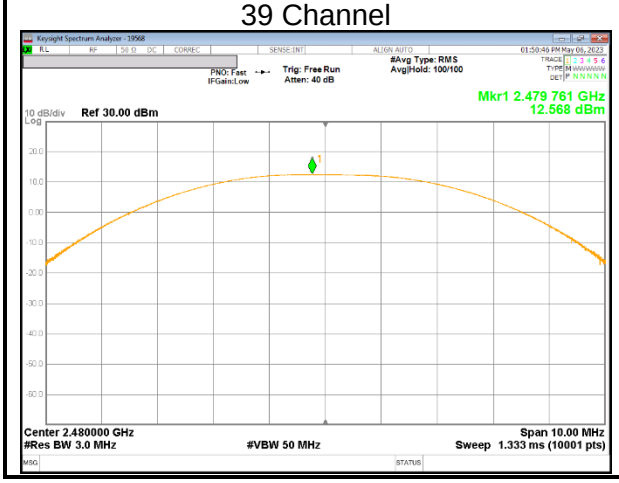
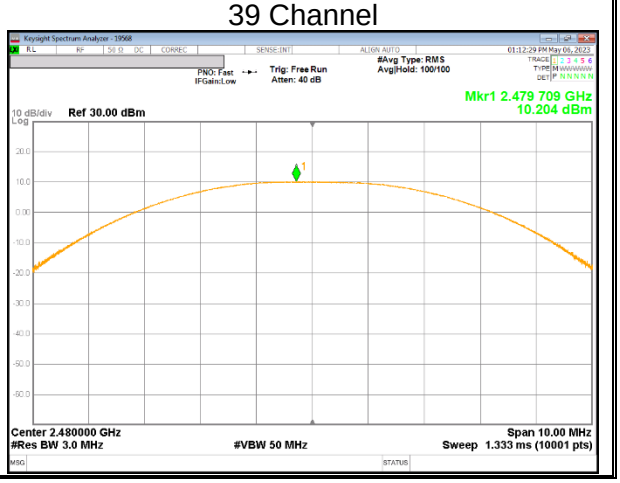
RESULTS

9.3.1. Test data

Mode	Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
1 Mbps (37 pkt)	ANT1	0	2 402	13.116	30.000	-16.884
		19	2 440	13.588		-16.412
		39	2 480	12.392		-17.608
	ANT2	0	2 402	11.597		-18.403
		19	2 440	11.918		-18.082
		39	2 480	11.266		-18.734
2 Mbps (37 pkt)	ANT1	0	2 402	13.216		-16.784
		19	**2 440**	**13.732**		**-16.268**
		39	2 480	12.568		-17.432
	ANT2	0	2 402	11.746		-18.254
		19	2 440	12.046		-17.954
		39	2 480	10.204		-19.796
Worst				**13.732**		**-16.268**

9.3.2. PEAK POWER PLOTS

1 Mbps ANT1	1 Mbps ANT2
0 Channel	0 Channel
	
19 Channel	19 Channel
	
39 Channel	39 Channel
	

2 Mbps ANT1	2 Mbps ANT2
0 Channel	0 Channel
	
19 Channel	19 Channel
	
39 Channel	39 Channel
	

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. Test data

Mode	Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
1 Mbps (37pkt)	ANT1	0	2 402	12.847	19.262
		19	**2 440**	**13.305**	**21.404**
		39	2 480	12.069	16.103
	ANT2	0	2 402	11.206	13.201
		19	2 440	11.542	14.263
		39	2 480	10.921	12.362
2 Mbps (37 pkt)	ANT1	0	2 402	12.637	18.353
		19	**2 440**	**13.100**	**20.417**
		39	2 480	11.843	15.286
	ANT2	0	2 402	10.977	12.523
		19	2 440	11.315	13.536
		39	2 480	10.704	11.760

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9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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

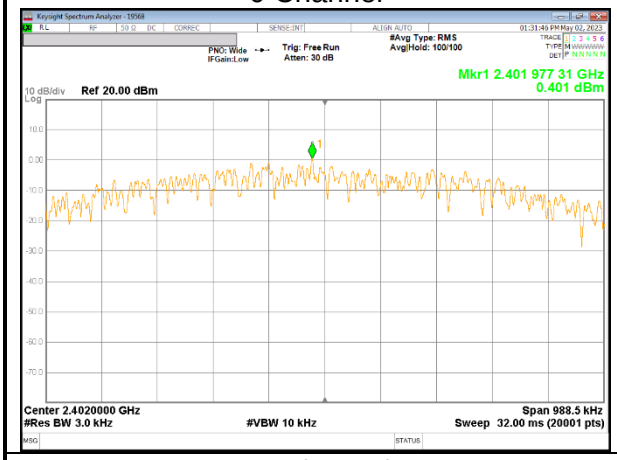
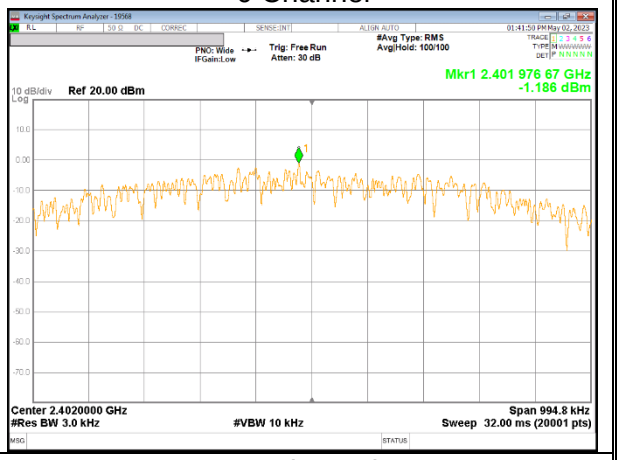
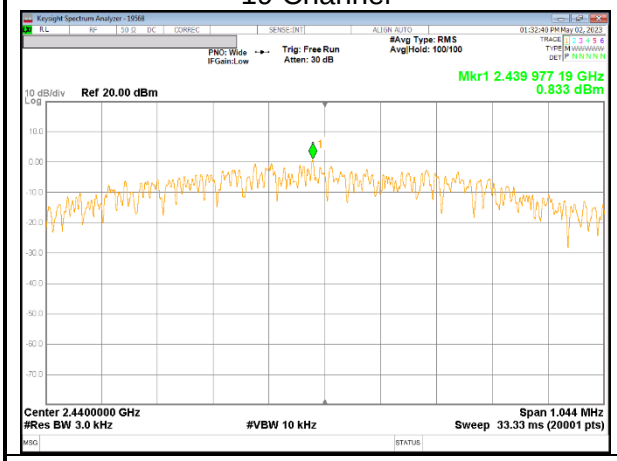
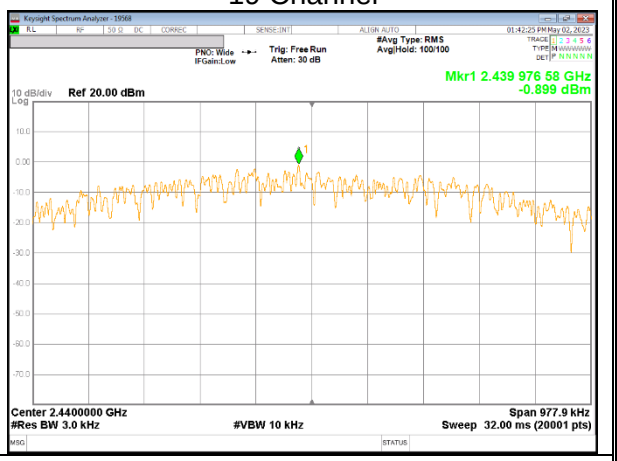
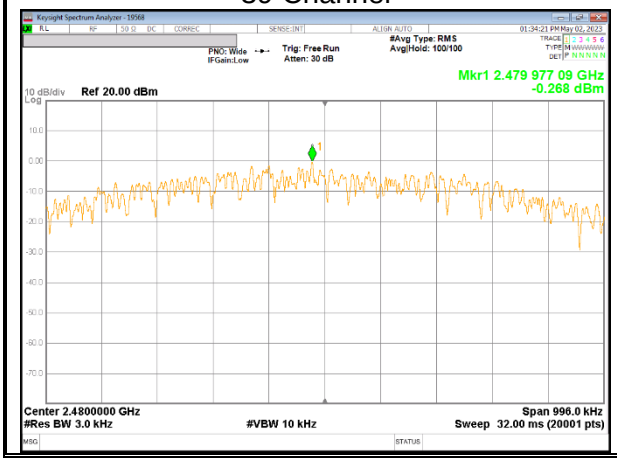
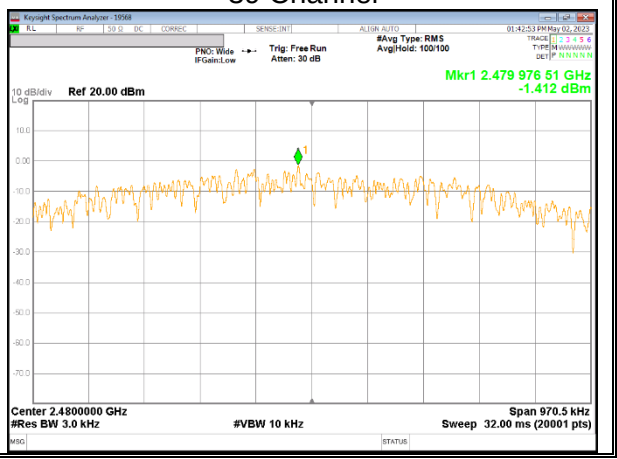
ANSI C63.10-2013, Section 11.10.2 Method PKPSD (peak PSD)

