



CERTIFICATION TEST REPORT

Report Number. : 12132879-E3V2

Applicant : SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA -KU, TOKYO, 140-0002, JAPAN

FCC ID : PY7-70663E

EUT Description : GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac &
NFC

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

Date Of Issue:

March 23, 2018

Prepared by:

UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	03/20/18	Initial Issue	Dan Corona
V2	03/23/18	Updated Section 5.5	Kiya Kedida

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION	7
4.3. MEASUREMENT UNCERTAINTY.....	7
5. EQUIPMENT UNDER TEST	8
5.1. EUT DESCRIPTION	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE.....	8
5.5. WORST-CASE CONFIGURATION AND MODE.....	8
5.6. DESCRIPTION OF TEST SETUP.....	9
6. MEASUREMENT METHOD.....	12
7. TEST AND MEASUREMENT EQUIPMENT	13
8. ANTENNA PORT TEST RESULTS	14
8.1. ON TIME AND DUTY CYCLE.....	14
8.2. 99% BANDWIDTH.....	17
8.2.1. BLE (1Mbps).....	18
8.2.2. BLE (2Mbps).....	19
8.3. 6 dB BANDWIDTH.....	20
8.3.1. BLE (1Mbps).....	21
8.3.2. BLE (2Mbps).....	22
8.4. OUTPUT POWER.....	23
8.4.1. BLE (1Mbps).....	24
8.4.2. BLE (2Mbps).....	25
8.5. AVERAGE POWER	26
8.5.1. BLE (1Mbps).....	27
8.5.2. BLE (2Mbps).....	28

8.6.	POWER SPECTRAL DENSITY	29
8.6.1.	BLE (1Mbps).....	30
8.6.2.	BLE (2Mbps).....	31
8.7.	CONDUCTED SPURIOUS EMISSIONS.....	32
8.7.1.	BLE (1Mbps).....	33
8.7.2.	BLE (2Mbps).....	34
9.	RADIATED TEST RESULTS.....	35
9.1.	LIMITS AND PROCEDURE	35
9.2.	TRANSMITTER ABOVE 1 GHz	36
9.2.1.	BLE (1Mbps).....	36
9.2.2.	BLE (2Mbps).....	46
9.3.	Worst Case Below 30 MHz	56
9.4.	Worst Case Below 1 GHz	58
9.5.	Worst Case 18-26 GHz.....	60
10.	AC POWER LINE CONDUCTED EMISSIONS	62
10.1.1.	AC Power Line Norm.....	63
11.	SETUP PHOTOS	65

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA -KU, TOKYO, 140-0002, JAPAN

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

SERIAL NUMBER: BH9000ARBG; BH9000JPBG (RADIATED)
BH9000BCBC; BH9000HPBC (CONDUCTED)

DATE TESTED: FEBRUARY 21 – MARCH 05, 2018

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

UL Verification Services Inc. 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 Verification Services Inc. 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 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Reviewed By:



Dan Corona
CONSUMER TECHNOLOGY DIVISION
Operations Leader
UL Verification Services Inc.



Kiya Kedida
CONSUMER TECHNOLOGY DIVISION
Project Engineer
UL Verification Services Inc

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v4, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)
	☐ Chamber G (ISED:22541-4)
	☒ Chamber H (ISED:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC.

5.2. 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 (1 Mbps)	5.38	3.45
2402 - 2480	BLE (2 Mbps)	5.62	3.65

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a loop antenna, with a maximum gain of -2.65 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was s_atp_XXX_0_00375_A_19
The test utility software used during testing was Tera Term Ver 4.79

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 30MHz, below 1GHz and above 18GHz, and AC 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, Harmonics and Radiated Emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z, and it was determined that Y-Axis with AC/DC Adapter was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y-Axis with AC/DC Adapter orientation.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	20B7S0A200	PC015REW	NA
AC Adapter	SONY	UCH12	4016W40310044	NA
DC Power Supply	Ametek	XT 15-4	T463	N/A

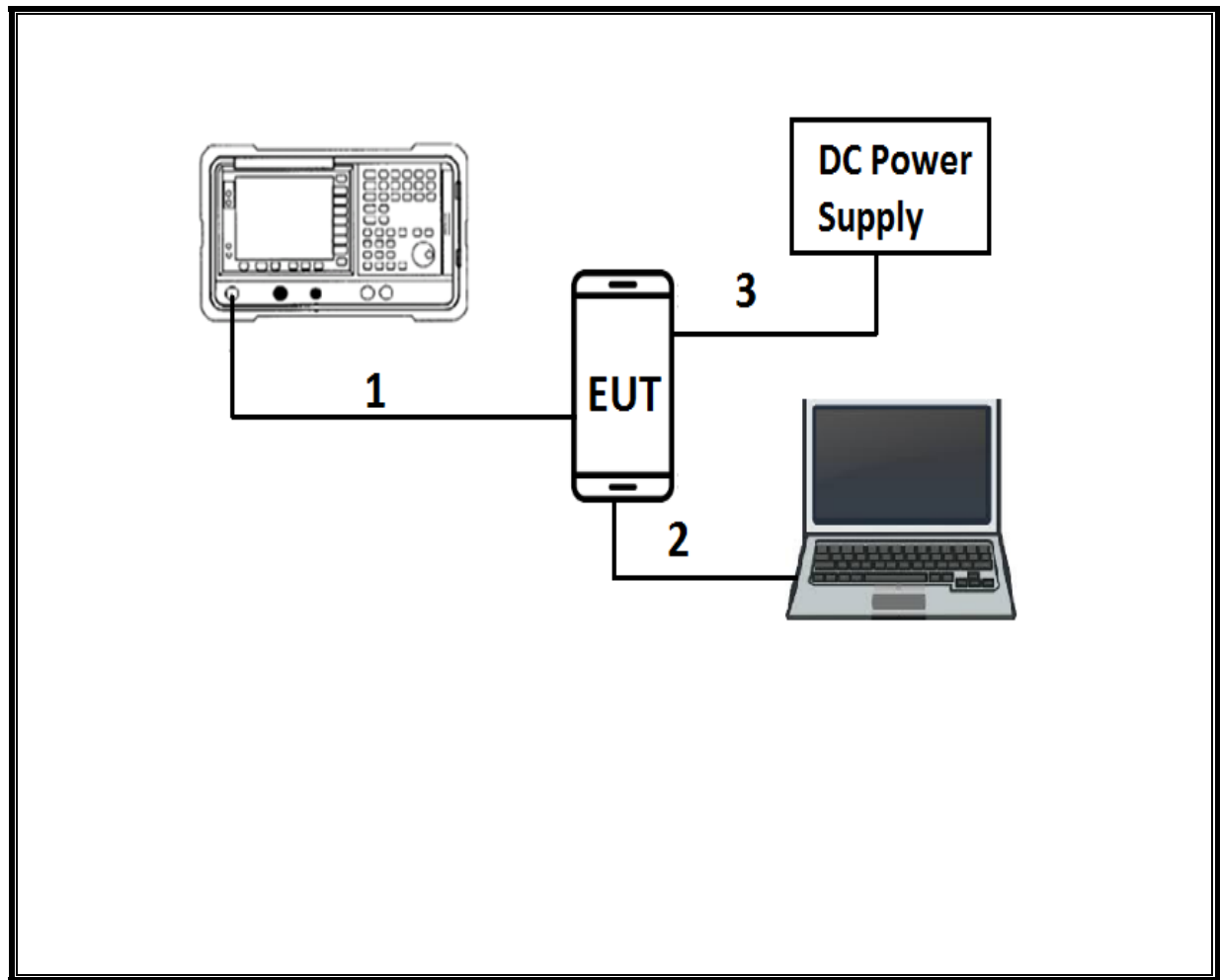
I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	RF	Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	DC	1	DC	Shielded	0.3	N/A

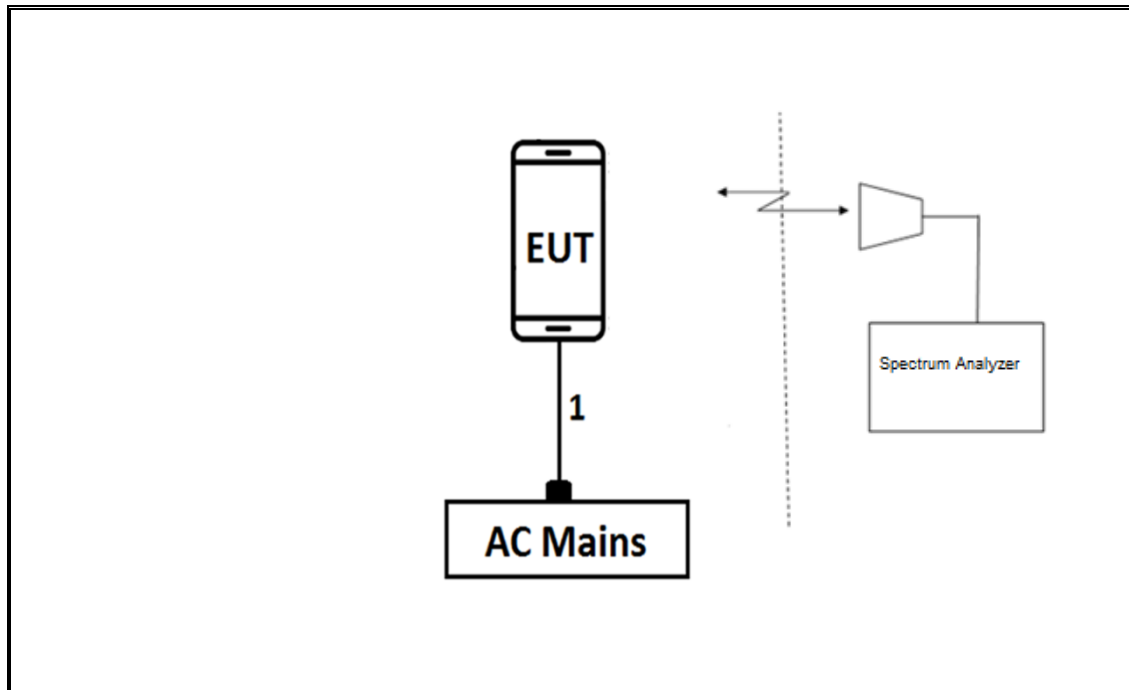
I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Shielded	3	N/A

CONDCUTED TEST SETUP DIAGRAM



RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

Output Power: KDB 558074 D01 v04, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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

7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T493	06/23/2018	06/23/2017
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	11/25/2018	11/25/2017
RF Preamplifier, 1 - 26GHz	Agilent	8449B	T404	07/23/2018	07/23/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma Instrument	310N	T835	06/24/2018	06/24/2017
Antenna, Broadband Hybrid 30MHz to 2000MHz	Sunol Science	JB1	T185	03/30//2018	03/30/2017
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/09/2018	06/09/2017
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	06/09/2018	06/09/2017
Antenna, Horn 18-26.5GHz	ARA	MWH-1826	T449	01/04/2019	01/04/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1269	03/29/2018	03/29/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	All	N1921A	T1224	03/29/2018	03/29/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018	12/21/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/11/2018	04/11/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019	01/08/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T917	06/29/2018	06/29/2017
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018	10/10/2017
Test Receiver, EMI, 10Hz-7GHz	Rhode&Schwarz	ESR	T1436	01/06/2019	01/06/2018
LISN	FISCHER	FCC-LISN-50/250-25-2-01	T1310	01/17/2019	01/17/2018

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, December 1, 2016
Antenna Port Software	UL	UL RF	Ver 9.1, January 25, 2018

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

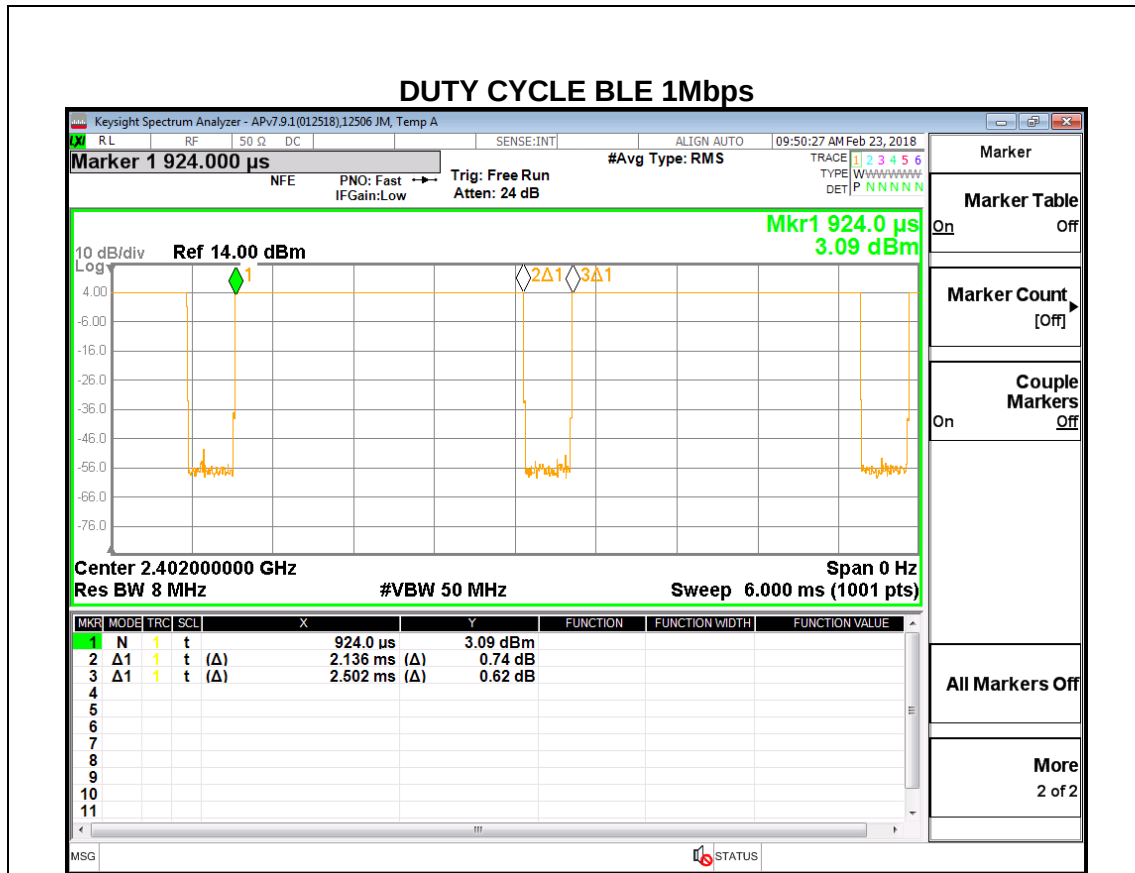
None; for reporting purposes only.

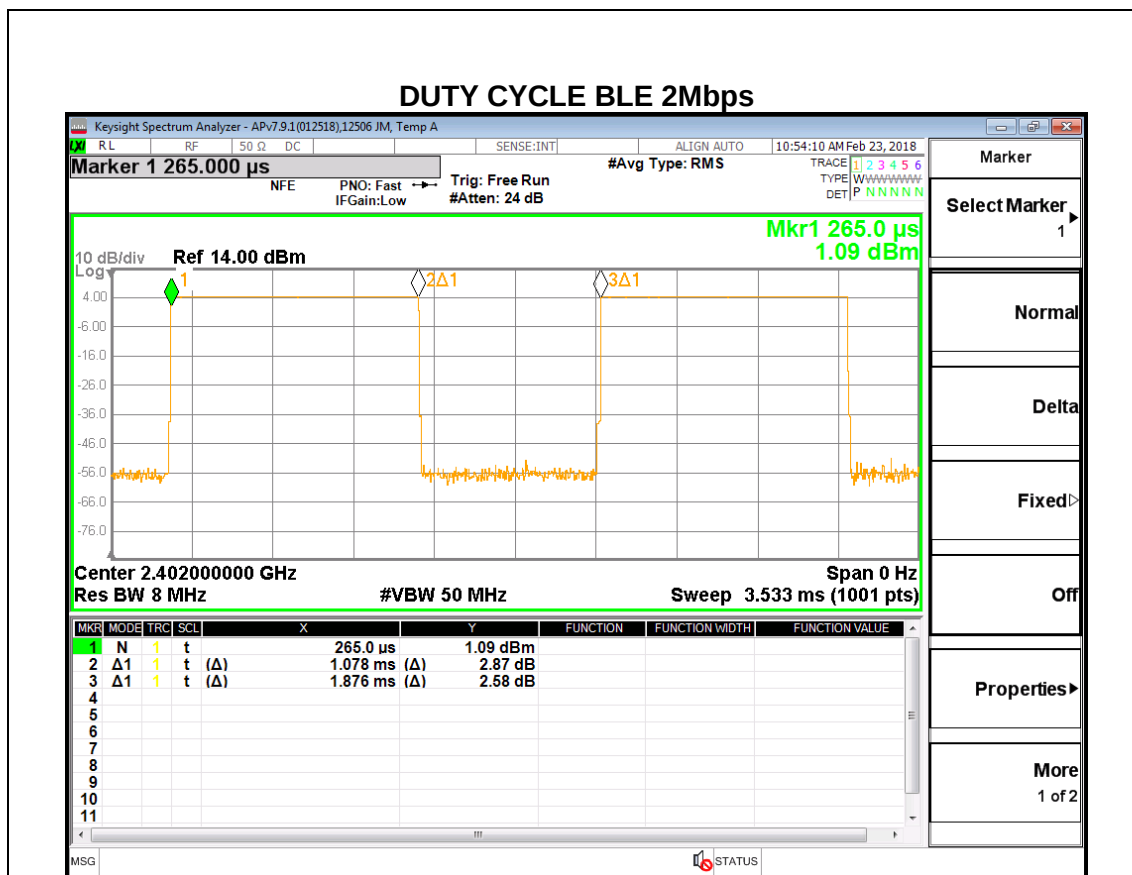
PROCEDURE

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)
BLE 1Mbps	2.136	2.502	0.854	85.37%	0.69	0.468
BLE 2Mbps	1.078	1.876	0.575	57.46%	2.41	0.928

