



CERTIFICATION TEST REPORT

Report Number. : 12081839-E3V2

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

FCC ID : PY7-24118Q

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:

January 24, 2018

Prepared by:

UL Verification Services Inc.
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	01/05/18	Initial Issue	
V2	01/24/18	Updated Section 5.5	Kiya Kedida

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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: RADIATED: BH9000A7AW & BH90002TAW
CONDUCTED: BH9000BMAW & BH90003HAW

DATE TESTED: December 13, 2017 – January 03, 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 any government.

Approved & Released For
UL Verification Services Inc By:

Prepared By:



Dan Corona
Operations Leader
UL Verification Services Inc.



Kiya Kedida
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 v04 and 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(IC: 2324B-1)	☐ Chamber D(IC: 22541-1)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 22541-2)
☐ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 22541-3)
	☒ Chamber G(IC: 22541-4)
	☐ Chamber H(IC: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. Chambers A through C is covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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:

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

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. DESCRIPTION OF EUT

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 (1Mbps)	5.33	3.41
2402 - 2480	BLE (2Mbps)	5.60	3.63

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Loop antenna, with the maximum gains:

Frequency Band (GHz)	Antenna Gain (dBi)
2402-2480	-3.94

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SONY, s_atp_1_00139_B_10_5.
The test utility software used during testing was Tera Term Ver 4.79.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated band edge, harmonics, and spurious emissions from 1 GHz to 18GHz were performed with the EUT was set to transmit at the Low/Middle/High channels.

Radiated emission below 30MHz, below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z, using the following two configurations, AC/DC Adapter and headphone. It was determined that Y-Axis with only 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.

Worst-case data rates as provided by the client were:

1Mbps

2Mbps

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	1309-8864.1	VB17W46601037	NA
DC Power Supply	Ametek	XT 15-4	T463	NA

I/O CABLES (CONDUCTED TEST)

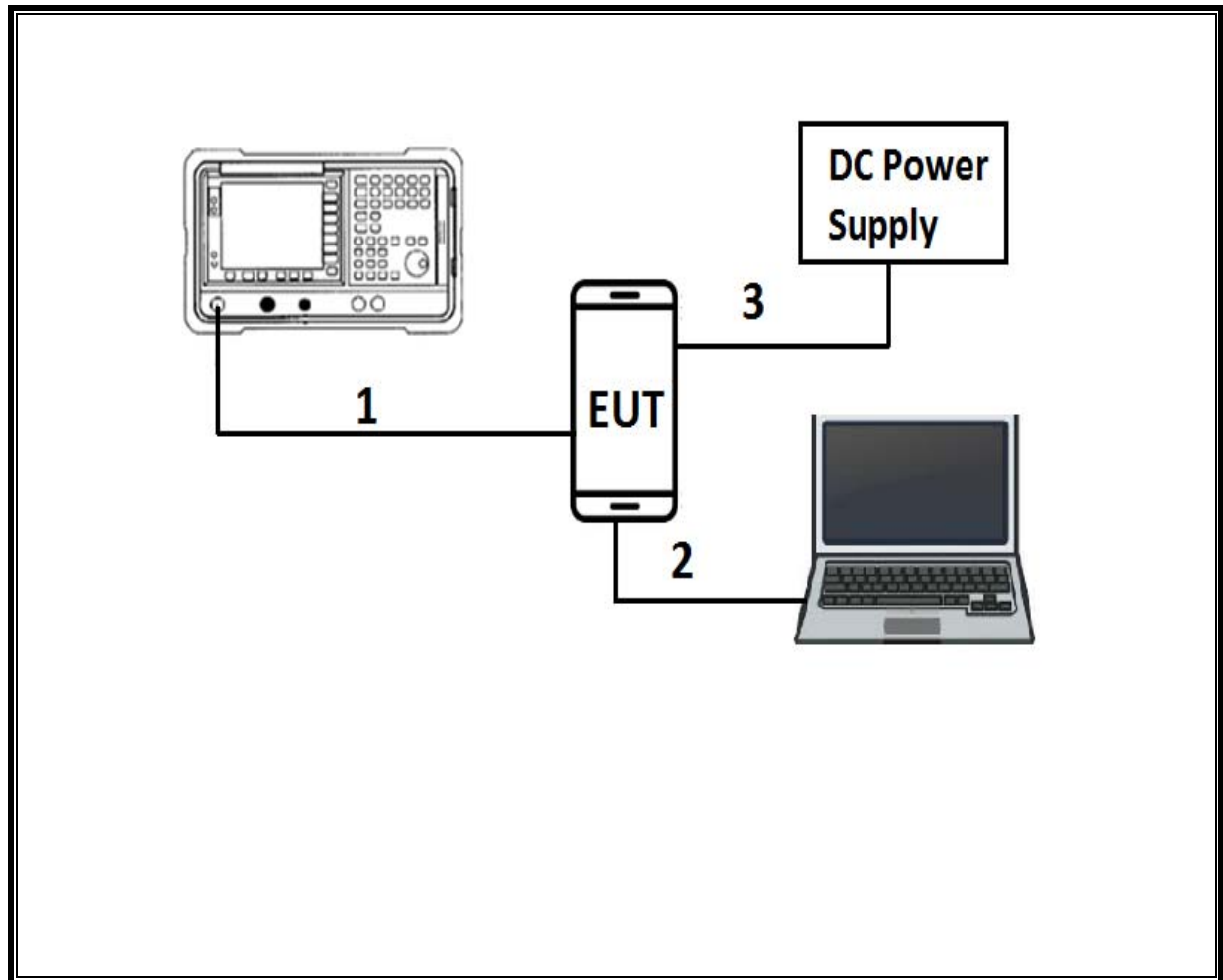
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	RF	Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	DC	1	DC	Shielded	0.3	N/A