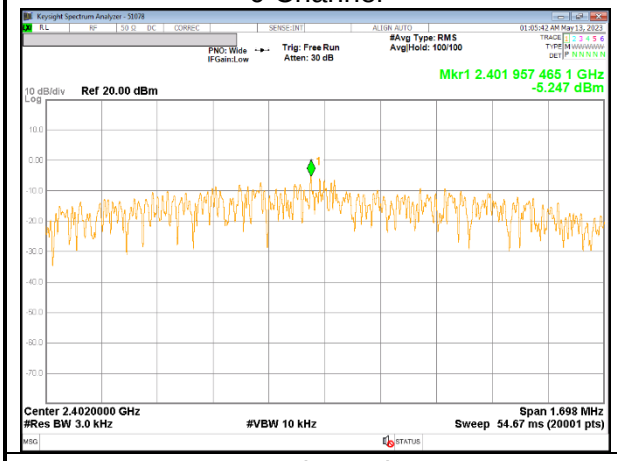
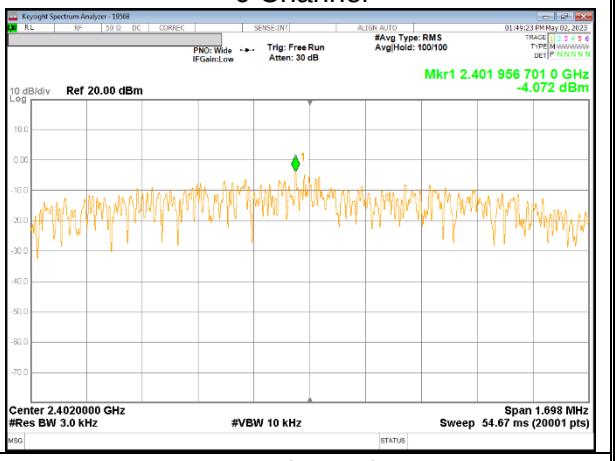
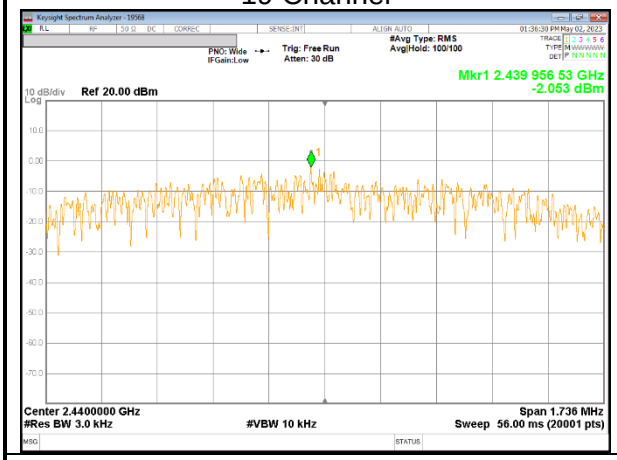
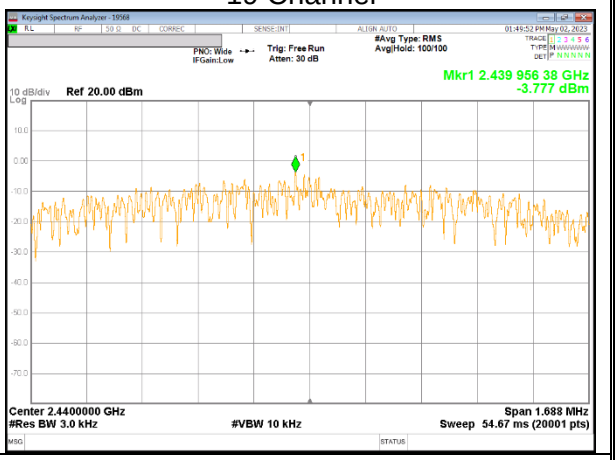
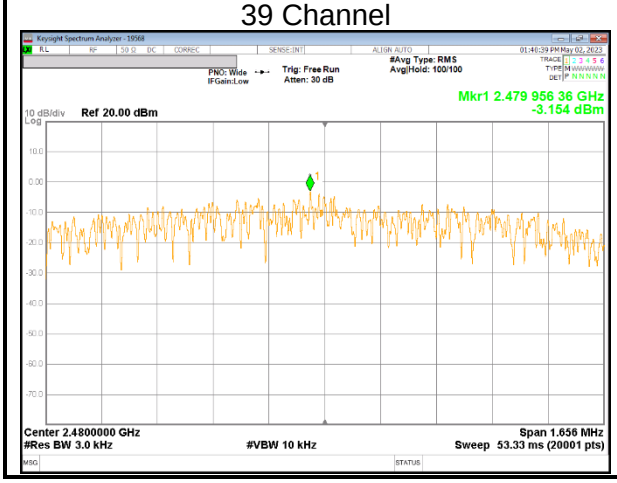
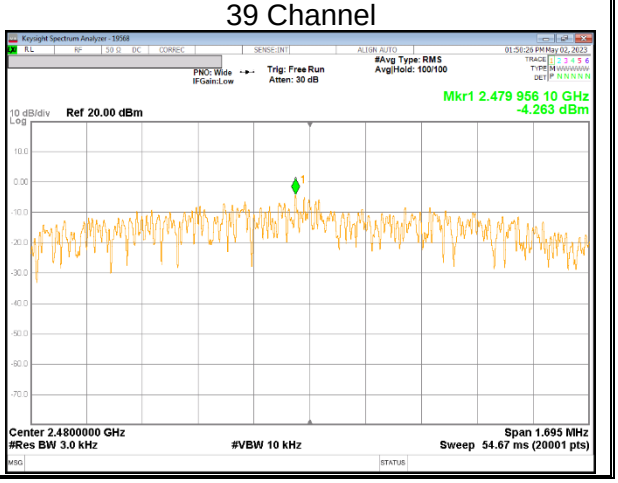
RESULTS

9.5.1. Test data

Mode	Antenna	Channel	Frequency [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
1 Mbps (37pkt)	ANT1	0	2 402	0.401	8.00	-7.599
		19	**2 440**	**0.833**		**-7.167**
		39	2 480	-0.268		-8.268
	ANT2	0	2 402	-1.186		-9.186
		19	2 440	-0.899		-8.899
		39	2 480	-1.412		-9.412
2 Mbps (37 pkt)	ANT1	0	2 402	-5.247		-10.571
		19	2 440	-2.053		-10.053
		39	2 480	-3.154		-11.154
	ANT2	0	2 402	-4.072		-12.072
		19	2 440	-3.777		-11.777
		39	2 480	-4.263		-12.263
Worst				**0.833**		**-7.167**

9.5.2. PSD TEST PLOTS

1 Mbps ANT1	1 Mbps ANT2
0 Channel	0 Channel
	
19 Channel	19 Channel
	
39 Channel	39 Channel
	

2 Mbps ANT1	2 Mbps ANT2
0 Channel	0 Channel
	
19 Channel	19 Channel
	
39 Channel	39 Channel
	

9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

RESULTS

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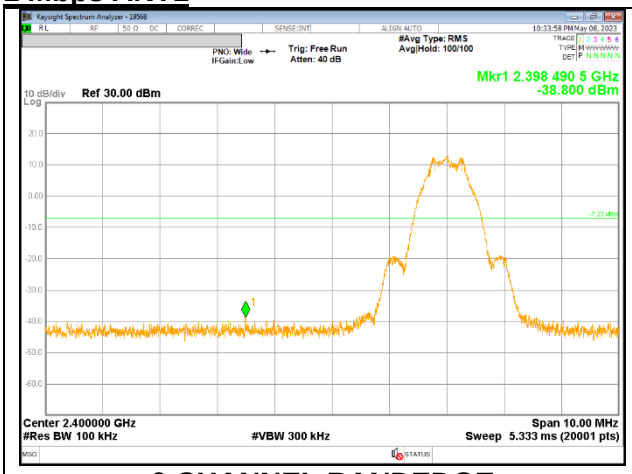
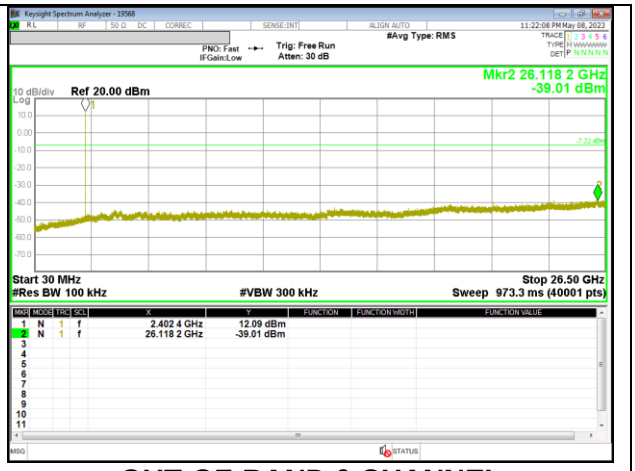
9.6.1. CONDUCTED SUPRIOUS EMISSIONS TEST PLOTS

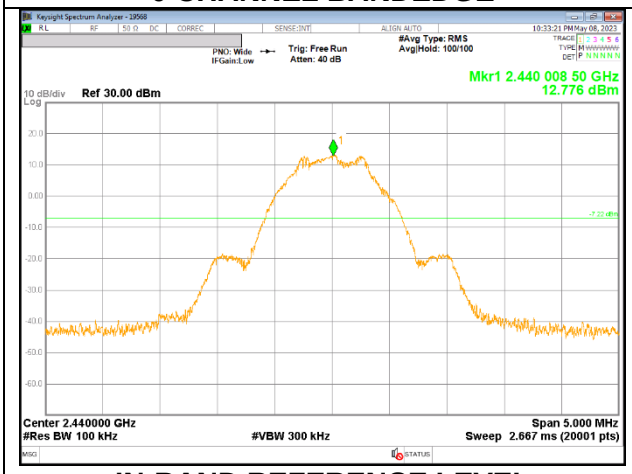
1 Mbps ANT1



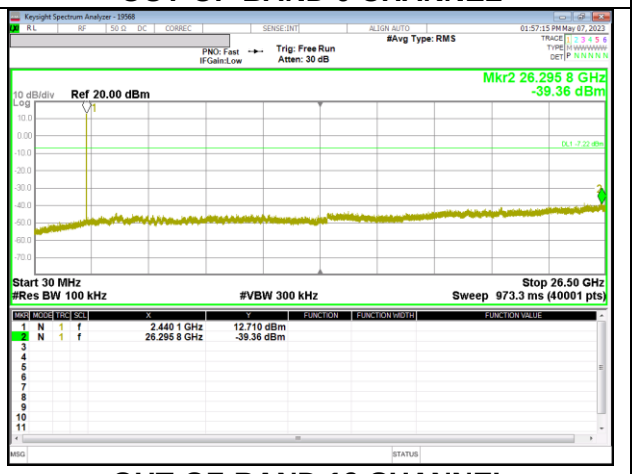
0 CHANNEL BANDEDGE



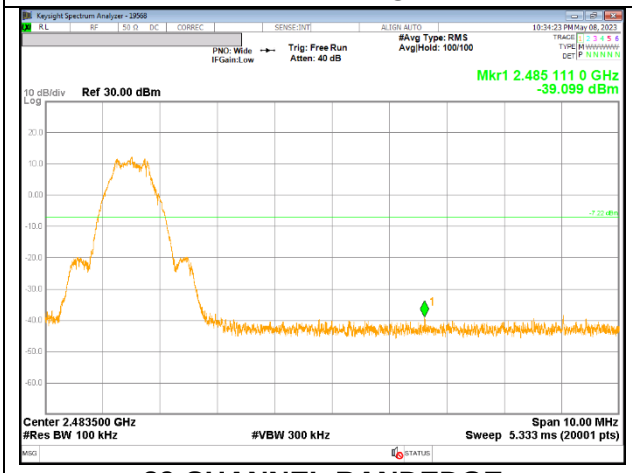
OUT-OF-BAND 0 CHANNEL



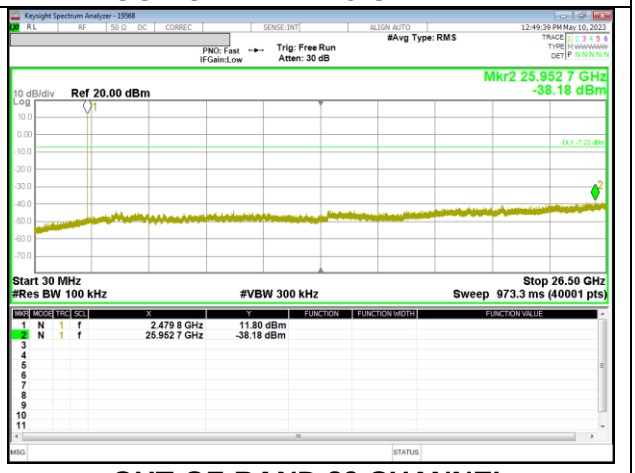
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 19 CHANNEL

