



CERTIFICATION TEST REPORT

Report Number. : 13685813-E3V1

Applicant : APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

Model : A2565

Brand : Apple

FCC ID : BCG-A2565

IC : 579C-A2565

EUT Description : BLUETOOTH EARBUD

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
September 02, 2021

Prepared by:
UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888



REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/2/2021	Initial Issue	Tri Pham

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	7
3. TEST METHODOLOGY	8
4. FACILITIES AND ACCREDITATION	8
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	9
5.1. METROLOGICAL TRACEABILITY	9
5.2. DECISION RULES	9
5.3. MEASUREMENT UNCERTAINTY	9
5.4. SAMPLE CALCULATION	9
6. EQUIPMENT UNDER TEST	10
6.1. EUT DESCRIPTION	10
6.2. MAXIMUM OUTPUT POWER	10
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	10
6.4. SOFTWARE AND FIRMWARE	10
6.5. WORST-CASE CONFIGURATION AND MODE	10
6.6. DESCRIPTION OF TEST SETUP	11
7. MEASUREMENT METHOD	17
8. TEST AND MEASUREMENT EQUIPMENT	18
9. ANTENNA PORT TEST RESULTS	19
9.1. ON TIME AND DUTY CYCLE	19
9.2. 99% BANDWIDTH	21
9.2.1. BLE (1Mbps)	21
9.2.2. BLE (2Mbps)	22
9.3. 6 dB BANDWIDTH	23
9.3.1. BLE (1Mbps)	24
9.3.2. BLE (2Mbps)	25
9.4. OUTPUT POWER	26
9.4.1. BLE (1Mbps)	27
9.4.2. BLE (2Mbps)	28

9.5.	AVERAGE POWER.....	29
9.5.1.	BLE (1Mbps).....	30
9.5.2.	BLE (2Mbps).....	30
9.6.	POWER SPECTRAL DENSITY.....	31
9.6.1.	BLE (1Mbps).....	32
9.6.2.	BLE (2Mbps).....	33
9.7.	CONDUCTED SPURIOUS EMISSIONS.....	34
9.7.1.	BLE (1Mbps).....	35
9.7.2.	BLE (2Mbps).....	36
10.	RADIATED TEST RESULTS	37
10.1.	LIMITS AND PROCEDURE.....	37
10.2.	TRANSMITTER ABOVE 1 GHZ.....	39
10.2.1.	BLE (1Mbps)	39
10.2.2.	BLE (2Mbps)	49
10.3.	WORST CASE BELOW 1 GHZ.....	59
10.4.	WORST CASE 18-26 GHZ.....	61
10.5.	WORST CASE BELOW 30MHz	63
11.	AC POWER LINE CONDUCTED EMISSIONS	65
11.1.	AC Power Line With Laptop.....	66
11.2.	AC Power Line With AC/DC Adapter.....	68
12.	SETUP PHOTOS	71

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

EUT DESCRIPTION: BLUETOOTH EARBUD

MODEL: A2565

BRAND: Apple

SERIAL NUMBER: H5R123600K6036030; H5R1262004Q03603N

SAMPLE RECEIPT DATE: 6/26/202, 7/23/2021

DATE TESTED: 7/22/2021 – 8/10/2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN ISSUE 5 + A1 + A2	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Chin Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Gerardo Abrego
Lab Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, KDB 662911, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
☒	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

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)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a Bluetooth earbud for right ear with an integral battery, microphone, and antenna.

6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE 1M	9.40	8.71
2402 - 2480	BLE 2M	9.21	8.34

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an LDS antenna, with a maximum gain of -3.6 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was B4B20

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle, and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that Y (Landscape) orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y (Landscape) orientation.

Radiated emissions below 1GHz, 18-26GHz and AC power line conducted emissions were performed with the EUT transmitting at the channel with the highest output power as worst-case scenario.

For below 1GHz and above 1GHz tests were performed with EUT only. For AC power line conducted emission, tests were investigated with AC power adapter and with laptop.

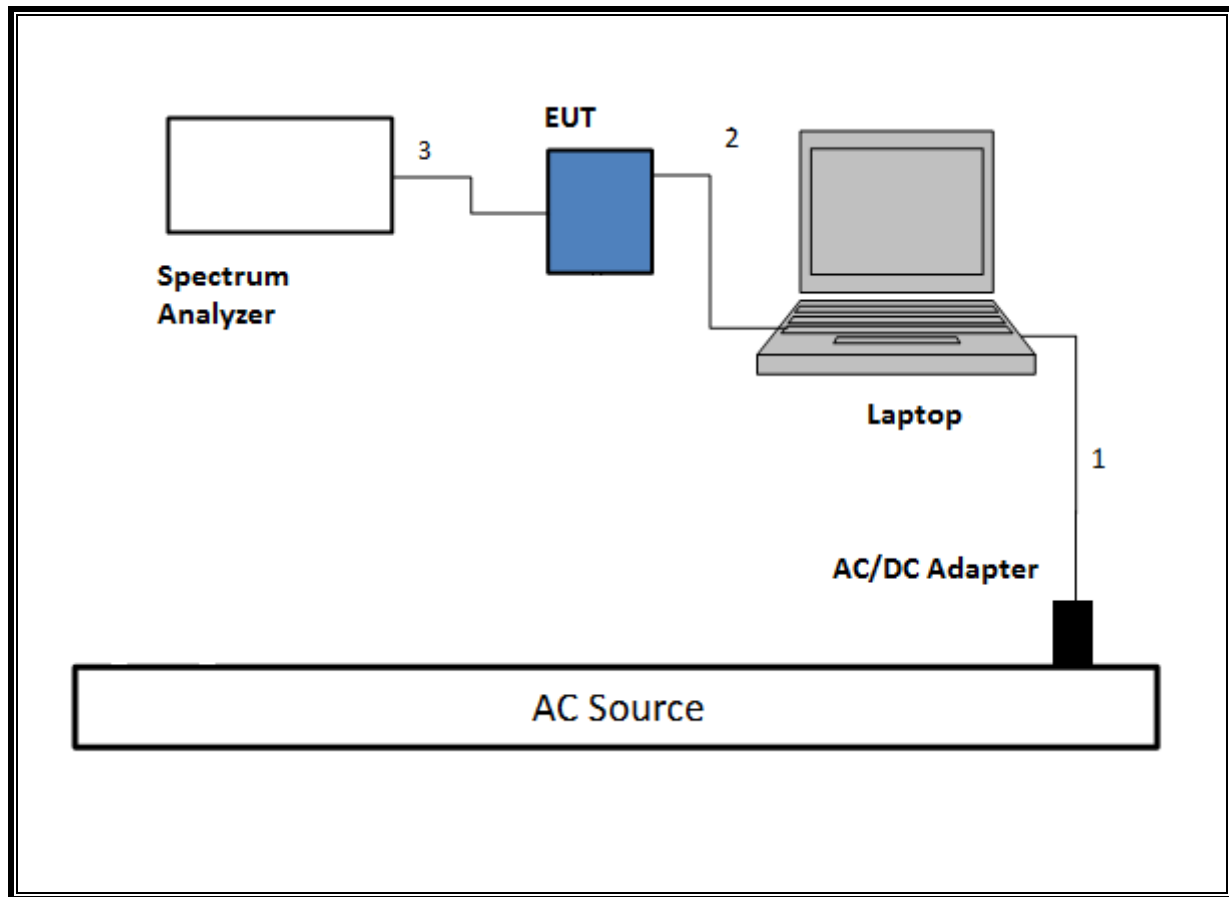
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	Macbook Pro	C02YL3ZMJHC8		BCGA1989
Laptop AC/DC adapter		Liteon Technology	A1424	NSW25679		DoC
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8		DoC
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A
2	USB-A	1	Lightning	Shielded	1.0	N/A
3	Antenna	1	SMA	Un-shielded	0.2	To spectrum Analyzer
I/O CABLES (RF RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A
2	USB-A	1	Lightning	Un-shielded	1	N/A

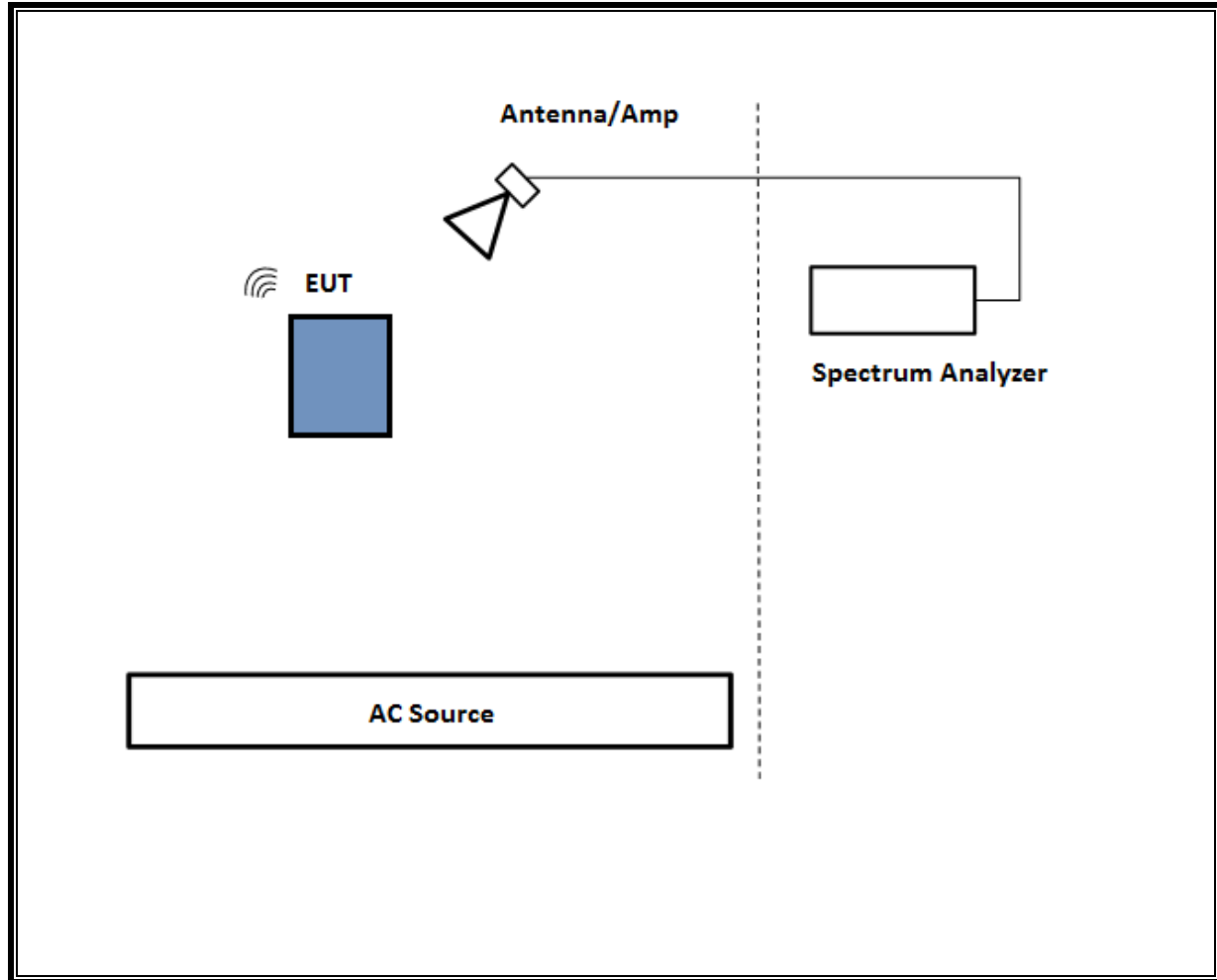
TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

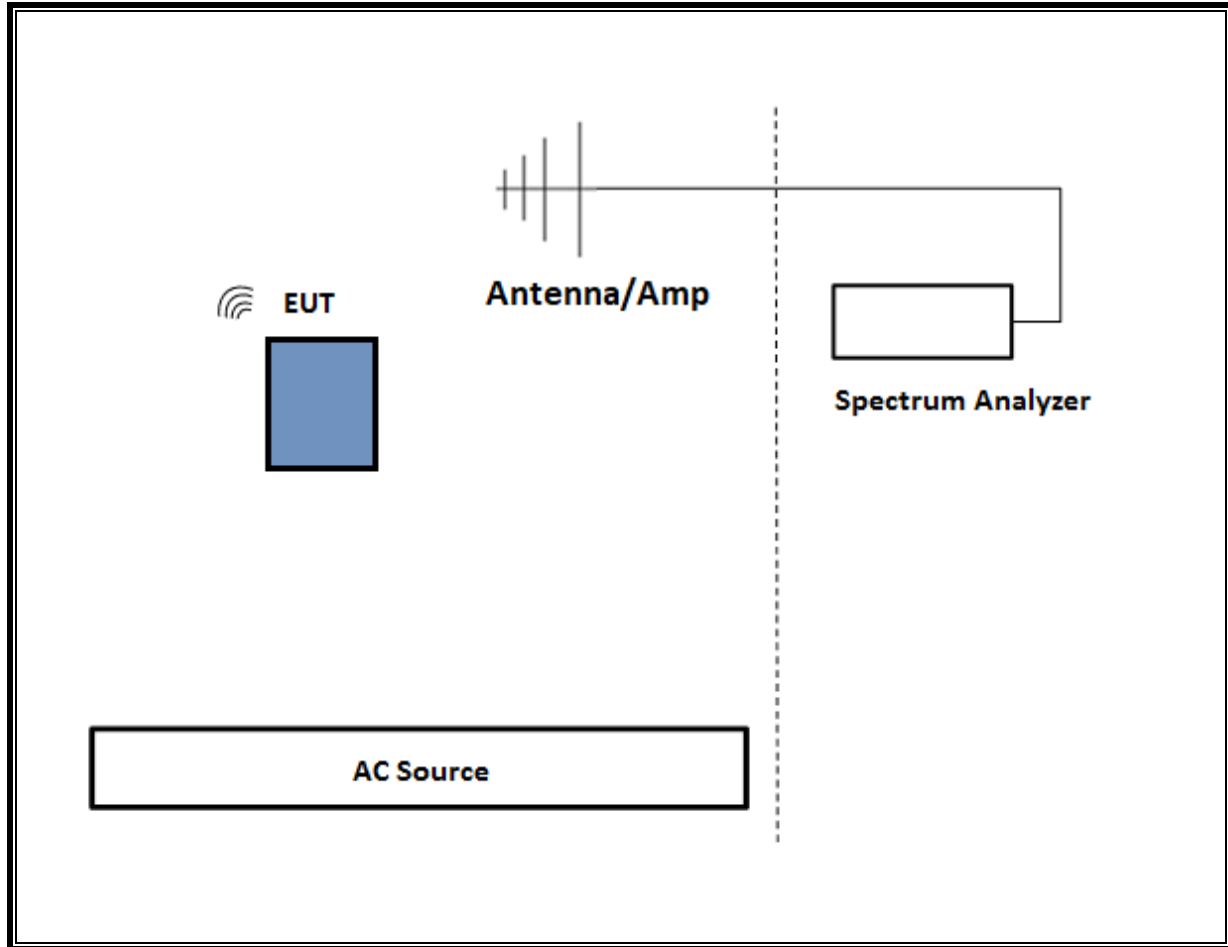
SETUP DIAGRAM FOR CONDUCTED TESTS



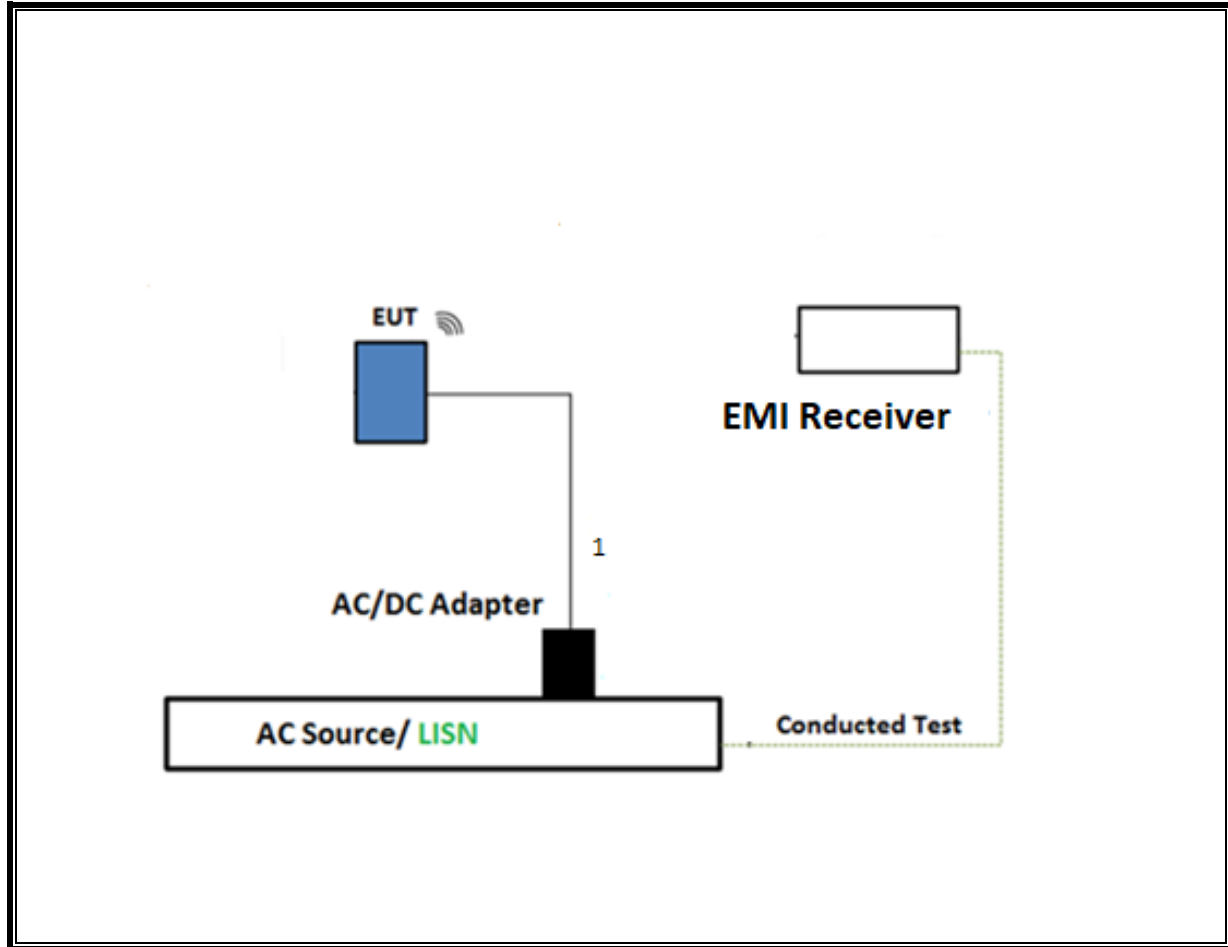
SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



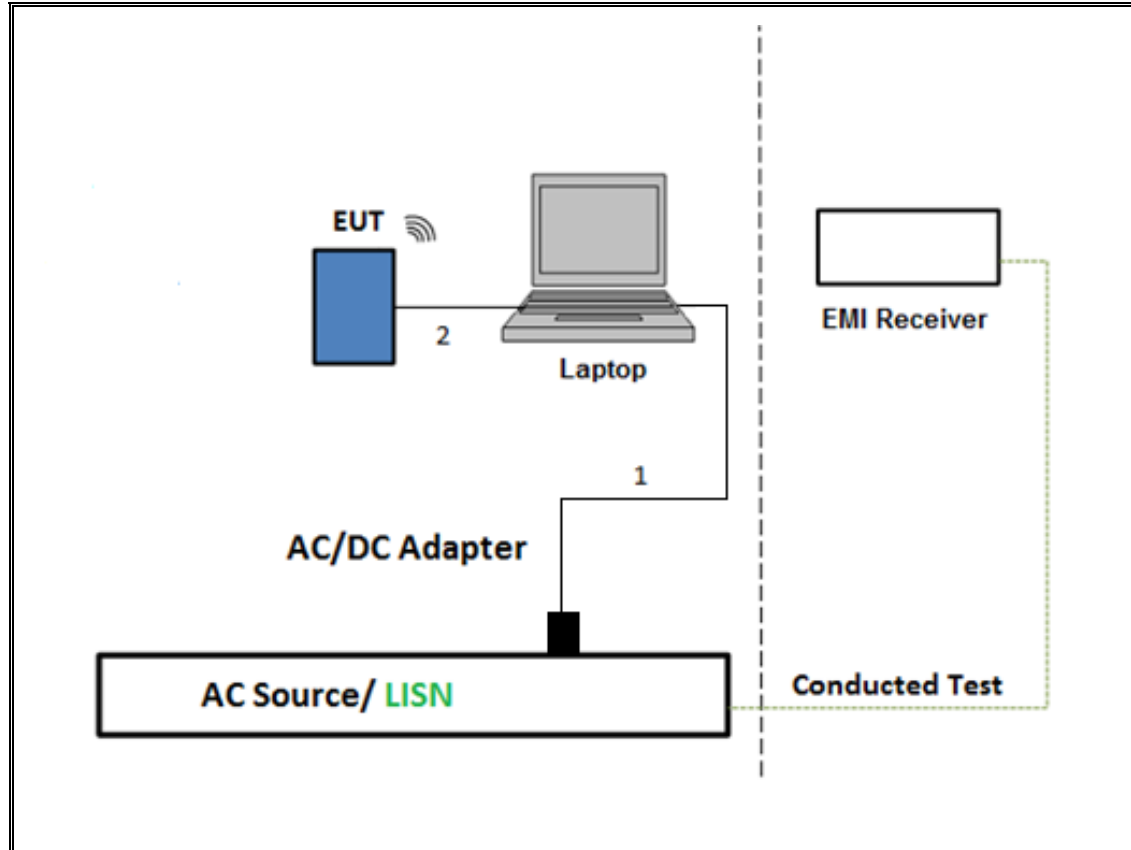
SETUP DIAGRAM FOR Below 1GHz



SETUP DIAGRAM FOR AC LINE CONDUCTED TEST



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v05r02, Section 6.