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

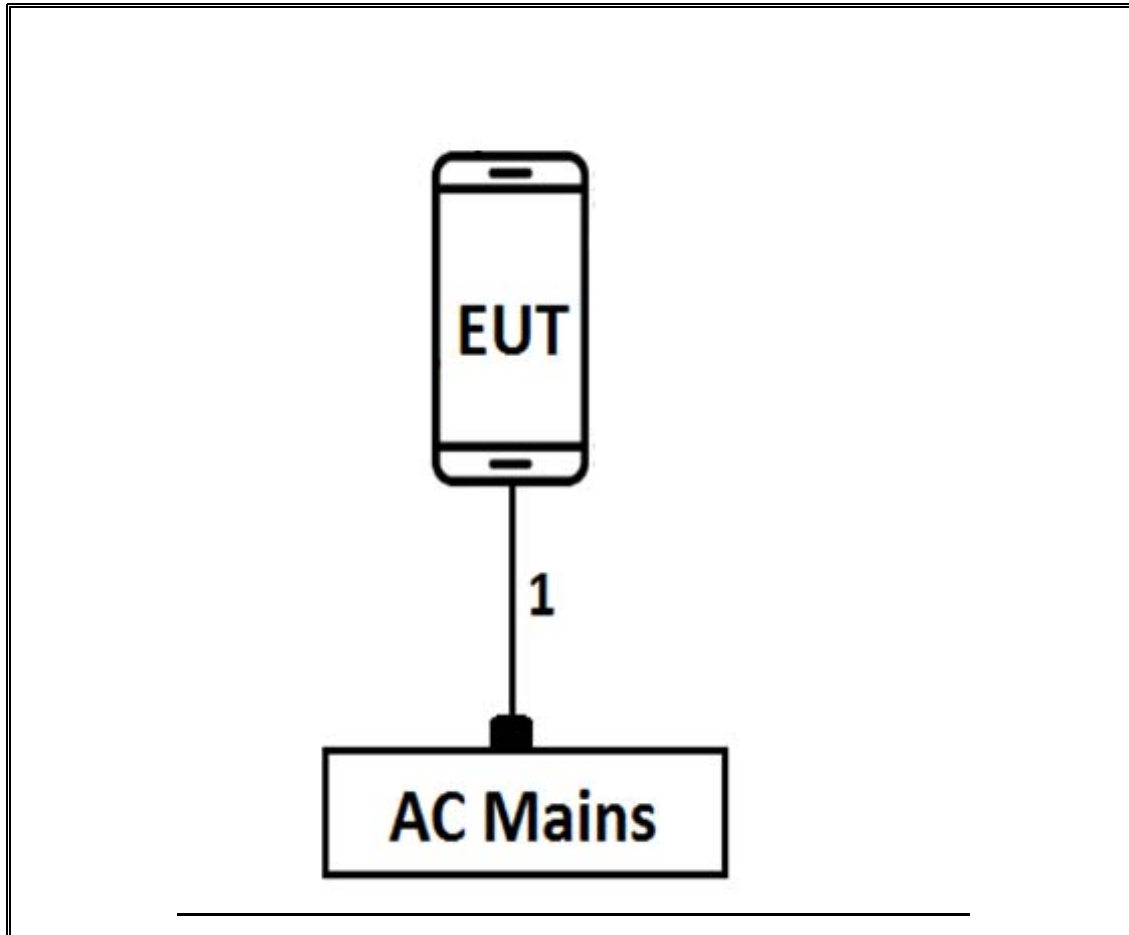
TEST SETUP

CONDCUTED TEST SETUP DIAGRAM



TEST SETUP

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



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	Asset	Cal Due
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB1	T130	10/16/2018
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/14/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T346	03/28/2018
Antenna, Horn 18-26.5GHz	ARA	MWH-1826	T89	01/04/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1268	06/15/2018
Power Sensor, P – series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1223	03/29/2018
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T491	06/01/2018
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T493	06/23/2018
Amplifier, 1-8GHz	MITEQ	AMF-4D-01000800-30-29P	T1156	06/24/2018
Pre Amplifier, 1-26.5GHz	Agilent	8449B	T404	7/23/2018
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T486	11/25/2018
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T485	6/24/2018
Amplifier, 10kHz-1GHz	Agilent (Keysight) Technologies	8447D	T15	08/14/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1210	07/17/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T339	09/13/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/11/2018
Test Receiver, EMI, 10Hz-7GHz	Rhode&Schwarz	ESR	T1436	01/06/2018
LISN	FISCHER	FCC-LISN-50/250-25-2-01	T1310	01/17/2018

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 7.7, Dec 14, 2017

NOTE: *testing is completed before equipment calibration expiration date.

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247	TX conducted output power	<30dBm		Pass
15.247	PSD	<8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	Pass
15.205, 15.209, 15.247(d)	Radiated Spurious Emission	< 54dBuV/m		Pass

8. ANTENNA PORT TEST RESULTS

8.1. MEASUREMENT METHODS

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 9.1.1.

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.