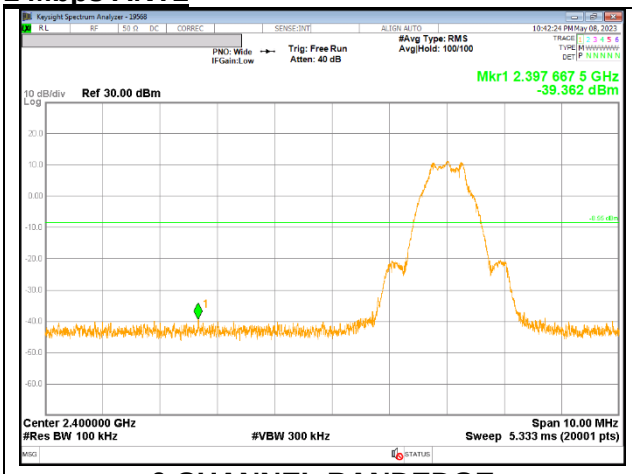


39 CHANNEL BANDEDGE

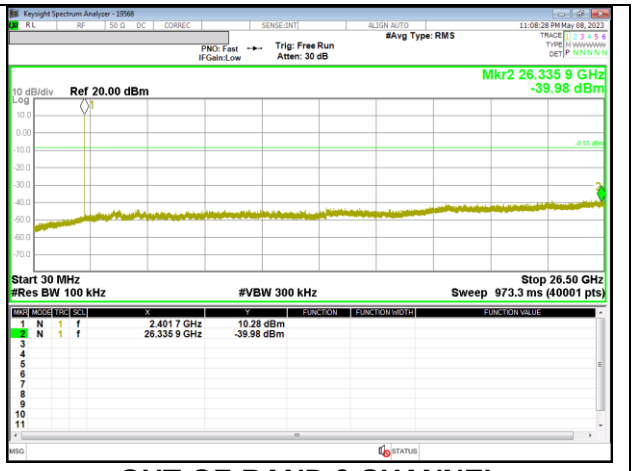


OUT-OF-BAND 39 CHANNEL

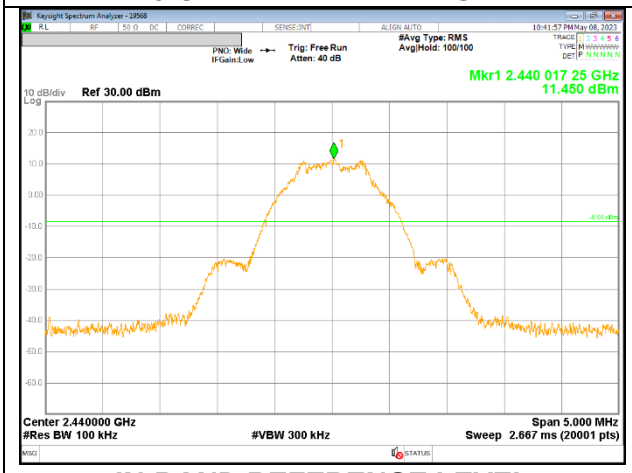
1 Mbps ANT2



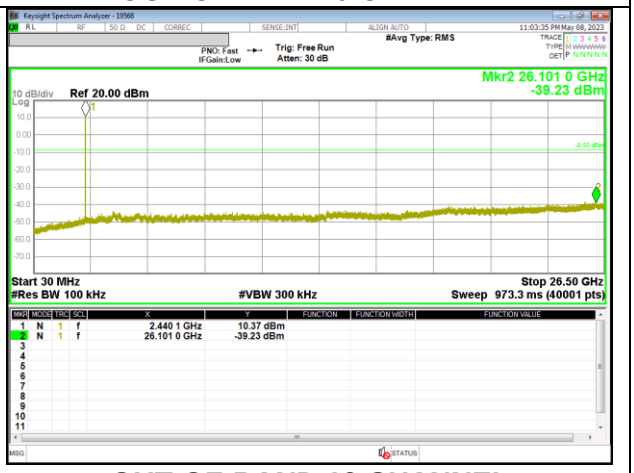
0 CHANNEL BANDEDGE



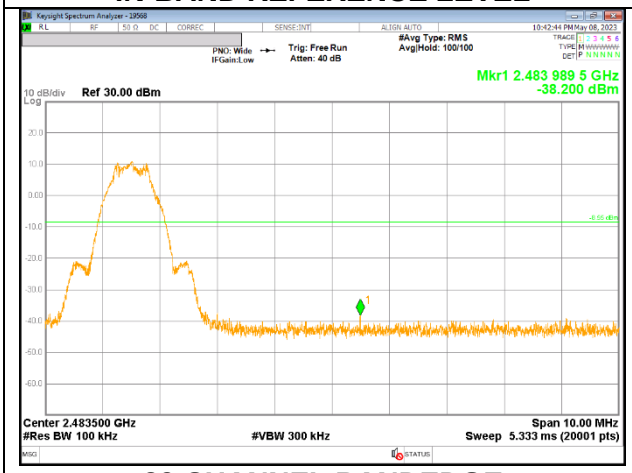
OUT-OF-BAND 0 CHANNEL



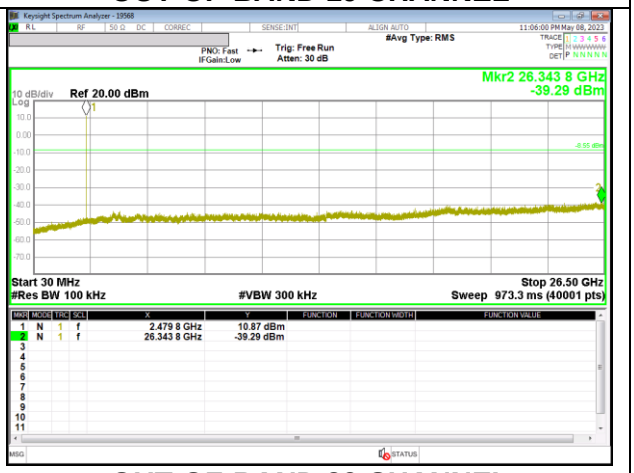
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 19 CHANNEL

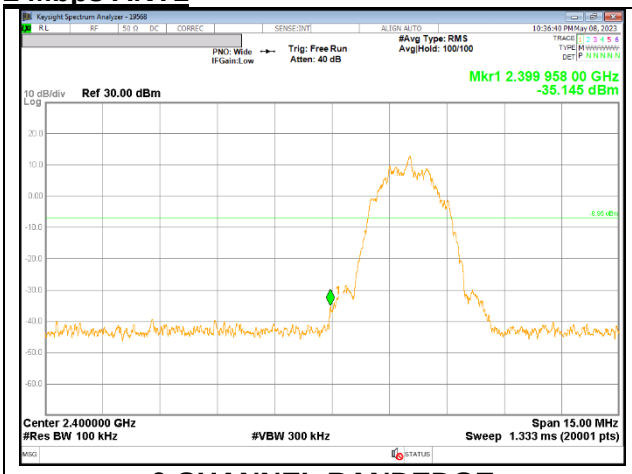


39 CHANNEL BANDEDGE

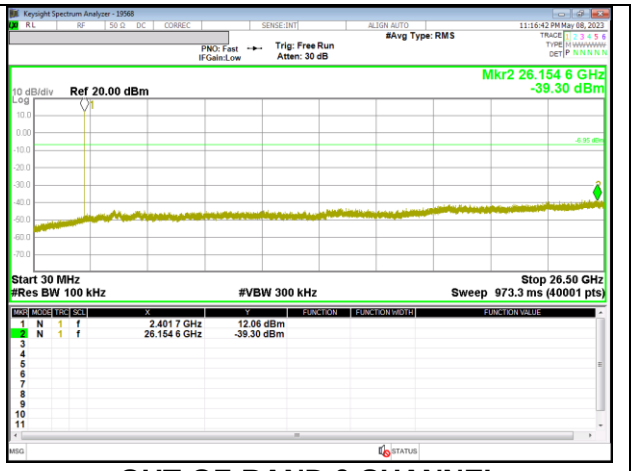


OUT-OF-BAND 39 CHANNEL

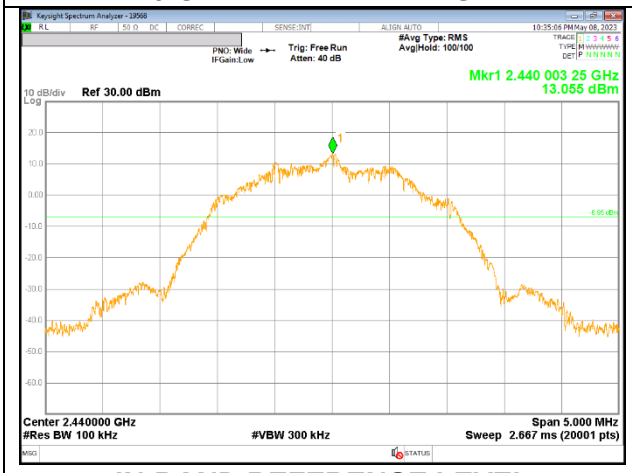
2 Mbps ANT1



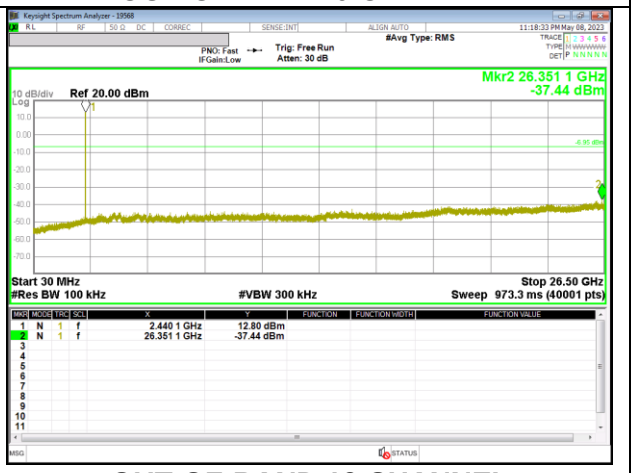
0 CHANNEL BANDEDGE



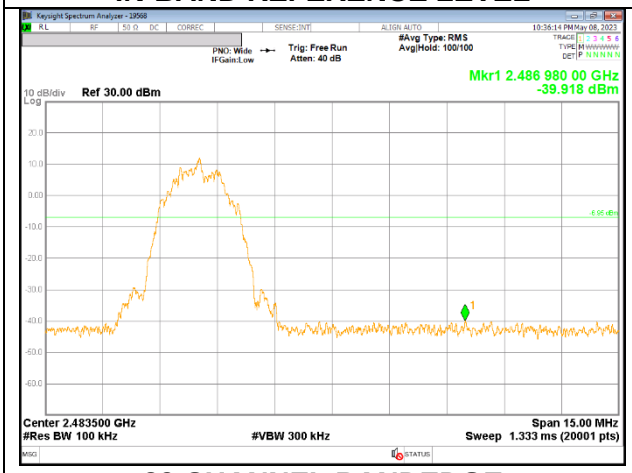
OUT-OF-BAND 0 CHANNEL



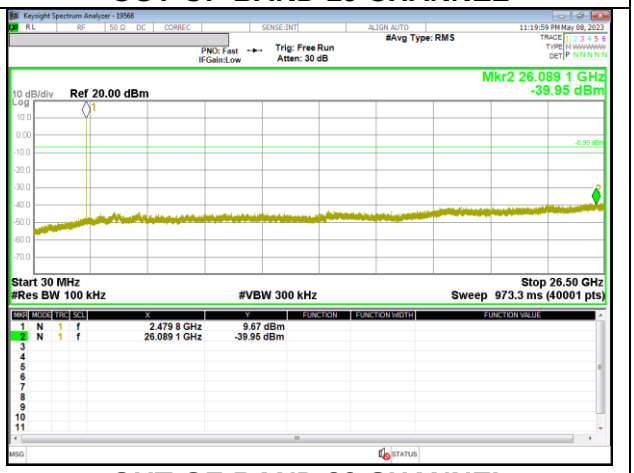
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 19 CHANNEL