DUTY CYCLE PLOTS





8.2. 99% BANDWIDTH

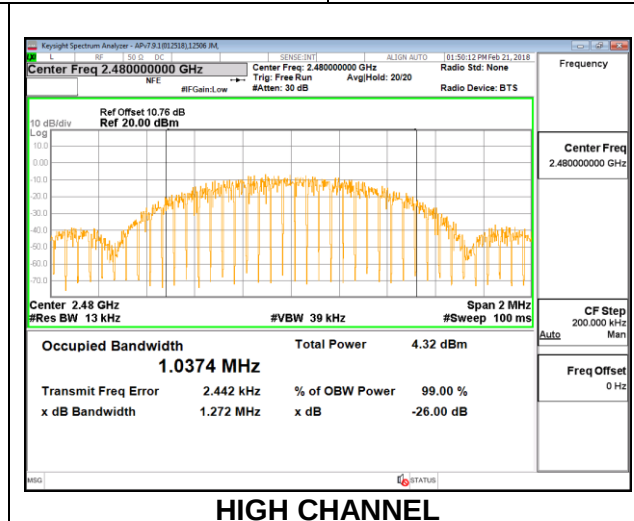
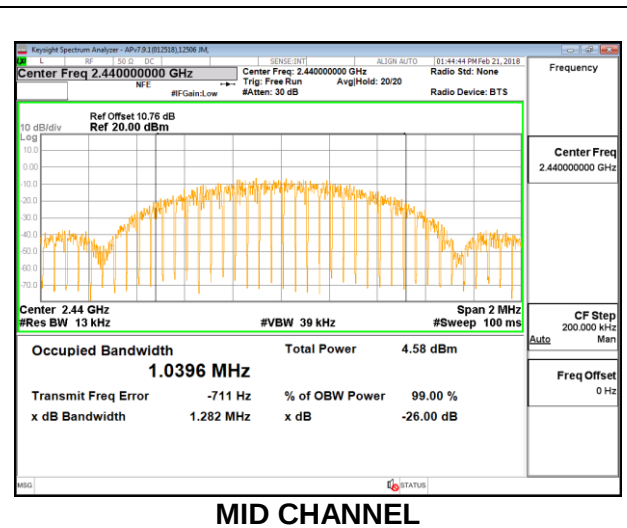
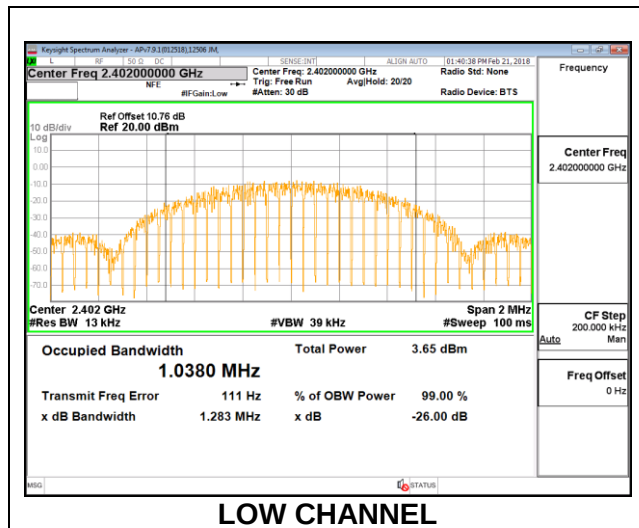
LIMITS

None; for reporting purposes only.

RESULTS

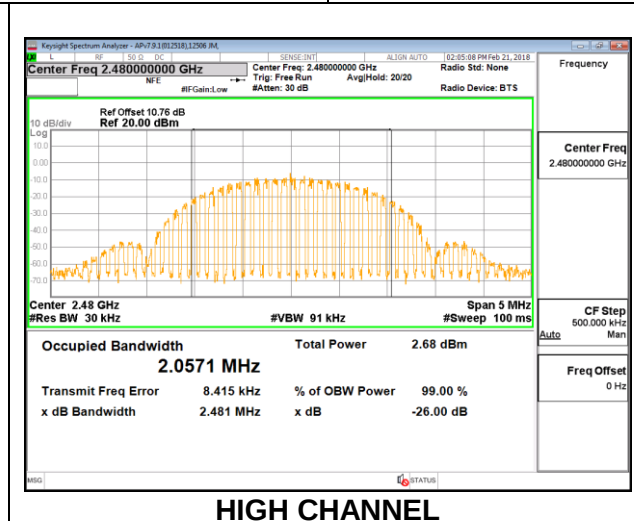
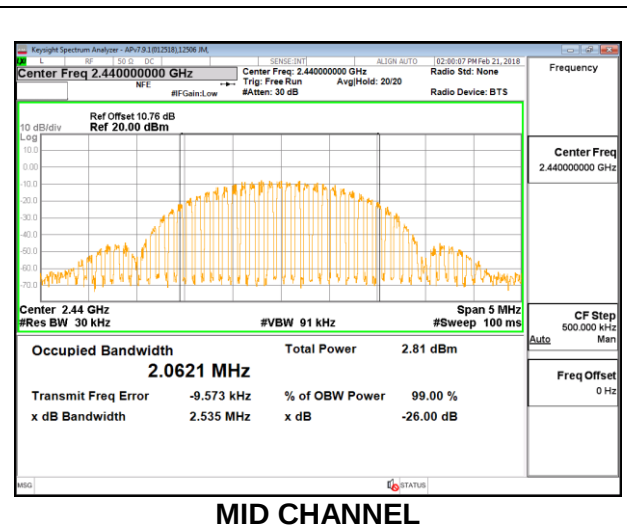
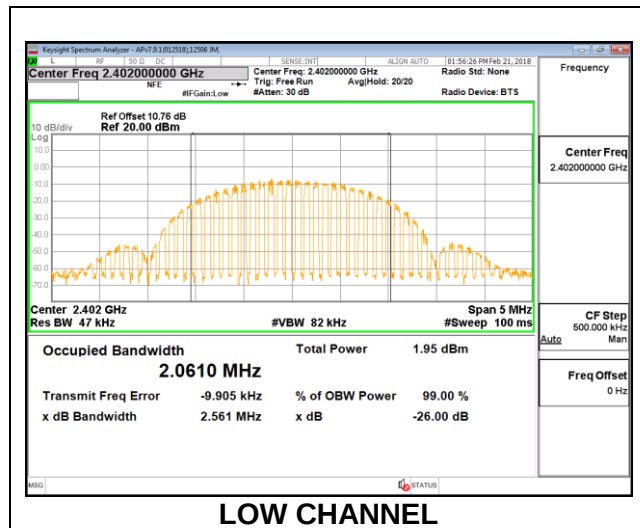
8.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0380
Middle	2440	1.0396
High	2480	1.0374



8.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0610
Middle	2440	2.0621
High	2480	2.0571



8.3. 6 dB BANDWIDTH

LIMITS

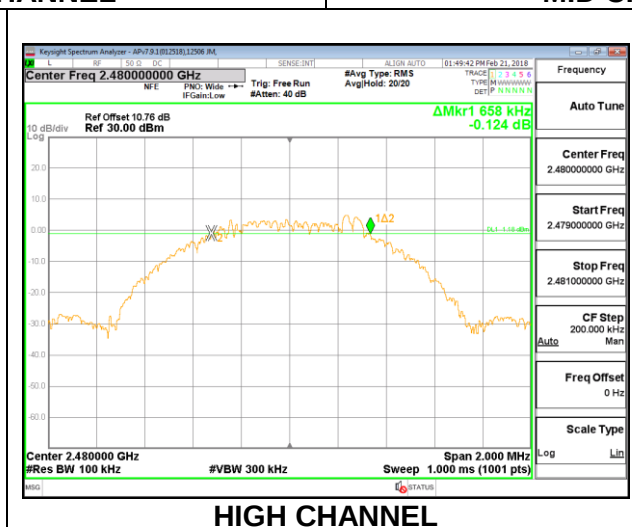
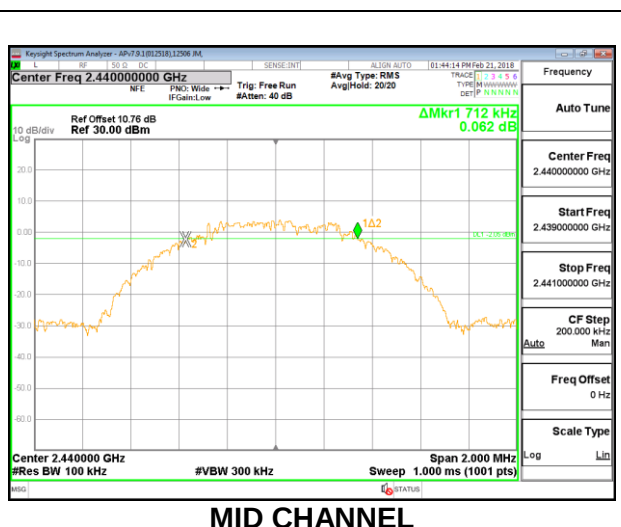
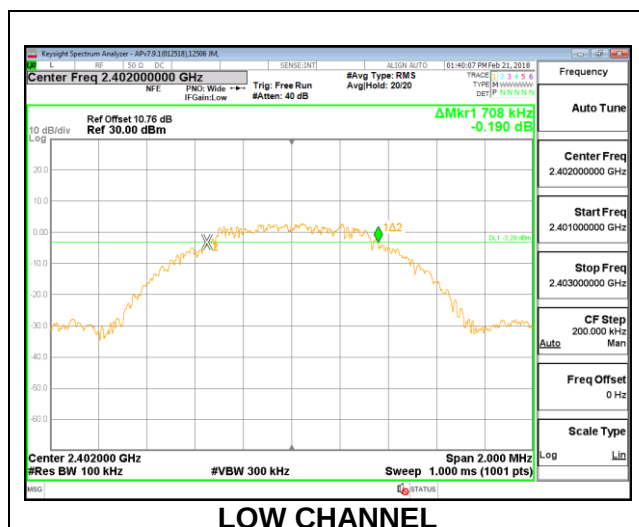
FCC §15.247 (a) (2)

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

RESULTS

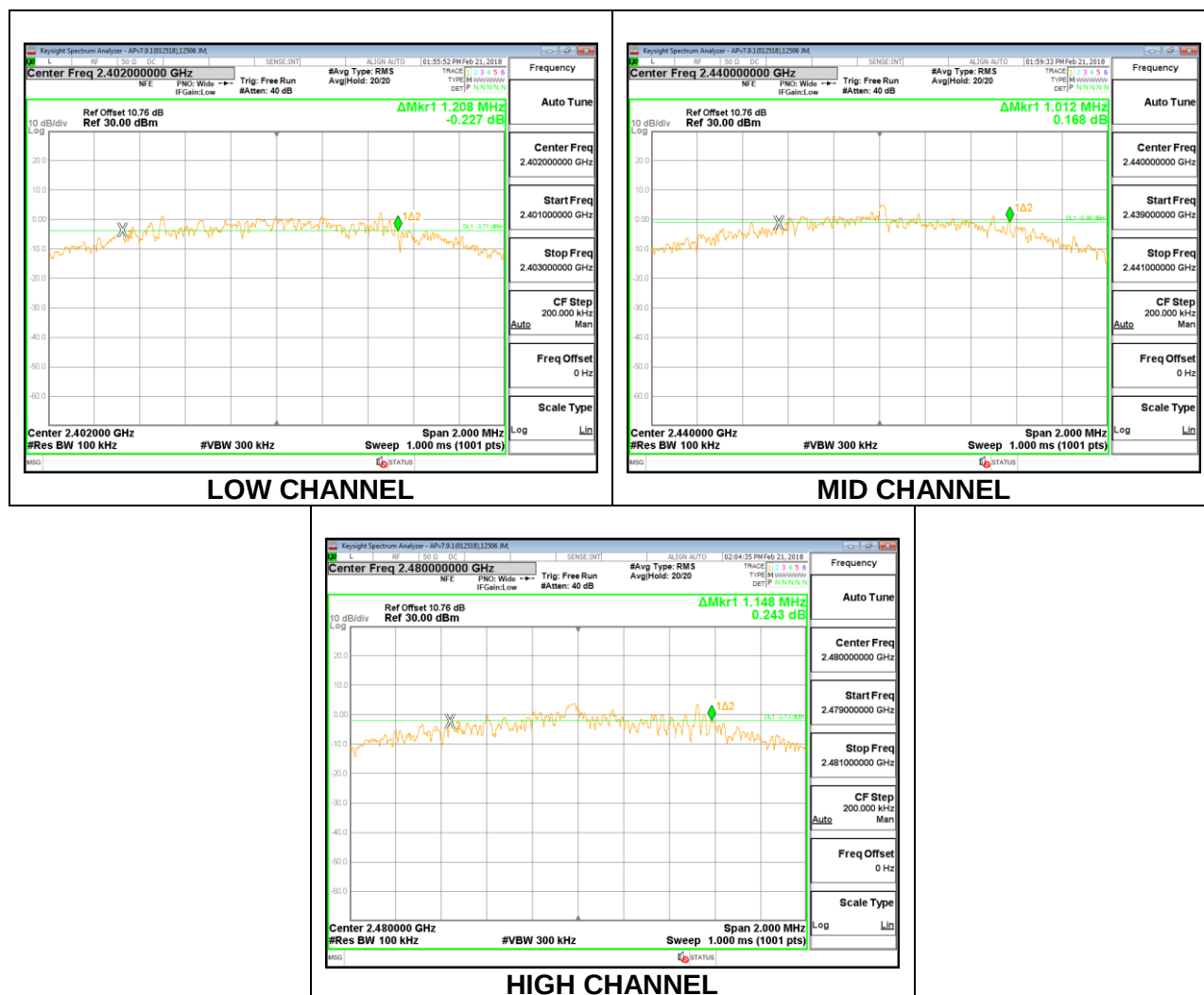
8.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7080	0.5
Middle	2440	0.7120	0.5
High	2480	0.6580	0.5



8.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.2080	0.5
Middle	2440	1.0120	0.5
High	2480	1.1480	0.5



8.4. 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

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

8.4.1. BLE (1Mbps)

Tested By:	GE43578
Date:	2/17/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.56	30	-25.440
Middle	2440	5.38	30	-24.620
High	2480	4.97	30	-25.030

8.4.2. BLE (2Mbps)

Tested By:	GE43578
Date:	2/17/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.79	30	-25.210
Middle	2440	5.62	30	-24.380
High	2480	5.31	30	-24.690

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated Average reading of power.

RESULTS

8.5.1. BLE (1Mbps)

Tested By:	GE43578
Date:	2/17/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.35
Middle	2440	5.15
High	2480	4.72

8.5.2. BLE (2Mbps)

Tested By:	GE43578
Date:	2/17/2018

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.28
Middle	2440	5.11
High	2480	4.74

8.6. POWER SPECTRAL DENSITY

LIMITS

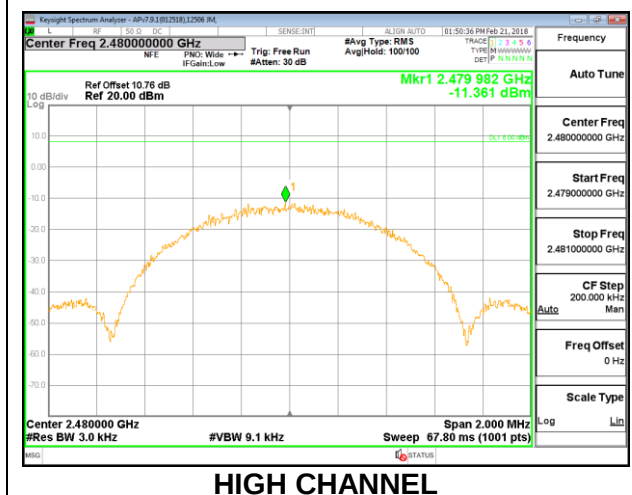
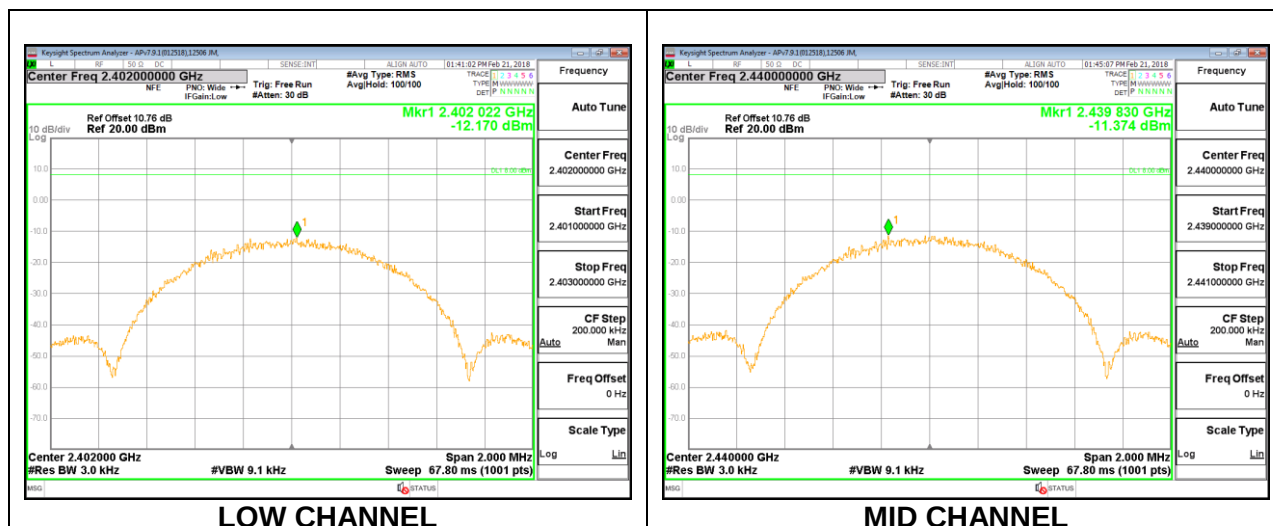
FCC §15.247 (e)

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.