8.2. ON TIME, DUTY CYCLE

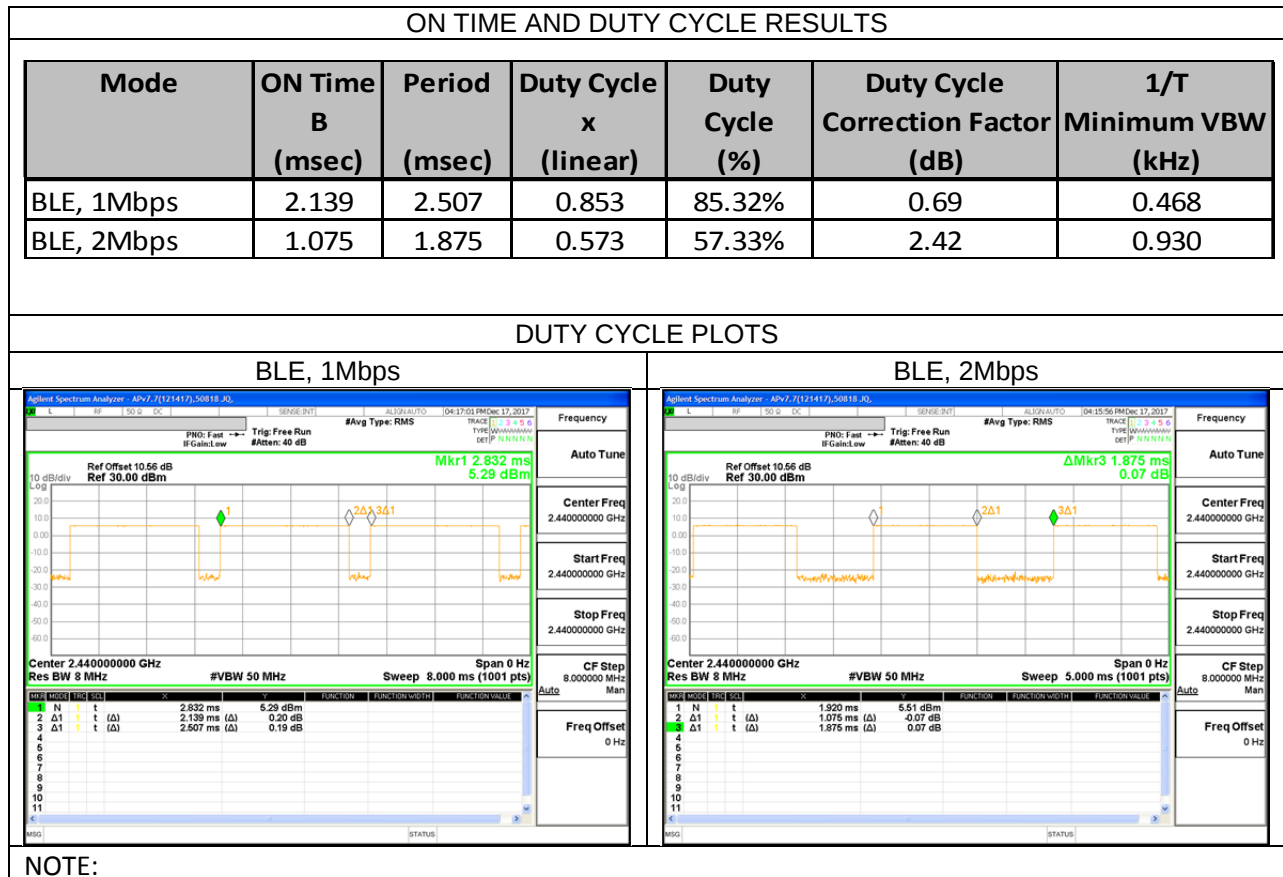
LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS



8.3.6 dB BANDWIDTH

LIMITS

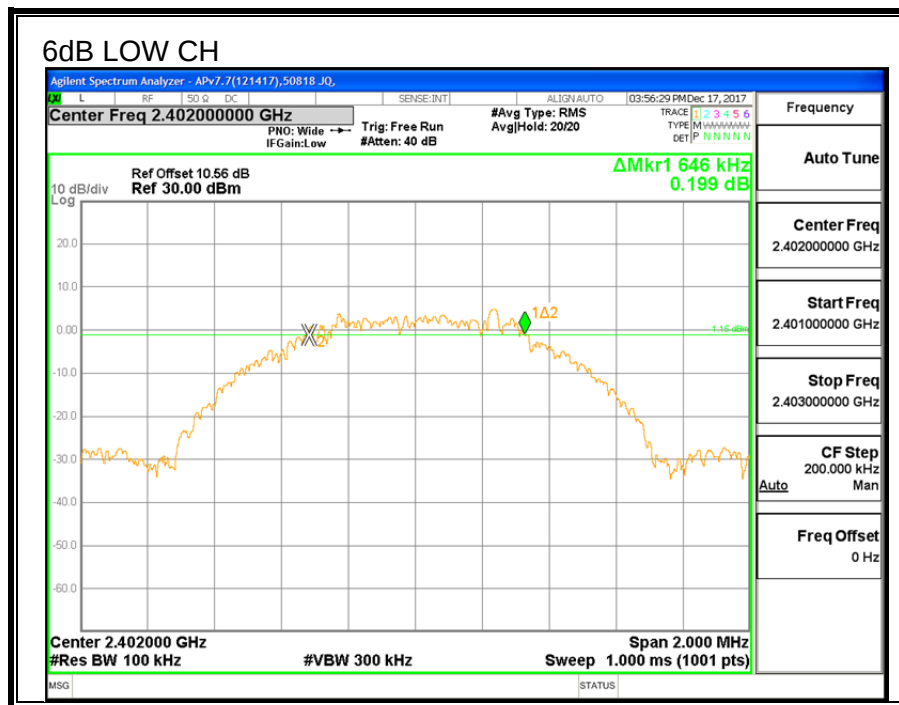
FCC §15.247 (a) (2)