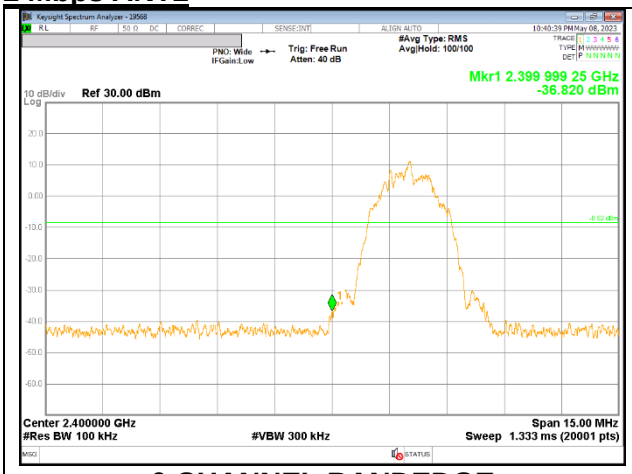


39 CHANNEL BANDEDGE

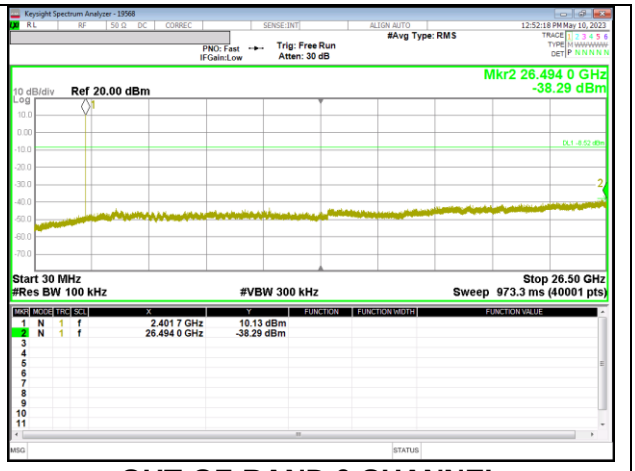


OUT-OF-BAND 39 CHANNEL

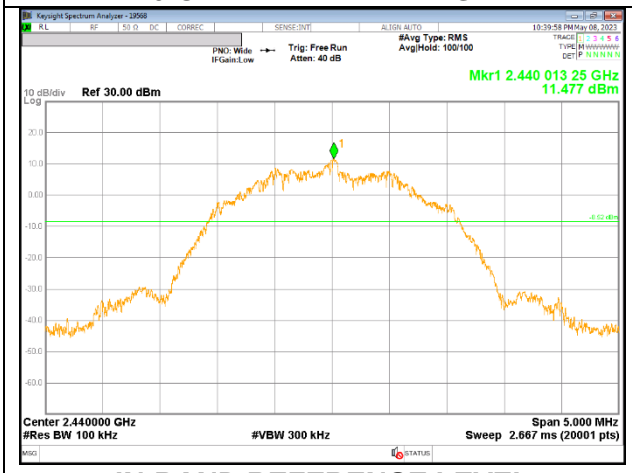
2 Mbps ANT2



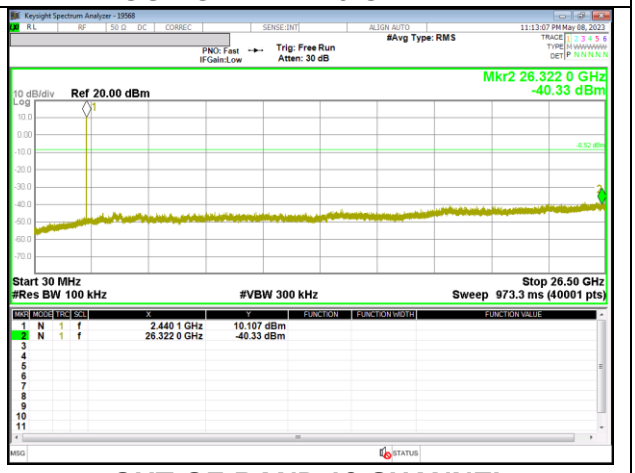
0 CHANNEL BANDEDGE



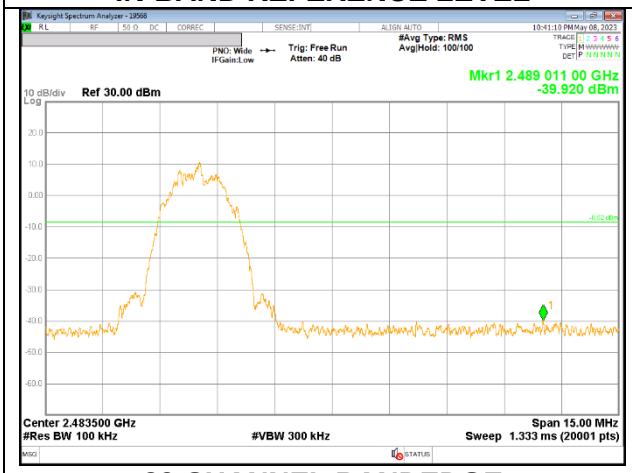
OUT-OF-BAND 0 CHANNEL



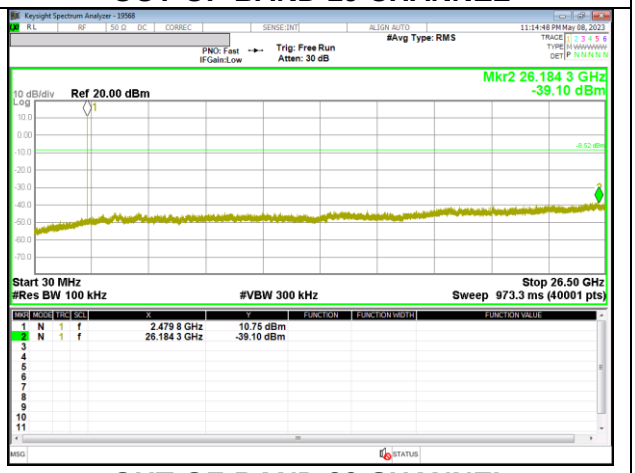
IN-BAND REFERENCE LEVEL



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 = 10log(1/0.510)=2.928 dB (Spectrum Analyzer round it up to 2.93 dB) and for 2 Mbps, DCF = 10log(1/0.373)=4.278 dB (Spectrum Analyzer round it up to 4.28 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.

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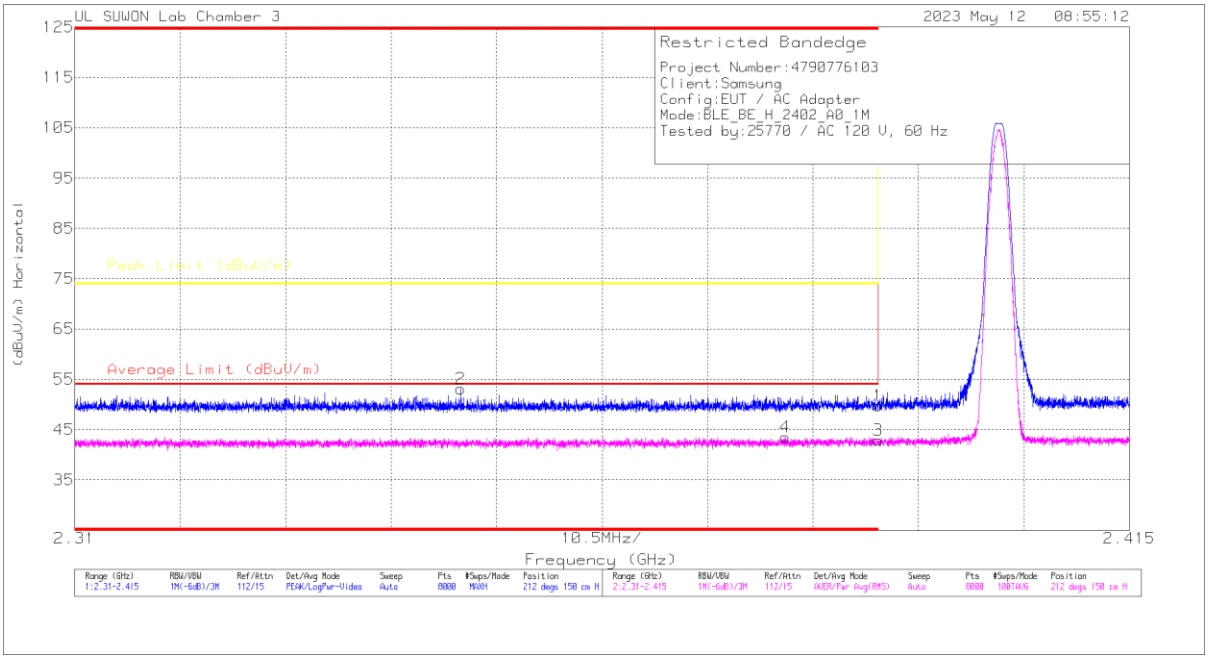
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. 1 Mbps ANT1

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

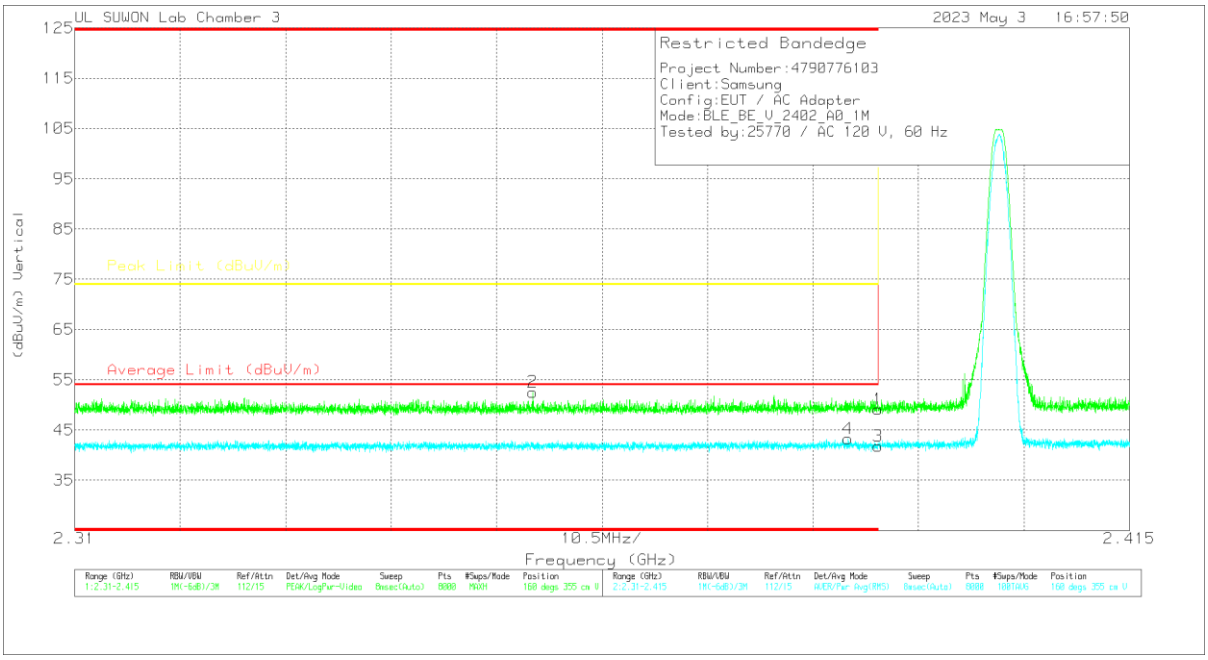


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.79	Pk	32.1	-25.1	0	49.79	-	-	74	-24.21	212	150	H
2	* 2.34844	46.21	Pk	32	-25.1	0	53.11	-	-	74	-20.89	212	150	H
3	* 2.39	32.92	RMS	32.1	-25.1	2.93	42.85	54	-11.15	-	-	212	150	H
4	* 2.38073	33.64	RMS	32.1	-25.1	2.93	43.57	54	-10.43	-	-	212	150	H

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

VERTICAL RESULT



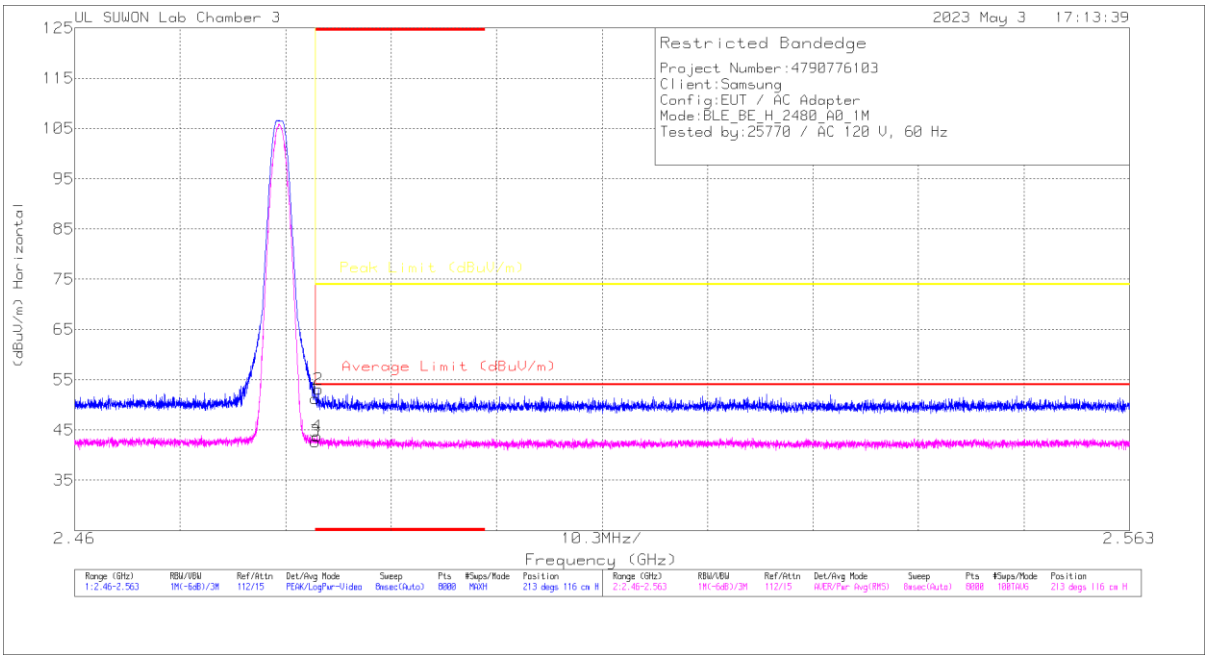
Trace Markers

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	42.18	Pk	32.1	-25.1	0	49.18	-	-	74	-24.82	160	355	V
2	* 2.35563	45.66	Pk	32	-25.1	0	52.56	-	-	74	-21.44	160	355	V
3	* 2.39	31.8	RMS	32.1	-25.1	2.93	41.73	54	-12.27	-	-	160	355	V
4	* 2.38698	33.31	RMS	32.1	-25.1	2.93	43.24	54	-10.76	-	-	160	355	V