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW $\geq$ DTS BW

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Measurement using gated average power meter.

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1 & Clause 13

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.2 & Clause 13: Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.3 & Clause 13: Integration method -Trace averaging with continuous transmission at full power

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

Radiated emissions non-restricted frequency bands ANSI C63.10 Subclause -11.11 & Clause 13

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4 & 13

8. 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	Local ID	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203383	2/24/2021	2/24/2022
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T120	4/7/2021	4/7/2022
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183207	4/27/2021	4/27/2022
PXA Signal Analyzer	Agilent	N9030A	T906	1/27/2021	1/27/2022
Hybrid Antenna, 30-2000 MHz	SunAR	JB3	T900	2/24/2021	2/24/2022
Preamp, 0.1-1300 MHz	Sonoma Inst.	310	T173	7/22/2021	7/22/2022
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T712	3/22/2021	3/22/2022
*Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183530	8/27/2020	8/27/2021
Antenna, Active Loop 9kHz-30MHz	ETS Lindgren	6502	T1616	12/2/2020	12/2/2021
PXA Signal Analyzer	Agilent	N9030A	T1454	1/27/2021	1/27/2022
Preamplifier, 1-26.5GHz	Agilent	8449B	T404	4/19/2021	4/19/2022
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	T449	4/22/2021	4/22/2022
Preamplifier, 26-40 GHz	Miteq	NSTTA2640-35-HG	T1864	4/19/2021	4/19/2022
PXA Signal Analyzer	Agilent	N9030A	206415	3/12/2021	3/12/2022
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	PRE0183142	4/22/2021	4/22/2022
PXA Signal Analyzer	Agilent	N9030A	T908	1/28/2021	1/28/2022
Power Meter, P-series single channel	Keysight	N1912A	T1245	1/21/2021	1/21/2022
Power Sensor	Keysight	N1912A	90392	1/28/2022	1/28/2021
PXA Signal Analyzer	Agilent	N9030A	T341	1/28/2021	1/28/2022
Power Meter, P-series single channel	Keysight	N1911A	PRE0177682	1/21/2021	1/21/2022
Power Meter, P-series single channel	Keysight	N1911A	T1264	1/26/2021	1/26/2022
Power Sensor	Keysight	N1921A	T1226	2/19/2021	2/19/2022
Power Sensor	Keysight	N1921A	T1227	3/16/2021	3/16/2022
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	2/19/2021	2/19/2022
Power Cable, Line Conducted Emissions	Pasternack Enterprises	RG233/U	202327	10/16/2020	10/16/2021
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	PRE0186446	1/20/2021	1/20/2022

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 15, 2019
Antenna Port Software	UL	UL RF	Ver 2021.1.19
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015

*Testing was completed before calibration expiration date

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

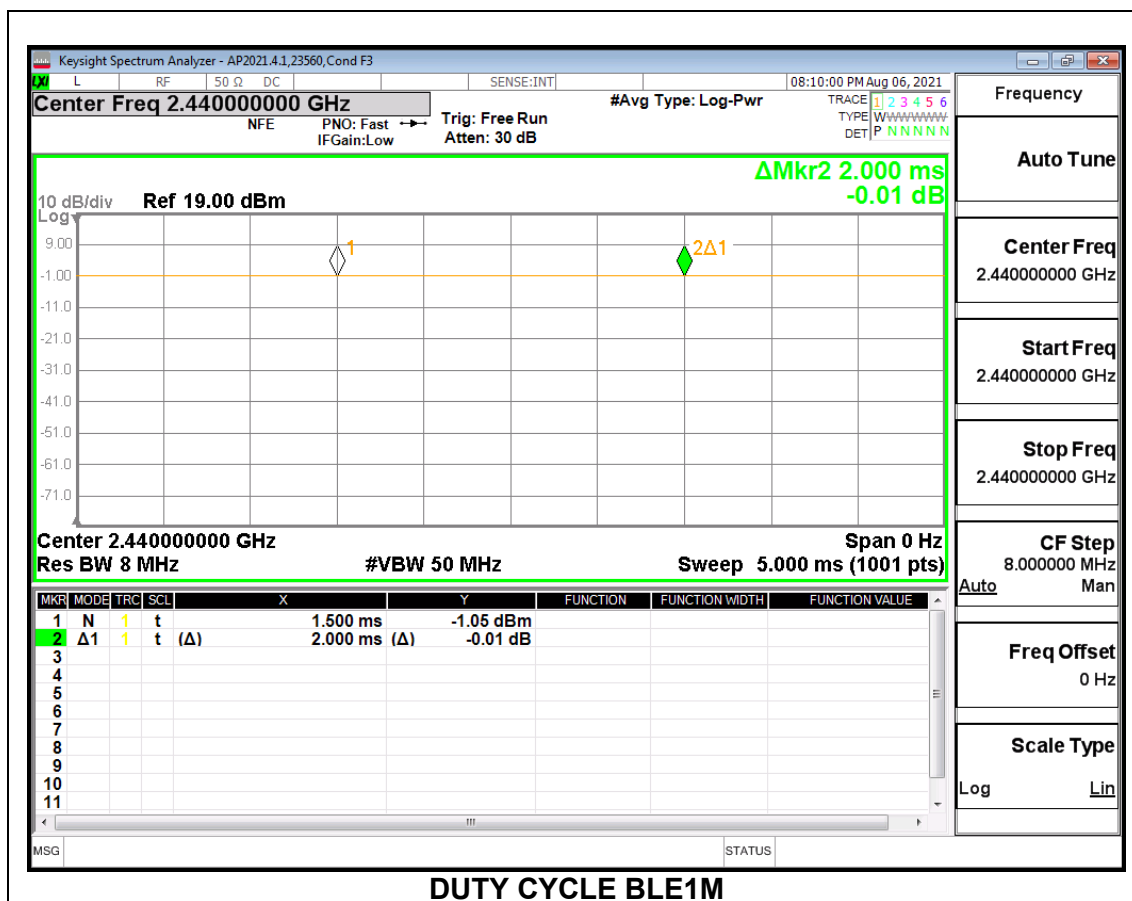
None; for reporting purposes only.

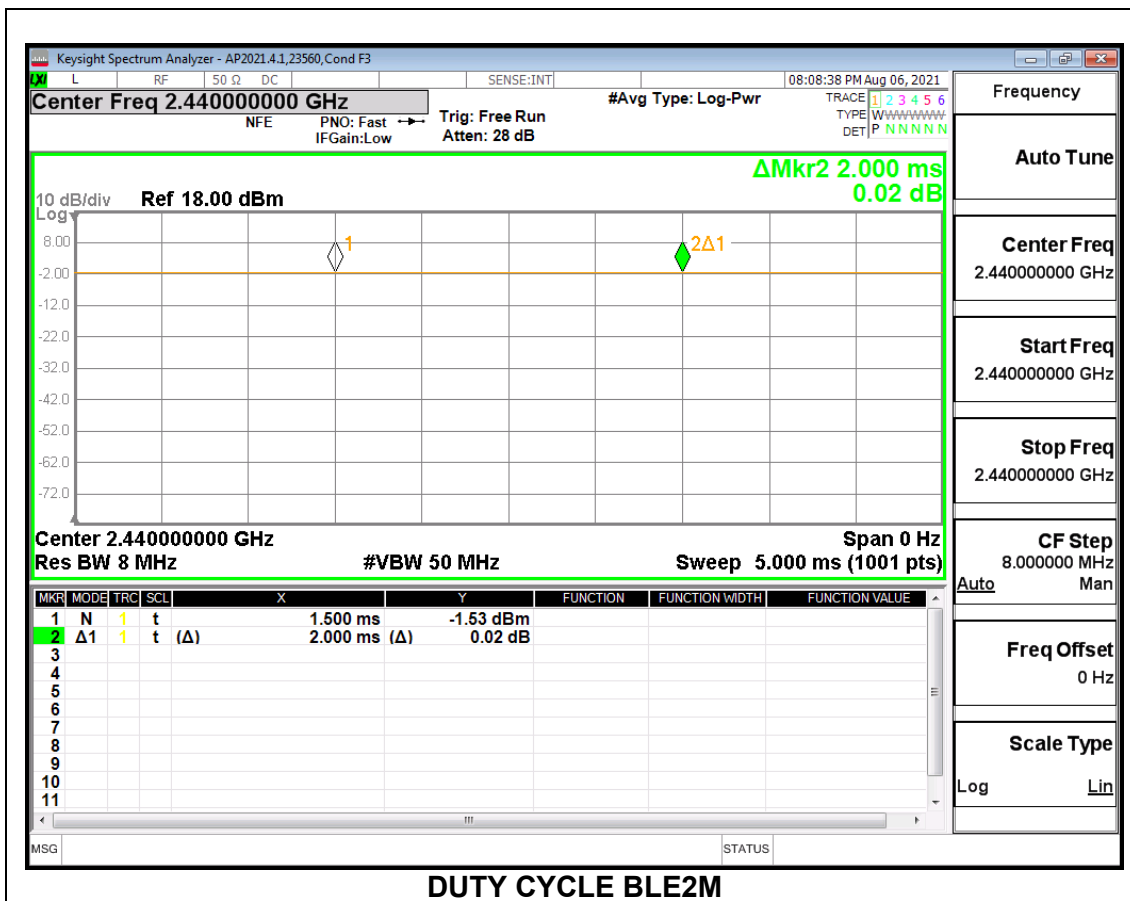
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE1M	2.0000	2.0000	1.000	100.00%	0.00	0.010
BLE2M	2.0000	2.0000	1.000	100.00%	0.00	0.010





9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

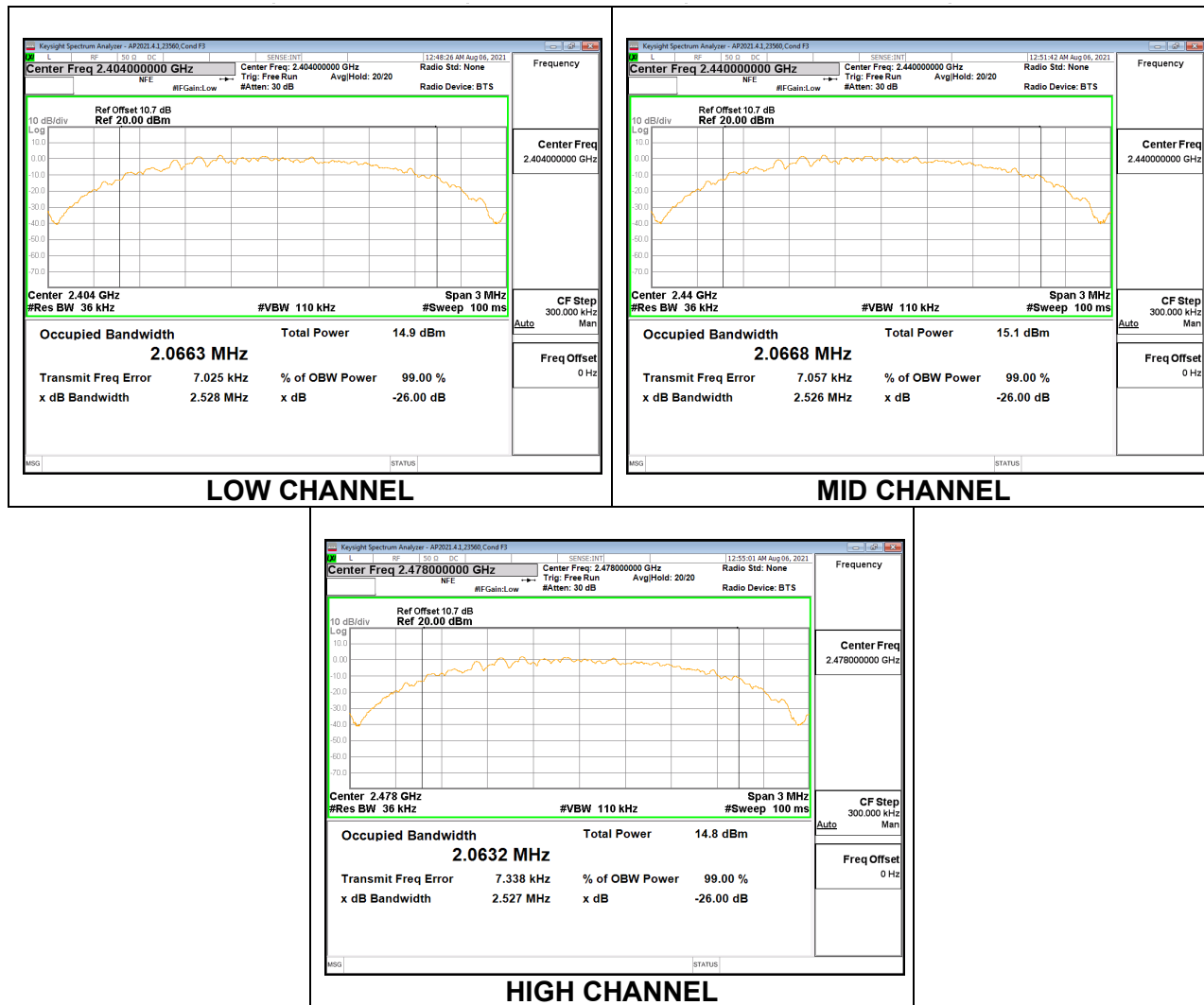
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0425
Middle	2440	1.0438
High	2480	1.0424



9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2404	2.0663
Middle	2440	2.0668
High	2478	2.0632



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

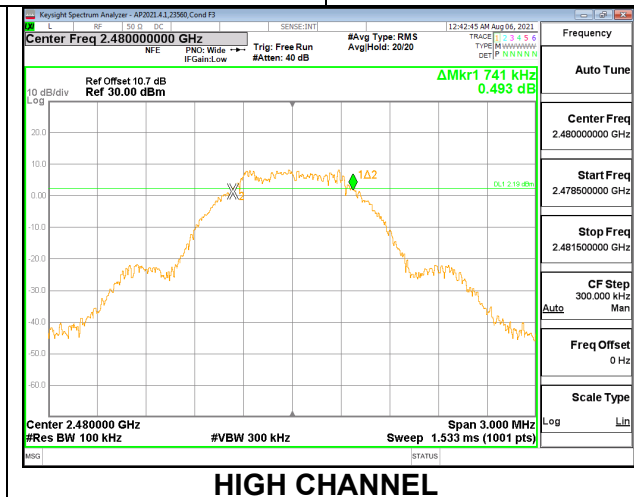
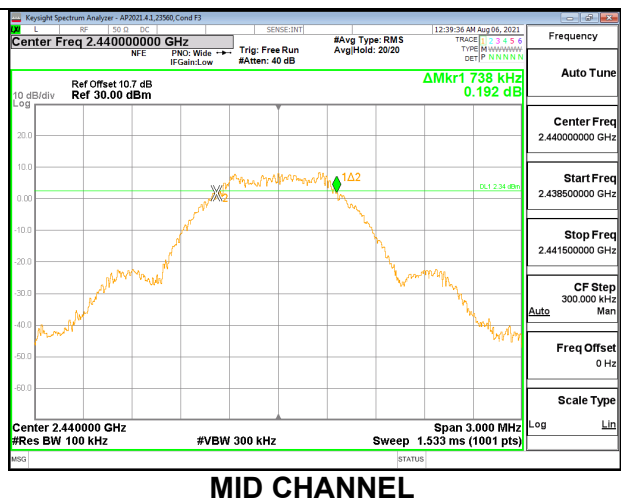
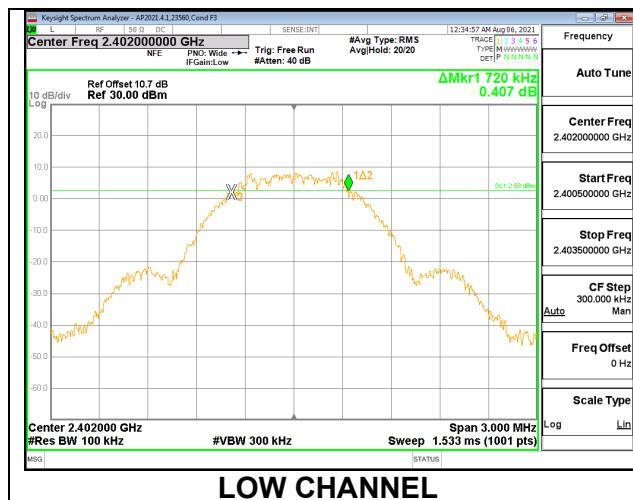
RSS-247 5.2 (a)

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

RESULTS

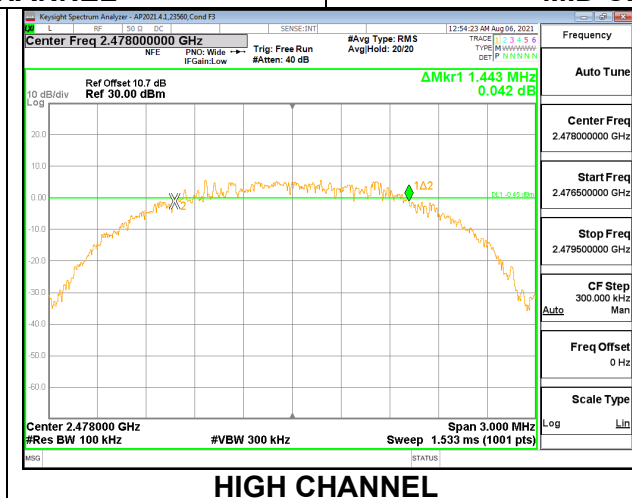
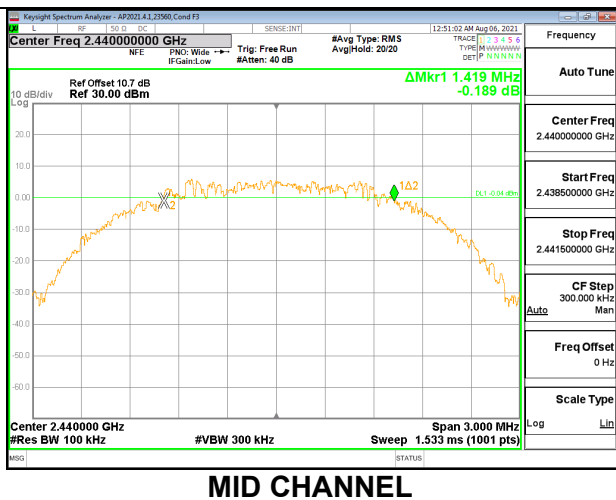
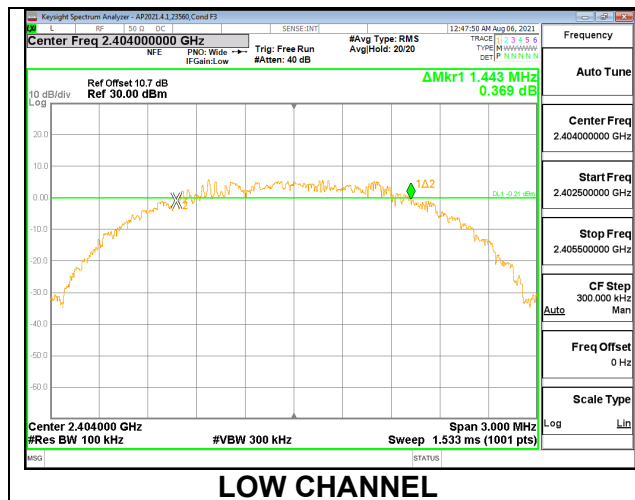
9.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.720	0.5
Middle	2440	0.738	0.5
High	2480	0.741	0.5