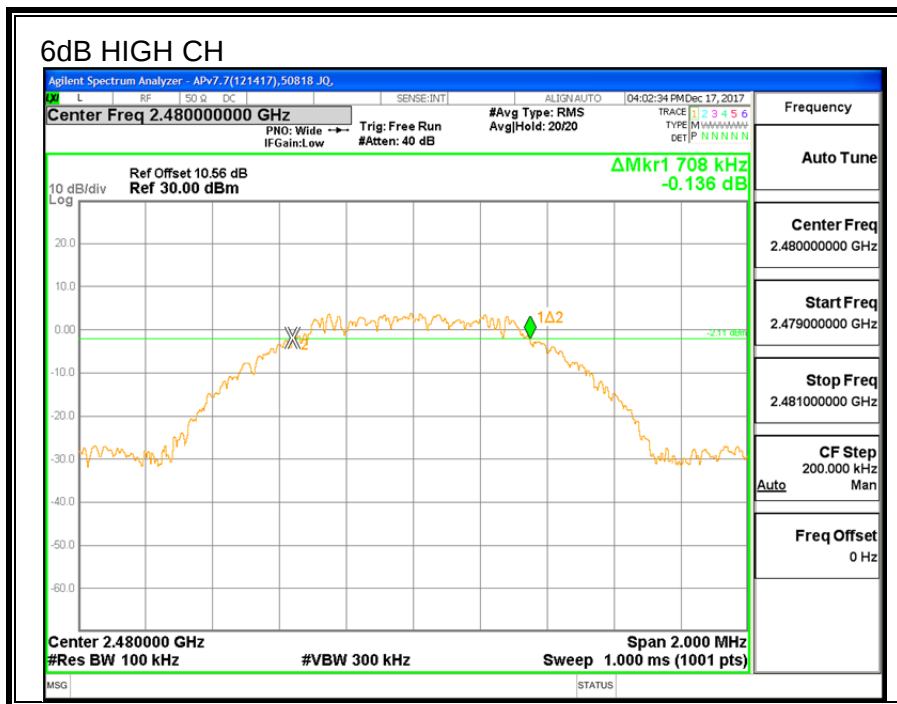
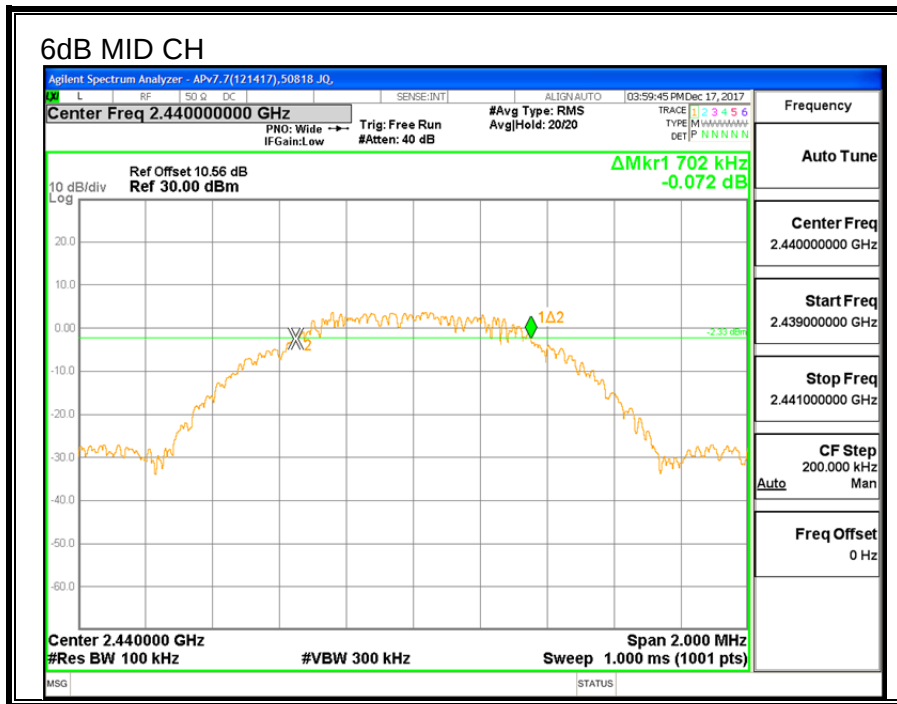
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

6 dB BANDWIDTH (1Mbps)

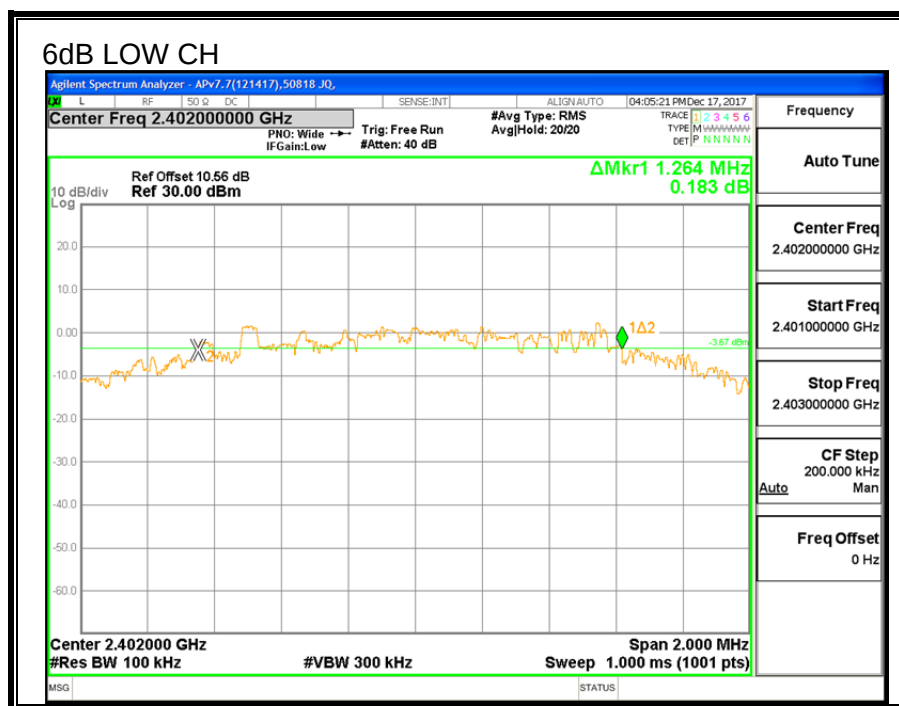
Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.646	0.5
Middle	2440	0.702	0.5
High	2480	0.708	0.5