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

BANDEDGE (39 CHANNEL)

HORIZONTAL RESULT

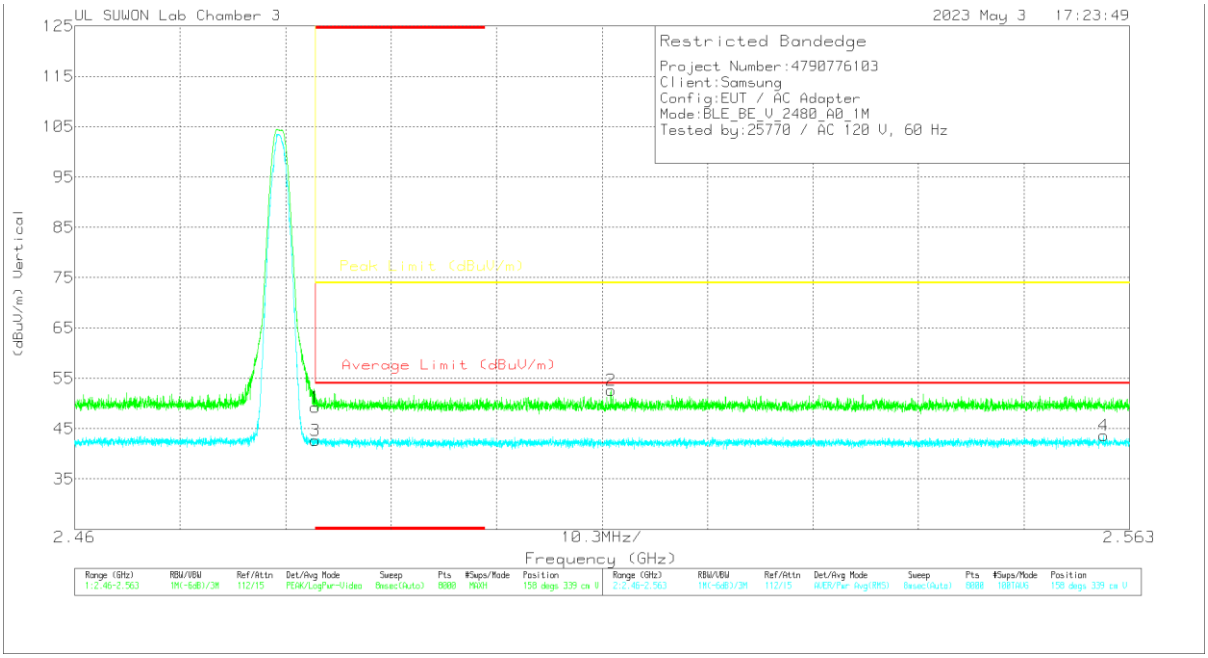


Trace Markers

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	43.83	Pk	32.4	-25	0	51.23	-	-	74	-22.77	213	116	H
2	* 2.48381	45.69	Pk	32.4	-25	0	53.09	-	-	74	-20.91	213	116	H
3	* 2.4835	32.39	RMS	32.4	-25	2.93	42.72	54	-11.28	-	-	213	116	H
4	* 2.48368	33.49	RMS	32.4	-25	2.93	43.82	54	-10.18	-	-	213	116	H

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

VERTICAL RESULT



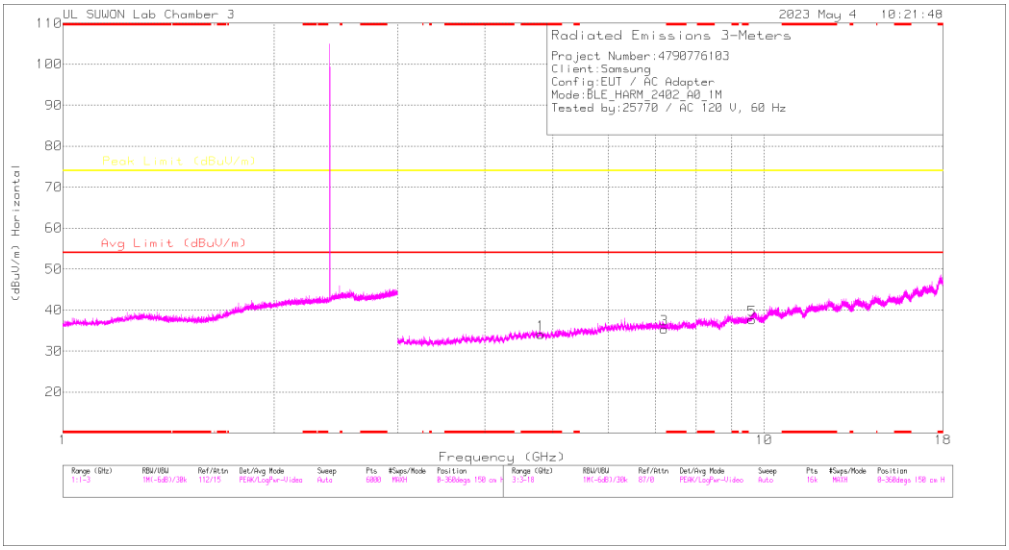
Trace Markers

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	* 2.4835	41.91	Pk	32.4	-25	0	49.31	-	-	74	-24.69	158	339	V
2	2.51236	45.11	Pk	32.4	-24.9	0	52.61	-	-	74	-21.39	158	339	V
3	* 2.4835	32.31	RMS	32.4	-25	2.93	42.64	54	-11.36	-	-	158	339	V
4	2.56047	33.28	RMS	32.4	-25	2.93	43.61	54	-10.39	-	-	158	339	V

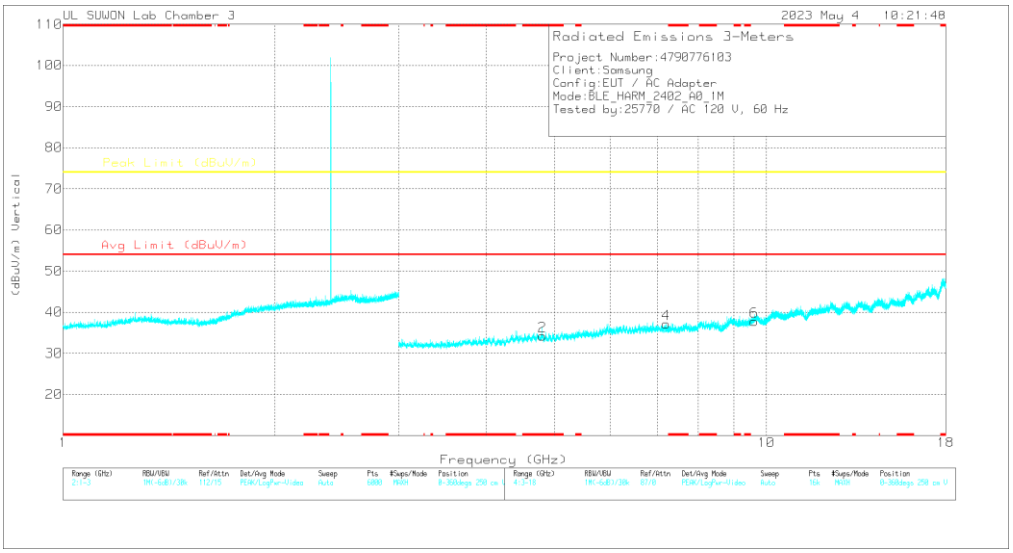
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

0 CHANNEL RESULTS



HORIZONTAL



VERTICAL

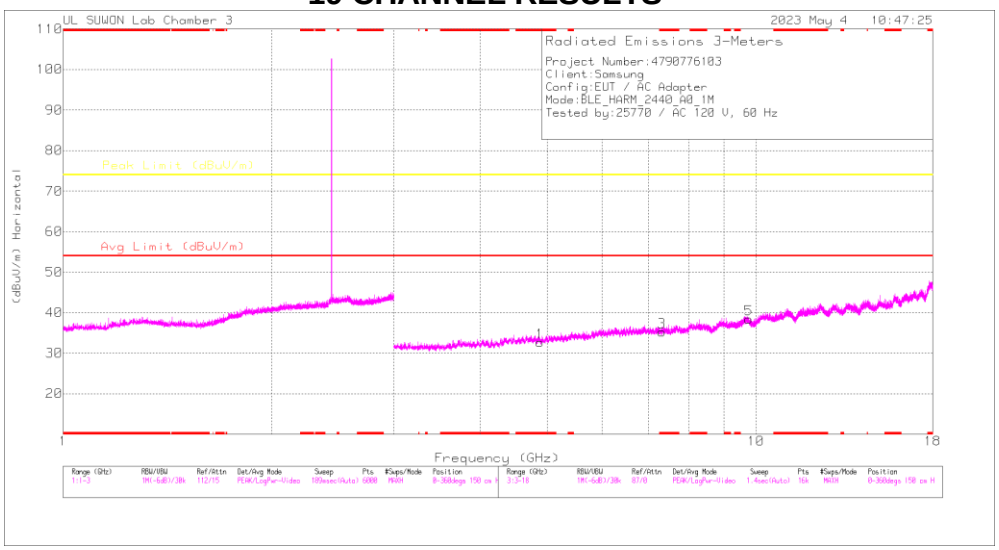
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

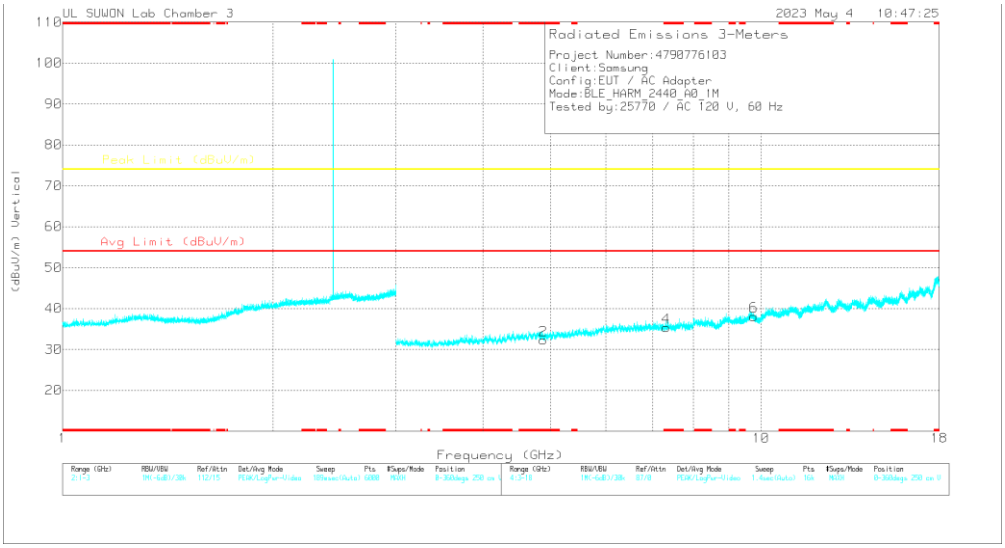
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	3GHz_HP(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80365	40.2	PK2	34.3	-30.1	0	44.4	-	-	74	-29.6	0	100	H
* 4.80196	40.39	PK2	34.3	-30.1	0	44.59	-	-	74	-29.41	0	100	V
7.20629	35.75	PK2	35.8	-25.7	0	45.85	-	-	74	-28.15	0	100	H
7.20629	35.98	PK2	35.8	-25.7	0	46.08	-	-	74	-27.92	0	100	V
9.60821	33.61	PK2	36.7	-21.7	0	48.61	-	-	74	-25.39	0	100	H
9.60764	32.87	PK2	36.7	-21.7	0	47.87	-	-	74	-26.13	0	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
* 4.88247	39.46	PK2	34.2	-30.9	0	42.76	-	-	74	-31.24	0	100	H
* 4.87836	40.23	PK2	34.2	-30.8	0	43.63	-	-	74	-30.37	0	100	V
* 7.32176	34.84	PK2	35.8	-25.4	0	45.24	-	-	74	-28.76	0	100	H
* 7.32176	32.3	PK2	35.8	-25.4	0	45.0	-	-	74	-25.9	0	100	V
9.76096	32.14	PK2	36.9	-21.2	0	47.84	-	-	74	-26.16	0	100	H
9.76158	32.64	PK2	36.9	-21.2	0	48.34	-	-	74	-25.66	0	100	V