RESULTS

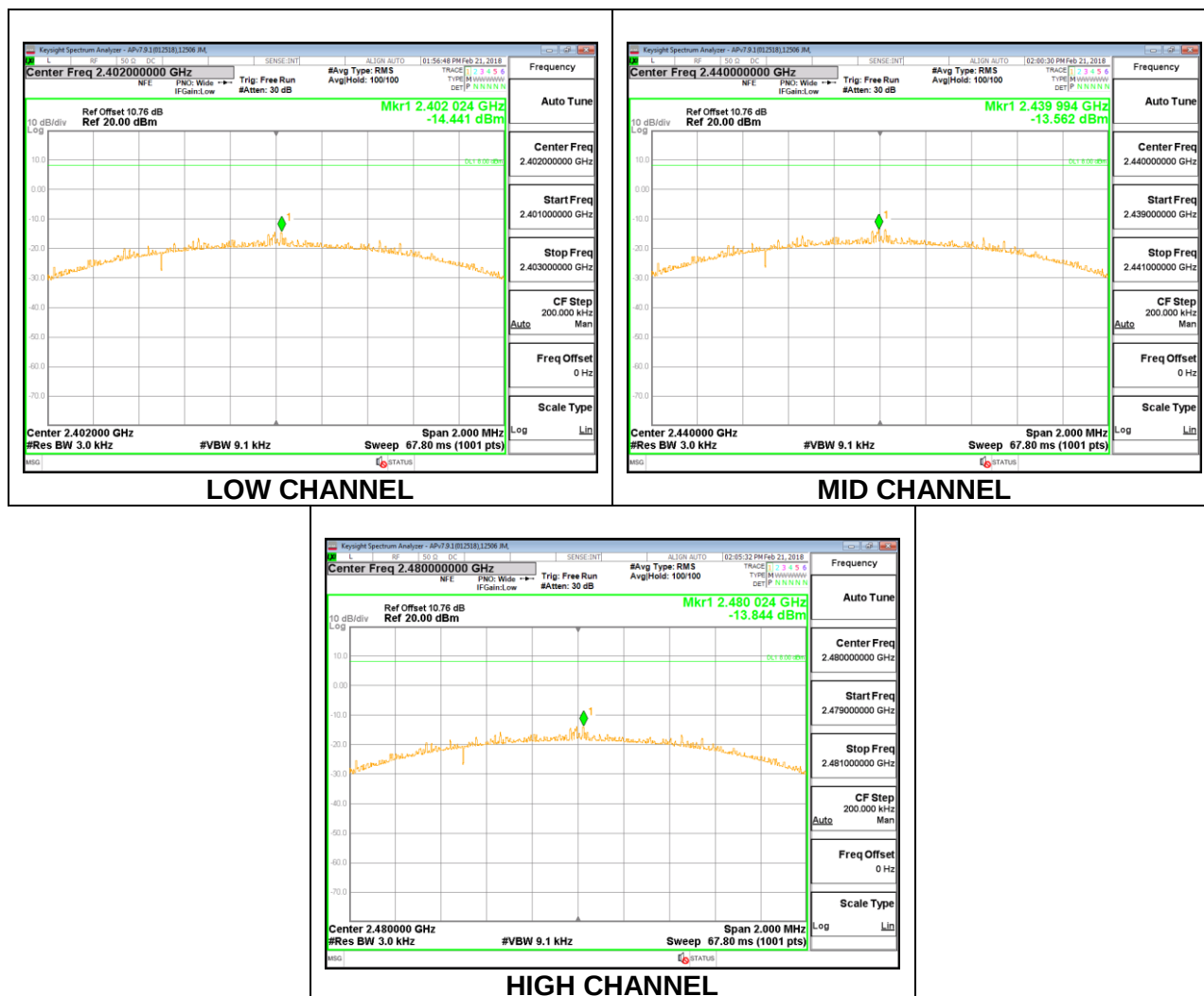
8.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-12.17	8	-20.17
Middle	2440	-11.37	8	-19.37
High	2480	-11.36	8	-19.36



8.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-14.44	8	-22.44
Middle	2440	-13.56	8	-21.56
High	2480	-13.84	8	-21.84



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

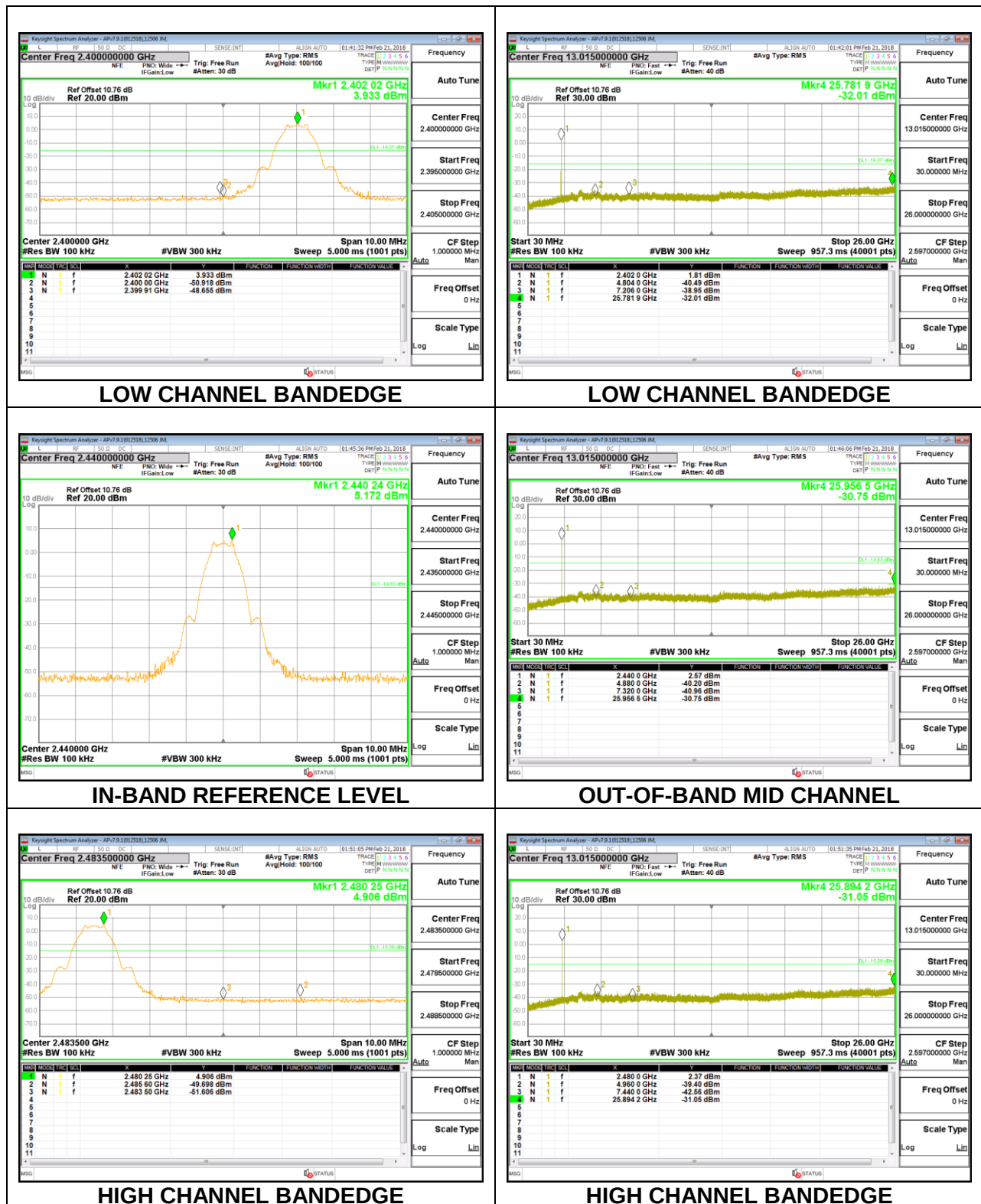
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

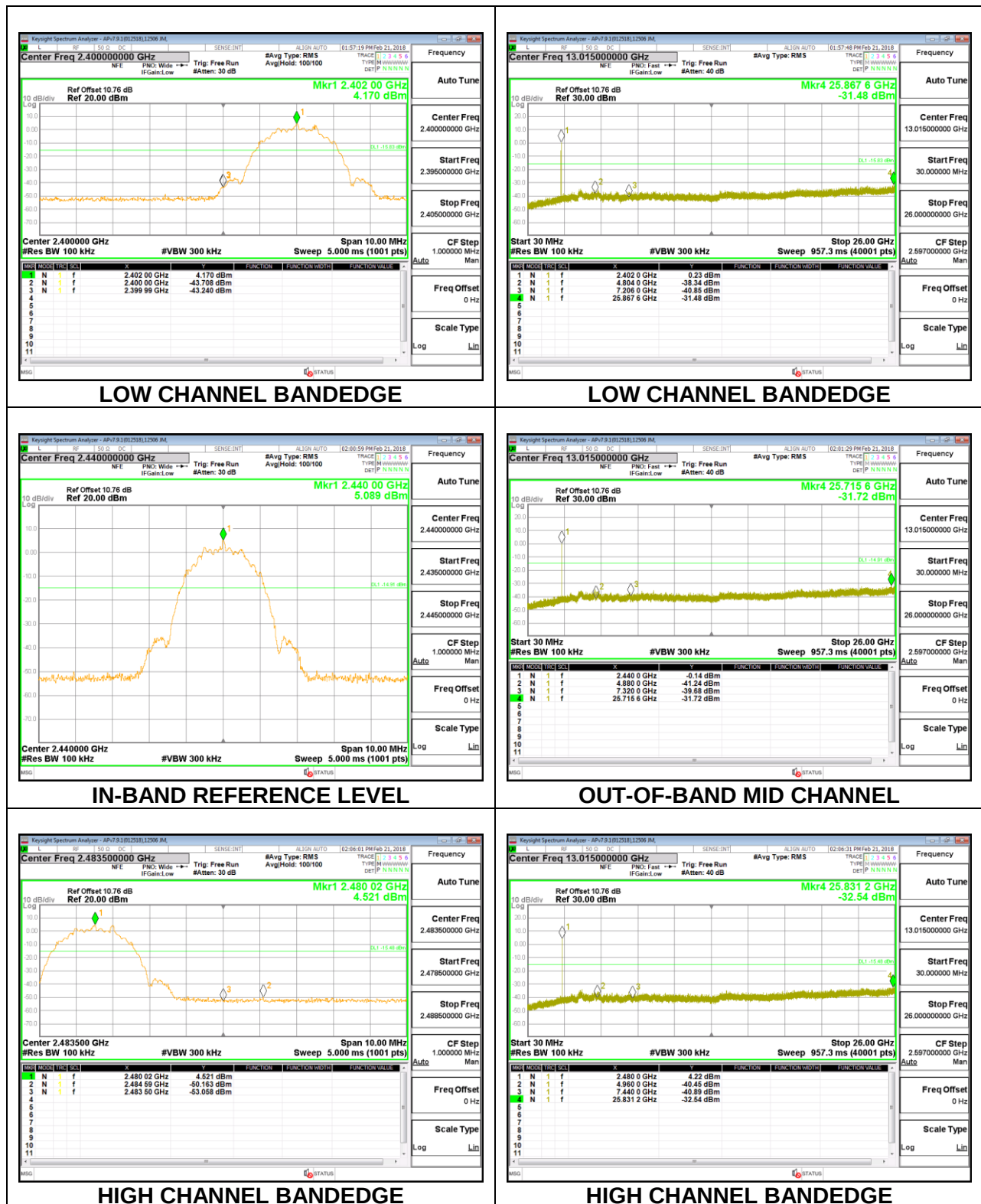
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

8.7.1. BLE (1Mbps)



8.7.2. BLE (2Mbps)



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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 30MHz, below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

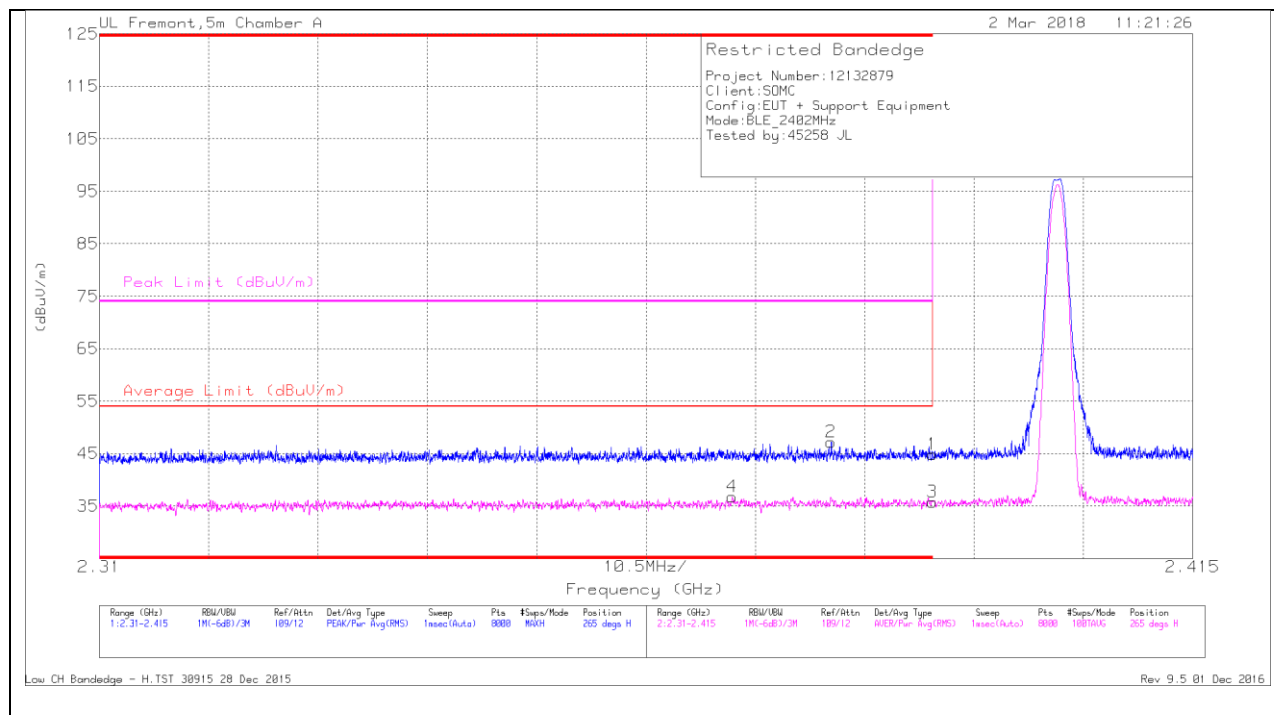
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Ch/Fltr/Pad (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	36.56	Pk	31.8	-23.5	0	44.86	-	-	74	-29.14	265	226	H
2	* 2.38	39.04	Pk	31.7	-23.5	0	47.24	-	-	74	-26.76	265	226	H
3	* 2.39	26.72	RMS	31.8	-23.5	.69	35.71	54	-18.29	-	-	265	226	H
4	* 2.371	27.83	RMS	31.7	-23.5	.69	36.72	54	-17.28	-	-	265	226	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1862 (dB/m)	Amp/Ch/Ftr/Pad (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
2	* 2.375	39.37	Pk	31.7	-23.5	0	47.57	-	-	74	-26.43	273	188	V
4	* 2.387	27.76	RMS	31.8	-23.5	.69	36.75	54	-17.25	-	-	273	188	V
1	* 2.39	35.63	Pk	31.8	-23.5	0	43.93	-	-	74	-30.07	273	188	V
3	* 2.39	26.64	RMS	31.8	-23.5	.69	35.63	54	-18.37	-	-	273	188	V