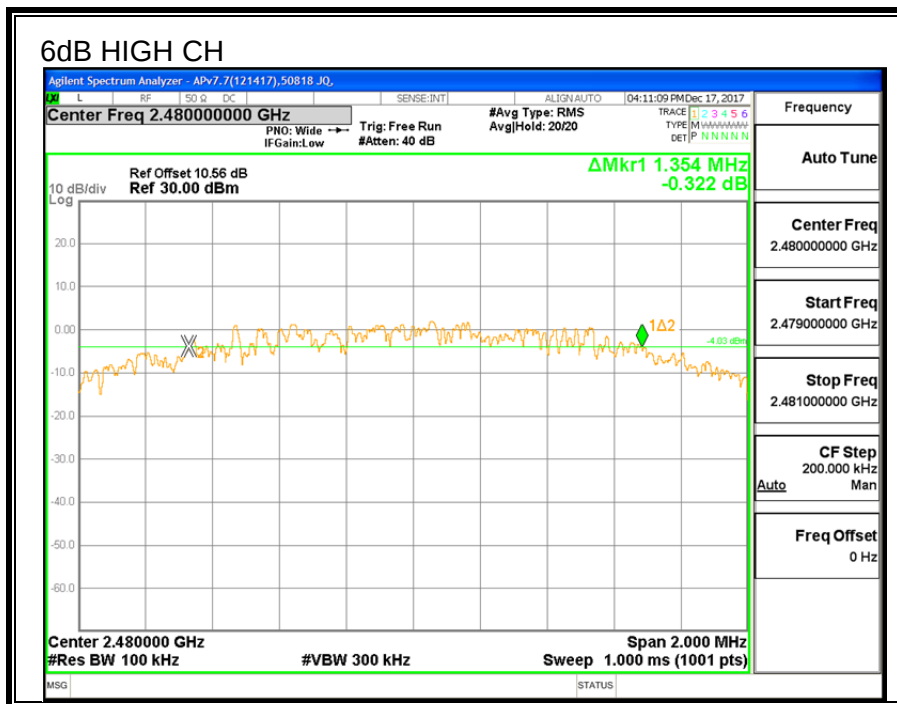
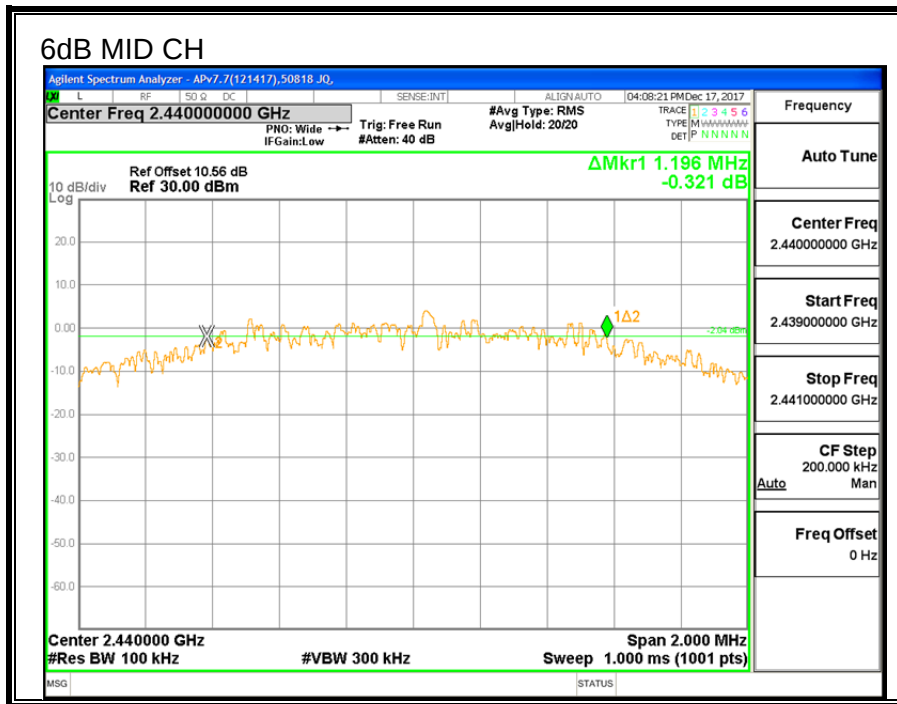




6 dB BANDWIDTH (2Mbps)

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.264	0.5
Middle	2440	1.196	0.5
High	2480	1.354	0.5





8.4.99% BANDWIDTH

LIMITS

None; for reporting purposes only.