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

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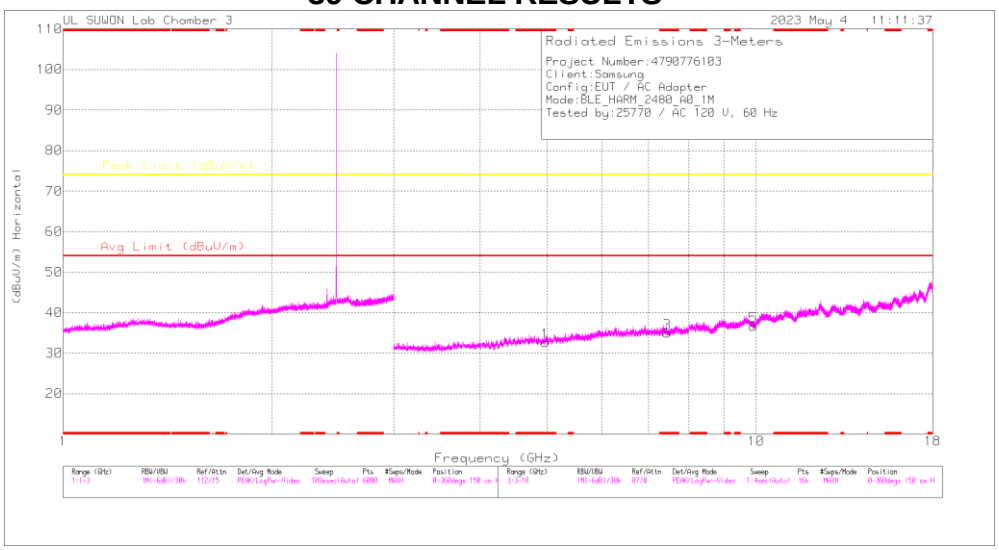
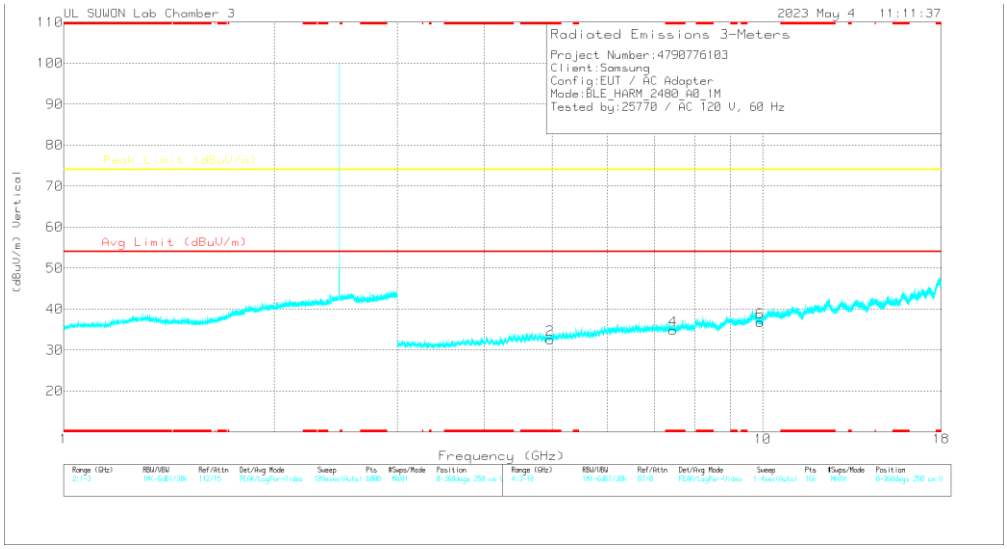
39 CHANNEL RESULTS



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
* 4.95963	39.12	PK2	34.3	-30.5	0	42.92	-	-	74	-31.08	0	100	H
* 4.96102	39.54	PK2	34.3	-30.5	0	43.34	-	-	74	-30.66	0	100	V
* 7.43967	35	PK2	35.7	-25.1	0	45.6	-	-	74	-28.4	0	100	H
* 7.43948	35.09	PK2	35.7	-25.1	0	45.69	-	-	74	-28.31	0	100	V
9.91931	31.16	PK2	37.1	-21.3	0	46.96	-	-	74	-27.04	0	100	H
9.91963	32.24	PK2	37.1	-21.4	0	47.94	-	-	74	-26.06	0	100	V

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

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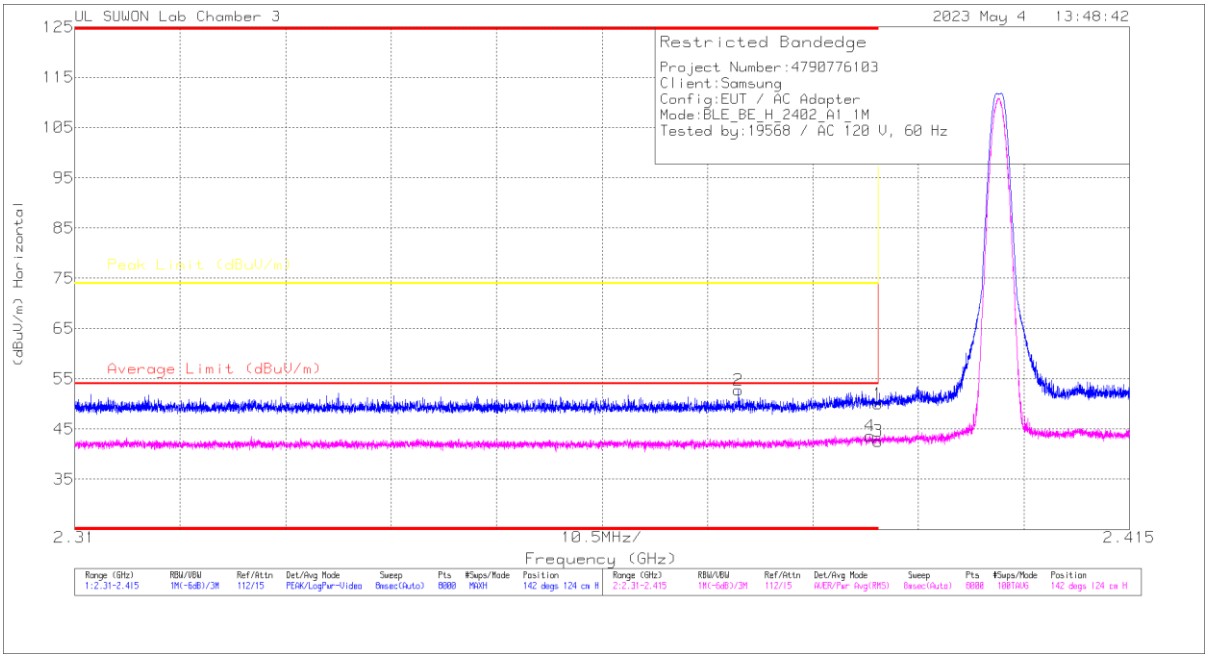
10.2.2. 1 Mbps ANT2

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

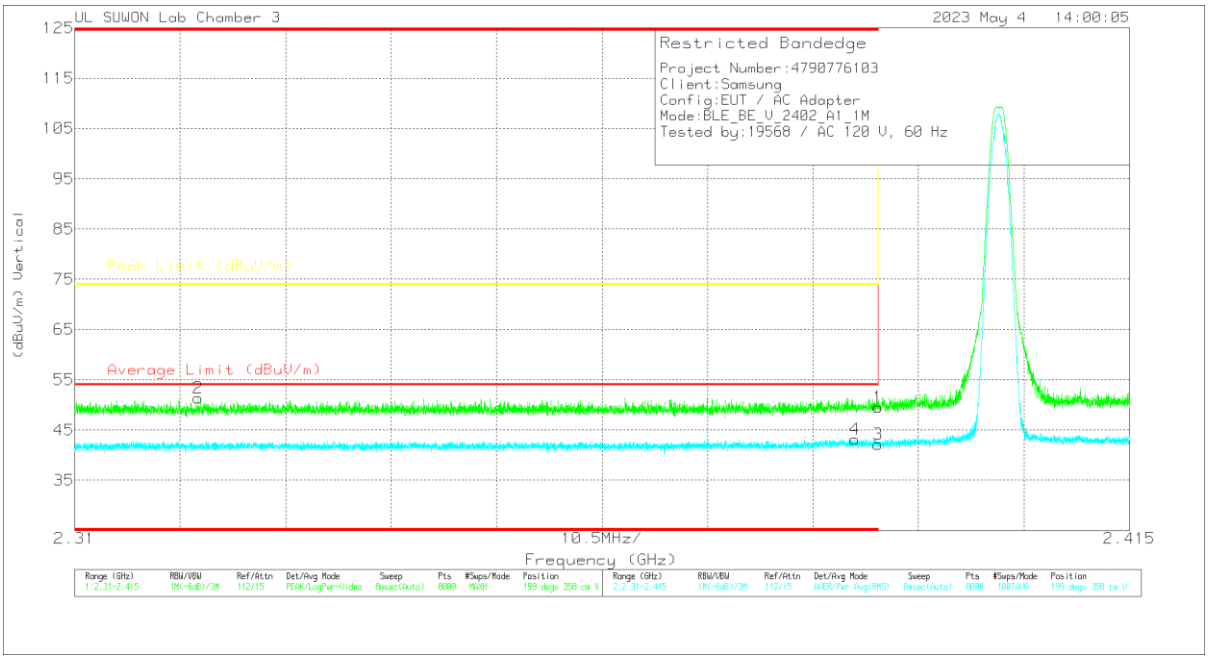


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.96	Pk	32.1	-25.1	0	49.96	-	-	74	-24.04	142	124	H
2	* 2.37609	45.71	Pk	32.1	-25.1	0	52.71	-	-	74	-21.29	142	124	H
3	* 2.39	32.66	RMS	32.1	-25.1	2.93	42.59	54	-11.41	-	-	142	124	H
4	* 2.38917	33.74	RMS	32.1	-25.1	2.93	43.67	54	-10.33	-	-	142	124	H

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

VERTICAL RESULT



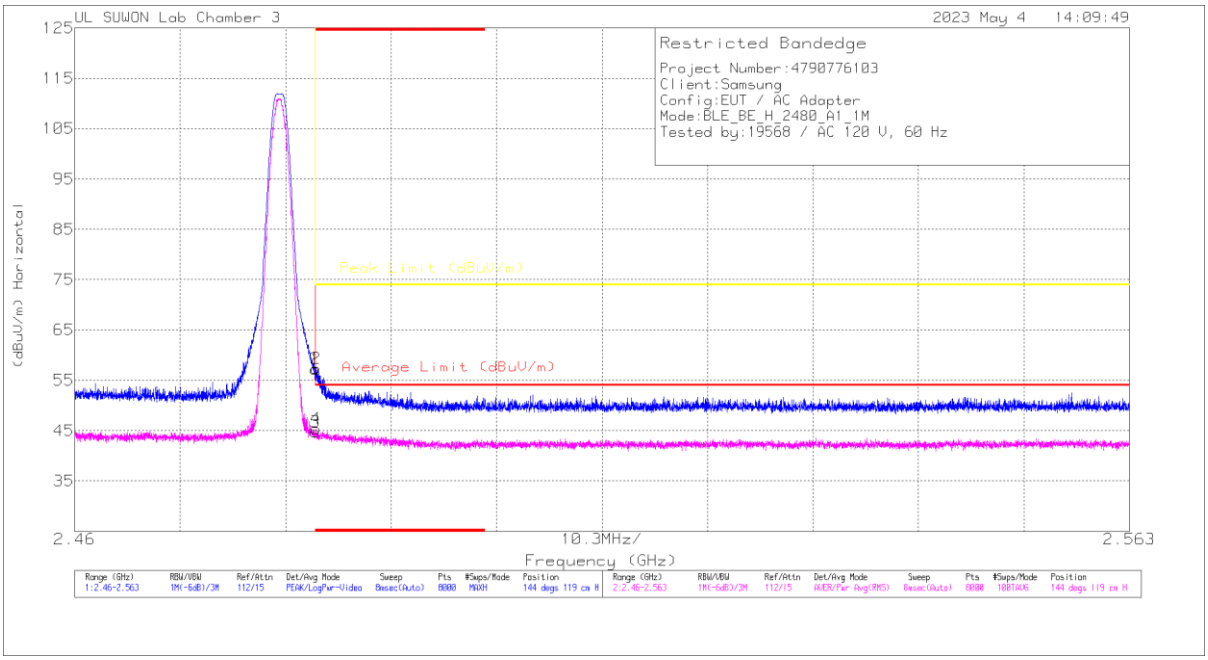
Trace Markers

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	42.56	Pk	32.1	-25.1	0	49.56	-	-	74	-24.44	199	358	V
2	* 2.32227	44.54	Pk	31.9	-25.1	0	51.34	-	-	74	-22.66	199	358	V
3	* 2.39	32.24	RMS	32.1	-25.1	2.93	42.17	54	-11.83	-	-	199	358	V
4	* 2.38766	33.22	RMS	32.1	-25.1	2.93	43.15	54	-10.85	-	-	199	358	V