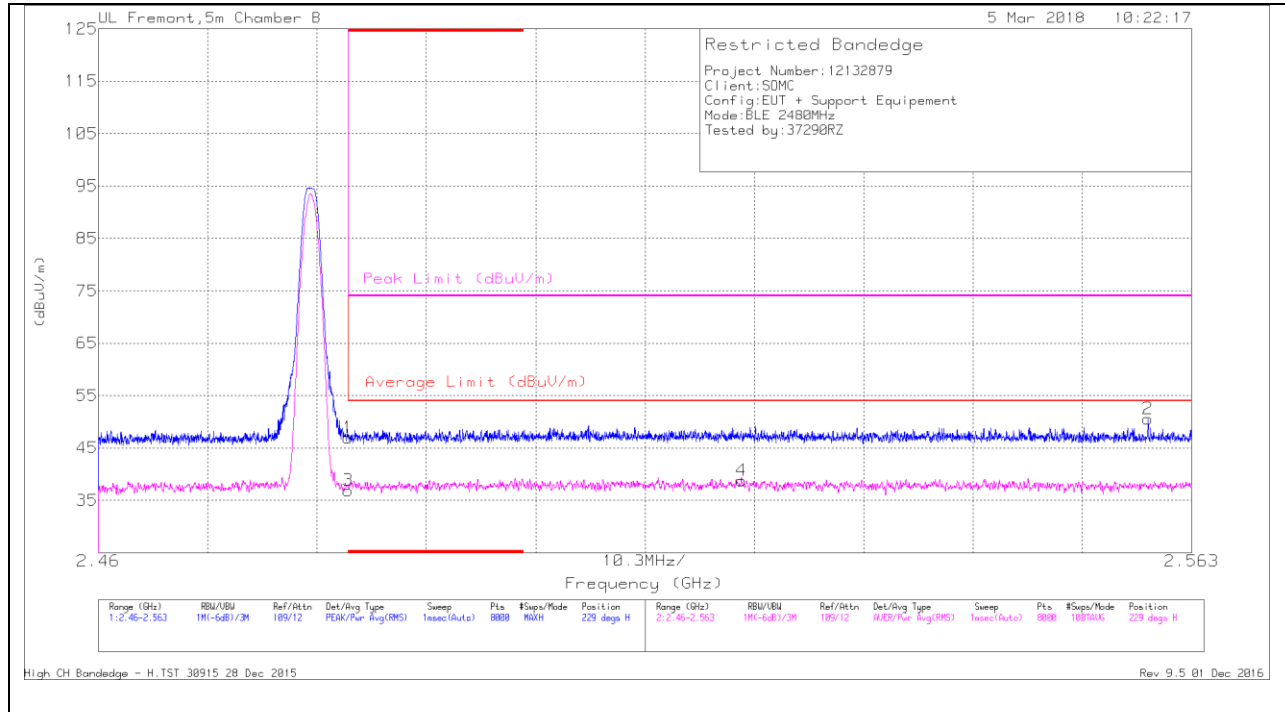
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

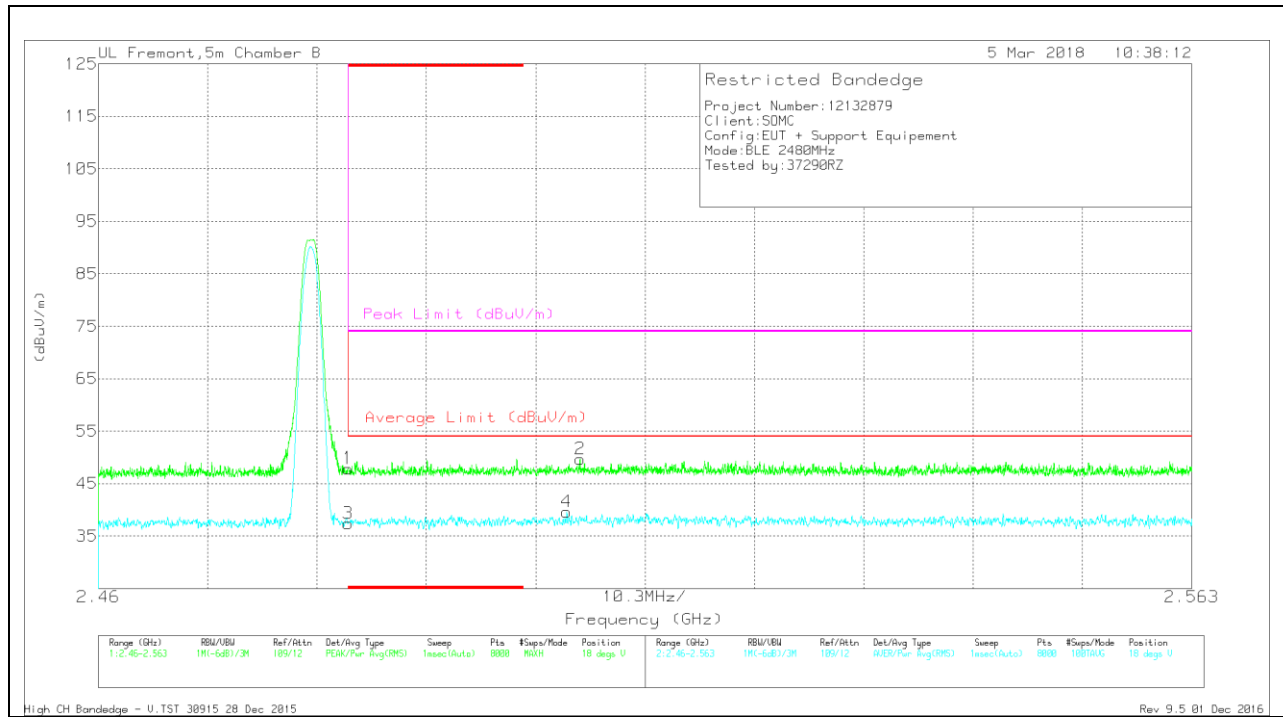
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Ch/Plr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	35.76	Pk	32.5	-21.3	0	46.96	-	-	74	-27.04	229	249	H
3	* 2.484	25.69	RMS	32.5	-21.3	.69	37.58	54	-16.42	-	-	229	249	H
4	2.521	27.11	RMS	32.6	-21	.69	39.4	54	-14.6	-	-	229	249	H
2	2.559	39.22	Pk	32.5	-21.2	0	50.52	-	-	74	-23.48	229	249	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF1863 (dB/m)	Amp/Ch/Flt/Pad (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	* 2.484	36.67	Pk	32.5	-21.3	0	47.87	-	-	74	-26.13	18	250	V
3	* 2.484	25.53	RMS	32.5	-21.3	.69	37.42	54	-16.58	-	-	18	250	V
4	2.504	27.4	RMS	32.6	-21.1	.69	39.59	54	-14.41	-	-	18	250	V
2	2.505	38.21	Pk	32.6	-21.1	0	49.71	-	-	74	-24.29	18	250	V

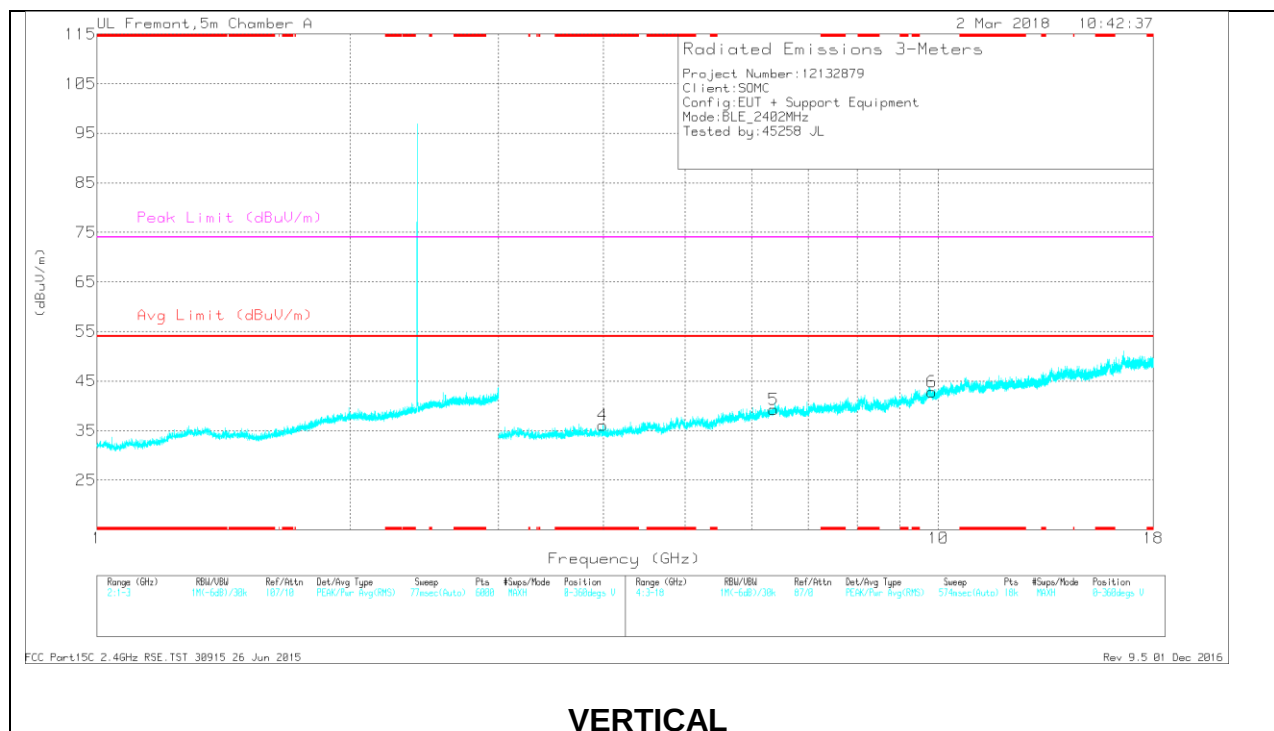
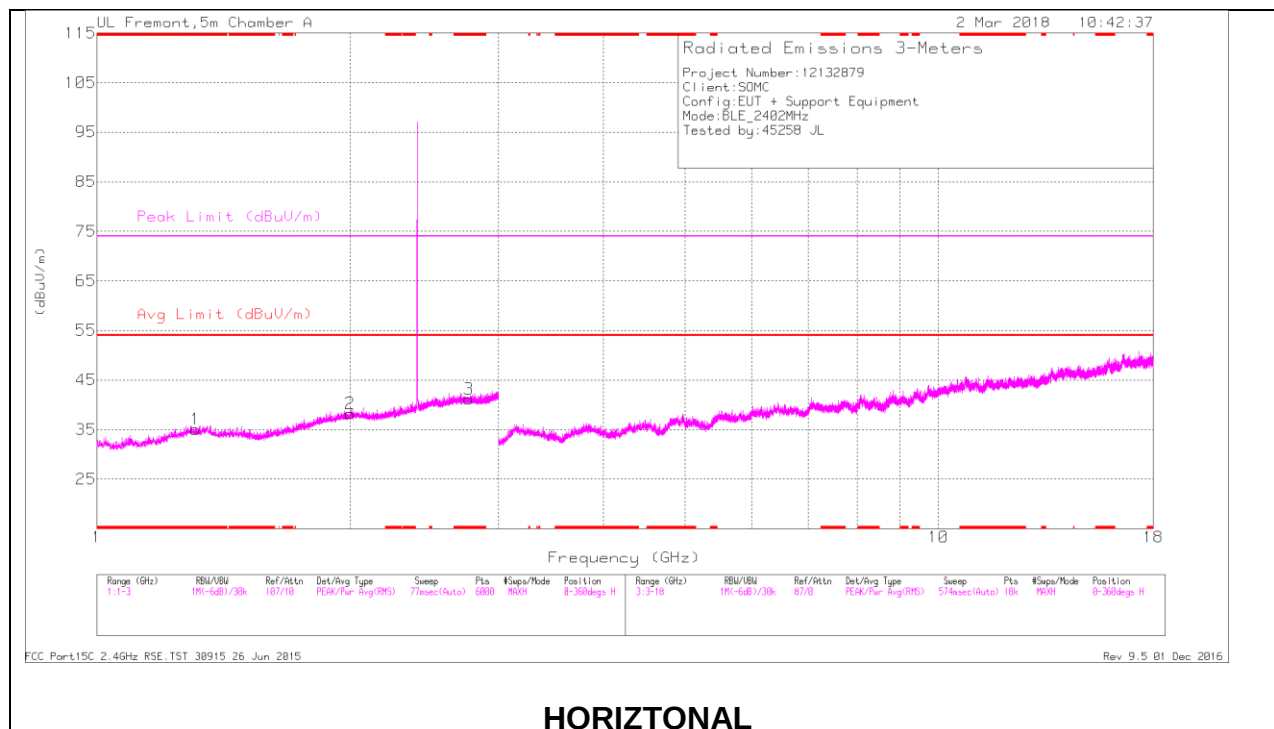
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

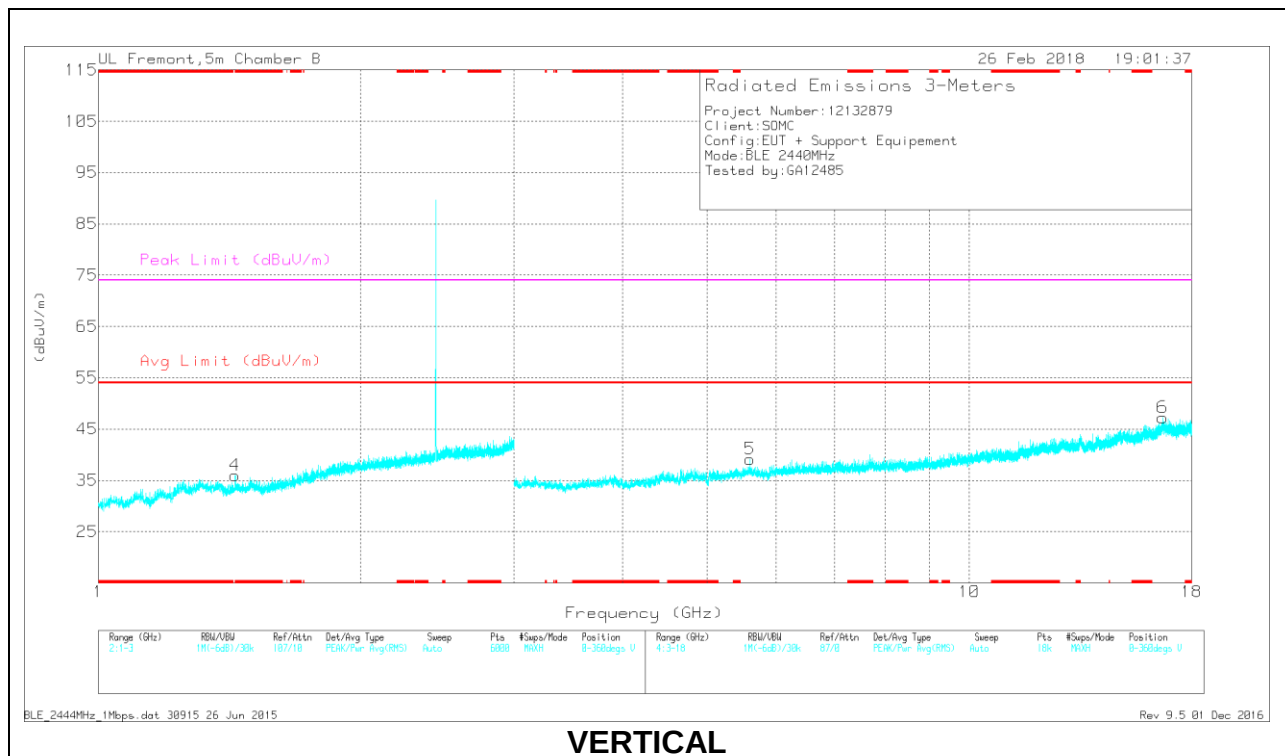
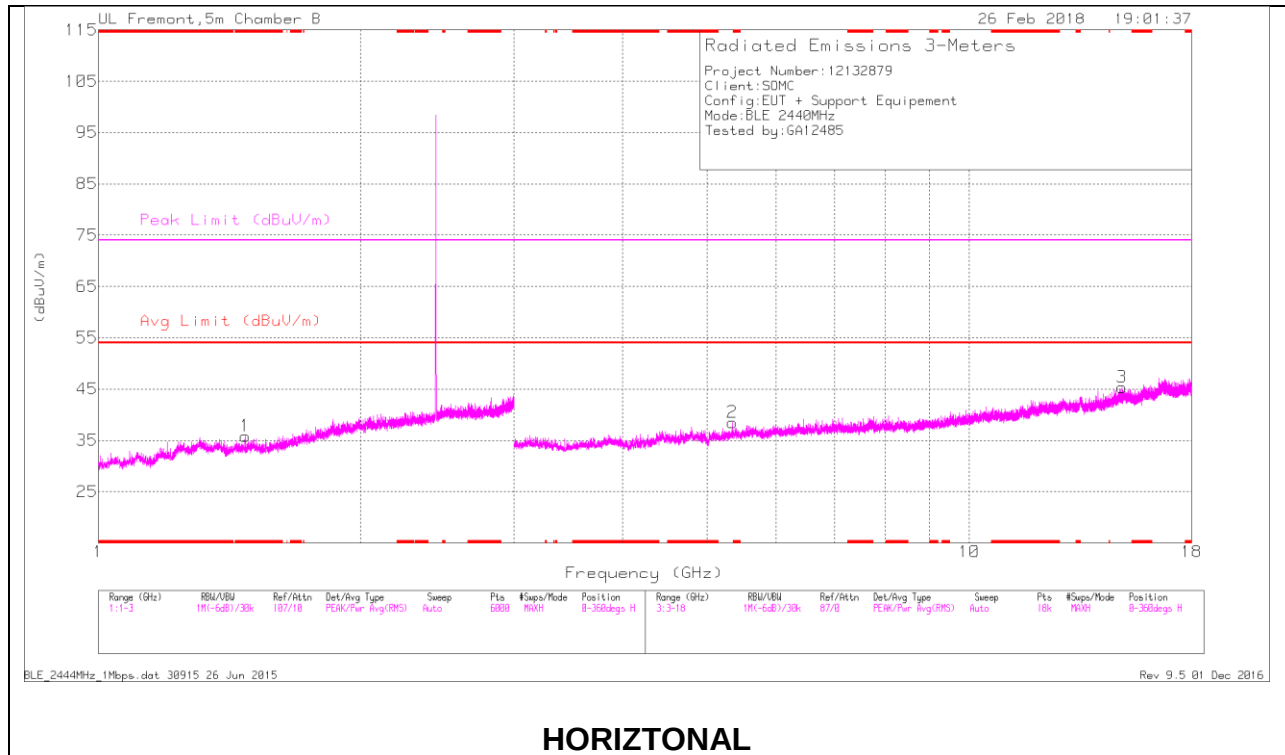
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.311	35.7	PK2	29.5	-23.8	0	41.4	-	-	74	-32.6	49	168	H
	* 1.308	24.28	MAv1	29.4	-23.8	.69	30.57	54	-23.43	-	-	49	168	H
3	* 2.767	37.86	PK2	32.3	-22.6	0	47.56	-	-	74	-26.44	76	198	H
	* 2.768	25.77	MAv1	32.3	-22.6	.69	36.16	54	-17.84	-	-	76	198	H
4	* 3.992	36.84	PK2	33.4	-28.7	0	41.54	-	-	74	-32.46	93	236	V
	* 3.99	25.87	MAv1	33.3	-28.8	.69	31.06	54	-22.94	-	-	93	236	V
2	2	36.61	PK2	31.4	-23.5	0	44.51	-	-	-	-	143	263	H
5	6.365	35.08	PK2	35.8	-24.8	0	46.08	-	-	-	-	143	263	V
6	9.826	32.87	PK2	37	-20.8	0	49.07	-	-	-	-	143	263	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