9.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2404	1.443	0.5
Middle	2440	1.419	0.5
High	2478	1.443	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	9.3	30	-20.700
Middle	2440	9.01	30	-20.990
High	2480	9.4	30	-20.600

9.4.2. BLE (2Mbps)

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2404	8.93	30	-21.070
Middle	2440	9.21	30	-20.790
High	2478	8.9	30	-21.100

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	23560
Date:	8/5/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	9.24
Middle	2440	8.95
High	2480	9.34

9.5.2. BLE (2Mbps)

Tested By:	23560
Date:	8/18/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2404	8.87
Middle	2440	9.04
High	2478	8.89

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

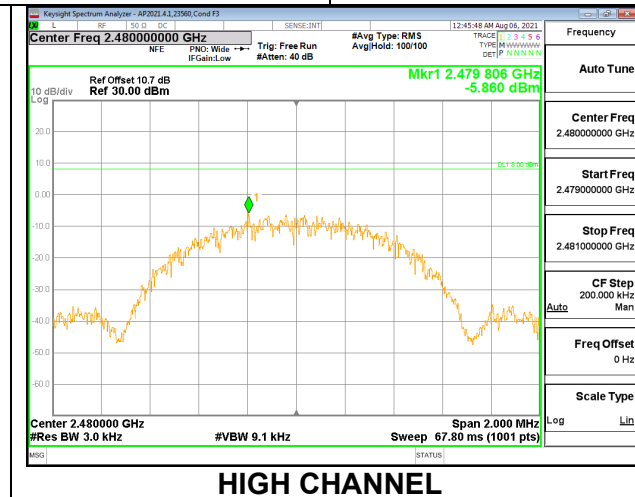
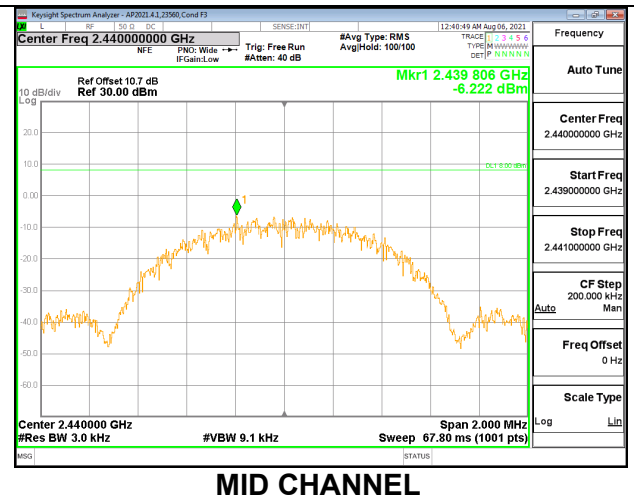
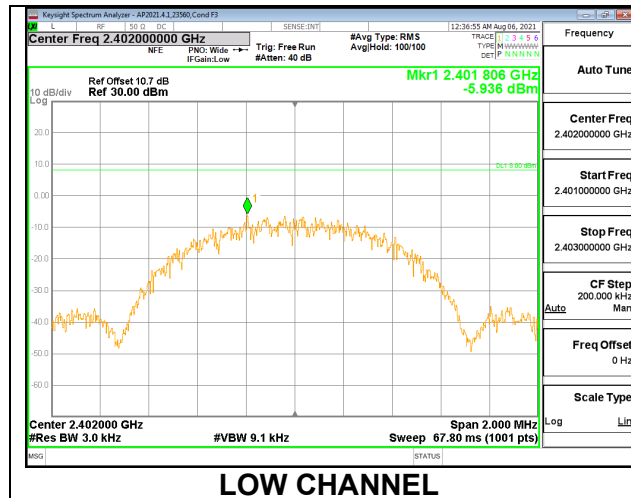
RSS-247 (5.2) (b)

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

RESULTS

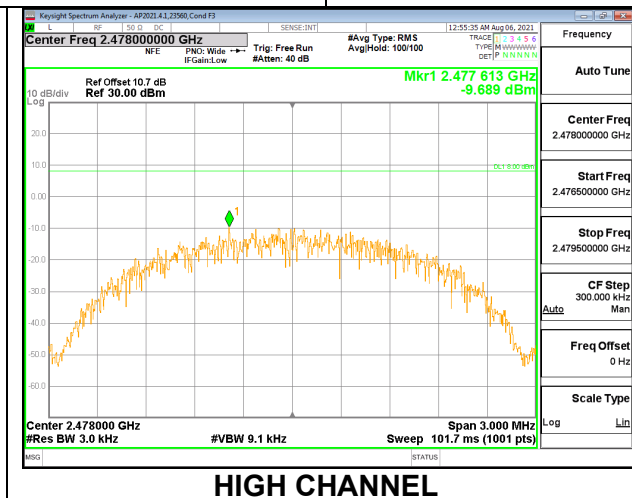
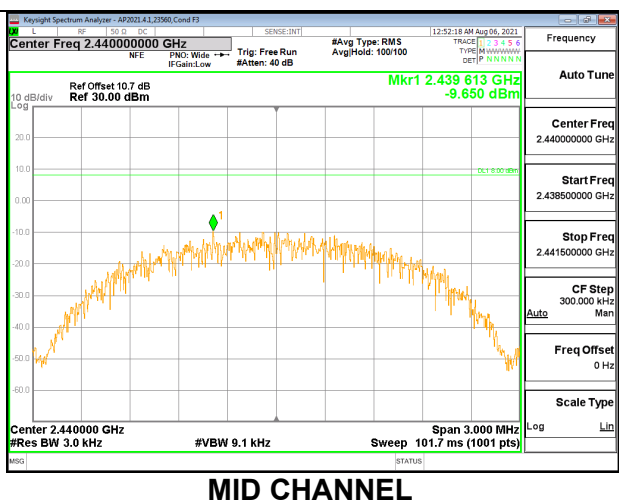
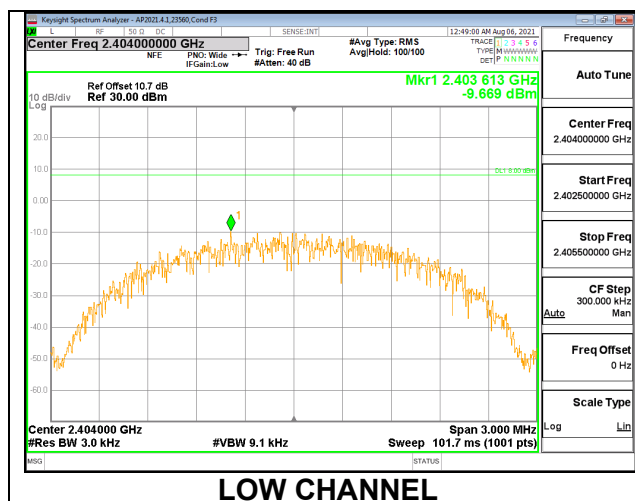
9.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-5.936	8	-13.94
Middle	2440	-6.222	8	-14.22
High	2480	-5.860	8	-13.86



9.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2404	-9.669	8	-17.67
Middle	2440	-9.650	8	-17.65
High	2478	-9.689	8	-17.69



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

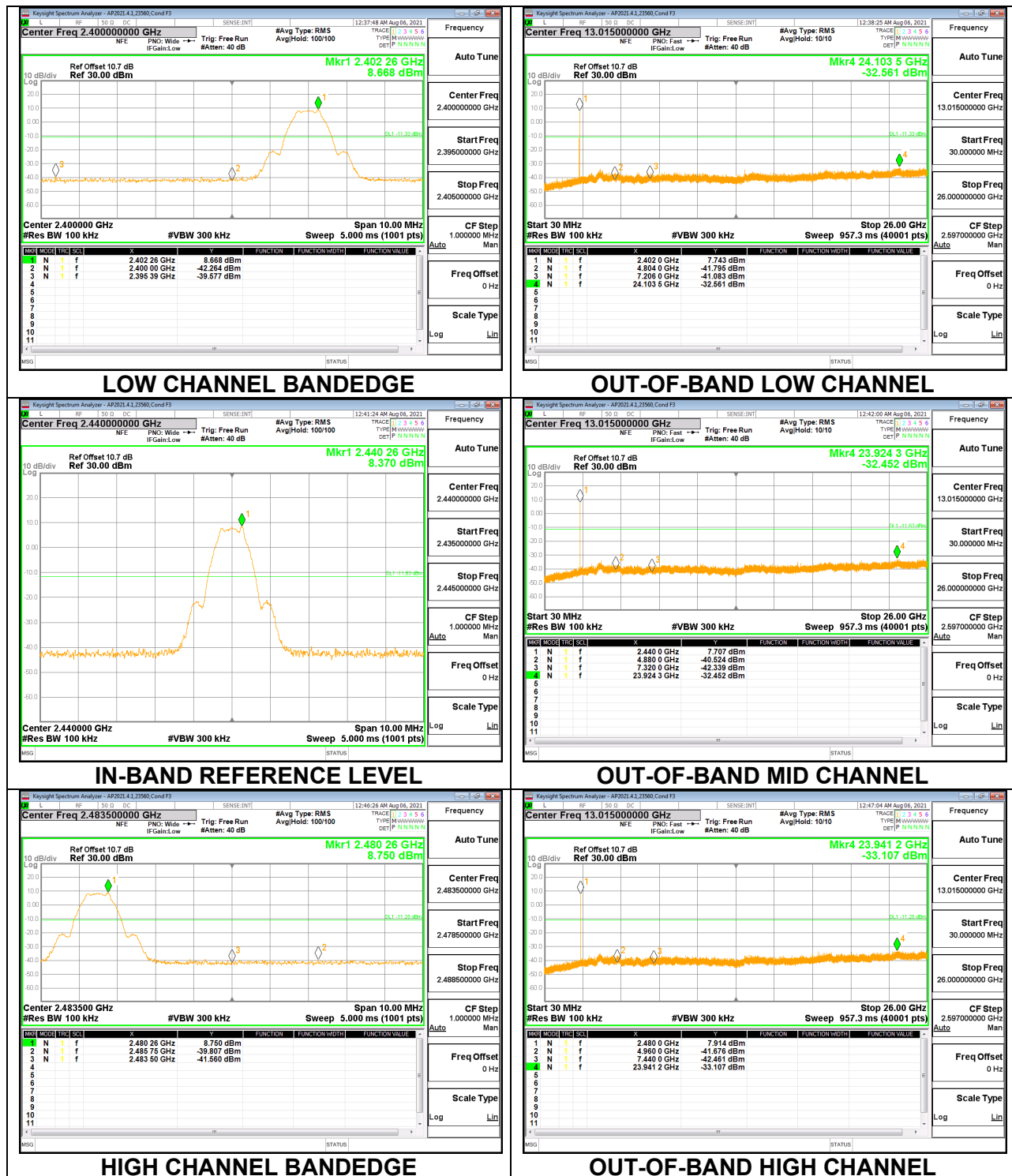
FCC §15.247 (d)

RSS-247 5.5

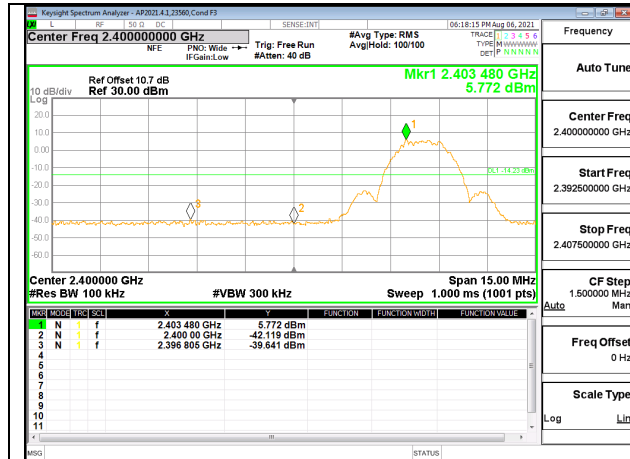
Output power was measured based on the use of a peak measurement; therefore, the required attenuation is 20 dB.

RESULTS

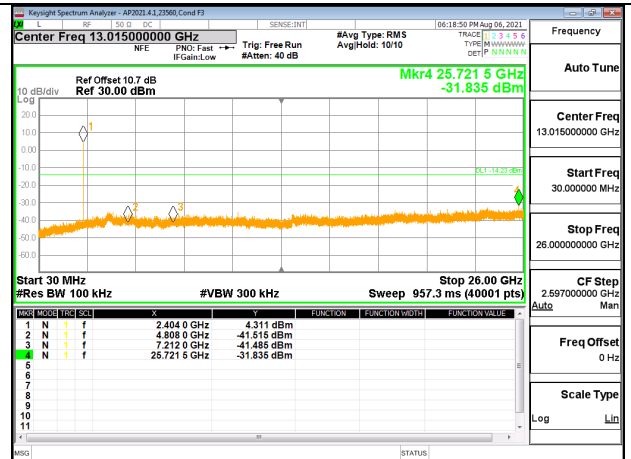
9.7.1. BLE (1Mbps)



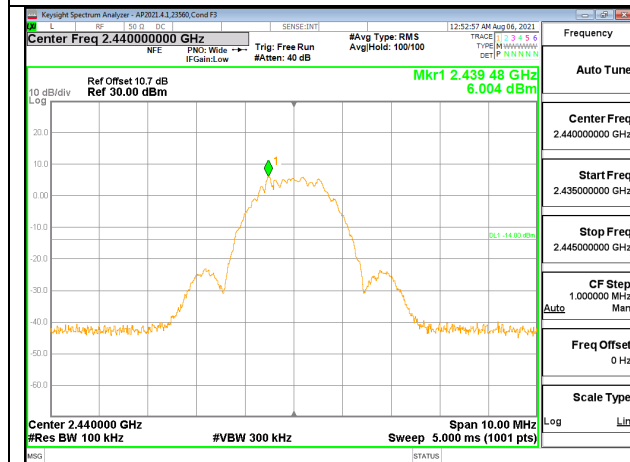
9.7.2. BLE (2Mbps)



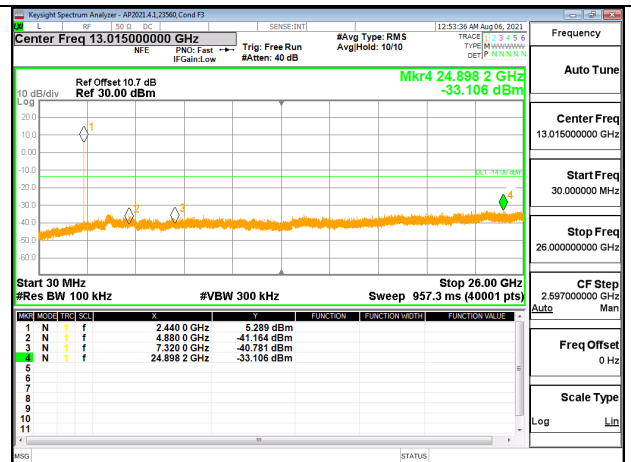
LOW CHANNEL BANDEDGE



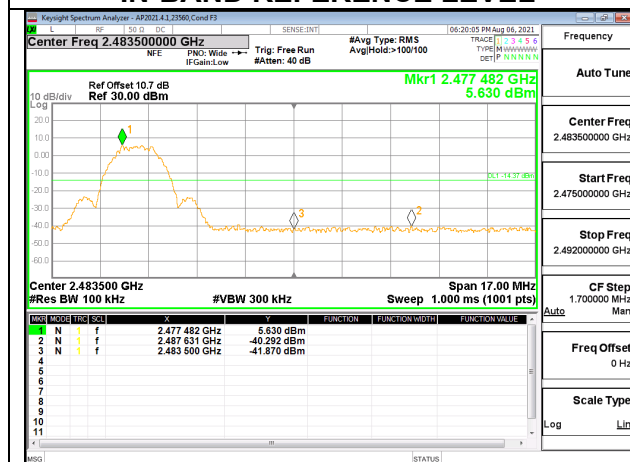
OUT-OF-BAND LOW CHANNEL



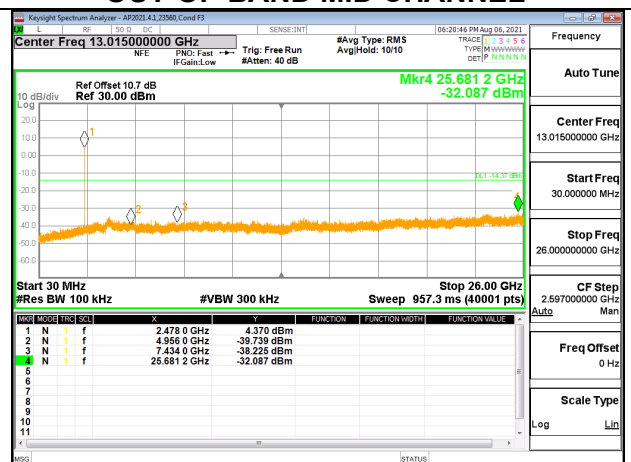
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement 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 pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

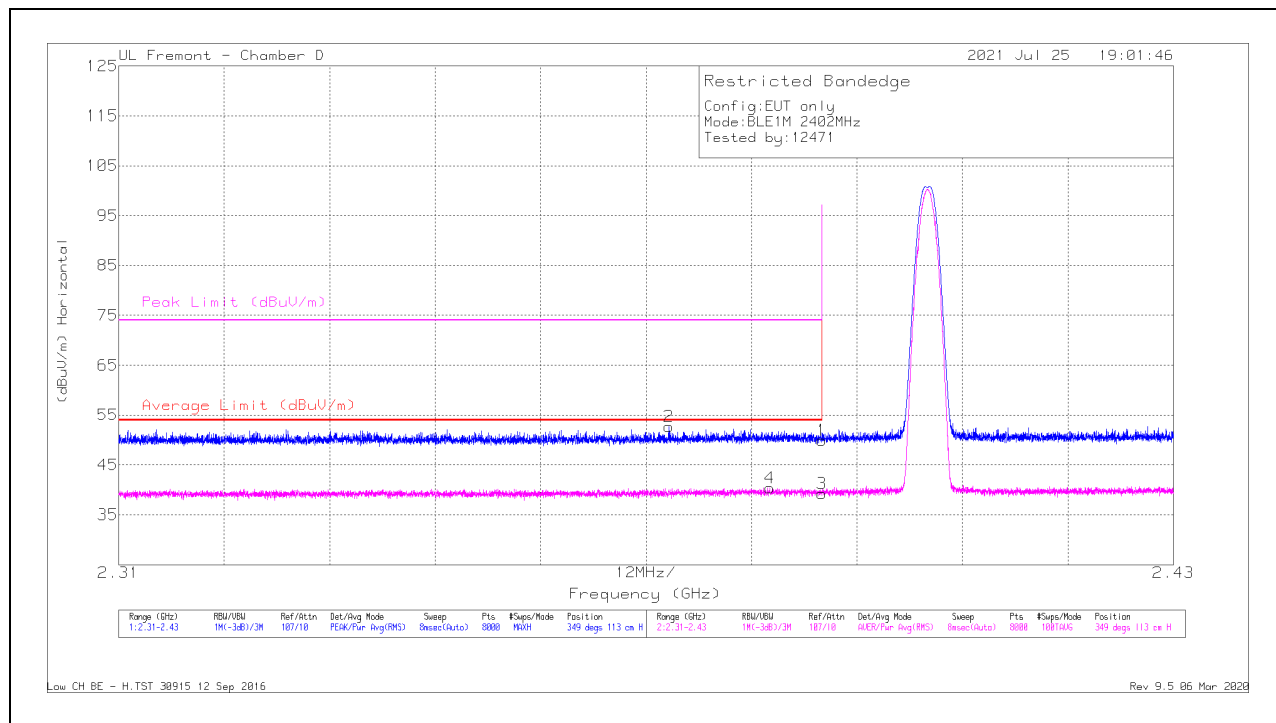
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