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

BANDEDGE (39 CHANNEL)

HORIZONTAL RESULT

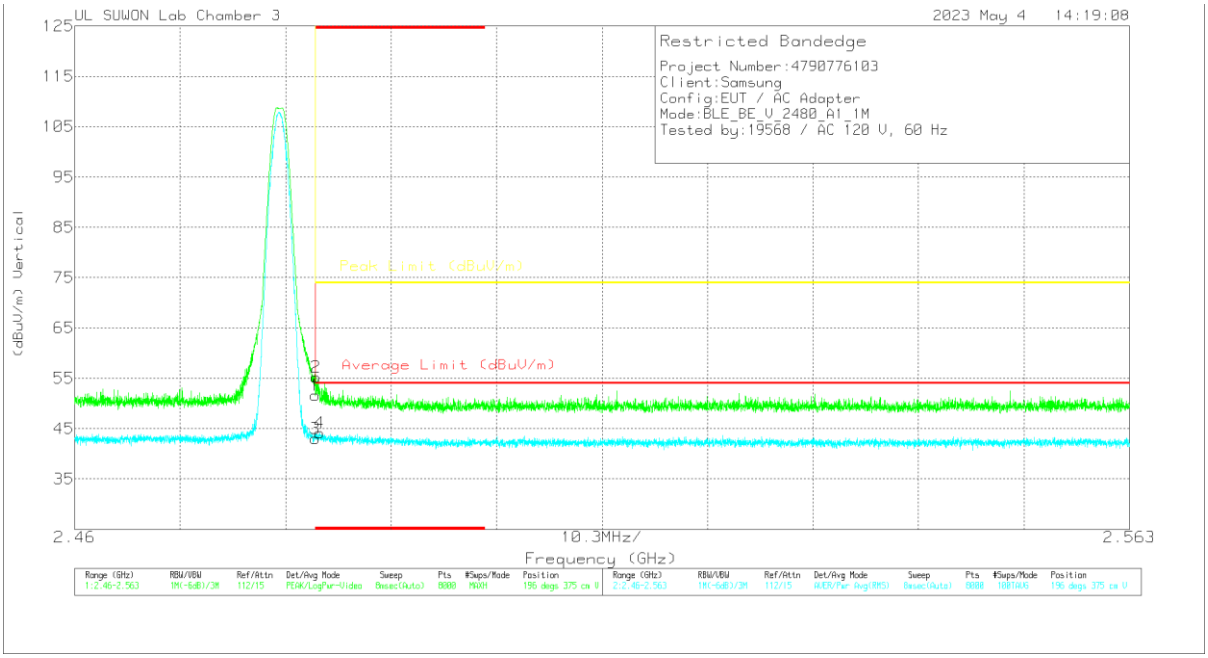


Trace Markers

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	49.85	Pk	32.4	-25	0	57.25	-	-	74	-16.75	144	119	H
2	* 2.48355	49.97	Pk	32.4	-25	0	57.37	-	-	74	-16.63	144	119	H
3	* 2.4835	34.42	RMS	32.4	-25	2.93	44.75	54	-9.25	-	-	144	119	H
4	* 2.48354	35.04	RMS	32.4	-25	2.93	45.37	54	-8.63	-	-	144	119	H

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

VERTICAL RESULT



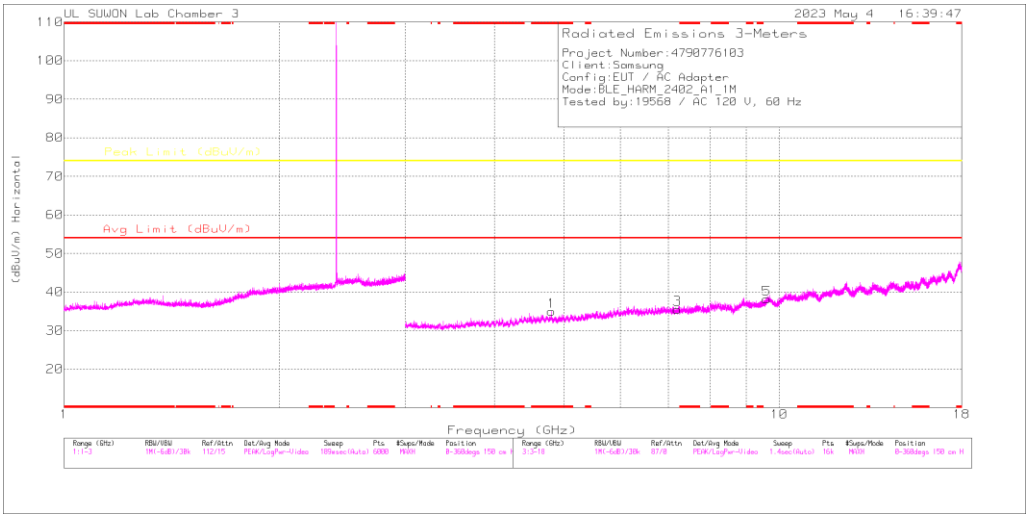
Trace Markers

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	* 2.4835	44.19	Pk	32.4	-25	0	51.59	-	-	74	-22.41	196	375	V
2	* 2.48355	47.87	Pk	32.4	-25	0	55.27	-	-	74	-18.73	196	375	V
3	* 2.4835	32.74	RMS	32.4	-25	2.93	43.07	54	-10.93	-	-	196	375	V
4	* 2.4839	33.82	RMS	32.4	-25	2.93	44.15	54	-9.85	-	-	196	375	V

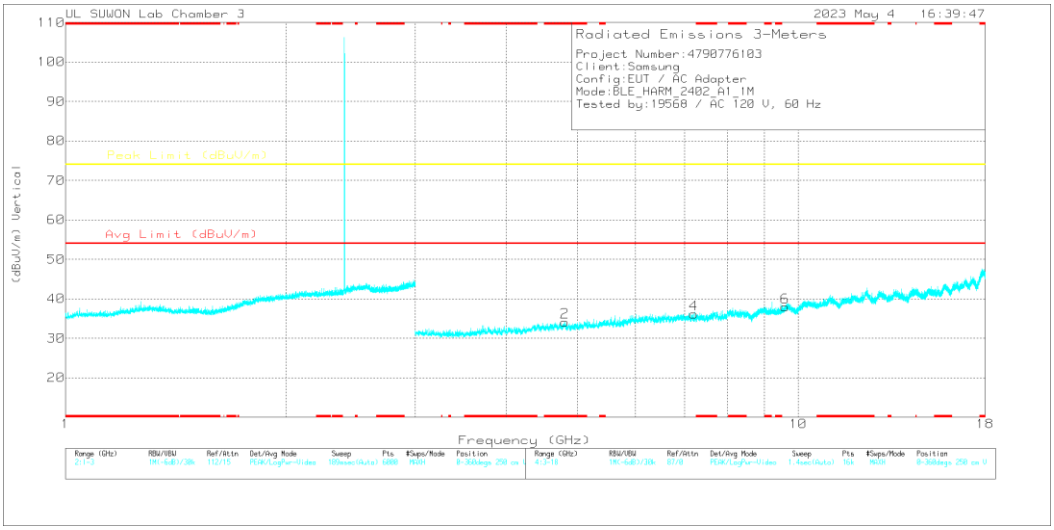
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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
* 4.7982	39.14	PK2	34.3	-30.1	0	43.34	-	-	74	-30.66	0	100	H
* 4.80926	39.14	PK2	34.3	-30.1	0	43.34	-	-	74	-30.66	0	100	V
7.20921	35.55	PK2	35.8	-25.8	0	45.55	-	-	74	-28.45	0	100	H
7.2096	35.21	PK2	35.8	-25.8	0	45.21	-	-	74	-28.79	0	100	V
9.60811	32.66	PK2	36.7	-21.7	0	47.66	-	-	74	-26.34	0	100	H
9.60804	32.99	PK2	36.7	-21.7	0	47.99	-	-	74	-26.01	0	100	V

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

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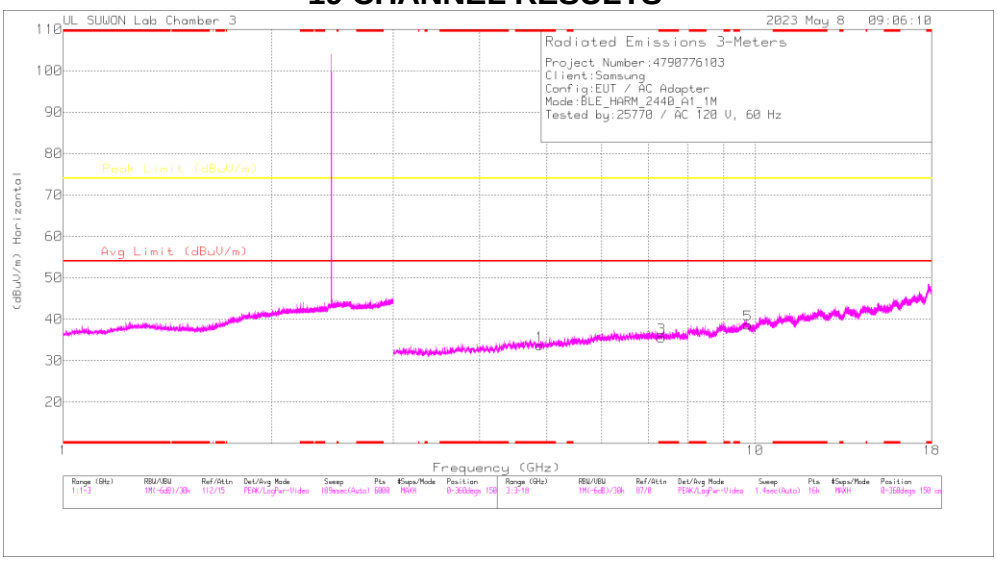
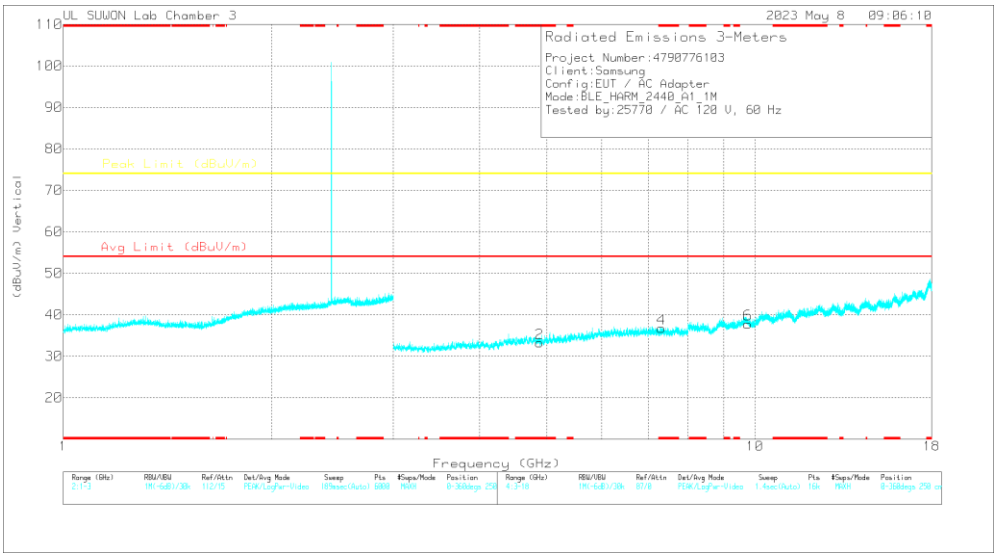
19 CHANNEL RESULTS