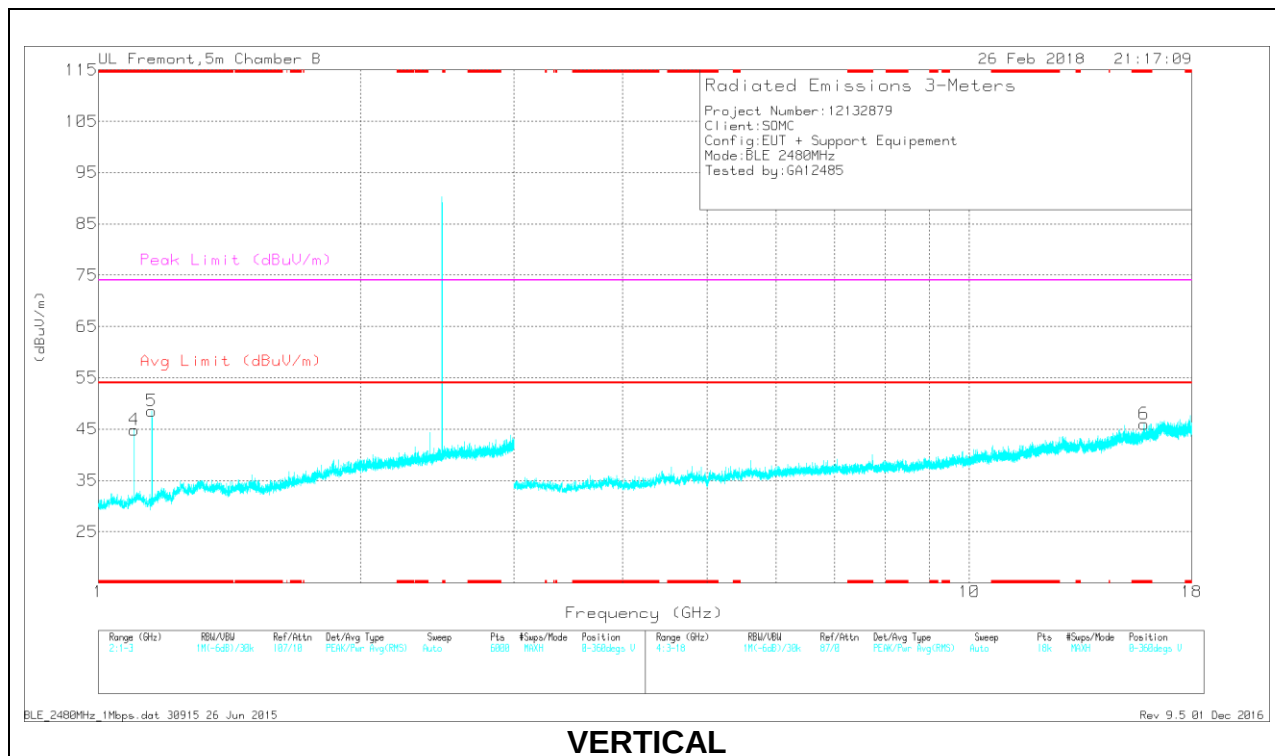
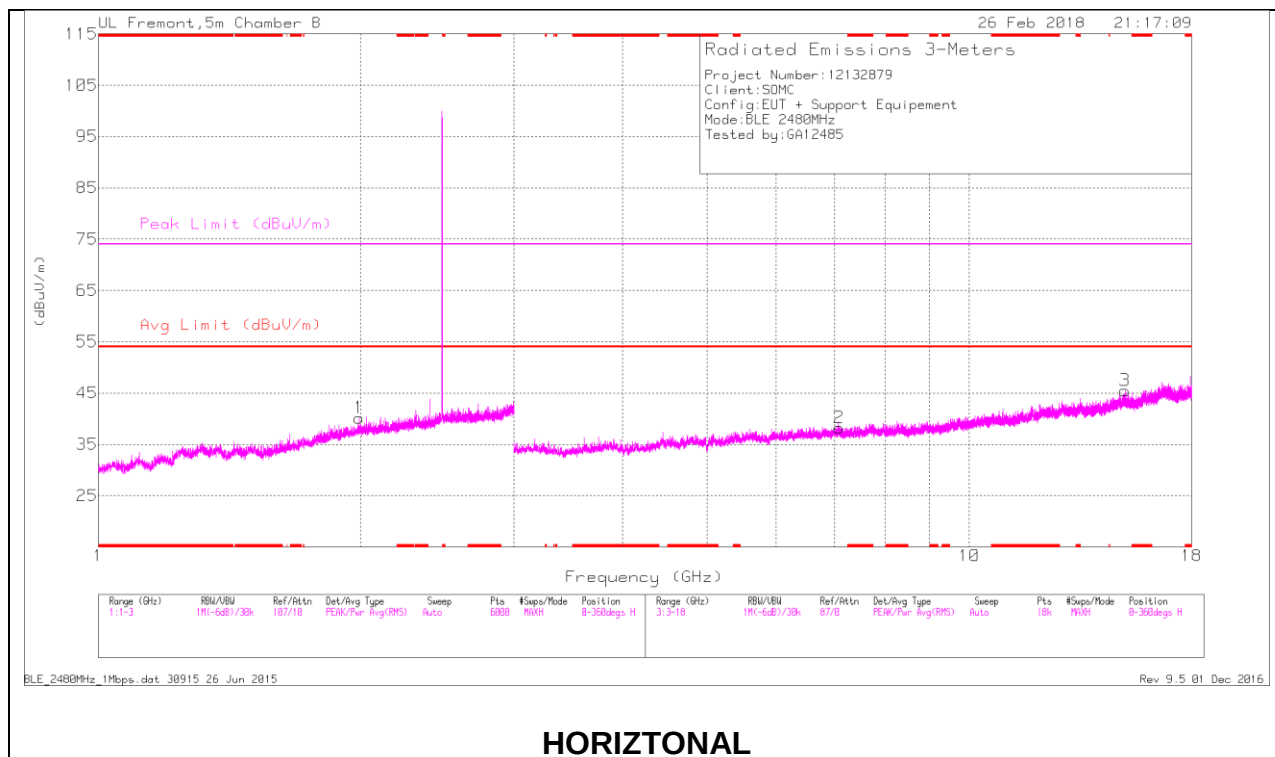
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Ftr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.475	33.71	PK2	28.3	-21.4	0	40.61	-	-	74	-33.39	206	365	H
	* 1.475	17.07	MAv1	28.3	-21.4	.69	24.66	54	-29.34	-	-	206	365	H
4	1.435	34.81	PK2	28.3	-21.6	0	41.51	-	-	-	-	110	182	V
2	5.344	38.04	PK2	34.9	-29.6	0	43.34	-	-	-	-	276	272	H
5	5.6	38.54	PK2	35.5	-30.2	0	43.84	-	-	-	-	55	131	V
3	14.978	32.96	PK2	40.6	-23.4	0	50.16	-	-	-	-	278	107	H
6	16.669	31.79	PK2	42.2	-21.6	0	52.39	-	-	-	-	67	222	V

* - indicates frequency in CFR47 Pt 15 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 T863 (dB/m)	Amp/Cb/Ftr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 1.098	34.51	PK2	27.6	-23	0	39.11	-	-	74	-34.89	192	299	V
	* 1.1	18.87	MAv1	27.7	-23	.69	24.26	54	-29.74	-	-	192	299	V
5	* 1.152	33.49	PK2	27.5	-22.9	0	38.09	-	-	74	-35.91	55	365	V
	* 1.153	17.45	MAv1	27.5	-22.8	.69	22.84	54	-31.16	-	-	55	365	V
6	* 15.861	32.54	PK2	41	-21	0	52.54	-	-	74	-21.46	302	173	V
	* 15.862	18.98	MAv1	41	-21	.69	39.67	54	-14.33	-	-	302	173	V
1	1.991	34.65	PK2	31.3	-21.1	0	44.85	-	-	-	-	94	382	H
2	7.085	37.29	PK2	35.9	-28.4	0	44.79	-	-	-	-	250	179	H
3	15.088	33.2	PK2	40.5	-22.2	0	51.5	-	-	-	-	32	204	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

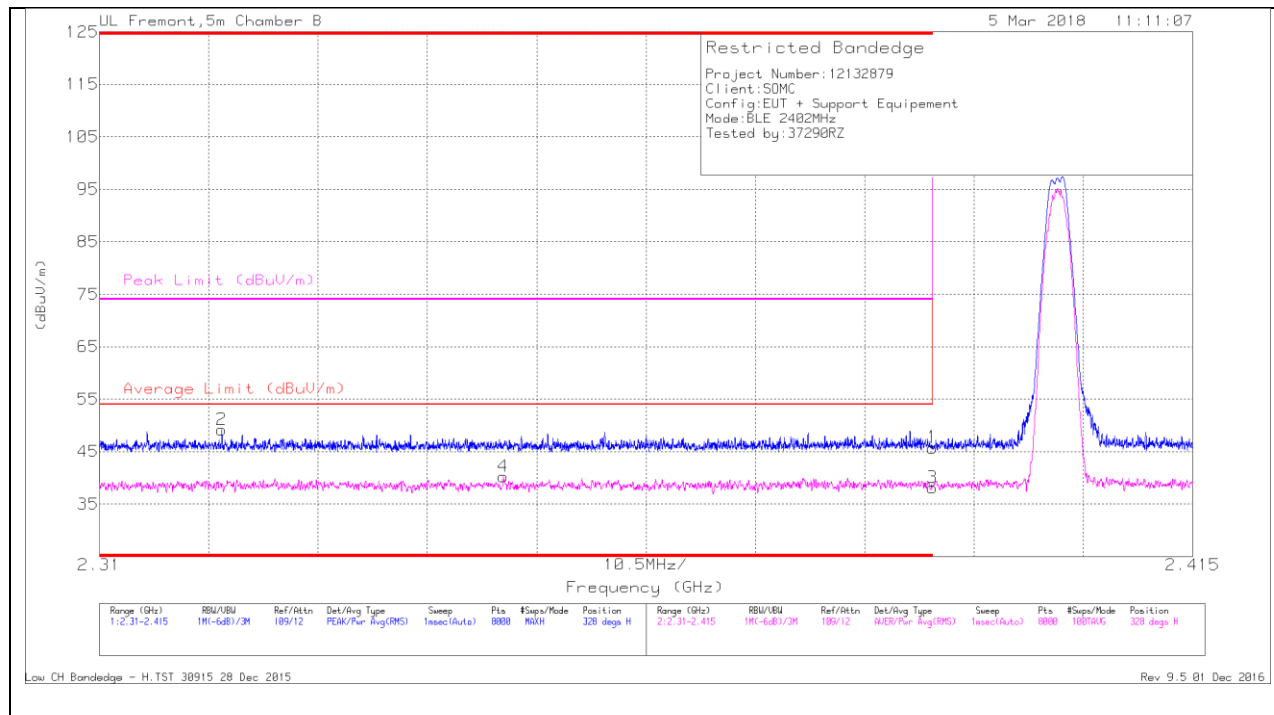
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

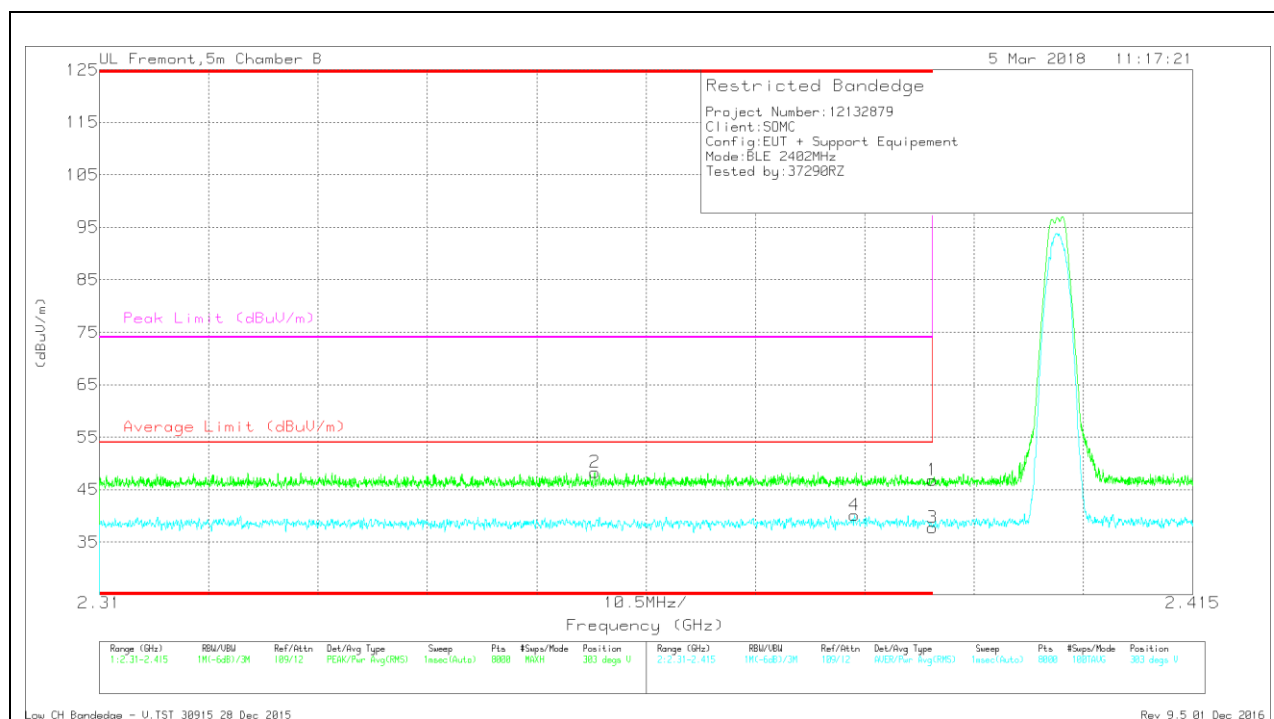
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.322	38.44	Pk	31.9	-21.2	0	49.14	-	-	74	-24.86	328	362	H
4	* 2.349	27.32	RMS	31.8	-21.3	2.41	40.23	54	-13.77	-	-	328	362	H
1	* 2.39	35.06	Pk	32	-21.3	0	45.76	-	-	74	-28.24	328	362	H
3	* 2.39	25	RMS	32	-21.3	2.41	38.11	54	-15.89	-	-	328	362	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1863 (dB/m)	Amp/Ch/Flt/Pad (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
2	* 2.358	37.75	Pk	31.9	-21.3	0	48.35	-	-	74	-25.65	303	119	V
4	* 2.383	26.94	RMS	32	-21.2	2.41	40.15	54	-13.85	-	-	303	119	V
1	* 2.39	36.07	Pk	32	-21.3	0	46.77	-	-	74	-27.23	303	119	V
3	* 2.39	24.61	RMS	32	-21.3	2.41	37.72	54	-16.28	-	-	303	119	V