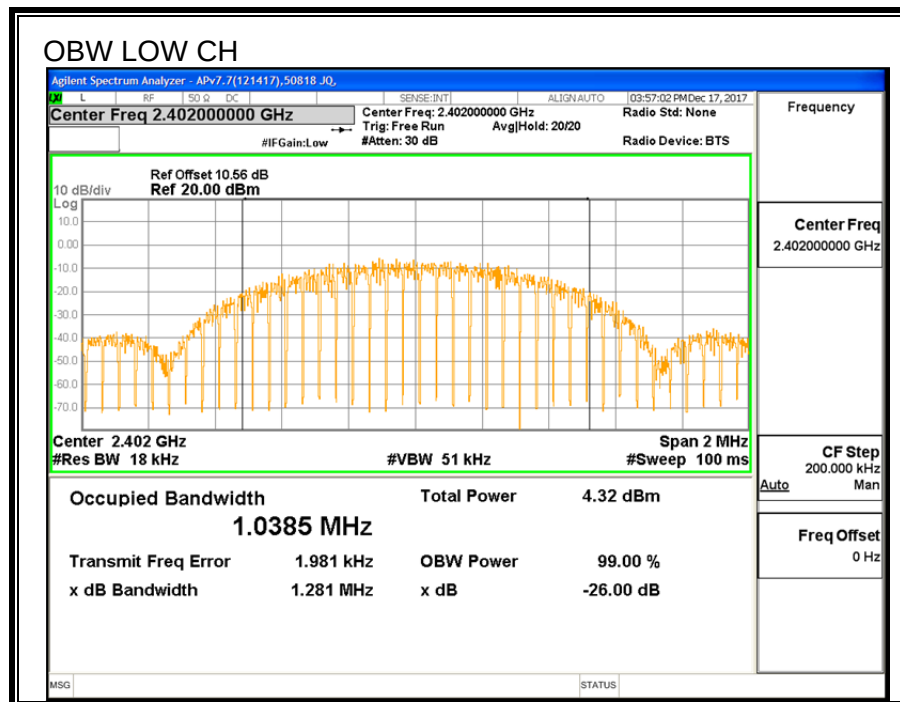
Test Procedure

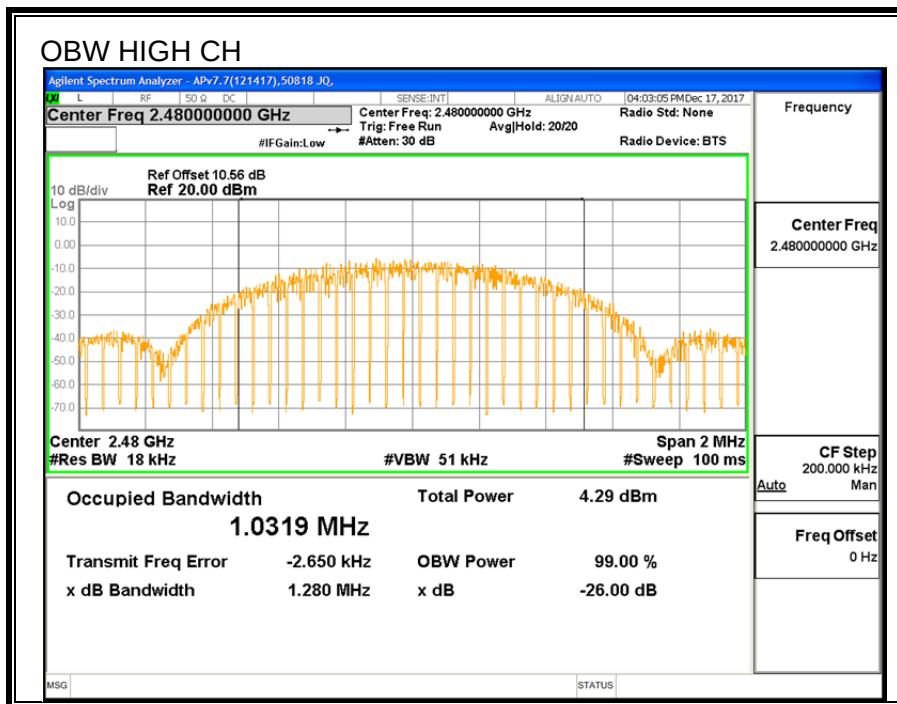
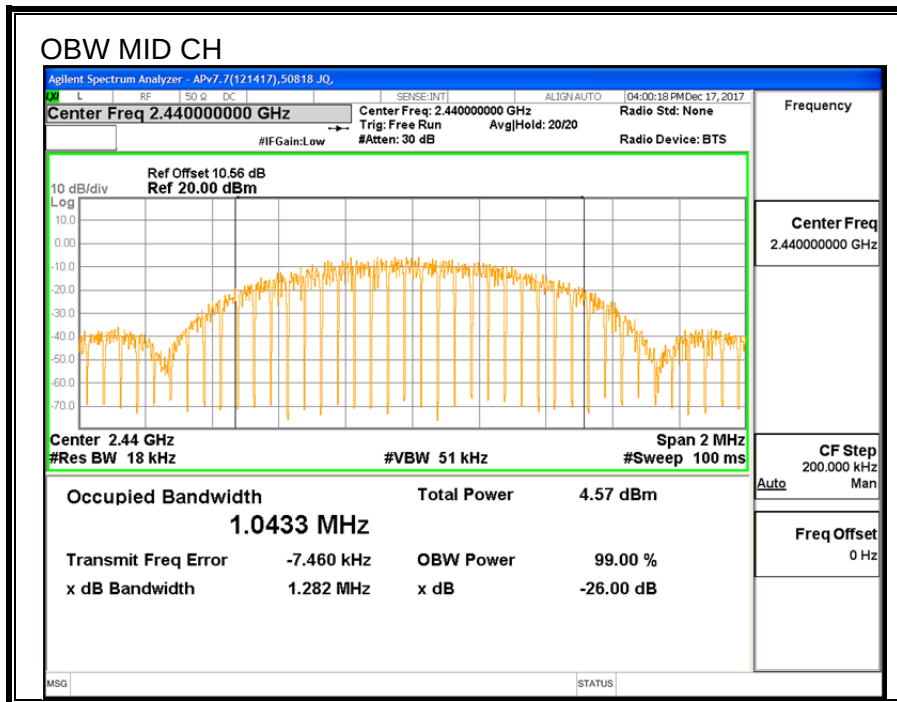
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% BANDWIDTH (1Mbps)