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
* 4.88305	39.68	PK2	34.2	-30.9	0	42.98	-	-	74	-31.02	0	100	H
* 4.88118	40.07	PK2	34.2	-30.9	0	43.37	-	-	74	-30.63	0	100	V
* 7.31885	34.92	PK2	35.8	-25.4	0	45.32	-	-	74	-28.68	0	100	H
* 7.32122	35.21	PK2	35.8	-25.4	0	45.61	-	-	74	-28.39	0	100	V
9.75965	32	PK2	36.9	-21.2	0	47.7	-	-	74	-26.3	0	100	H
9.76044	32.2	PK2	36.9	-21.2	0	47.9	-	-	74	-26.1	0	100	V

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

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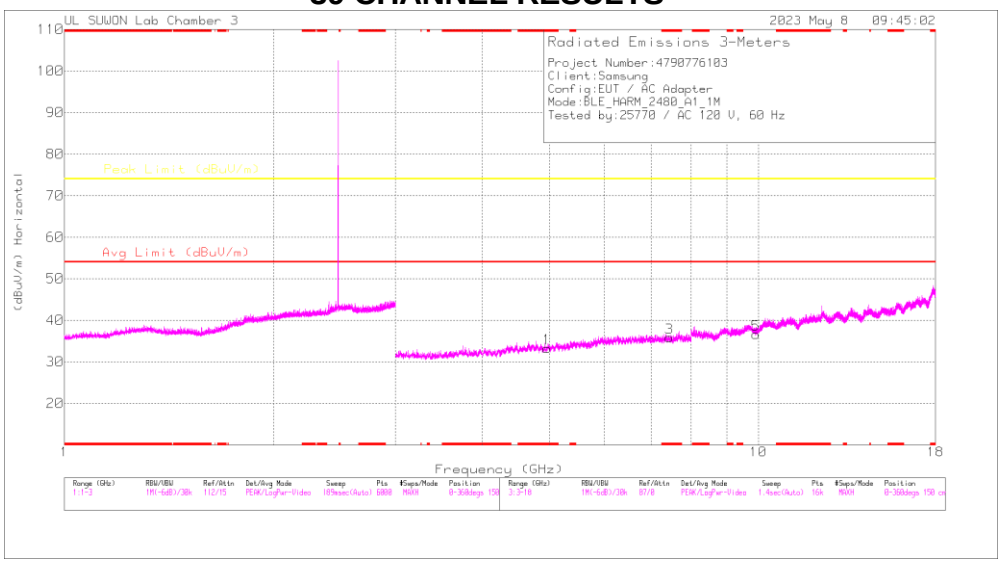
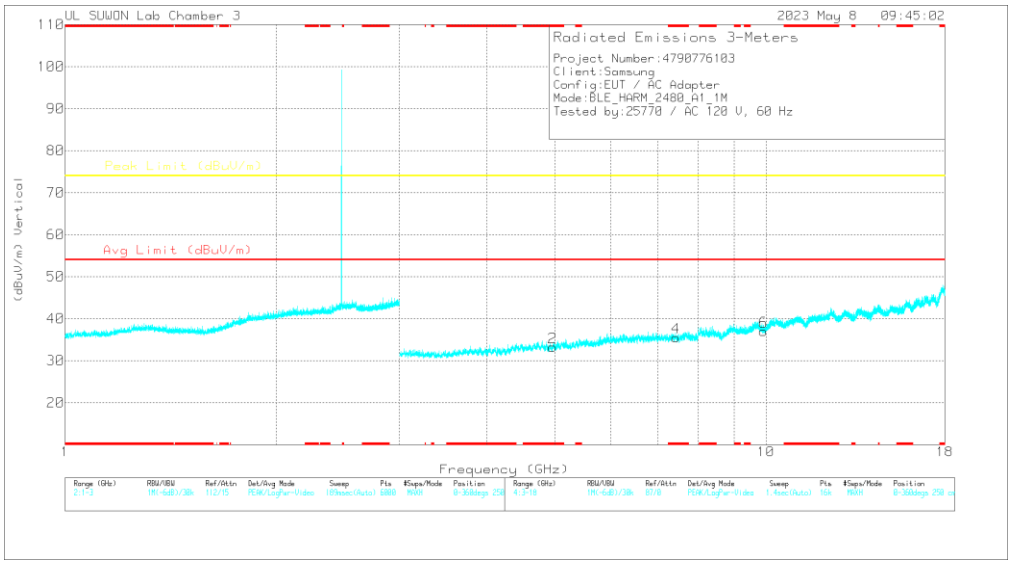
39 CHANNEL RESULTS



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
* 4.95839	39.41	PK2	34.3	-30.6	0	43.11	-	-	74	-30.89	0	100	H
* 4.96277	39.44	PK2	34.3	-30.5	0	43.24	-	-	74	-30.76	0	100	V
* 7.43971	34.89	PK2	35.7	-25.1	0	45.49	-	-	74	-28.51	0	100	H
* 7.44069	35.02	PK2	35.7	-25.1	0	45.62	-	-	74	-28.38	0	100	V
9.92076	31.76	PK2	37.1	-21.4	0	47.46	-	-	74	-26.54	0	100	H
9.91989	31.7	PK2	37.1	-21.4	0	47.4	-	-	74	-26.6	0	100	V

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

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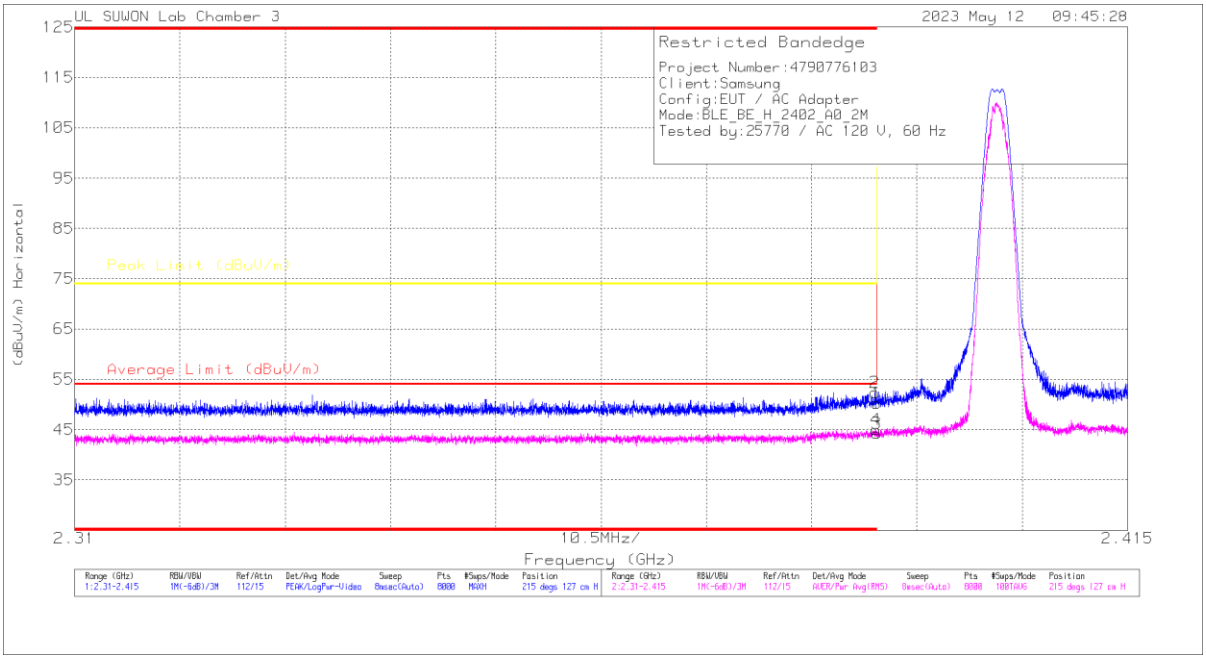
10.2.3. 2 Mbps ANT1

BANDEDGE (0 CHANNEL)

HORIZONTAL RESULT

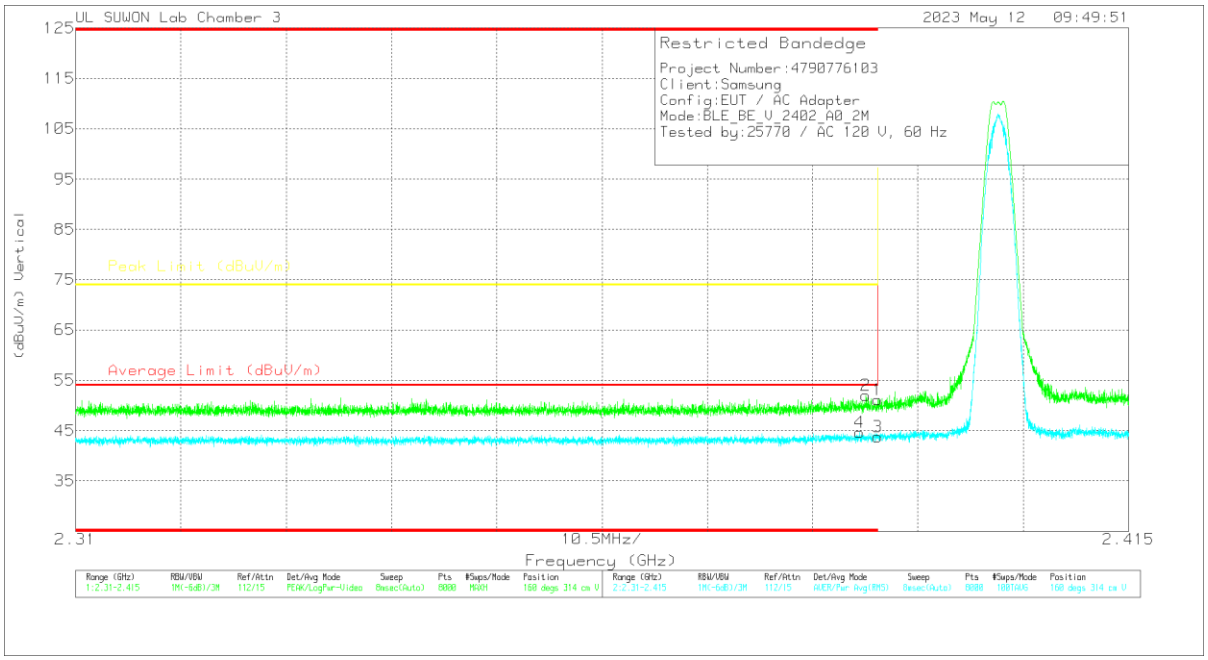


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00218957	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.31	Pk	32.1	-25.1	0	50.31	-	-	74	-23.69	215	127	H
2	* 2.38981	45.4	Pk	32.1	-25.1	0	52.4	-	-	74	-21.6	215	127	H
3	* 2.39	33.02	RMS	32.1	-25.1	4.28	44.3	54	-9.7	-	-	215	127	H
4	* 2.38989	33.79	RMS	32.1	-25.1	4.28	45.07	54	-8.93	-	-	215	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	44.11	Pk	32.1	-25.1	0	51.11	-	-	74	-22.89	160	314	V
2	* 2.38881	45.01	Pk	32.1	-25.1	0	52.01	-	-	74	-21.99	160	314	V
3	* 2.39	32.52	RMS	32.1	-25.1	4.28	43.8	54	-10.2	-	-	160	314	V
4	* 2.3882	33.4	RMS	32.1	-25.1	4.28	44.68	54	-9.32	-	-	160	314	V

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