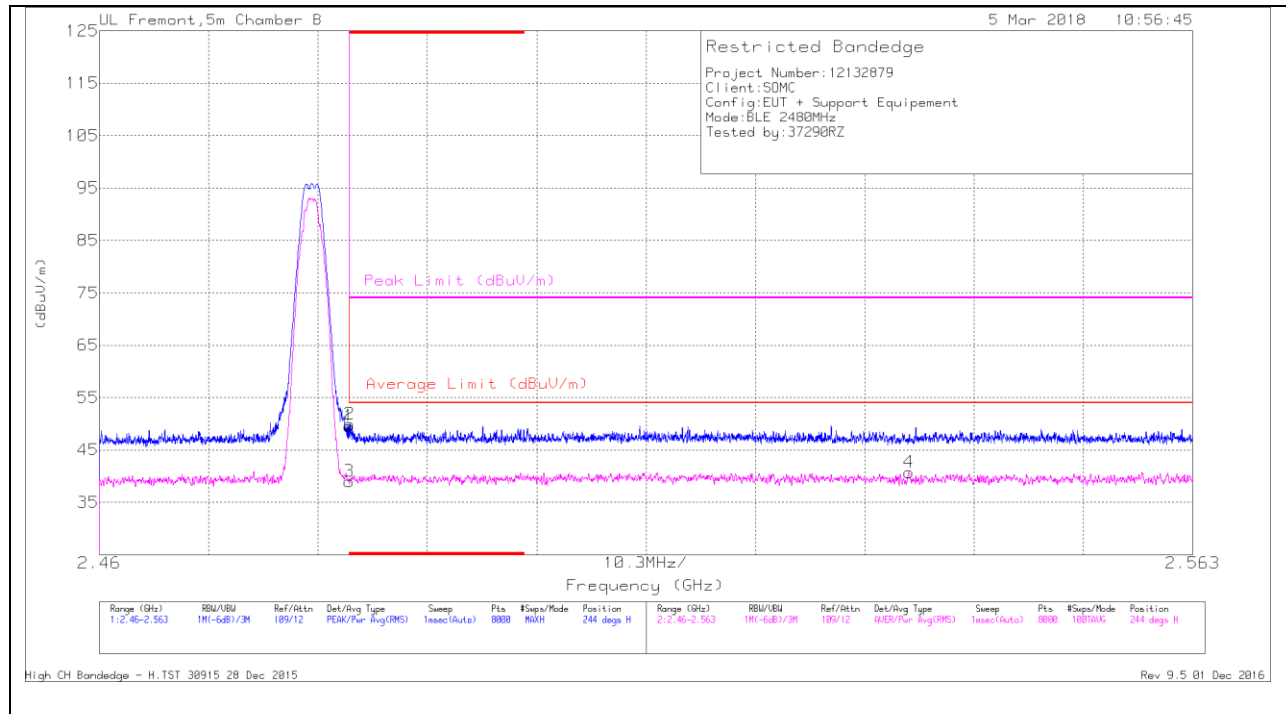
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

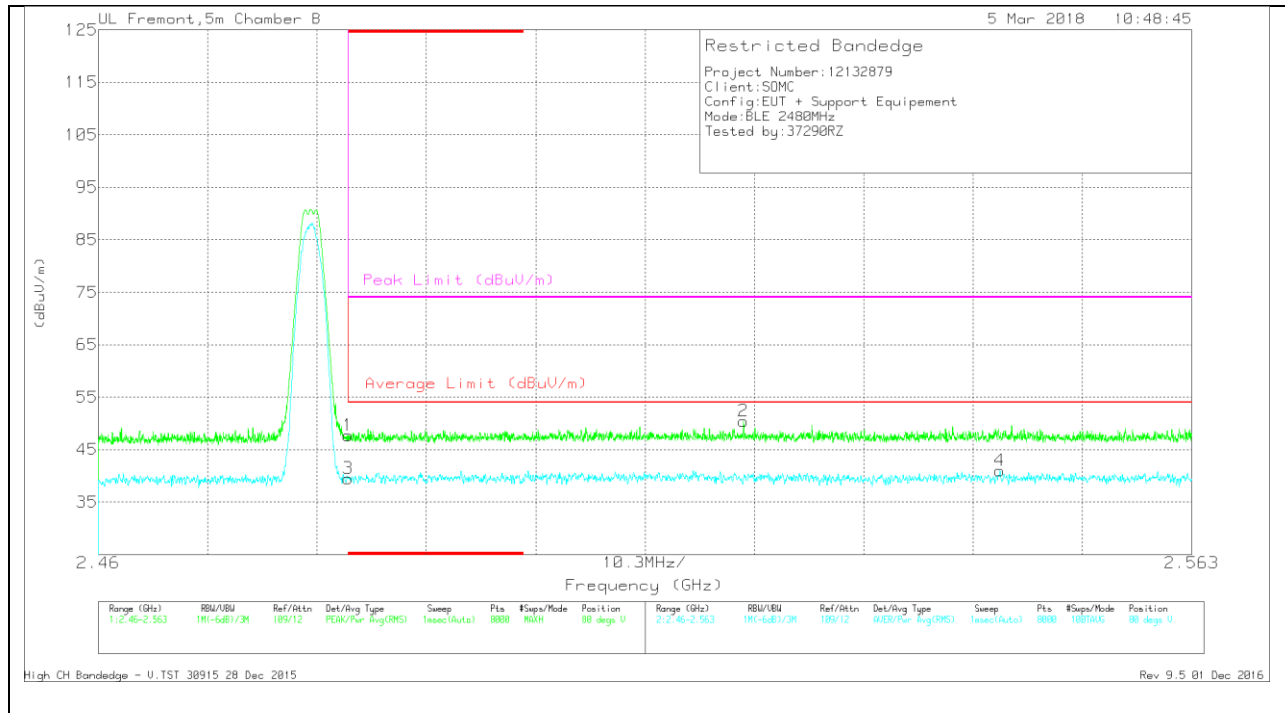
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Ch/Plr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.4	Pk	32.5	-21.3	0	49.6	-	-	74	-24.4	244	343	H
2	* 2.484	38.69	Pk	32.5	-21.3	0	49.89	-	-	74	-24.11	244	343	H
3	* 2.484	25.38	RMS	32.5	-21.3	2.41	38.99	54	-15.01	-	-	244	343	H
4	2.536	27.02	RMS	32.5	-21.2	2.41	40.73	54	-13.27	-	-	244	343	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1863 (dB/m)	Amp/Ch/Flt/Pad (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	* 2.484	36.5	Pk	32.5	-21.3	0	47.7	-	-	74	-26.3	80	250	V
3	* 2.484	25.9	RMS	32.5	-21.3	2.41	39.51	54	-14.49	-	-	80	250	V
2	2.521	38.82	Pk	32.6	-21	0	50.42	-	-	74	-23.58	80	250	V
4	2.545	27.19	RMS	32.5	-21.1	2.41	41	54	-13	-	-	80	250	V

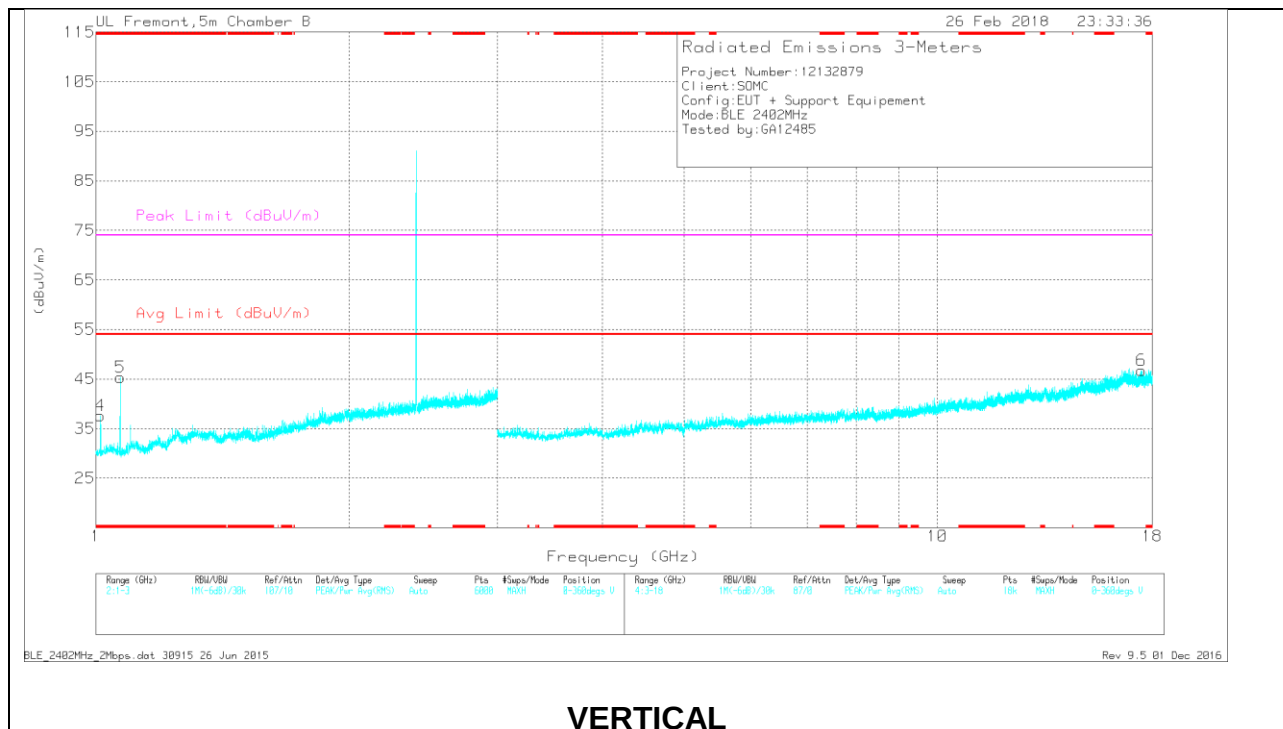
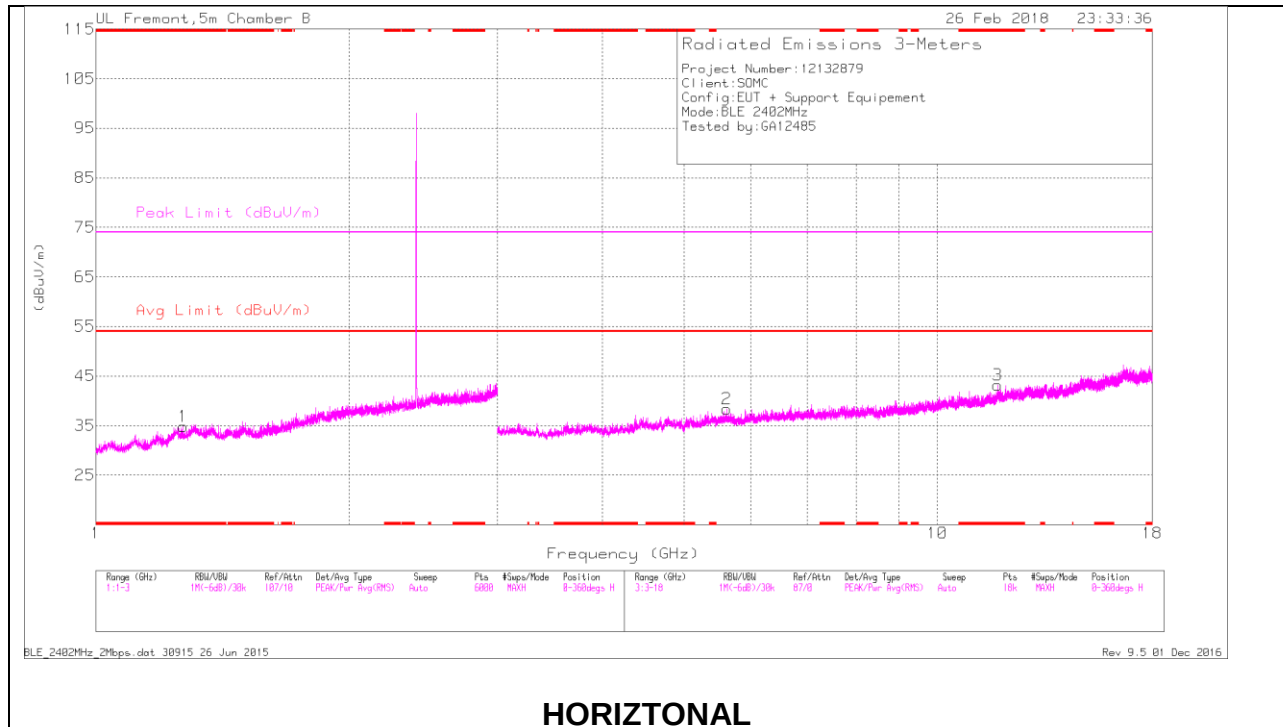
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

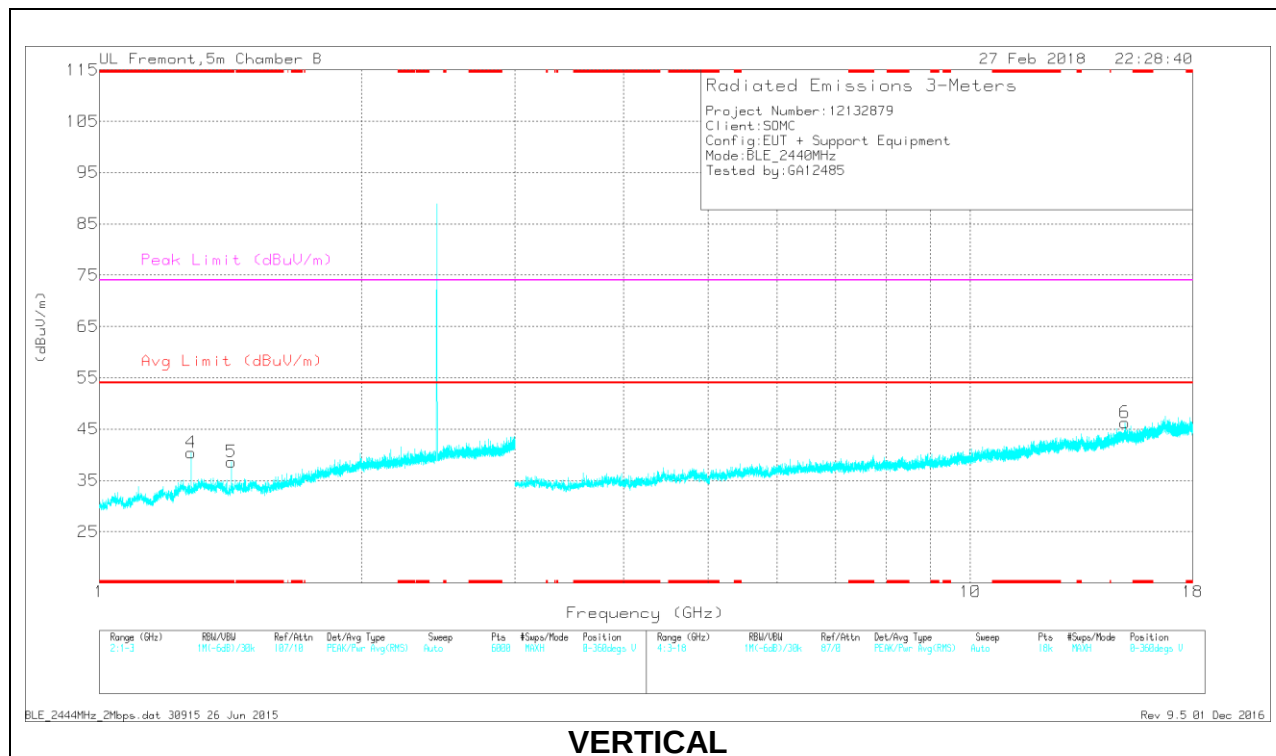
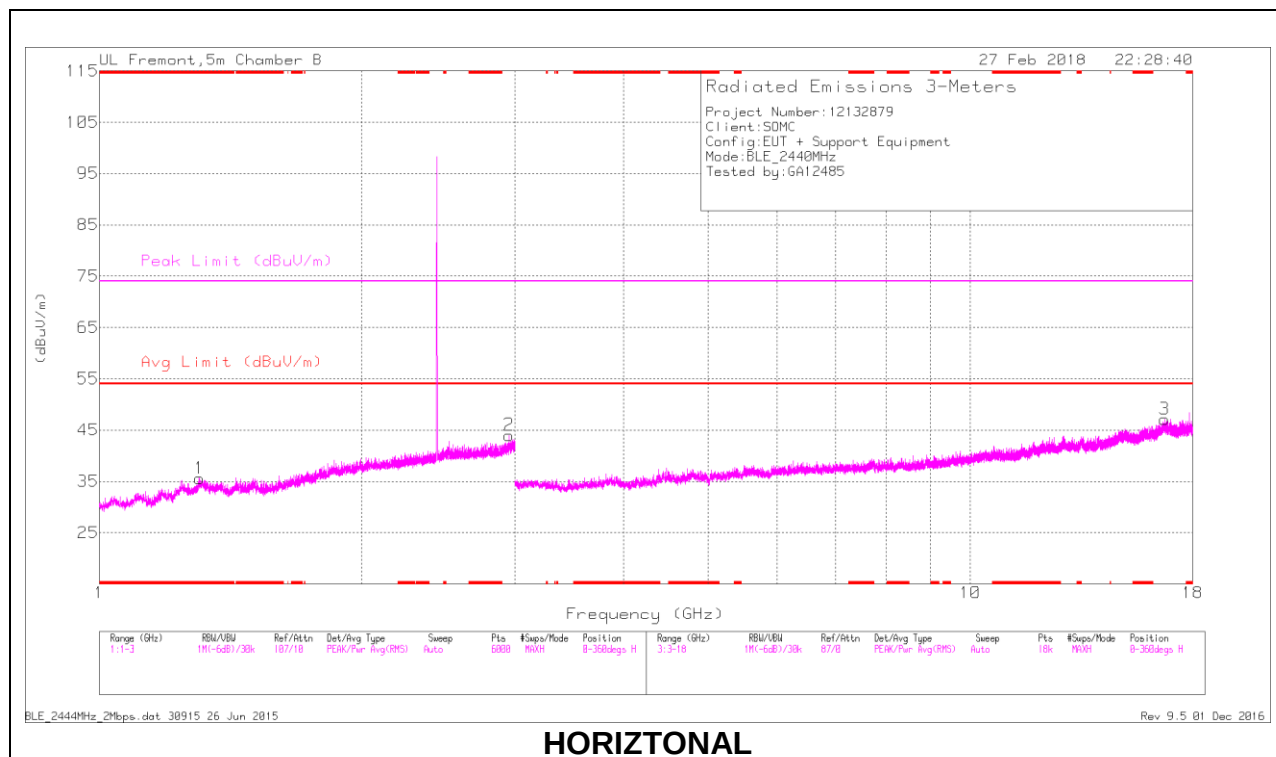
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.272	33.34	PK2	28.8	-22.1	0	40.04	-	-	74	-33.96	289	282	H
	* 1.268	16.99	MAv1	28.8	-22.2	2.41	26	54	-28	-	-	289	282	H
4	* 1.013	34.66	PK2	27.4	-23.8	0	38.26	-	-	74	-35.74	181	286	V
	* 1.013	18.07	MAv1	27.4	-23.7	2.41	24.18	54	-29.82	-	-	181	286	V
5	* 1.067	33.83	PK2	27.2	-23.2	0	37.83	-	-	74	-36.17	328	195	V
	* 1.067	17.96	MAv1	27.2	-23.2	2.41	24.37	54	-29.63	-	-	328	195	V
3	* 11.8	33.62	PK2	38.6	-23.4	0	48.82	-	-	74	-25.18	359	130	H
	* 11.798	20.75	MAv1	38.6	-23.4	2.41	38.36	54	-15.64	-	-	359	130	H
2	5.619	38.11	PK2	35.4	-29.8	0	43.71	-	-	-	-	196	320	H
6	17.463	31.74	PK2	41.7	-21.1	0	52.34	-	-	-	-	225	199	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