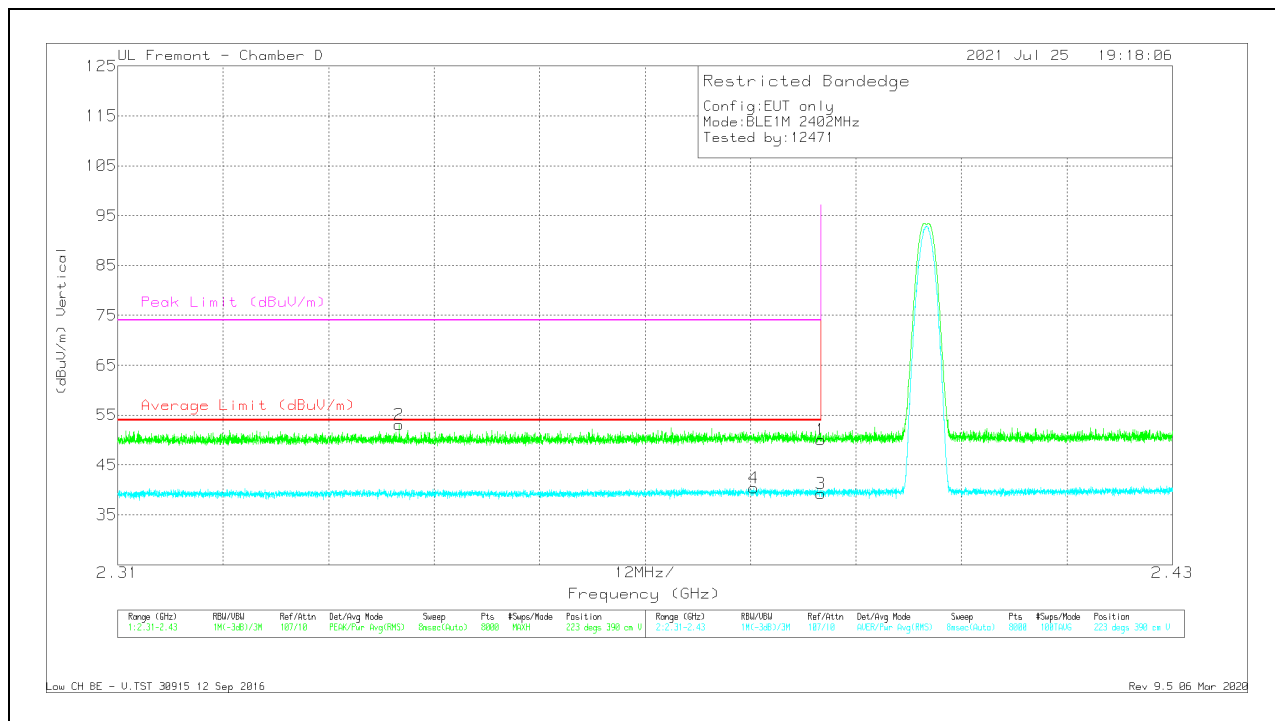
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cb/Filt/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.11	Pk	32.1	-20.3	49.91	-	-	74	-24.09	349	113	H
2	* 2.37257	41.04	Pk	32	-20.4	52.64	-	-	74	-21.36	349	113	H
3	* 2.38999	27.44	RMS	32.1	-20.3	39.24	54	-14.76	-	-	349	113	H
4	* 2.38409	28.66	RMS	32.1	-20.4	40.36	54	-13.64	-	-	349	113	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Filt/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.27	Pk	32.1	-20.3	50.07	-	-	74	-23.93	223	390	V
2	* 2.34201	41.68	Pk	31.9	-20.5	53.08	-	-	74	-20.92	223	390	V
3	* 2.38999	27.42	RMS	32.1	-20.3	39.22	54	-14.78	-	-	223	390	V
4	* 2.38235	28.73	RMS	32.1	-20.4	40.43	54	-13.57	-	-	223	390	V

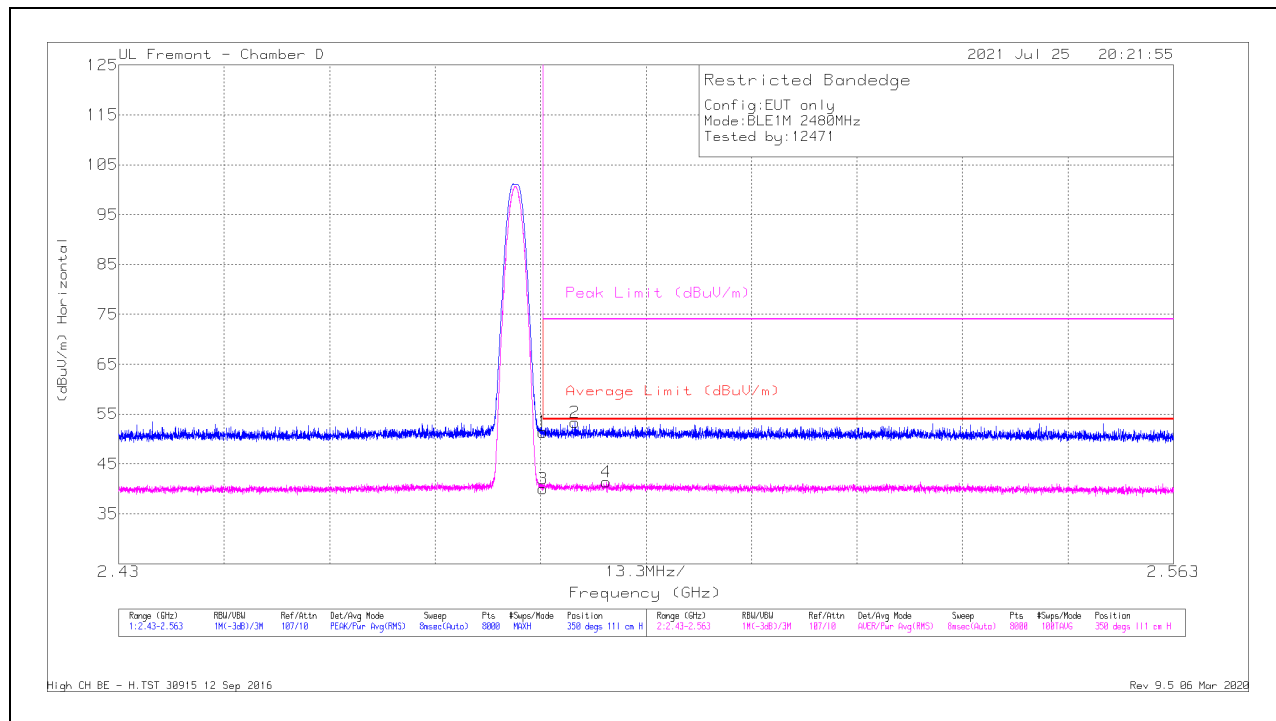
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



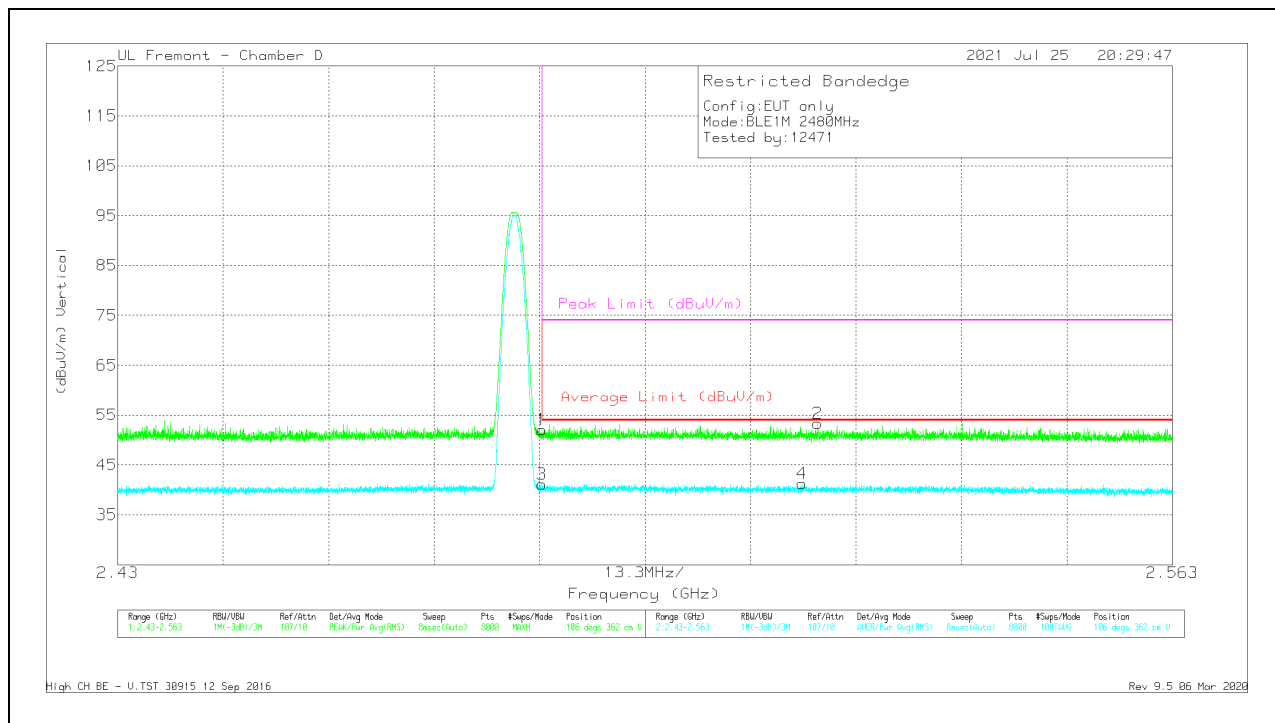
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Filt/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	38.98	Pk	32.7	-20.3	51.38	-	-	74	-22.62	350	111	H
2	* 2.4875	40.83	Pk	32.8	-20.3	53.33	-	-	74	-20.67	350	111	H
3	* 2.48351	27.67	RMS	32.7	-20.3	39.97	54	-14.03	-	-	350	111	H
4	* 2.4915	28.81	RMS	32.8	-20.2	41.41	54	-12.59	-	-	350	111	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	39.63	Pk	32.7	-20.3	52.03	-	-	74	-21.97	106	362	V
3	* 2.48351	28.7	RMS	32.7	-20.3	41.1	54	-12.9	-	-	106	362	V
4	2.51631	28.89	RMS	32.7	-20.3	41.29	54	-12.71	-	-	106	362	V
2	2.51829	40.97	Pk	32.7	-20.3	53.37	-	-	74	-20.63	106	362	V

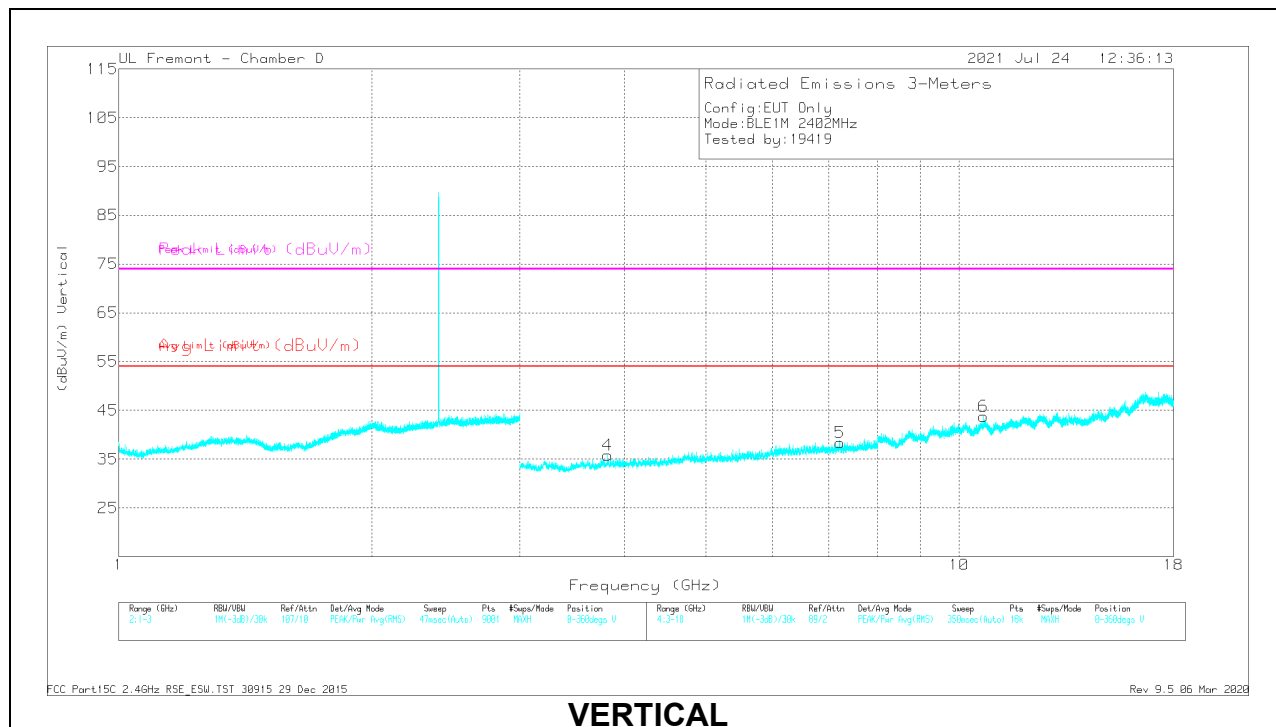
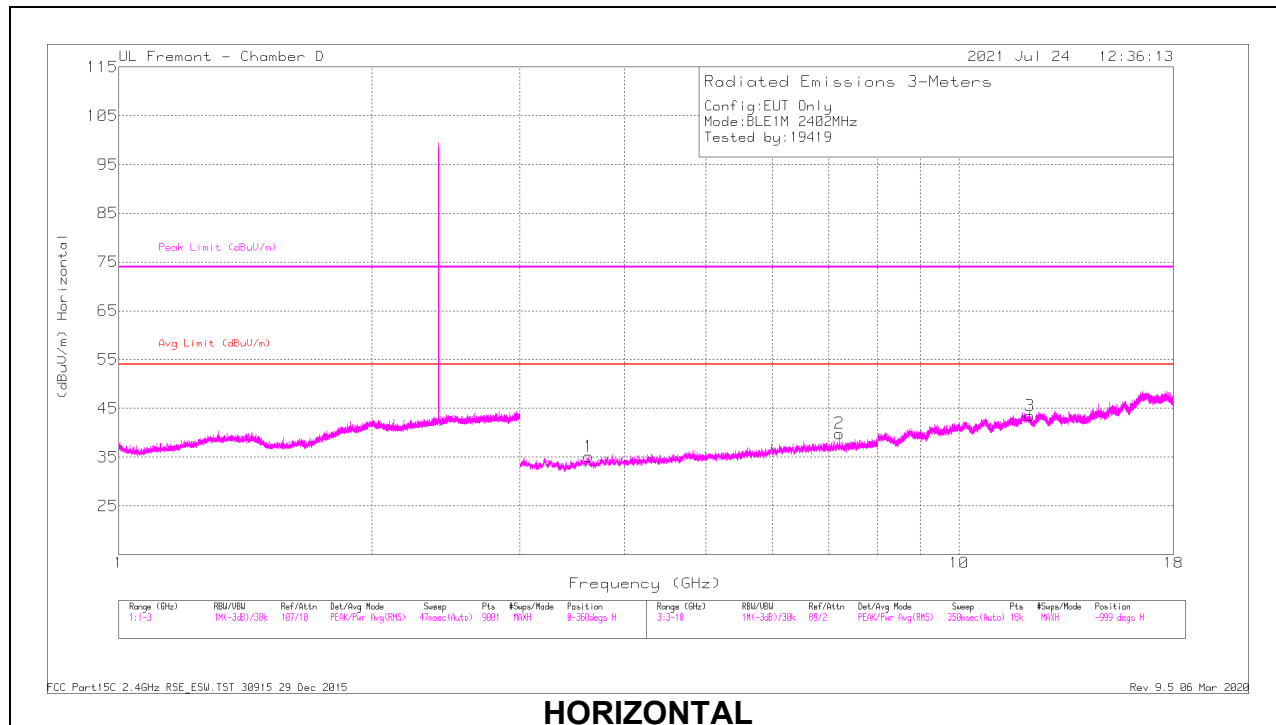
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

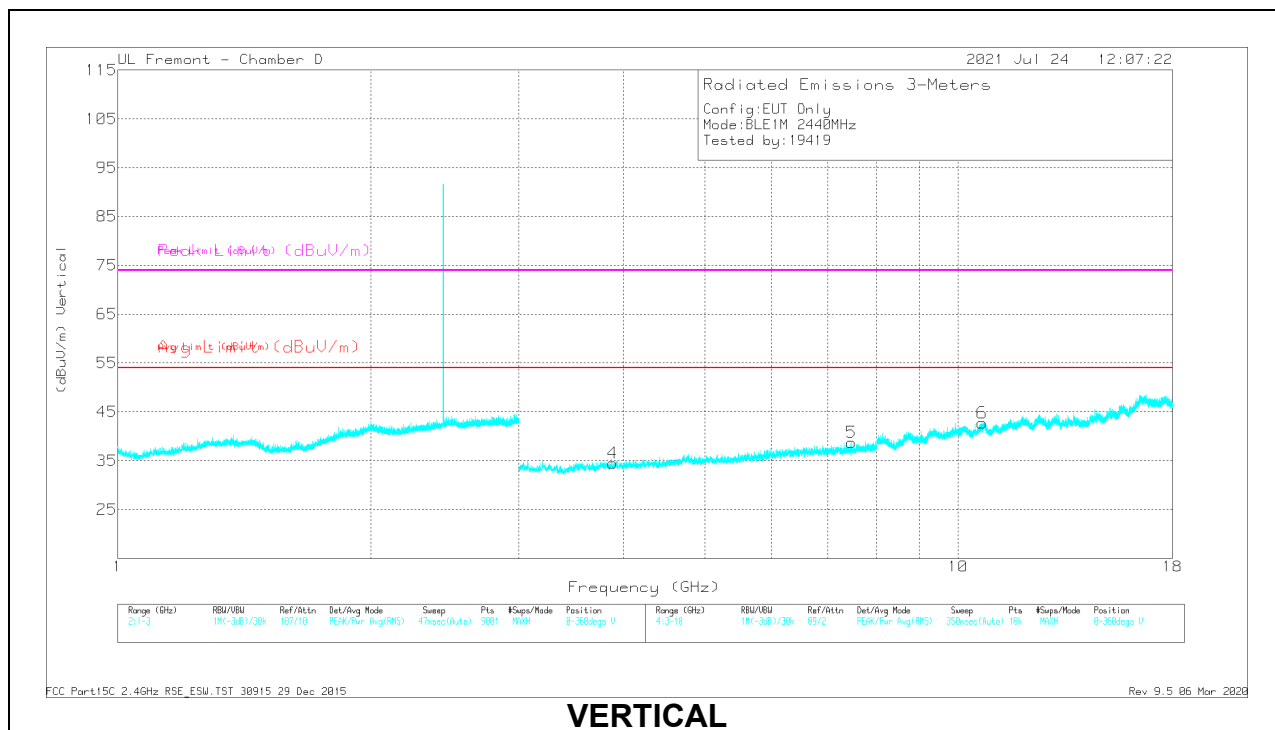
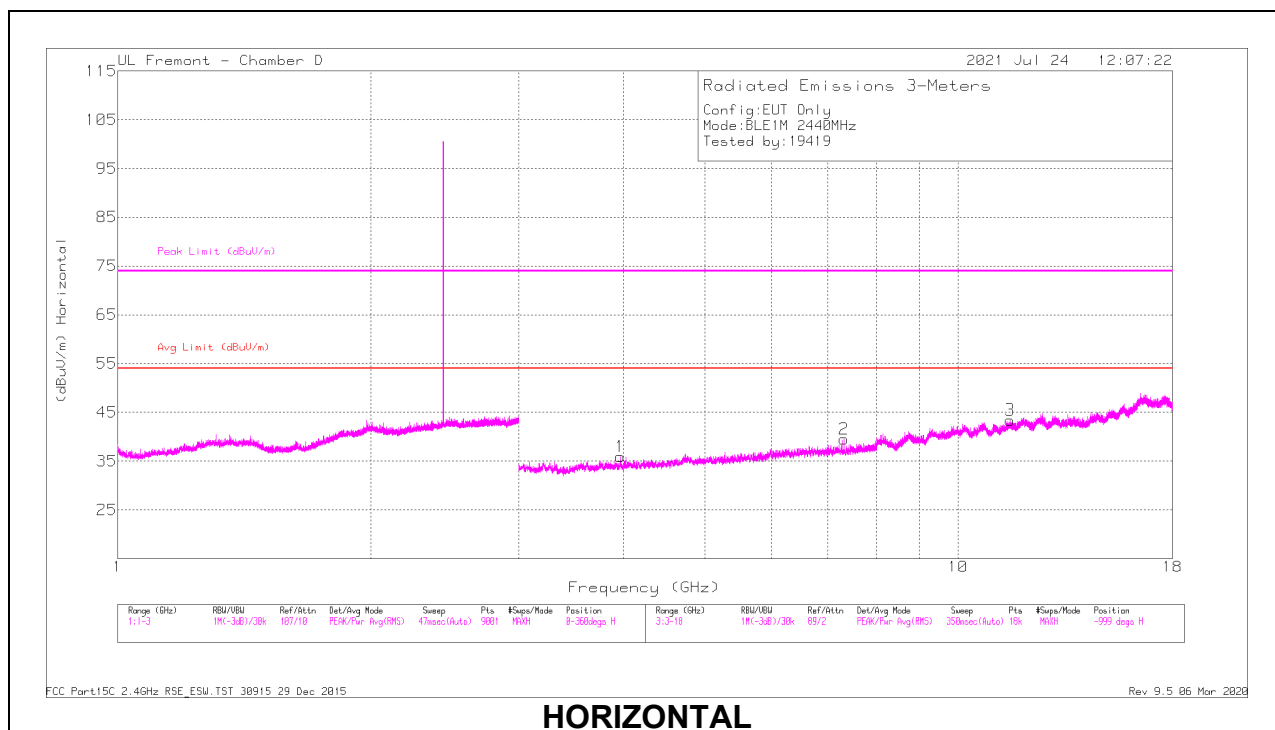