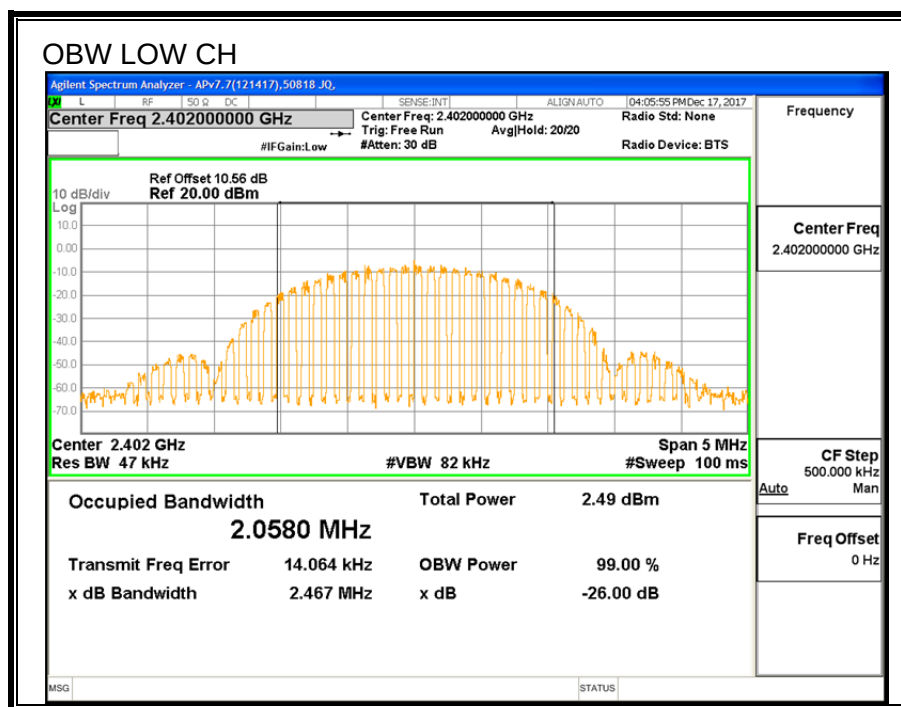
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0385
Middle	2440	1.0433
High	2480	1.0319

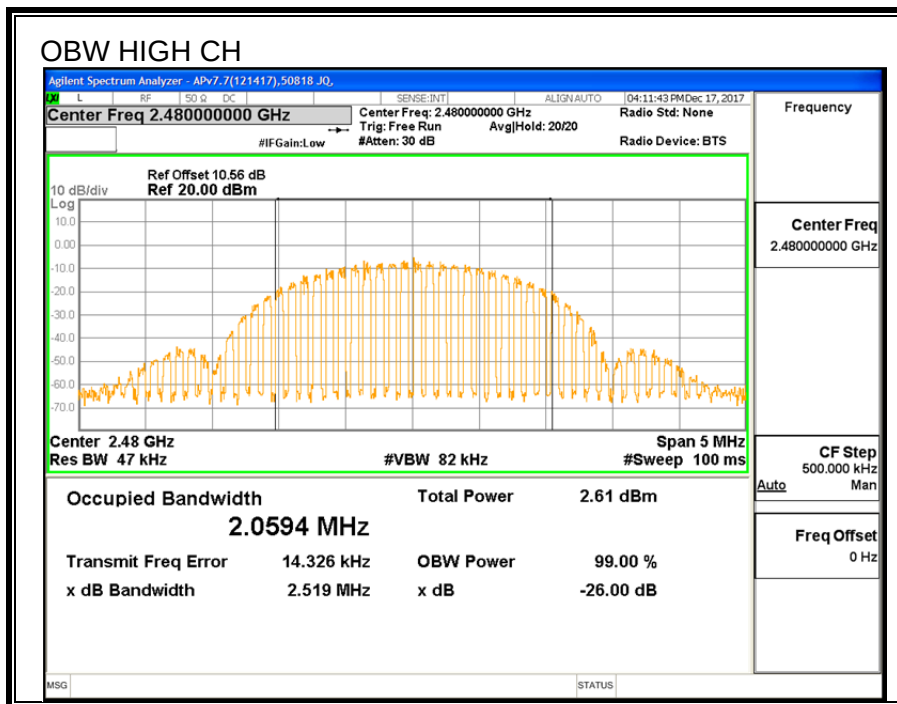
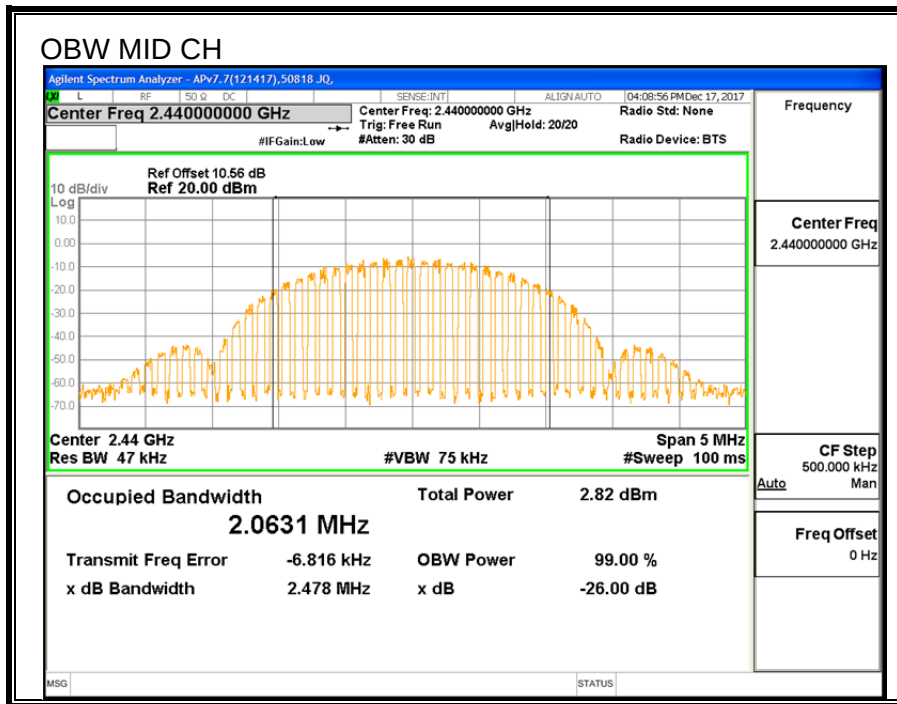




99% BANDWIDTH (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0580
Middle	2440	2.0631
High	2480	2.0594





8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

The cable assembly insertion loss of 10.6 dB (consisting of 10 dB pad and 0.6 dB cable) is entered as an offset in the power meter to enable direct reading of the power. The power meter is gated to measure average power during the ON time of the transmitter.