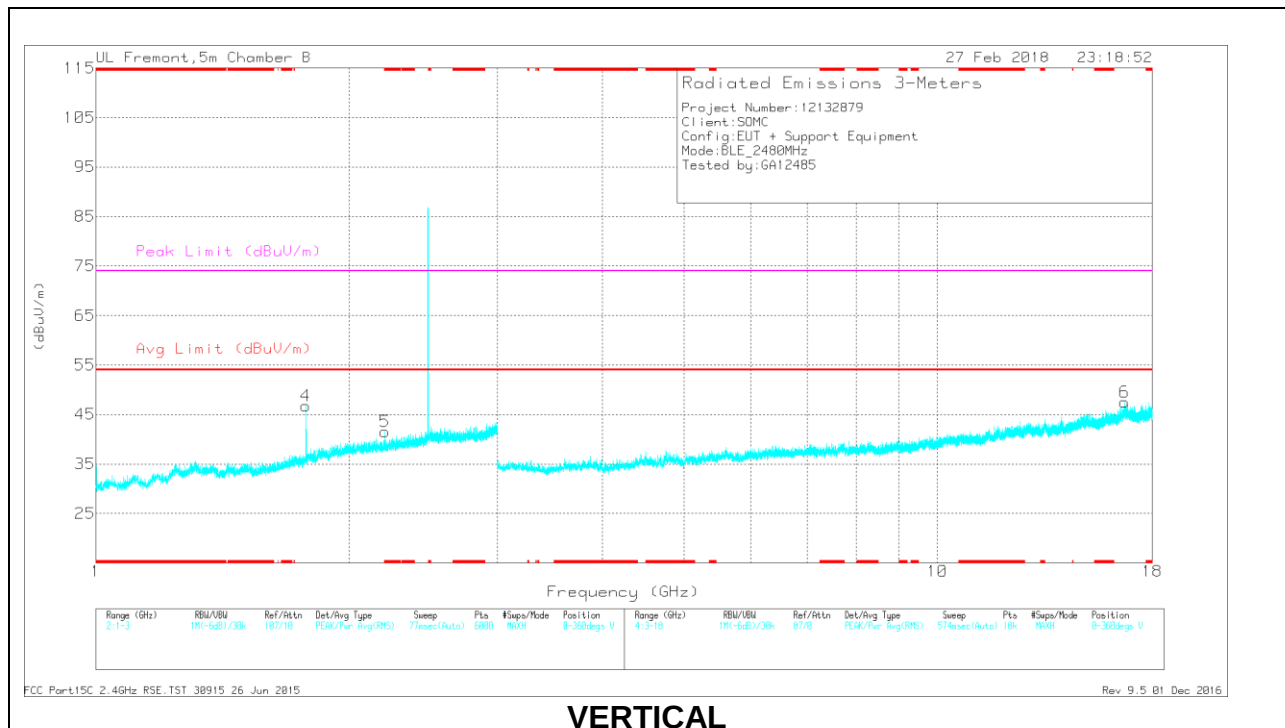
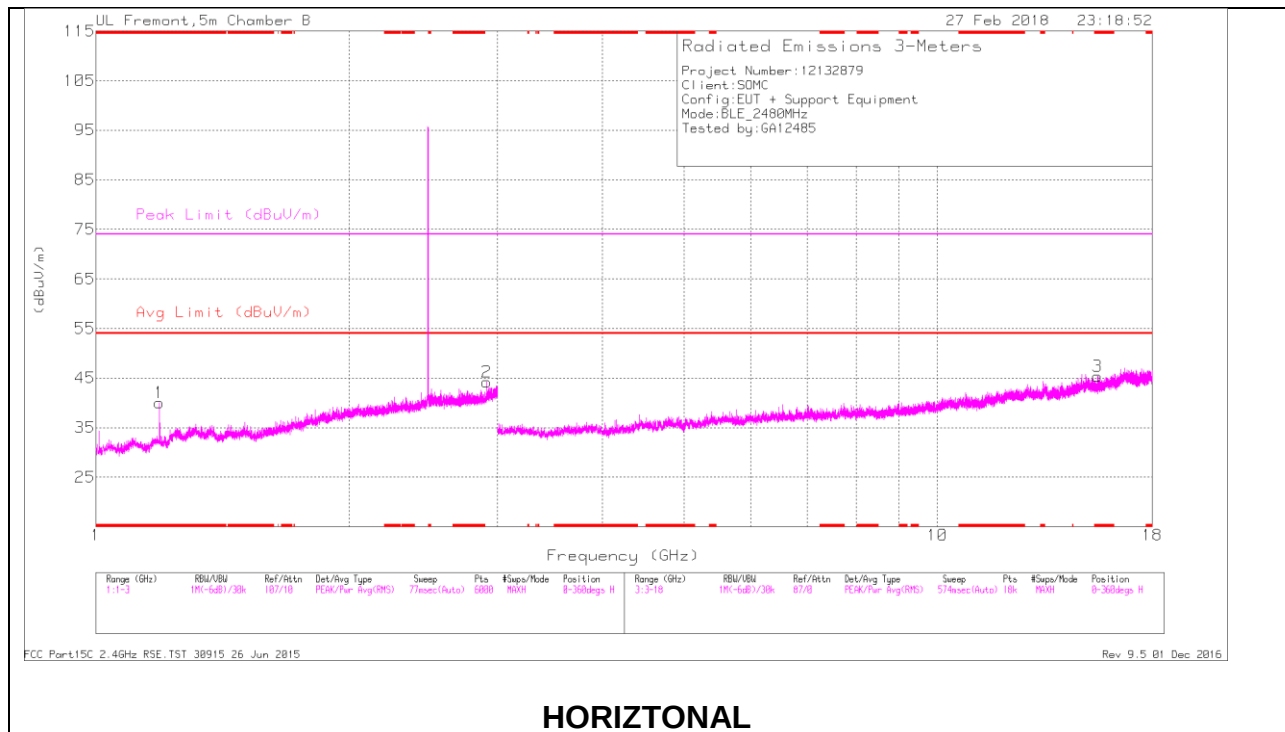
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.304	34.74	PK2	28.9	-21.7	0	41.94	-	-	74	-32.06	107	379	H
	* 1.305	18.56	MAv1	28.9	-21.8	2.41	28.07	54	-25.93	-	-	107	379	H
4	* 1.274	32.84	PK2	28.9	-22.1	0	39.64	-	-	74	-34.36	134	183	V
	* 1.274	16.77	MAv1	28.9	-22.1	2.41	25.98	54	-28.02	-	-	134	183	V
5	* 1.417	33.69	PK2	28.2	-21.7	0	40.19	-	-	74	-33.81	178	380	V
	* 1.418	17.05	MAv1	28.2	-21.7	2.41	25.96	54	-28.04	-	-	178	380	V
2	2.952	35.66	PK2	32.6	-20	0	48.26	-	-	-	-	278	287	H
6	15.057	33.01	PK2	40.5	-22.4	0	51.11	-	-	-	-	124	313	V
3	16.724	31.99	PK2	42.3	-21.5	0	52.79	-	-	-	-	65	172	H

* - indicates frequency in CFR47 Pt 15 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 T863 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.19	34.06	PK2	27.9	-22.6	0	39.36	-	-	74	-34.64	50	357	H
	* 1.189	18.92	MAv1	27.9	-22.5	2.41	26.73	54	-27.27	-	-	50	357	H
5	* 2.203	34.58	PK2	31.6	-21.3	0	44.88	-	-	74	-29.12	296	354	V
	* 2.204	17.99	MAv1	31.6	-21.3	2.41	30.7	54	-23.3	-	-	296	354	V
3	* 15.503	32.54	PK2	40.6	-23.1	0	50.04	-	-	74	-23.96	300	229	H
	* 15.499	20.39	MAv1	40.6	-23.2	2.41	40.2	54	-13.8	-	-	300	229	H
4	1.779	33.97	PK2	30	-21	0	42.97	-	-	-	-	278	301	V
2	2.911	35.12	PK2	32.5	-20.1	0	47.52	-	-	-	-	195	329	H
6	16.698	31.96	PK2	42.3	-21.3	0	52.96	-	-	-	-	265	222	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

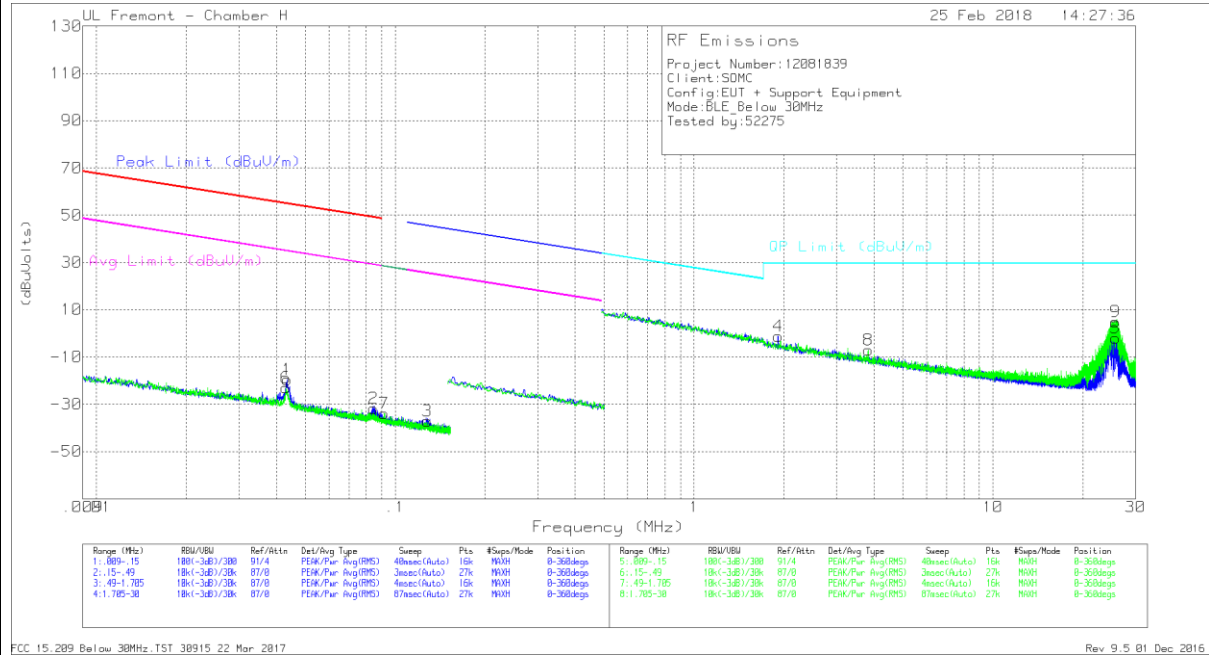
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. Worst Case Below 30 MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL AND VERTICAL PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification

- Based 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.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Below 30MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
6	.04311	44.38	Pk	12.6	0	-80	-23.02	54.89	-77.91	34.89	-57.91	0-360
1	.04348	47.81	Pk	12.6	0	-80	-19.59	54.82	-74.41	34.82	-54.41	0-360
2	.08446	36.5	Pk	11.8	0	-80	-31.7	49.05	-80.75	29.05	-60.75	0-360
7	.09203	34.43	Pk	11.7	0	-80	-33.87	28.31	-62.18	-	-	0-360
3	.12812	31.31	Pk	11.6	0	-80	-37.09	45.47	-82.56	25.47	-62.56	0-360

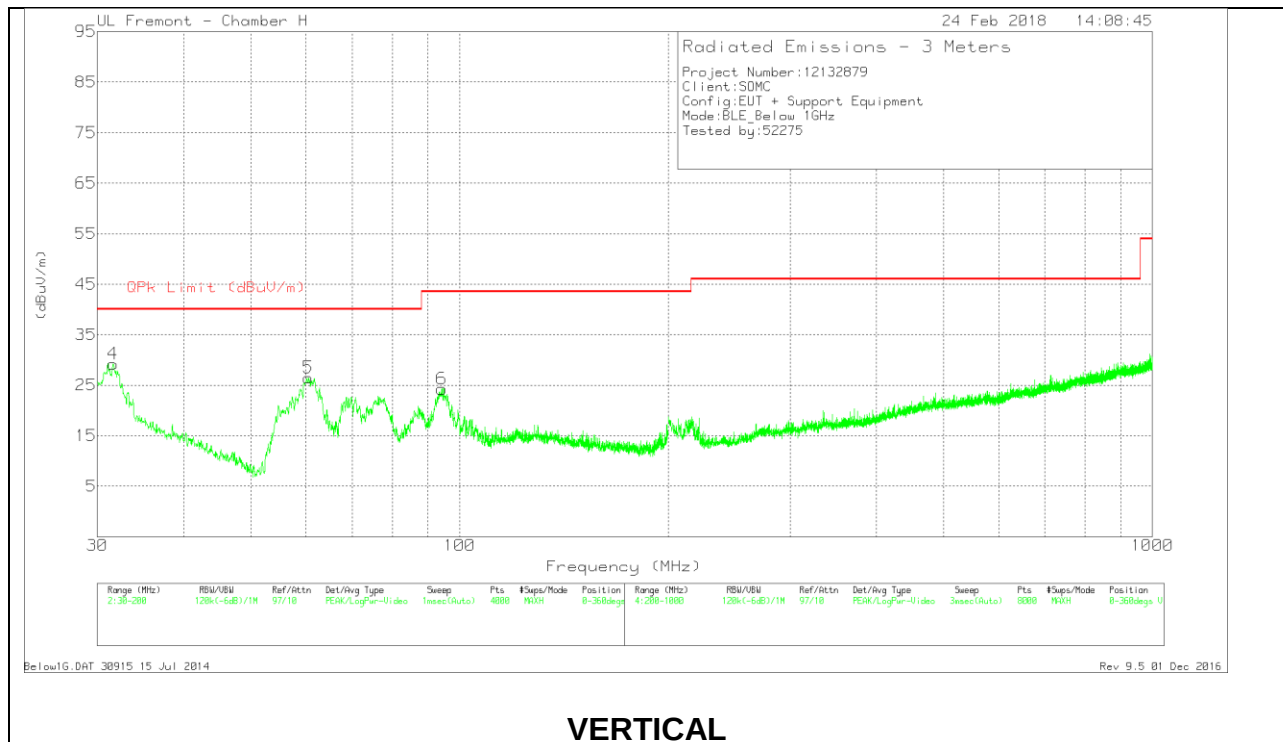
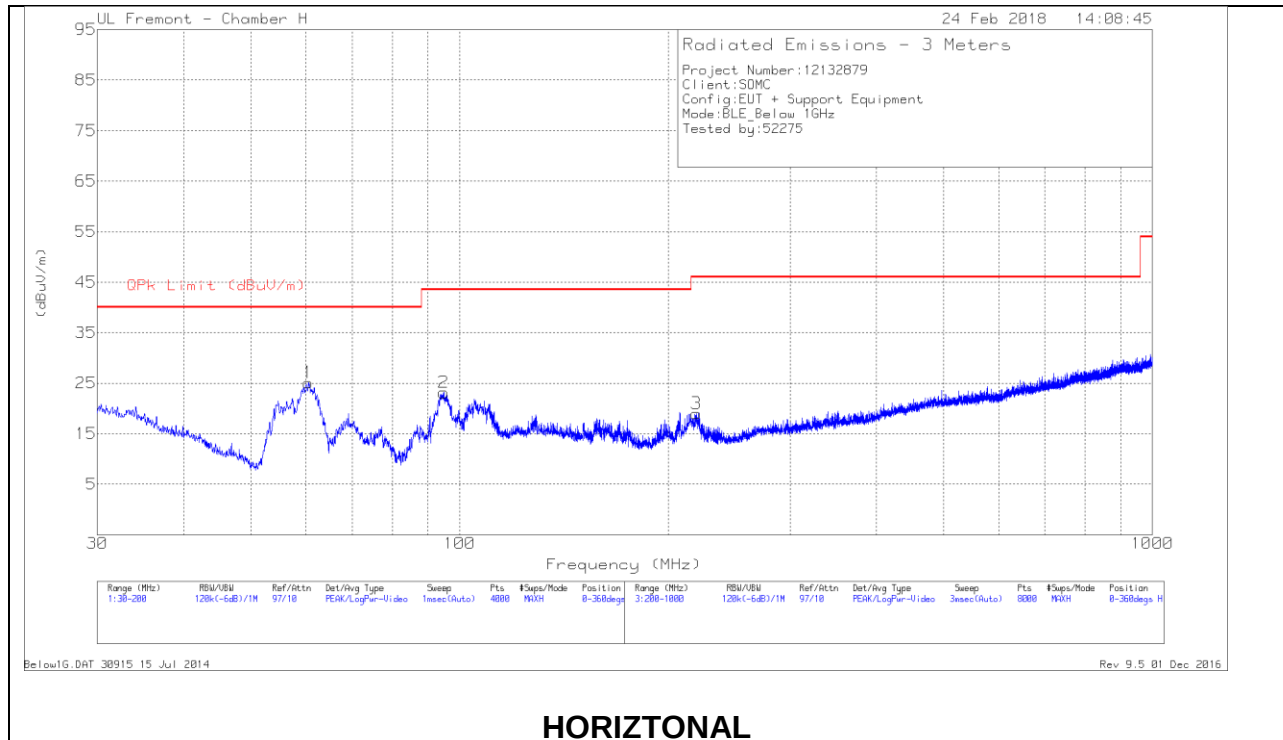
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	1.90936	26.8	Pk	11.7	.2	-40	-1.3	29.5	-30.8	0-360
8	3.82301	21.18	Pk	11.5	.2	-40	-7.12	29.5	-36.62	0-360
9	25.67538	35.37	Pk	8.9	.6	-40	4.87	29.5	-24.63	0-360
5	25.76446	28.6	Pk	8.9	.6	-40	-1.9	29.5	-31.4	0-360