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.62576	37.38	PKFH	33.4	-28.2	42.58	-	-	74	-31.42	34	200	H
	* 3.62376	24.2	VA1T	33.5	-28.1	29.6	54	-24.4	-	-	34	200	H
3	* 12.14545	32.42	PKFH	38.7	-20.2	50.92	-	-	74	-23.08	267	105	H
	* 12.14732	19.57	VA1T	38.7	-20.3	37.97	54	-16.03	-	-	267	105	H
4	* 3.82103	37.3	PKFH	33.5	-28	42.8	-	-	74	-31.2	230	101	V
	* 3.81824	24.02	VA1T	33.5	-27.9	29.62	54	-24.38	-	-	230	101	V
6	* 10.69916	34.65	PKFH	37.8	-20.6	51.85	-	-	74	-22.15	136	101	V
	* 10.69993	20.17	VA1T	37.9	-20.6	37.47	54	-16.53	-	-	136	101	V
2	7.20632	25.36	VA1T	35.6	-24.7	36.26	-	-	-	-	355	120	H
	7.20649	37.78	PKFH	35.6	-24.7	48.68	-	-	-	-	355	120	H
5	7.22048	21.73	VA1T	35.6	-24.5	32.83	-	-	-	-	198	150	V
	7.22092	35.69	PKFH	35.6	-24.5	46.79	-	-	-	-	198	150	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS

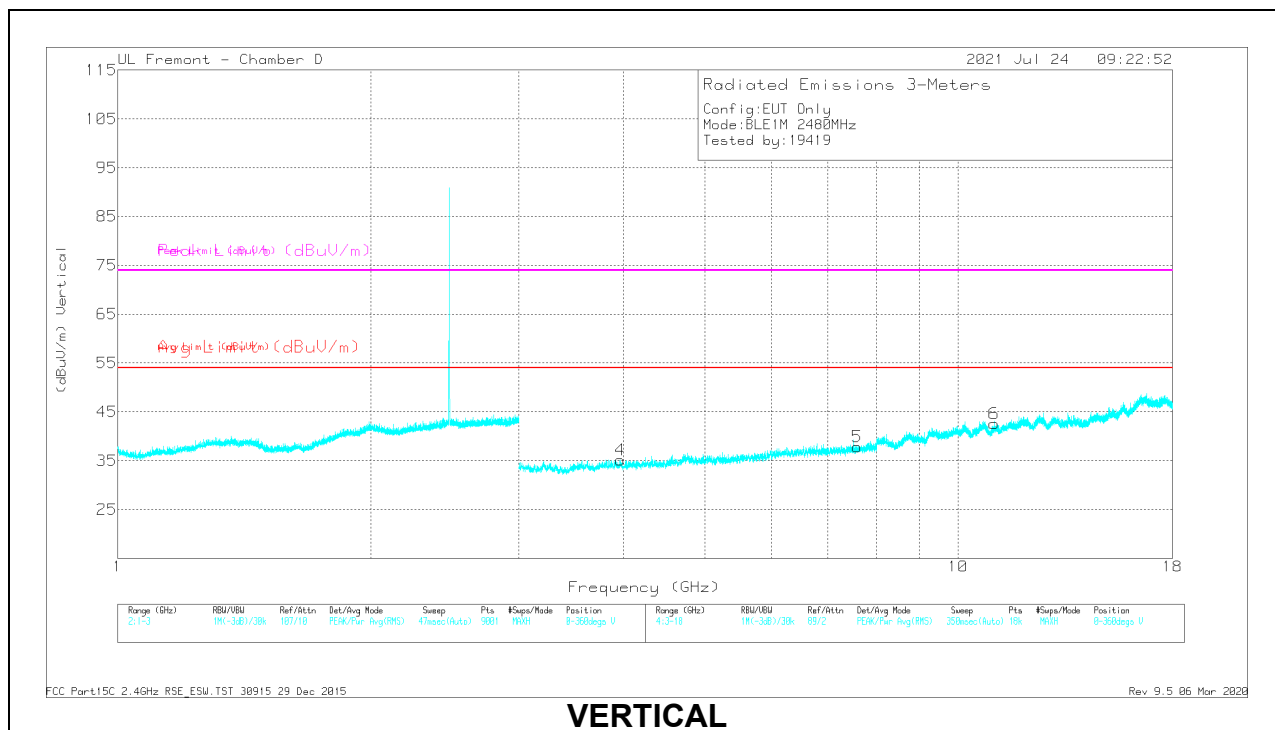
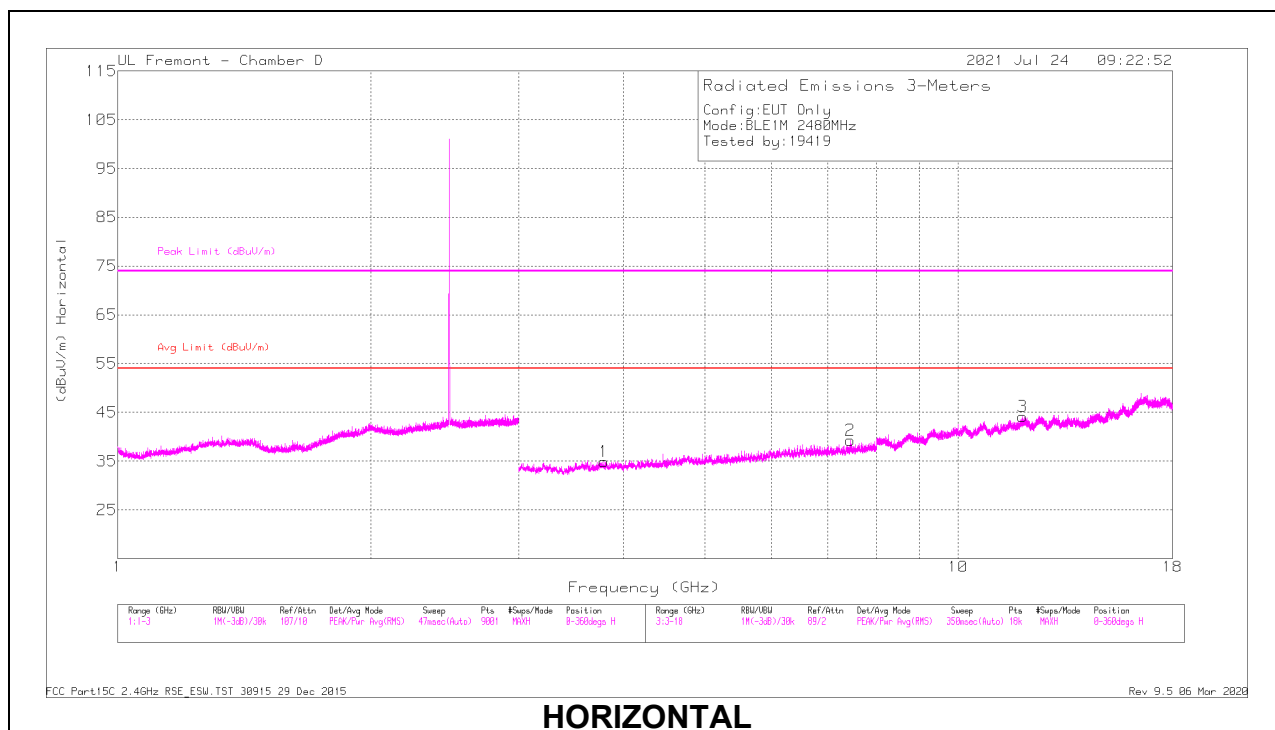


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.96274	37.61	PKFH	33.4	-27.9	43.11	-	-	74	-30.89	258	103	H
	* 3.9609	24.12	VA1T	33.4	-28	29.52	54	-24.48	-	-	258	103	H
2	* 7.32055	36.82	PKFH	35.6	-24.8	47.62	-	-	74	-26.38	343	132	H
	* 7.32041	25.06	VA1T	35.6	-24.8	35.86	54	-18.14	-	-	343	132	H
3	* 11.54009	33.39	PKFH	38.2	-20.1	51.49	-	-	74	-22.51	116	200	H
	* 11.54291	19.44	VA1T	38.2	-20	37.64	54	-16.36	-	-	116	200	H
4	* 3.88512	37.2	PKFH	33.4	-27.9	42.7	-	-	74	-31.3	97	176	V
	* 3.88252	23.71	VA1T	33.4	-27.8	29.31	54	-24.69	-	-	97	176	V
5	* 7.47426	34.64	PKFH	35.7	-24.4	45.94	-	-	74	-28.06	86	191	V
	* 7.47607	21.36	VA1T	35.7	-24.3	32.76	54	-21.24	-	-	86	191	V
6	* 10.6882	34.06	PKFH	37.9	-20.8	51.16	-	-	74	-22.84	122	139	V
	* 10.68889	20.27	VA1T	37.9	-20.8	37.37	54	-16.63	-	-	122	139	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

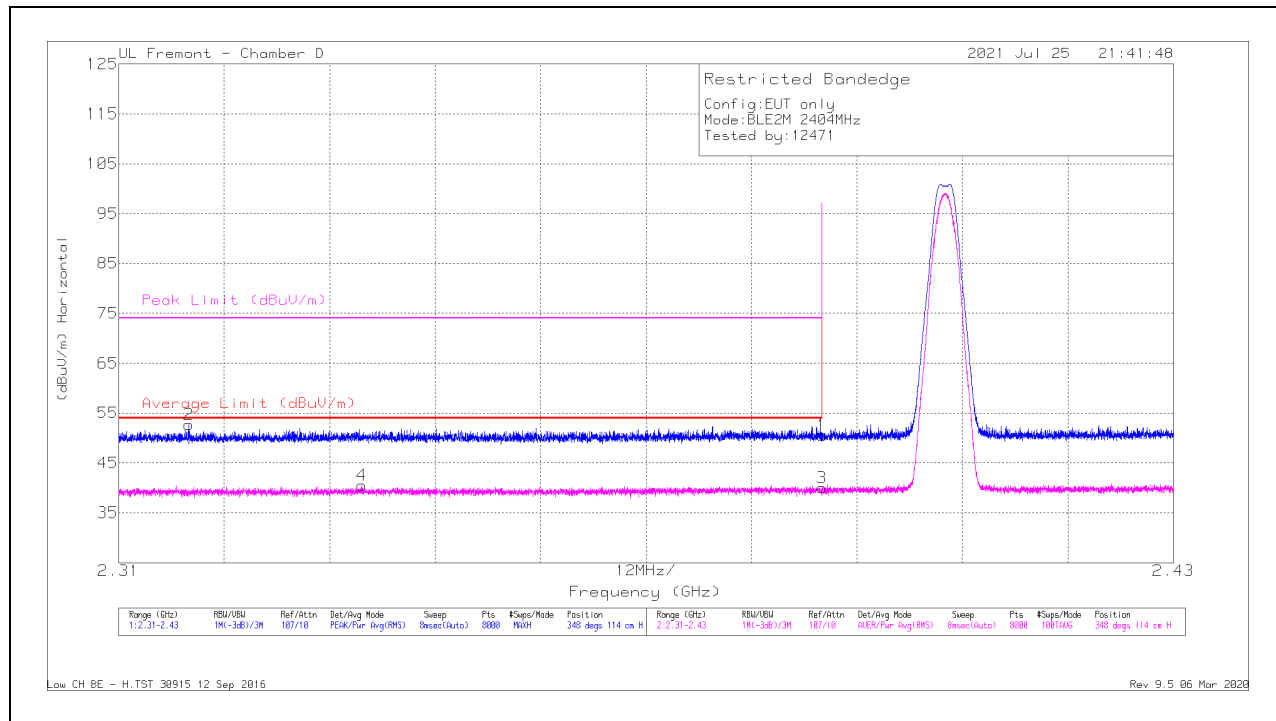
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.79221	36.97	PKFH	33.4	-27.9	42.47	-	-	74	-31.53	97	200	H
	* 3.79	23.79	VA1T	33.4	-27.9	29.29	54	-24.71	-	-	97	200	H
2	* 7.43934	36.28	PKFH	35.7	-24.4	47.58	-	-	74	-26.42	111	125	H
	* 7.43941	22.35	VA1T	35.7	-24.4	33.65	54	-20.35	-	-	111	125	H
3	* 11.94876	33.25	PKFH	38.7	-20.9	51.05	-	-	74	-22.95	99	156	H
	* 11.95045	20.26	VA1T	38.7	-21	37.96	54	-16.04	-	-	99	156	H
4	* 3.96201	38.69	PKFH	33.4	-27.9	44.19	-	-	74	-29.81	75	101	V
	* 3.9617	24.1	VA1T	33.4	-28	29.5	54	-24.5	-	-	75	101	V
5	* 7.58886	35.19	PKFH	35.7	-24.3	46.59	-	-	74	-27.41	75	165	V
	* 7.59028	21.36	VA1T	35.7	-24.3	32.76	54	-21.24	-	-	75	165	V
6	* 11.04036	32.5	PKFH	37.7	-20.3	49.9	-	-	74	-24.1	113	113	V
	* 11.04369	19.45	VA1T	37.7	-20.3	36.85	54	-17.15	-	-	113	113	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

10.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



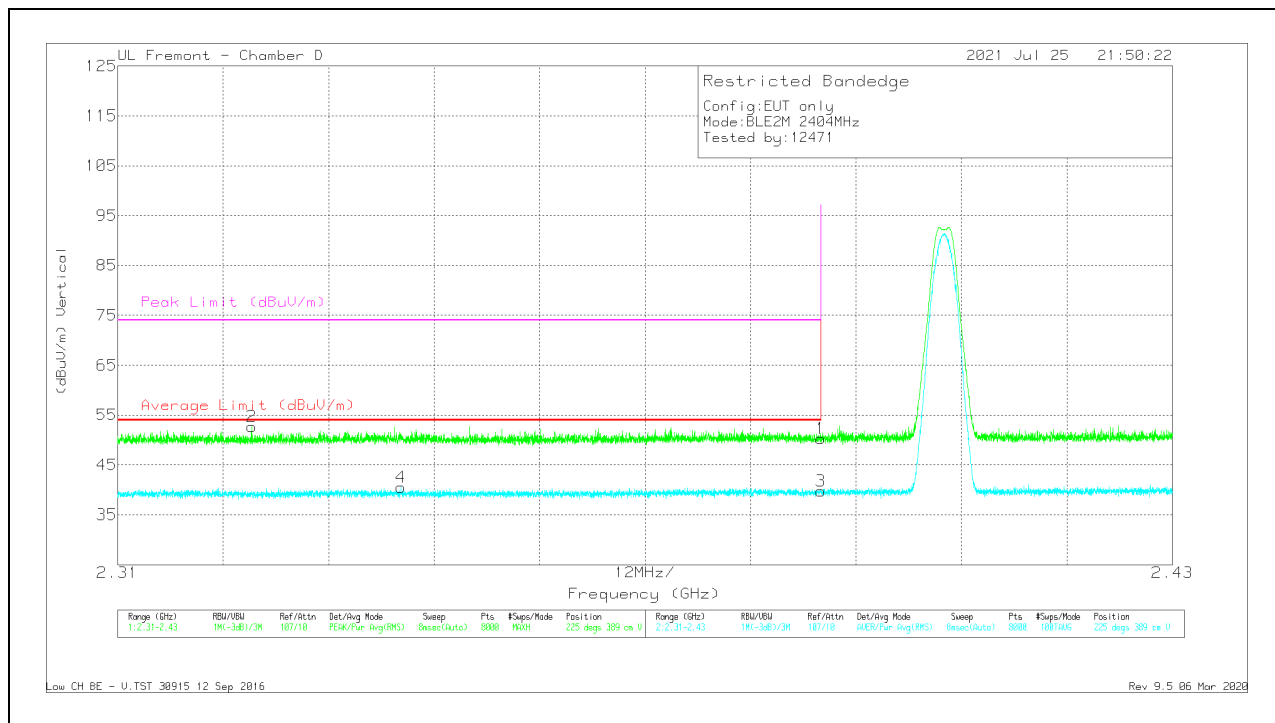
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1712 (dB/m)	Amp/Cbl/Ftr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.8	Pk	32.1	-20.3	50.6	-	-	74	-23.4	348	114	H
2	* 2.31797	41.25	Pk	31.8	-20.4	52.65	-	-	74	-21.35	348	114	H
3	* 2.38999	28.22	RMS	32.1	-20.3	40.02	54	-13.98	-	-	348	114	H
4	* 2.33768	29.1	RMS	31.9	-20.5	40.5	54	-13.5	-	-	348	114	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.47	Pk	32.1	-20.3	50.27	-	-	74	-23.73	225	389	V
2	* 2.32523	41.31	Pk	31.8	-20.4	52.71	-	-	74	-21.29	225	389	V
3	* 2.38999	28	RMS	32.1	-20.3	39.8	54	-14.2	-	-	225	389	V
4	* 2.34221	29.1	RMS	31.9	-20.5	40.5	54	-13.5	-	-	225	389	V

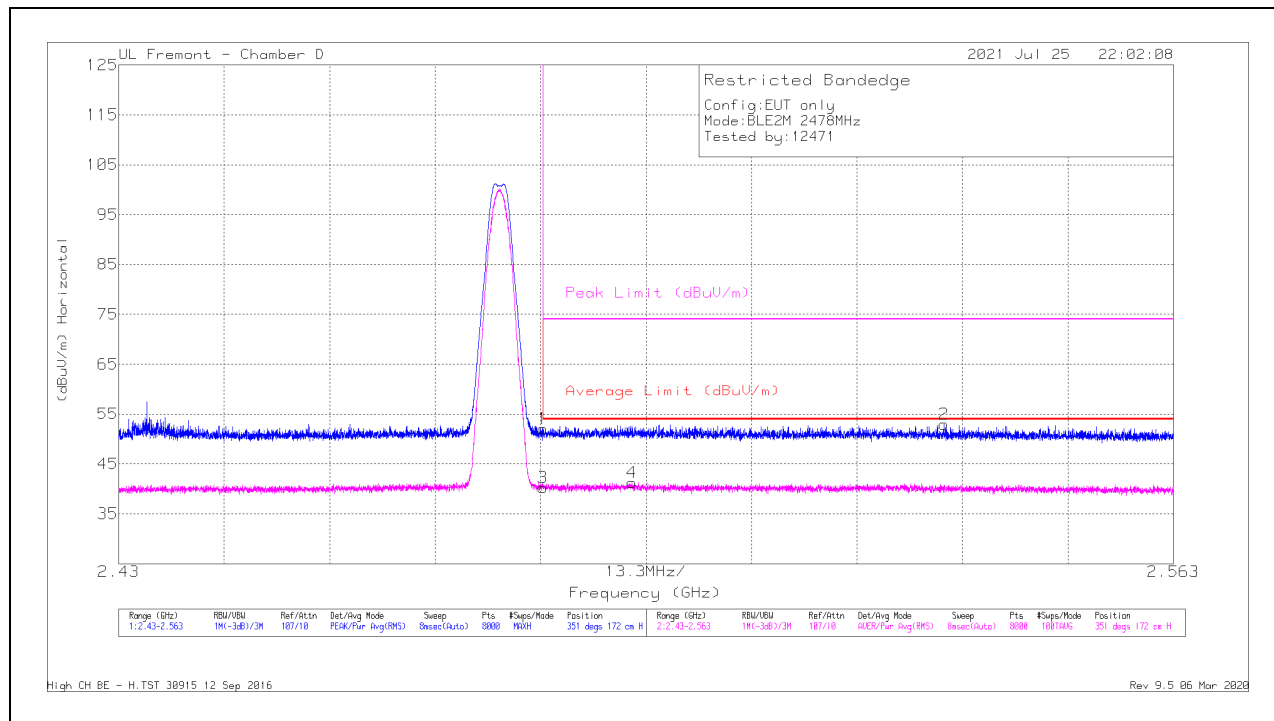
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