Pk - Peak detector

9.4. Worst Case Below 1 GHz

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



Below 1GHz Data

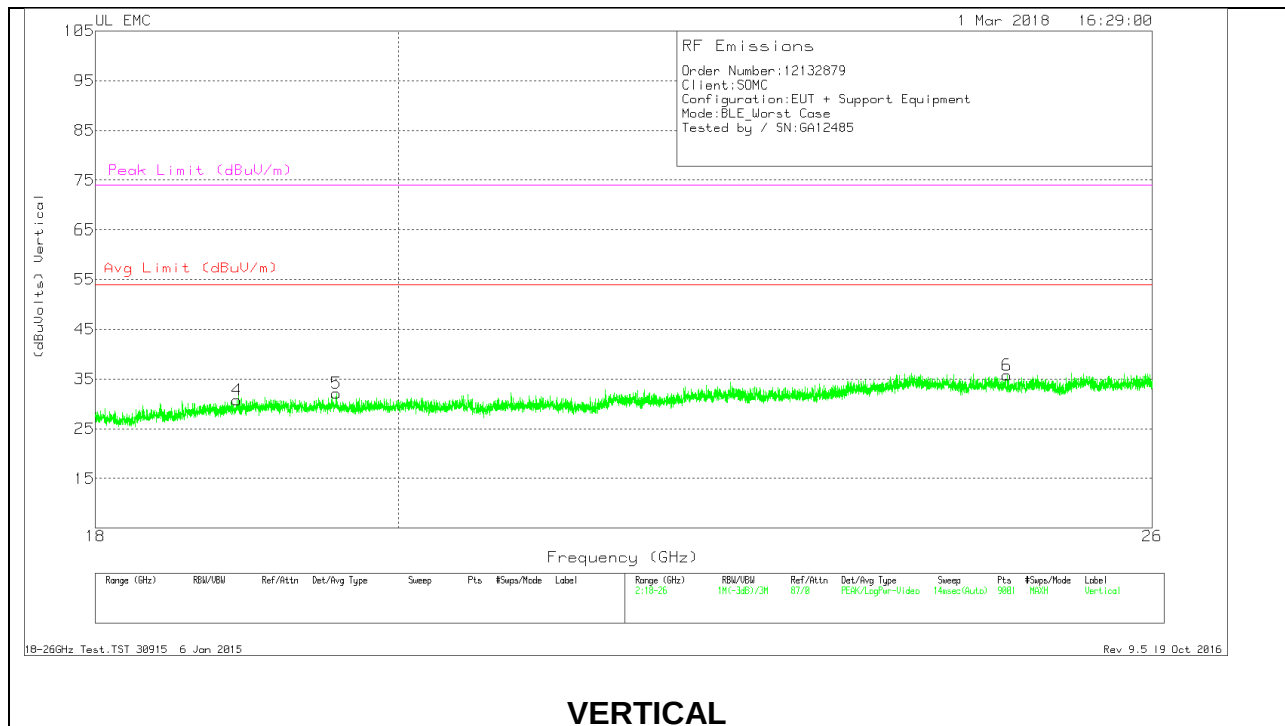
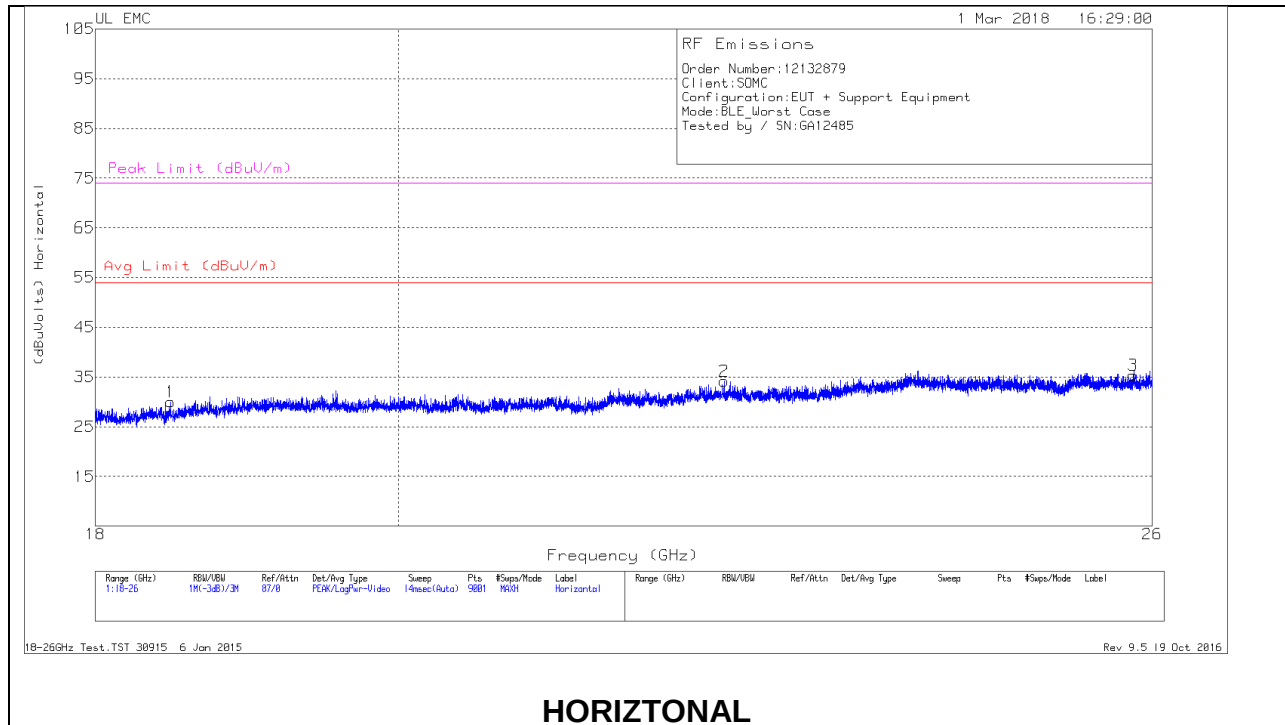
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.6154	37.82	Pk	22.7	-31.3	29.22	40	-10.78	0-360	100	V
1	60.5229	44.72	Pk	11.3	-30.9	25.12	40	-14.88	0-360	399	H
5	60.5229	46.09	Pk	11.3	-30.9	26.49	40	-13.51	0-360	100	V
6	94.2766	42.19	Pk	12.6	-30.5	24.29	43.52	-19.23	0-360	100	V
2	94.8718	40.96	Pk	12.8	-30.6	23.16	43.52	-20.36	0-360	199	H
3	219.7026	33.98	Pk	14.6	-29.6	18.98	46.02	-27.04	0-360	101	H

Pk - Peak detector

9.5. Worst Case 18-26 GHz

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



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.477	32.59	Pk	32.3	-25.4	-9.5	29.99	54	-24.01	74	-44.01
2	22.4	35.08	Pk	33.5	-24.9	-9.5	34.18	54	-19.82	74	-39.82
3	25.827	35.36	Pk	34.3	-24.8	-9.5	35.36	54	-18.64	74	-38.64
4	18.908	33.23	Pk	32.4	-25.4	-9.5	30.73	54	-23.27	74	-43.27
5	19.573	34.04	Pk	32.7	-25.1	-9.5	32.14	54	-21.86	74	-41.86
6	24.718	35.85	Pk	34.1	-24.7	-9.5	35.75	54	-18.25	74	-38.25

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

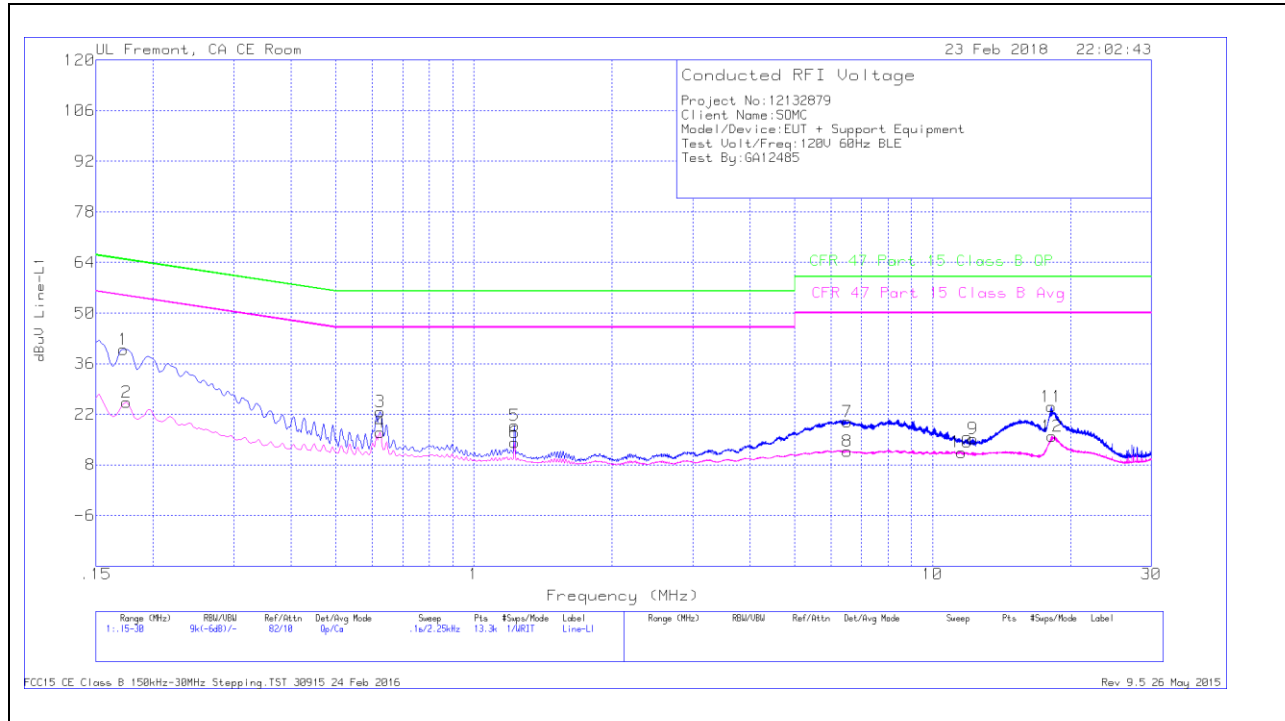
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS

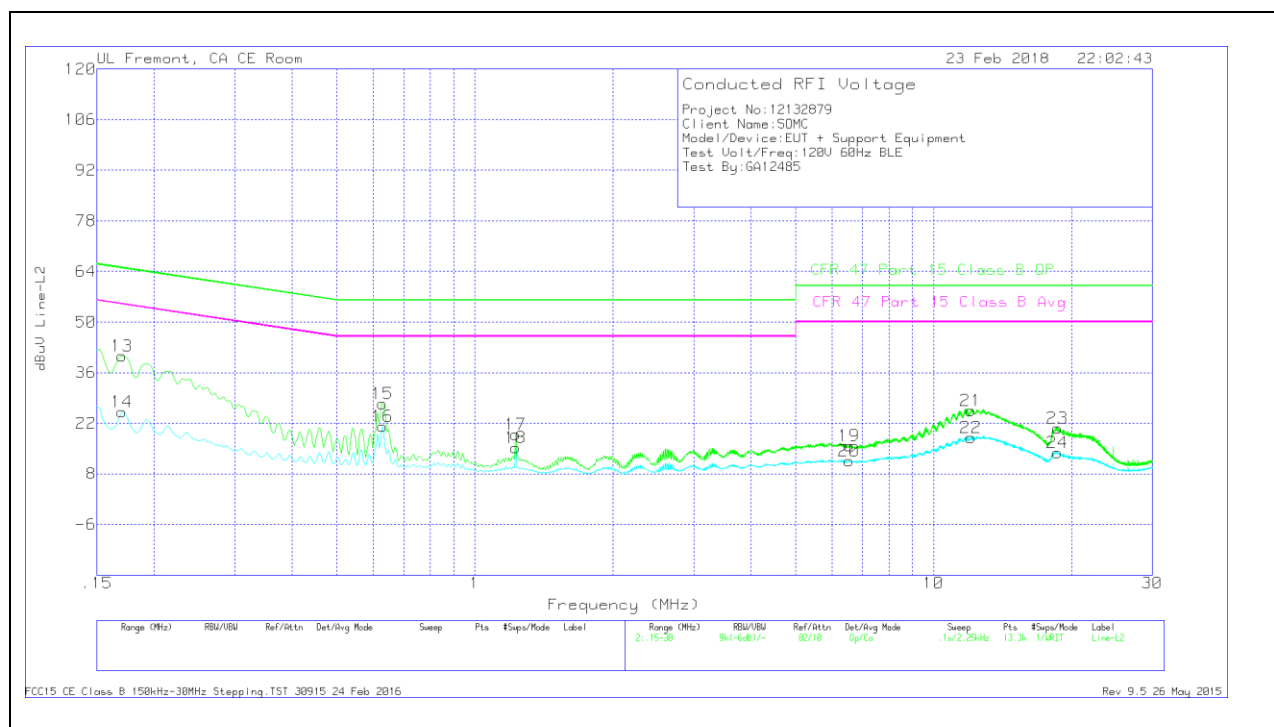


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.1725	29.85	Qp	0	0	10.1	39.95	64.84	-24.89	-	-
2	.17475	15.16	Ca	0	0	10.1	25.26	-	-	54.73	-29.47
3	.62475	12.66	Qp	0	0	10.1	22.76	56	-33.24	-	-
4	.62475	6.95	Ca	0	0	10.1	17.05	-	-	46	-28.95
5	1.2255	8.69	Qp	0	.1	10.1	18.89	56	-37.11	-	-
6	1.2255	3.93	Ca	0	.1	10.1	14.13	-	-	46	-31.87
7	6.52425	9.54	Qp	0	.2	10.2	19.94	60	-40.06	-	-
8	6.52875	1.38	Ca	0	.2	10.2	11.78	-	-	50	-38.22
9	12.264	4.68	Qp	.1	.2	10.2	15.18	60	-44.82	-	-
10	11.56425	1	Ca	.1	.2	10.2	11.5	-	-	50	-38.5
11	18.14325	13.44	Qp	0	.3	10.3	24.04	60	-35.96	-	-
12	18.231	5.36	Ca	0	.3	10.3	15.96	-	-	50	-34.04

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.17025	30.51	Qp	0	0	10.1	40.61	64.95	-24.34	-	-
14	.17025	14.98	Ca	0	0	10.1	25.08	-	-	54.95	-29.87
15	.62925	17.34	Qp	0	0	10.1	27.44	56	-28.56	-	-
16	.62925	10.97	Ca	0	0	10.1	21.07	-	-	46	-24.93
17	1.22775	8.74	Qp	0	.1	10.1	18.94	56	-37.06	-	-
18	1.22775	5.02	Ca	0	.1	10.1	15.22	-	-	46	-30.78
19	6.54675	5.28	Qp	0	.2	10.2	15.68	60	-44.32	-	-
20	6.5445	1.12	Ca	0	.2	10.2	11.52	-	-	50	-38.48
21	12.057	15.04	Qp	0	.2	10.2	25.44	60	-34.56	-	-
22	12.05475	7.56	Ca	0	.2	10.2	17.96	-	-	50	-32.04
23	18.62475	10.09	Qp	0	.3	10.3	20.69	60	-39.31	-	-
24	18.62475	3.29	Ca	0	.3	10.3	13.89	-	-	50	-36.11

Qp - Quasi-Peak detector

Ca - CISPR average detection