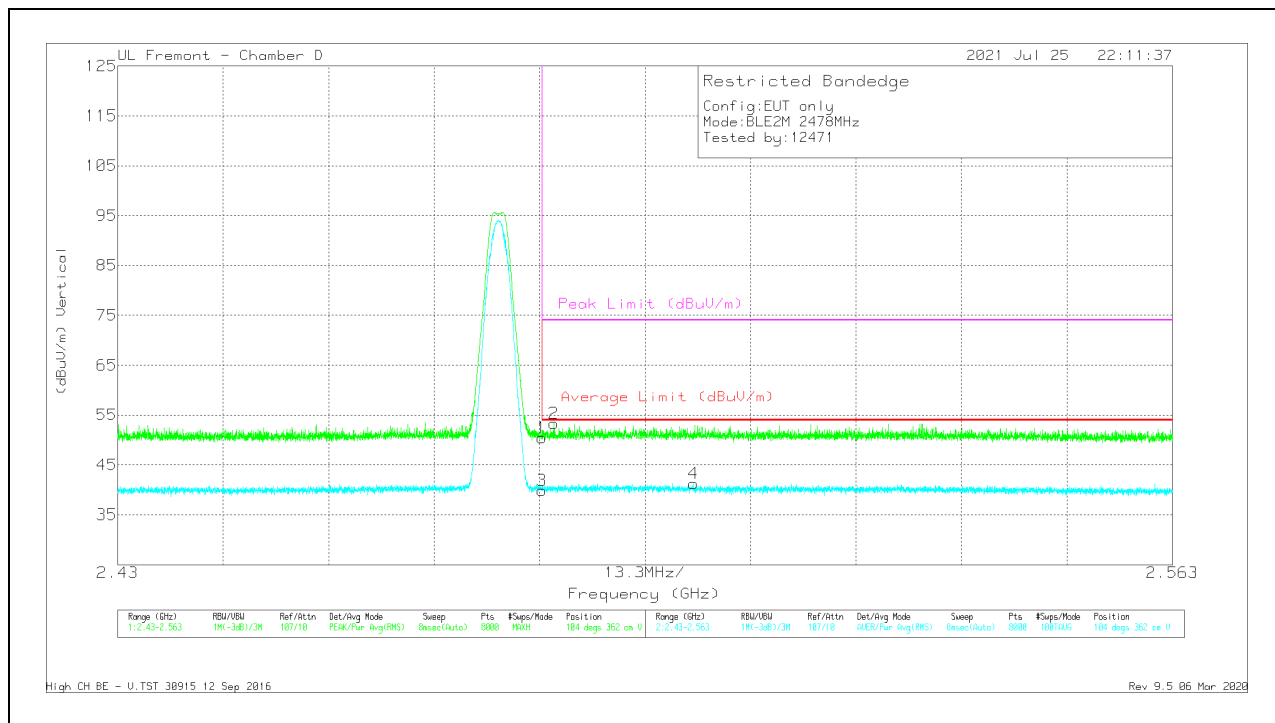
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/CbI/Ftr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	39.65	Pk	32.7	-20.3	52.05	-	-	74	-21.95	351	172	H
3	* 2.48351	27.91	RMS	32.7	-20.3	40.31	54	-13.69	-	-	351	172	H
4	* 2.49473	28.67	RMS	32.8	-20.2	41.27	54	-12.73	-	-	351	172	H
2	2.53405	40.69	Pk	32.5	-20.2	52.99	-	-	74	-21.01	351	172	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	38.03	Pk	32.7	-20.3	50.43	-	-	74	-23.57	104	362	V
2	* 2.485	40.89	Pk	32.7	-20.3	53.29	-	-	74	-20.71	104	362	V
3	* 2.48351	27.45	RMS	32.7	-20.3	39.85	54	-14.15	-	-	104	362	V
4	2.50261	28.89	RMS	32.7	-20.3	41.29	54	-12.71	-	-	104	362	V

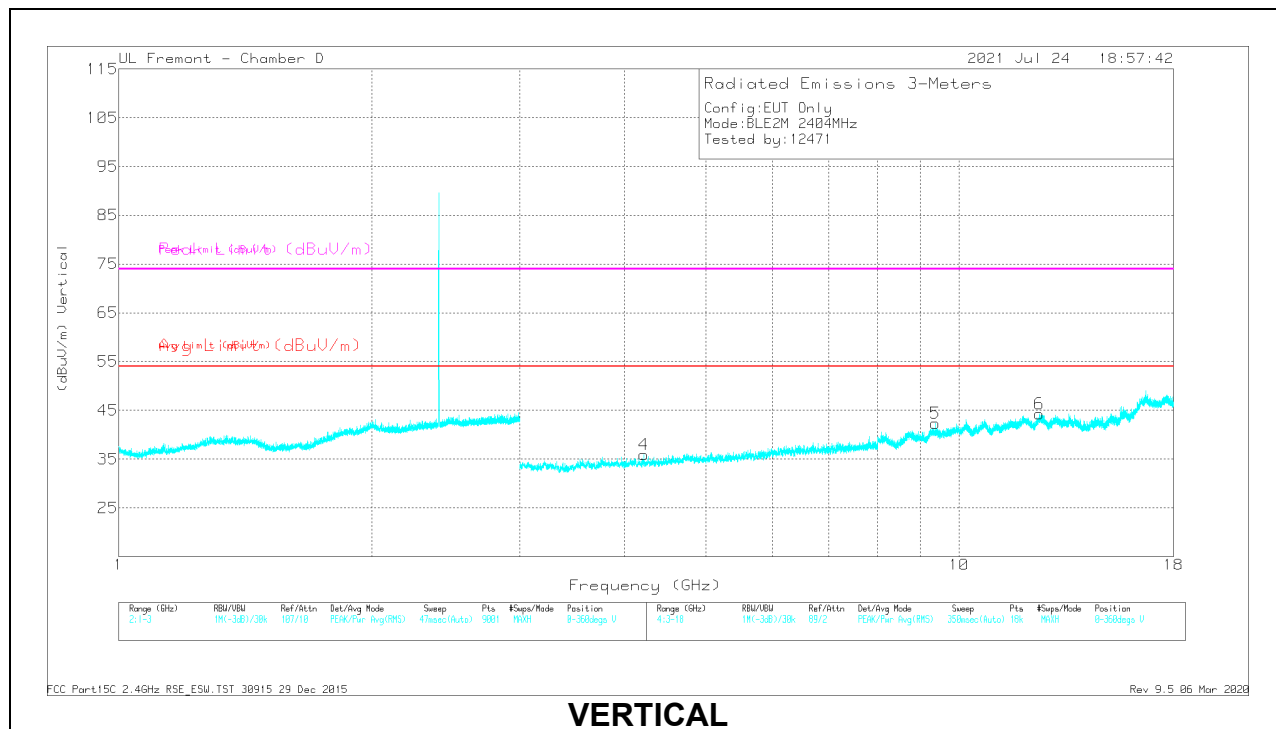
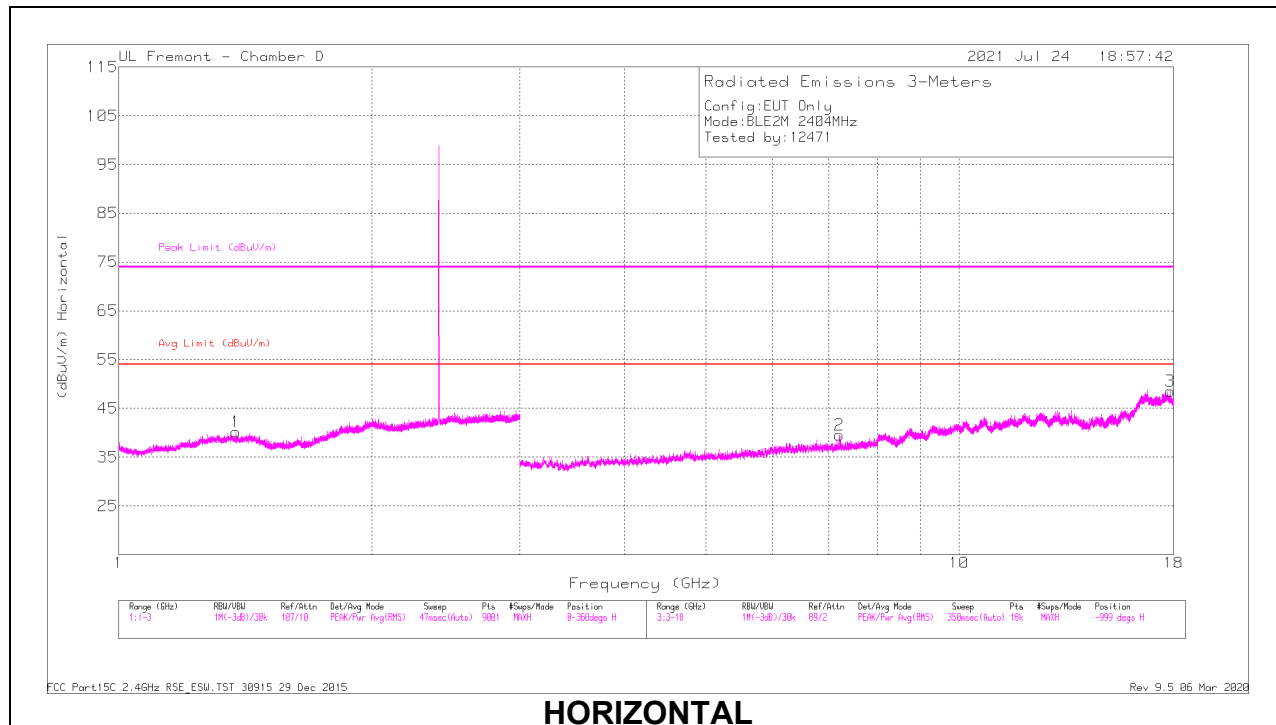
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

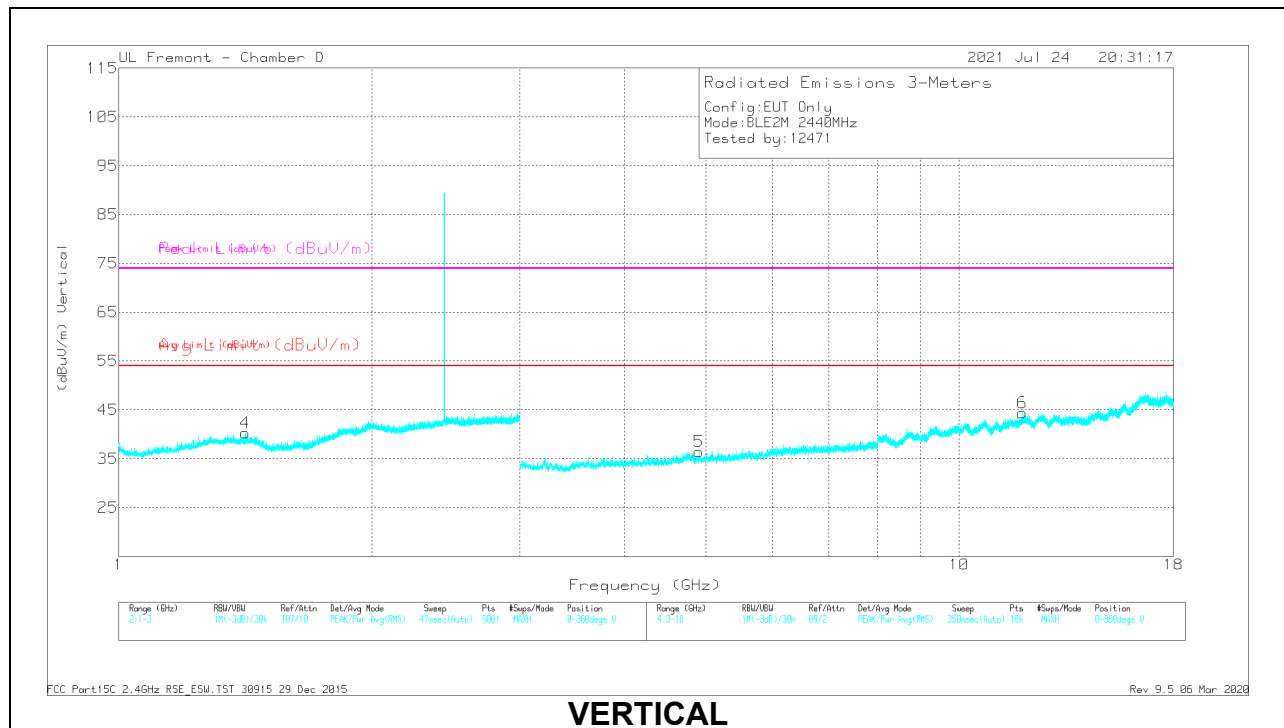
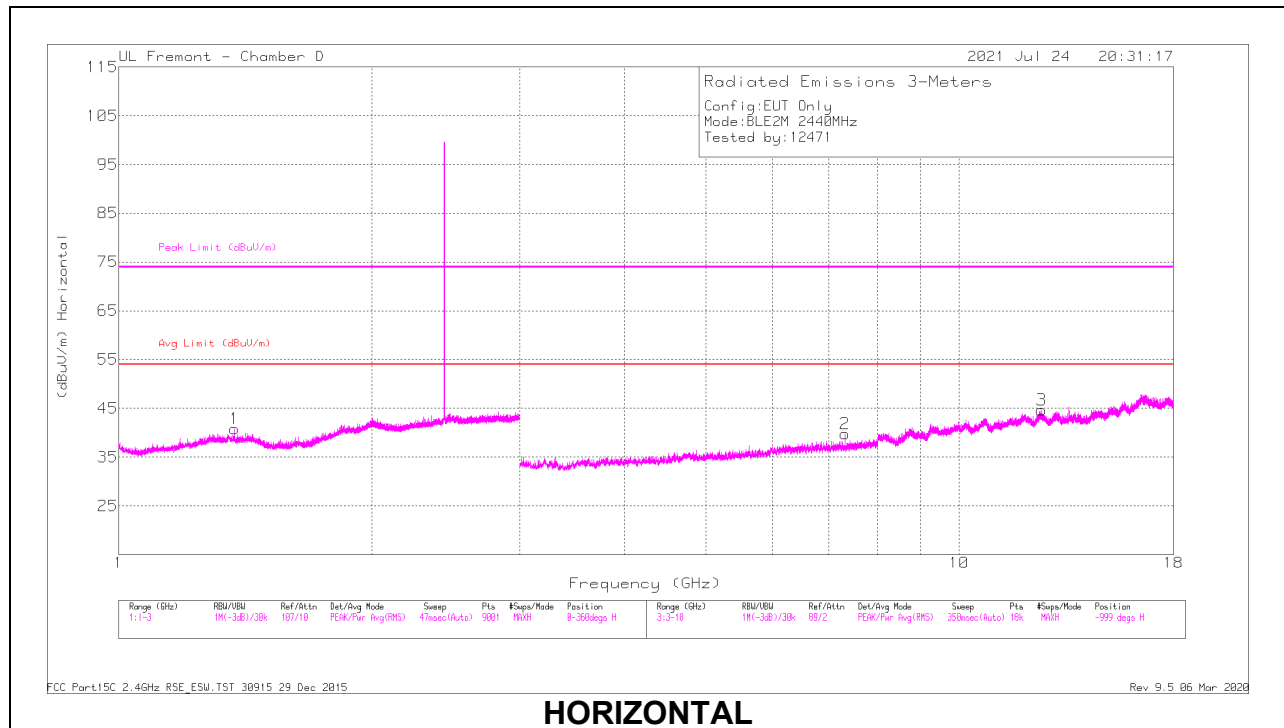


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.37559	41.34	PK2	29.4	-21.7	49.04	-	-	74	-24.96	0	200	H
	* 1.37817	29.72	MAv1	29.4	-21.7	37.42	54	-16.58	-	-	0	200	H
3	* 17.8437	33.22	PK2	41.3	-17.1	57.42	-	-	74	-16.58	0	242	H
	* 17.84507	21.19	MAv1	41.2	-17.1	45.29	54	-8.71	-	-	0	242	H
4	* 4.21463	38.59	PK2	33.4	-27.2	44.79	-	-	74	-29.21	0	101	V
	* 4.2165	27.08	MAv1	33.4	-27.2	33.28	54	-20.72	-	-	0	101	V
5	* 9.36349	35.76	PK2	36.5	-21.5	50.76	-	-	74	-23.24	0	101	V
	* 9.36733	24.31	MAv1	36.4	-21.6	39.11	54	-14.89	-	-	0	101	V
6	* 12.45519	34.91	PK2	39	-20.7	53.21	-	-	74	-20.79	0	200	V
	* 12.4558	23.32	MAv1	39	-20.7	41.62	54	-12.38	-	-	0	200	V
2	7.21084	38.81	PK2	35.6	-24.7	49.71	-	-	-	-	117	242	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

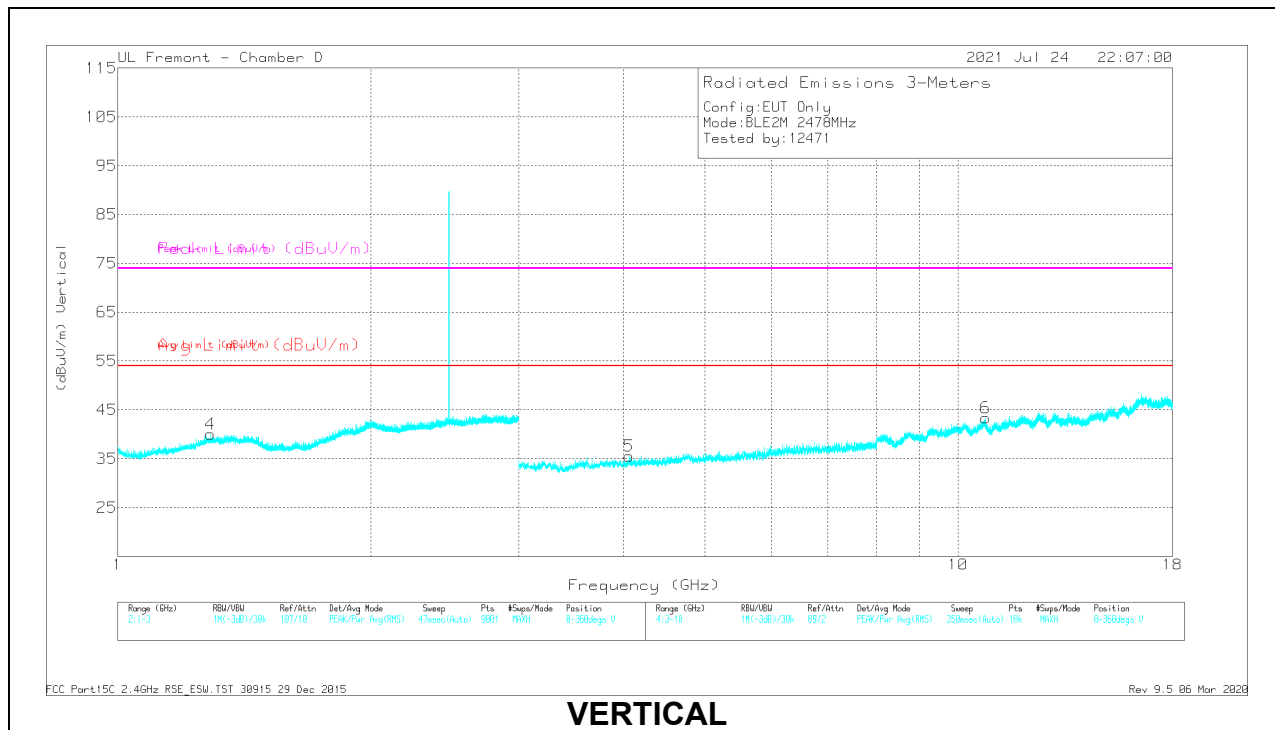
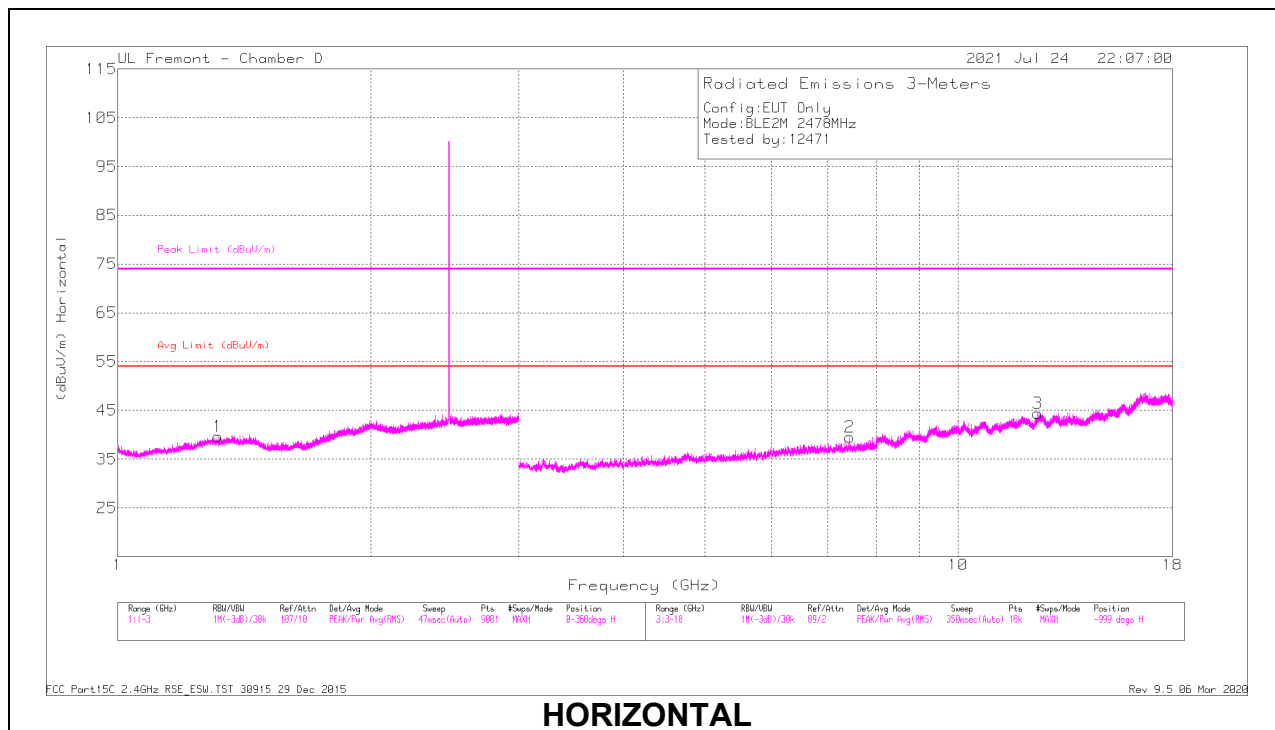
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.37083	41.32	PK2	29.5	-21.7	49.12	-	-	74	-24.88	0	101	H
	* 1.37014	29.68	MAv1	29.6	-21.7	37.58	54	-16.42	-	-	0	101	H
4	* 1.41436	41.53	PK2	29.3	-21.6	49.23	-	-	74	-24.77	0	200	V
	* 1.41557	29.93	MAv1	29.3	-21.7	37.53	54	-16.47	-	-	0	200	V
2	* 7.31937	38.77	PK2	35.7	-24.8	49.67	-	-	74	-24.33	133	120	H
	* 7.32124	27.91	MAv1	35.7	-24.8	38.81	54	-15.19	-	-	133	120	H
3	* 12.53833	36.53	PK2	39	-21.4	54.13	-	-	74	-19.87	0	200	H
	* 12.53612	24.2	MAv1	39	-21.3	41.9	54	-12.1	-	-	0	200	H
5	* 4.90389	39.06	PK2	34.1	-27.7	45.46	-	-	74	-28.54	0	200	V
	* 4.90443	27.16	MAv1	34.1	-27.6	33.66	54	-20.34	-	-	0	200	V
6	* 11.90688	35.19	PK2	38.6	-20.3	53.49	-	-	74	-20.51	0	200	V
	* 11.90922	23.18	MAv1	38.6	-20.4	41.38	54	-12.62	-	-	0	200	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.31539	41.53	PK2	29.4	-21.8	49.13	-	-	74	-24.87	0	200	H
	* 1.31461	29.86	MAv1	29.5	-21.8	37.56	54	-16.44	-	-	0	200	H
4	* 1.28761	41.3	PK2	29.5	-21.9	48.9	-	-	74	-25.1	0	200	V
	* 1.2864	30.06	MAv1	29.5	-21.9	37.66	54	-16.34	-	-	0	200	V
2	* 7.43586	38.51	PK2	35.7	-24.3	49.91	-	-	74	-24.09	138	102	H
	* 7.43535	27.7	MAv1	35.7	-24.3	39.1	54	-14.9	-	-	138	102	H
3	* 12.44291	34.48	PK2	38.9	-20.9	52.48	-	-	74	-21.52	0	102	H
	* 12.4432	23.14	MAv1	38.9	-20.8	41.24	54	-12.76	-	-	0	102	H
5	* 4.06287	39.3	PK2	33.6	-27.8	45.1	-	-	74	-28.9	0	200	V
	* 4.06131	27.45	MAv1	33.6	-27.8	33.25	54	-20.75	-	-	0	200	V
6	* 10.78388	34.49	PK2	37.8	-20.2	52.09	-	-	74	-21.91	0	101	V
	* 10.78593	22.86	MAv1	37.8	-20.2	40.46	54	-13.54	-	-	0	101	V

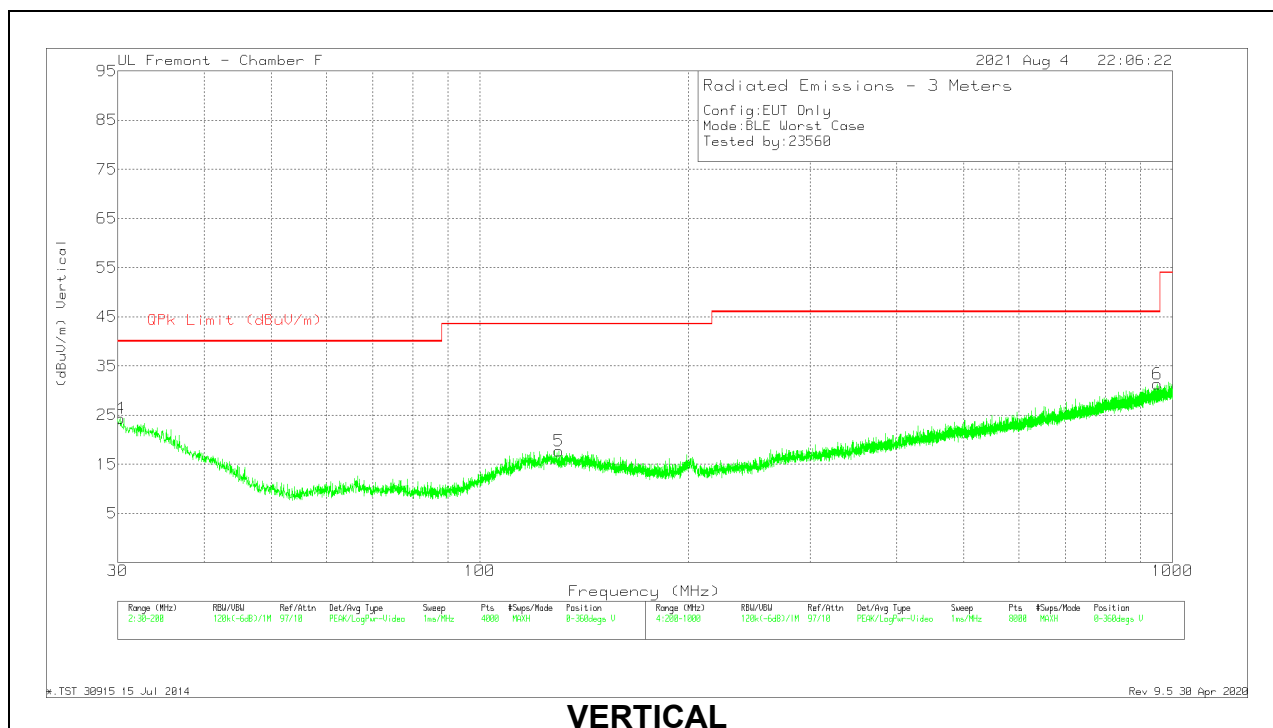
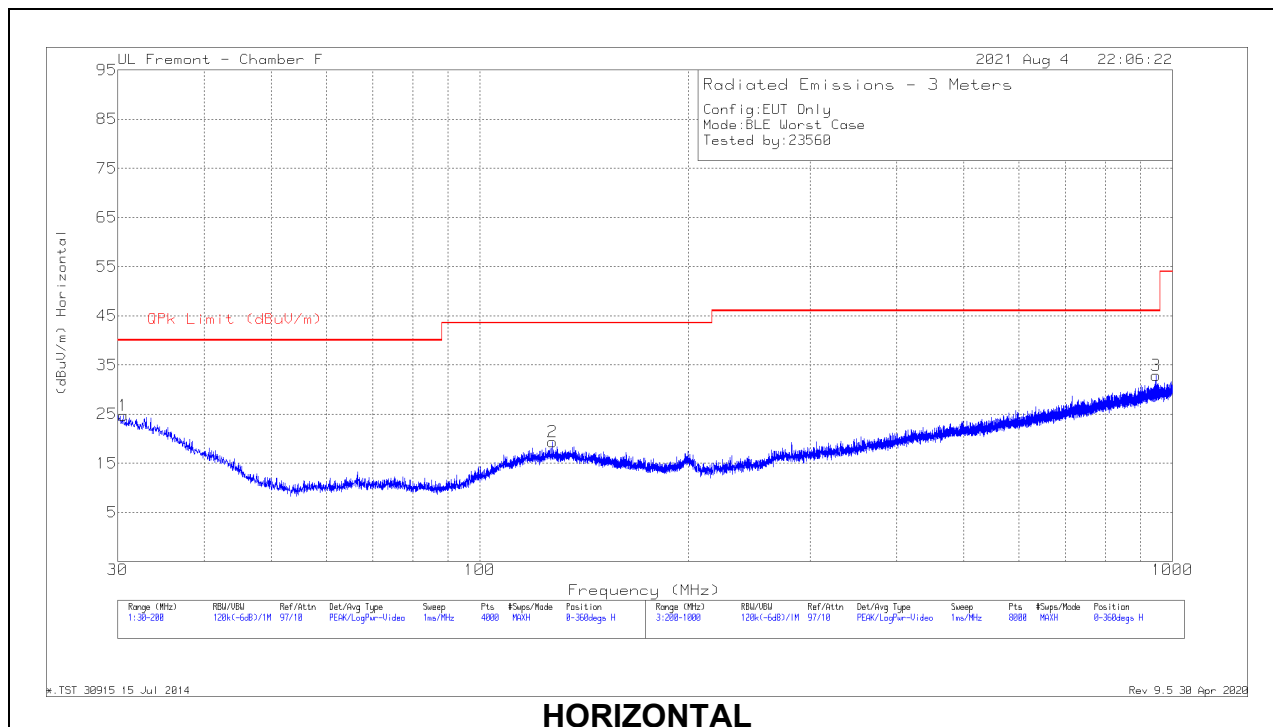
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST CASE BELOW 1 GHZ

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



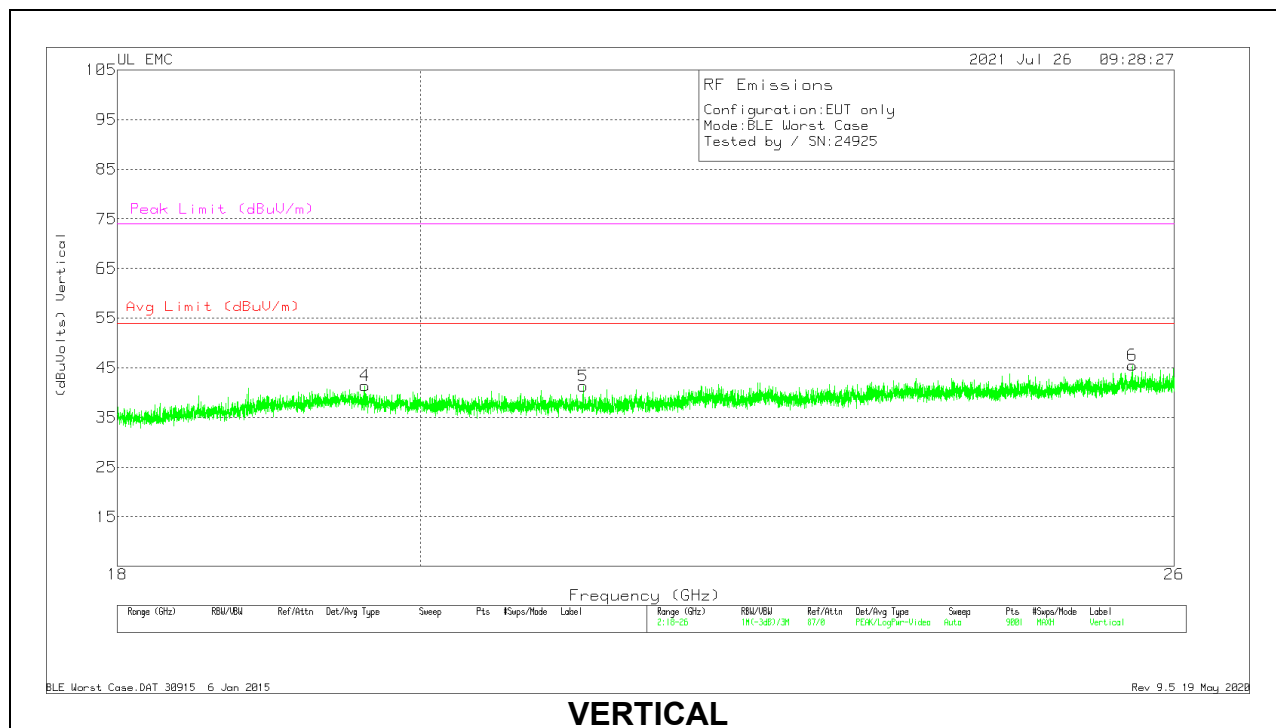
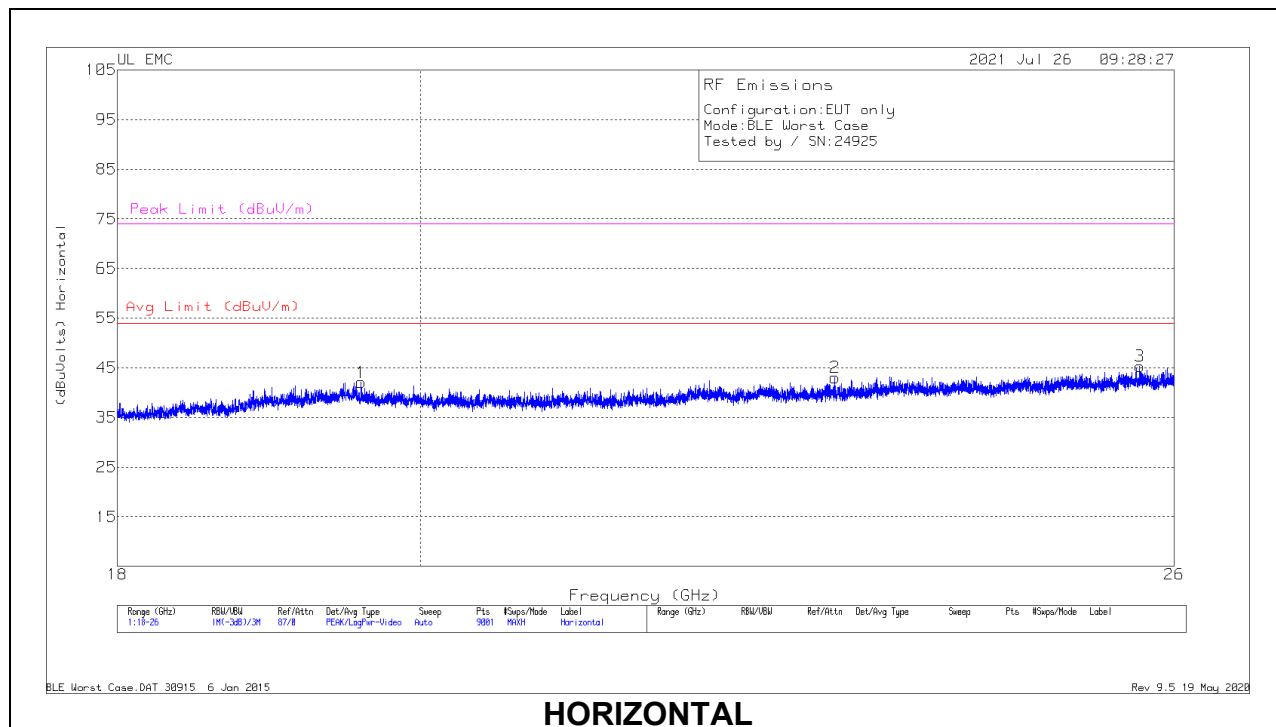
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.9305	22.03	Qp	26	-31.9	16.13	40	-23.87	117	300	H
2	* 125.1377	21.63	Qp	19.6	-31	10.23	43.52	-33.29	331	300	H
4	31.9548	21.73	Qp	26.7	-31.9	16.53	40	-23.47	339	177	V
5	* 127.8559	21.47	Qp	19.6	-30.9	10.17	43.52	-33.35	8	115	V
3	949.2171	19.49	Qp	28.7	-26.2	21.99	46.02	-24.03	191	132	H
6	952.4177	19.52	Qp	28.8	-26.2	22.12	46.02	-23.9	120	228	V

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

10.4. WORST CASE 18-26 GHZ

SPURIOUS EMISSIONS 18 to 26GHz (WORST-CASE CONFIGURATION)



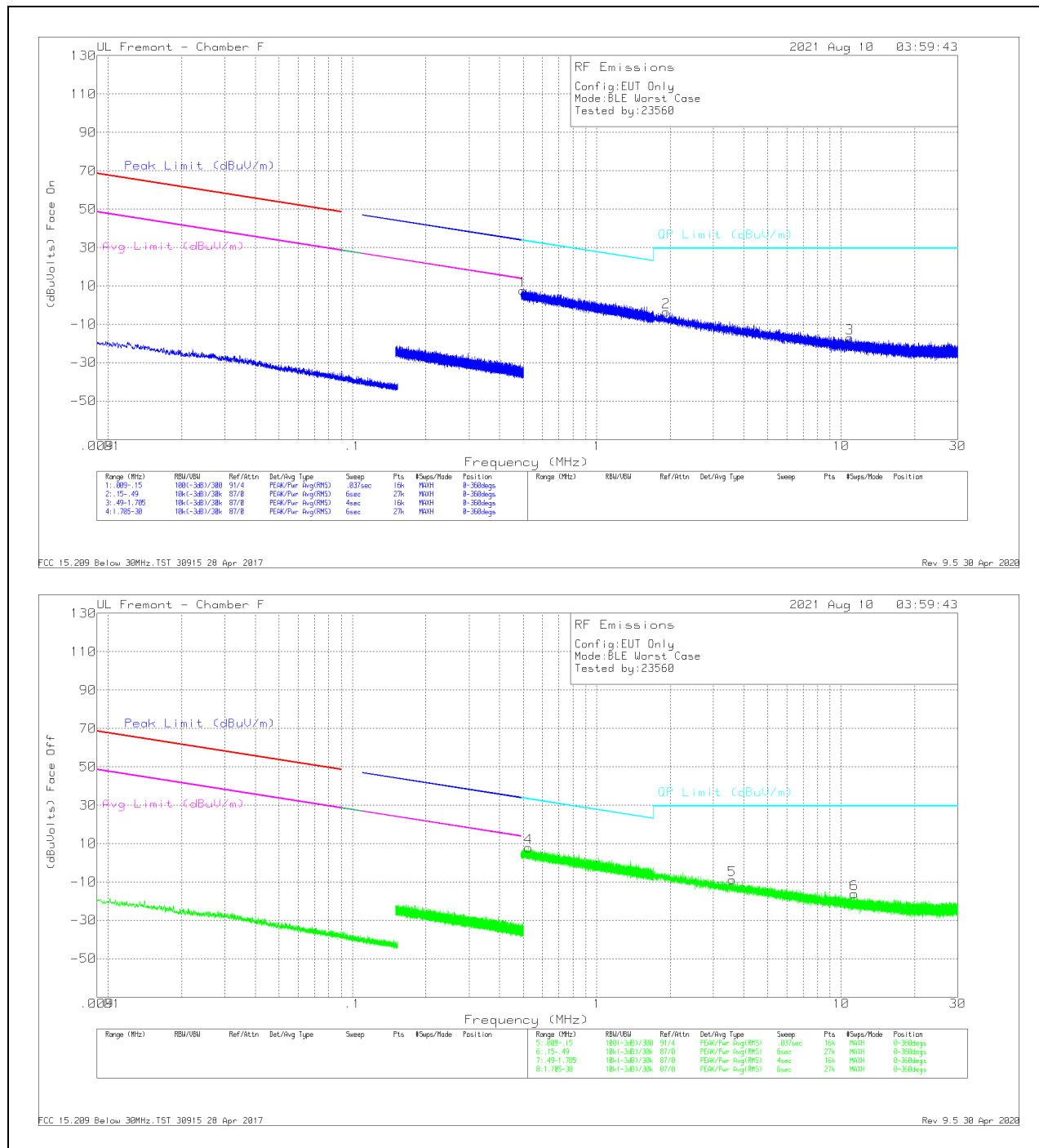
18 - 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Polarity
1	19.59289	37.48	Pk	32.8	-18.7	-9.5	42.08	54	-11.92	74	-31.92	H
2	23.104	37.62	Pk	33.4	-18.5	-9.5	43.02	54	-10.98	74	-30.98	H
3	25.68889	38.6	Pk	34.1	-17.9	-9.5	45.3	54	-8.7	74	-28.7	H
4	19.61778	36.78	Pk	32.7	-18.6	-9.5	41.38	54	-12.62	74	-32.62	V
5	21.16533	37.73	Pk	32.9	-19.8	-9.5	41.33	54	-12.67	74	-32.67	V
6	25.62222	38.8	Pk	34.1	-17.9	-9.5	45.5	54	-8.5	74	-28.5	V

Pk - Peak detector

10.5. WORST CASE BELOW 30MHz

FACE-ON AND FACE-OFF



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
1	.49904	36.3	Pk	11.1	.1	-40	7.5	33.64	-26.14	0-360	Face on
2	1.91984	24.71	Pk	11.4	.2	-40	-3.69	29.5	-33.19	0-360	Face on
3	10.87186	11.68	Pk	10.8	.4	-40	-17.12	29.5	-46.62	0-360	Face on
4	.52572	36.64	Pk	11.2	.1	-40	7.94	33.19	-25.25	0-360	Face off
5	3.58511	19.45	Pk	11.5	.2	-40	-8.85	29.5	-38.35	0-360	Face off
6	11.30258	12.7	Pk	10.8	.4	-40	-16.1	29.5	-45.6	0-360	Face off

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.

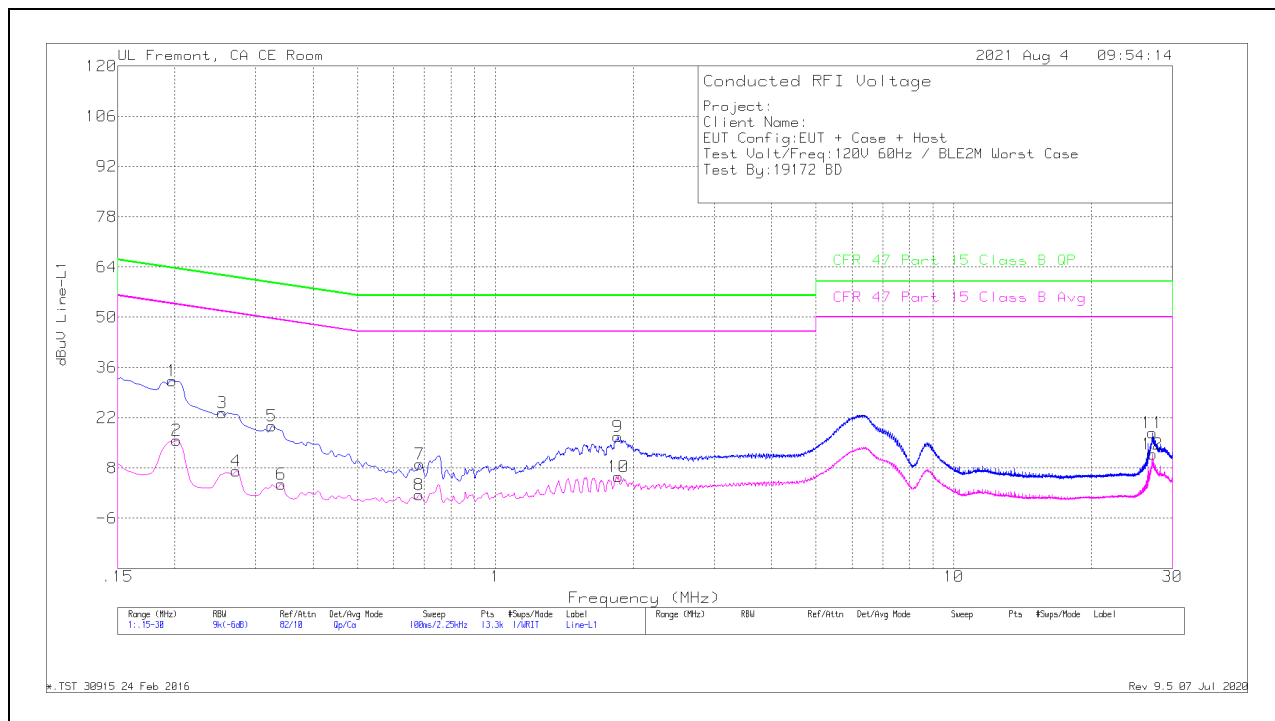
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

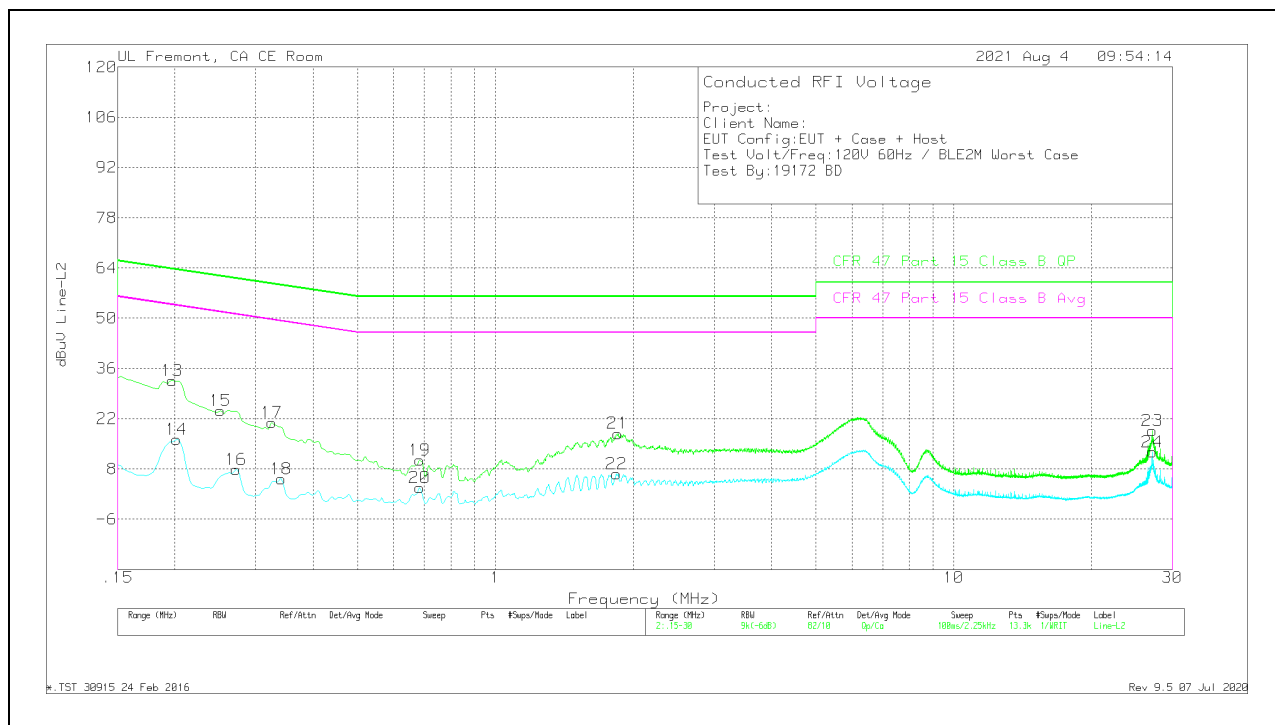
RESULTS

11.1. AC Power Line With Laptop

LINE 1 RESULTS



LINE 2 RESULTS



AC LINE DATA

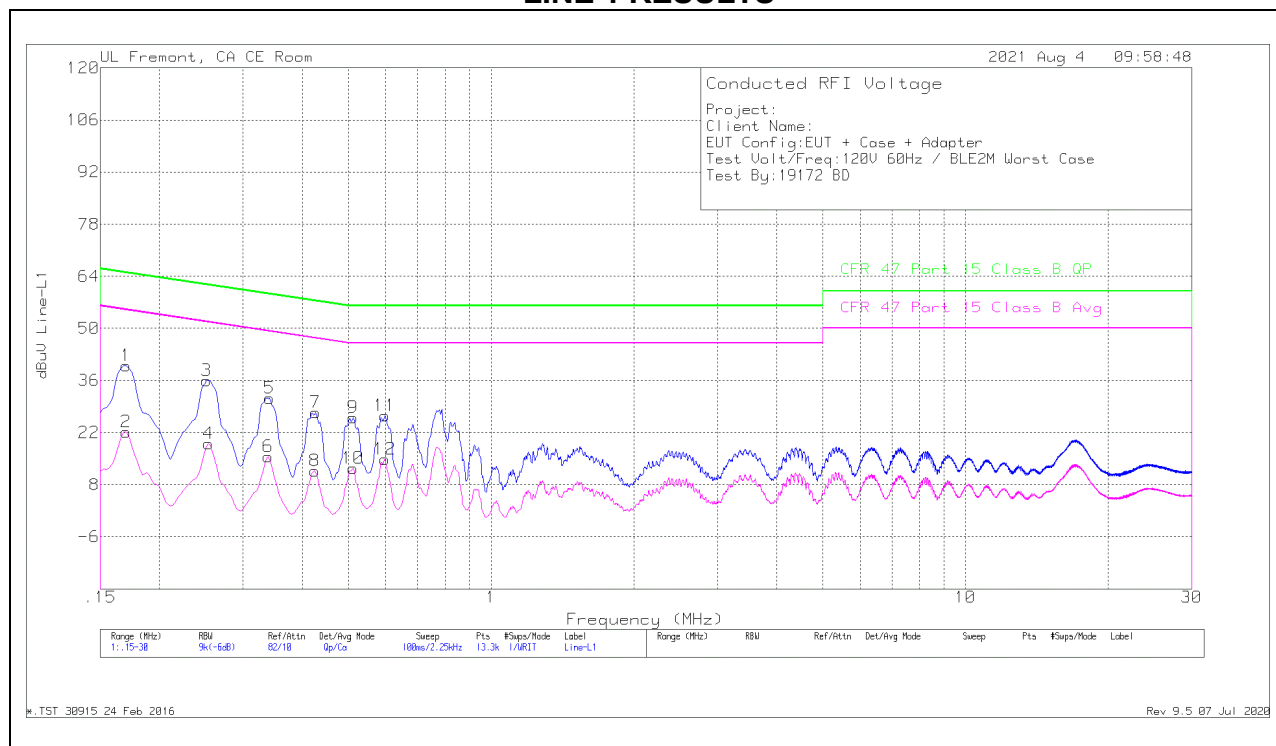
Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)M argin (dB)
2	.20175	6.34	Ca	0	0	9.3	15.64	-	-	53.54	-37.9
4	.2715	-2.12	Ca	0	0	9.3	7.18	-	-	51.07	-43.89
6	.34125	-5.77	Ca	0	0	9.3	3.53	-	-	49.17	-45.64
8	.681	-8.74	Ca	0	0	9.3	.56	-	-	46	-45.44
10	1.85325	-3.81	Ca	0	.1	9.3	5.59	-	-	46	-40.41
12	27.13425	2.17	Ca	0	.3	9.4	11.87	-	-	50	-38.13
1	.19725	23.01	Qp	0	0	9.3	32.31	63.73	-31.42	-	-
3	.2535	14.08	Qp	0	0	9.3	23.38	61.64	-38.26	-	-
5	.3255	10.39	Qp	0	0	9.3	19.69	59.57	-39.88	-	-
7	.68325	-2	Qp	0	0	9.3	9.1	56	-46.9	-	-
9	1.851	7.28	Qp	0	.1	9.3	16.68	56	-39.32	-	-
11	27.1365	8.1	Qp	0	.3	9.4	17.8	60	-42.2	-	-

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)M argin (dB)
14	.20175	6.89	Ca	0	0	9.3	16.19	-	-	53.54	-37.35
16	.2715	-1.44	Ca	0	0	9.3	7.86	-	-	51.07	-43.21
18	.34125	-4.02	Ca	0	0	9.3	5.28	-	-	49.17	-43.89
20	.68325	-6.57	Ca	0	0	9.3	2.73	-	-	46	-43.27
22	1.8375	-2.69	Ca	0	.1	9.3	6.71	-	-	46	-39.29
24	27.123	2.98	Ca	.1	.3	9.4	12.78	-	-	50	-37.22
13	.19725	23.3	Qp	0	0	9.3	32.6	63.73	-31.13	-	-
15	.25125	15.01	Qp	0	0	9.3	24.31	61.72	-37.41	-	-
17	.3255	11.61	Qp	0	0	9.3	20.91	59.57	-38.66	-	-
19	.68325	1.21	Qp	0	0	9.3	10.51	56	-45.49	-	-
21	1.851	8.49	Qp	0	.1	9.3	17.89	56	-38.11	-	-
23	27.12075	8.86	Qp	.1	.3	9.4	18.66	60	-41.34	-	-

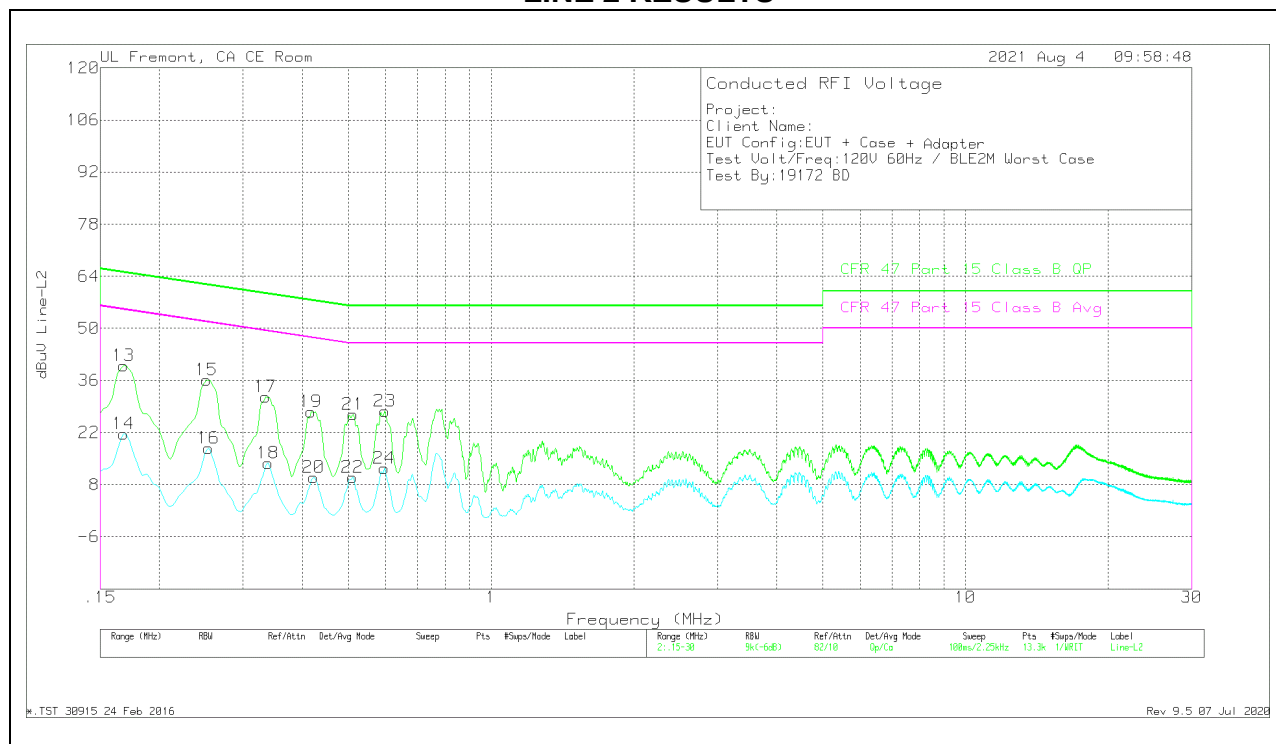
Qp - Quasi-Peak detector
Ca - CISPR average detection

11.2. AC Power Line With AC/DC Adapter

LINE 1 RESULTS



LINE 2 RESULTS



WORST DATA

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)M argin (dB)
2	.17025	12.79	Ca	0	0	9.4	22.19	-	-	54.95	-32.76
4	.2535	9.73	Ca	0	0	9.3	19.03	-	-	51.64	-32.61
6	.339	6.2	Ca	0	0	9.3	15.5	-	-	49.23	-33.73
8	.4245	2.33	Ca	0	0	9.3	11.63	-	-	47.36	-35.73
10	.51225	3.04	Ca	0	0	9.3	12.34	-	-	46	-33.66
12	.59775	5.56	Ca	0	0	9.3	14.86	-	-	46	-31.14
1	.17025	30.64	Qp	0	0	9.4	40.04	64.95	-24.91	-	-
3	.25125	26.64	Qp	0	0	9.3	35.94	61.72	-25.78	-	-
5	.34125	22.01	Qp	0	0	9.3	31.31	59.17	-27.86	-	-
7	.42675	18.03	Qp	0	0	9.3	27.33	57.32	-29.99	-	-
9	.51225	16.67	Qp	0	0	9.3	25.97	56	-30.03	-	-
11	.59775	17.22	Qp	0	0	9.3	26.52	56	-29.48	-	-

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L2	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)M argin (dB)
14	.168	12.22	Ca	0	0	9.4	21.62	-	-	55.06	-33.44
16	.2535	8.49	Ca	0	0	9.3	17.79	-	-	51.64	-33.85
18	.339	4.43	Ca	0	0	9.3	13.73	-	-	49.23	-35.5
20	.42225	.59	Ca	0	0	9.3	9.89	-	-	47.4	-37.51
22	.51	.61	Ca	0	0	9.3	9.91	-	-	46	-36.09
24	.5955	3.04	Ca	0	0	9.3	12.34	-	-	46	-33.66
13	.168	30.55	Qp	0	0	9.4	39.95	65.06	-25.11	-	-
15	.25125	26.78	Qp	0	0	9.3	36.08	61.72	-25.64	-	-
17	.3345	22.33	Qp	0	0	9.3	31.63	59.34	-27.71	-	-
19	.41775	18.32	Qp	0	0	9.3	27.62	57.49	-29.87	-	-
21	.51225	17.5	Qp	0	0	9.3	26.8	56	-29.2	-	-
23	.59775	18.41	Qp	0	0	9.3	27.71	56	-28.29	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

12. SETUP PHOTOS

Please refer to 13685813-EP2V1 for setup photos

END OF THE TEST REPORT