RESULTS

TEST ENGINEER:	12506 JM	Date:	12/19/17
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1Mbps

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	5.10
Middle	2440	5.12
High	2480	4.80

2Mbps

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	5.05
Middle	2440	5.15
High	2480	4.83

8.6. OUTPUT POWER

LIMITS

FCC §15.247 (b)

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 10.6 dB (consisting of 10 dB pad and 0.6 dB cable) is entered as an offset in the power meter to enable direct reading of the power. The power meter is gated to measure peak power during the ON time of the transmitter

RESULTS

TEST ENGINEER:	12506 JM	Date:	12/19/17
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OUTPUT POWER (1Mbps)

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.32	30.00	-26.68
Middle	2440	5.33	30.00	-24.88
High	2480	5.00	30.00	-25.20

OUTPUT POWER (2Mbps)

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.58	30.00	-24.95
Middle	2440	5.60	30.00	-24.85
High	2480	5.40	30.00	-25.17

8.7. POWER SPECTRAL DENSITY

LIMITS

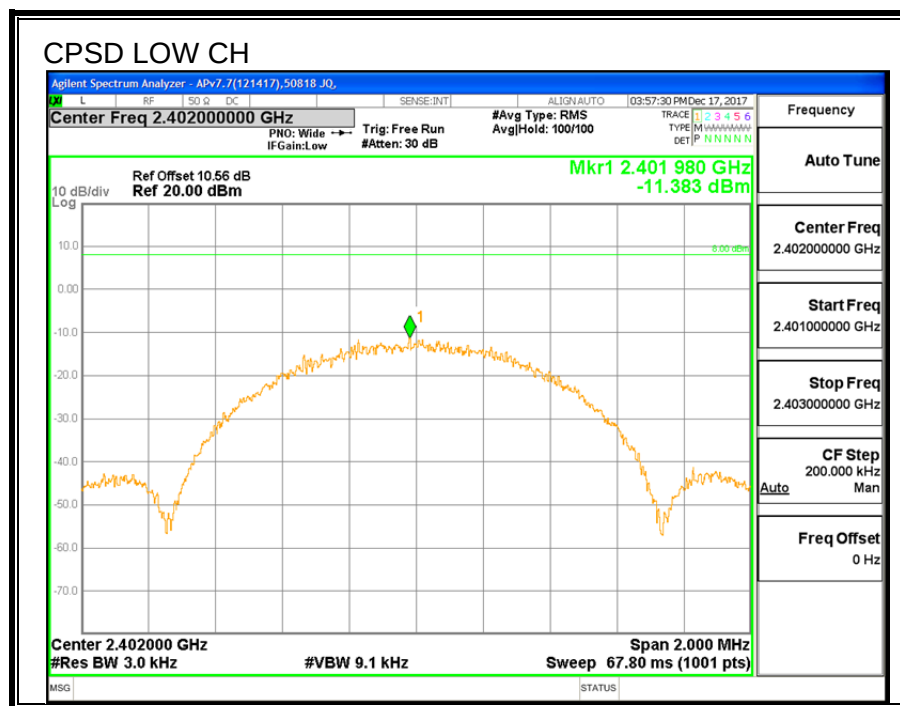
FCC §15.247 (e)

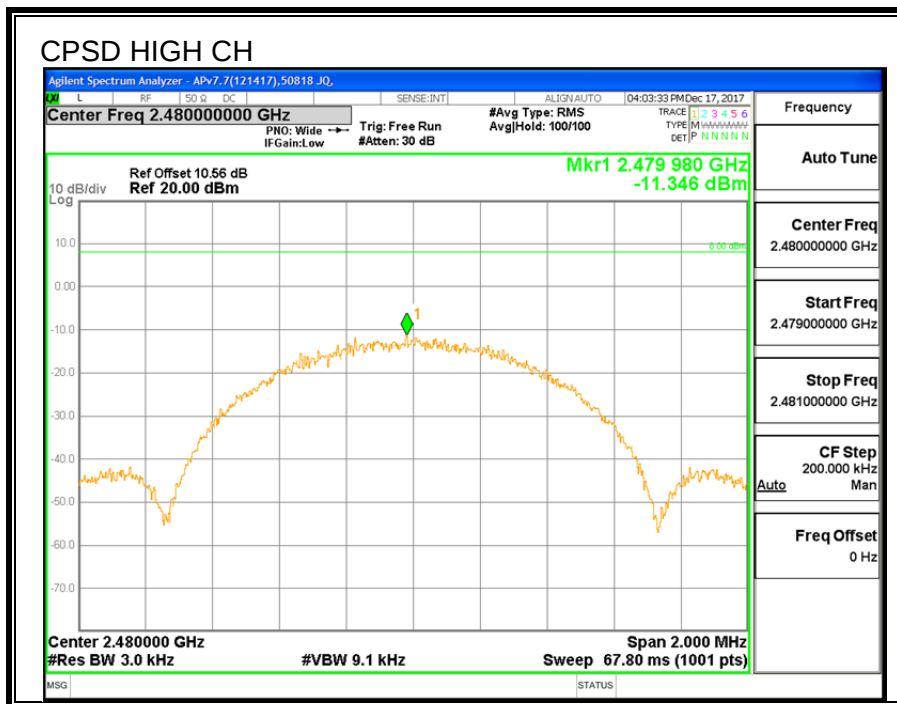
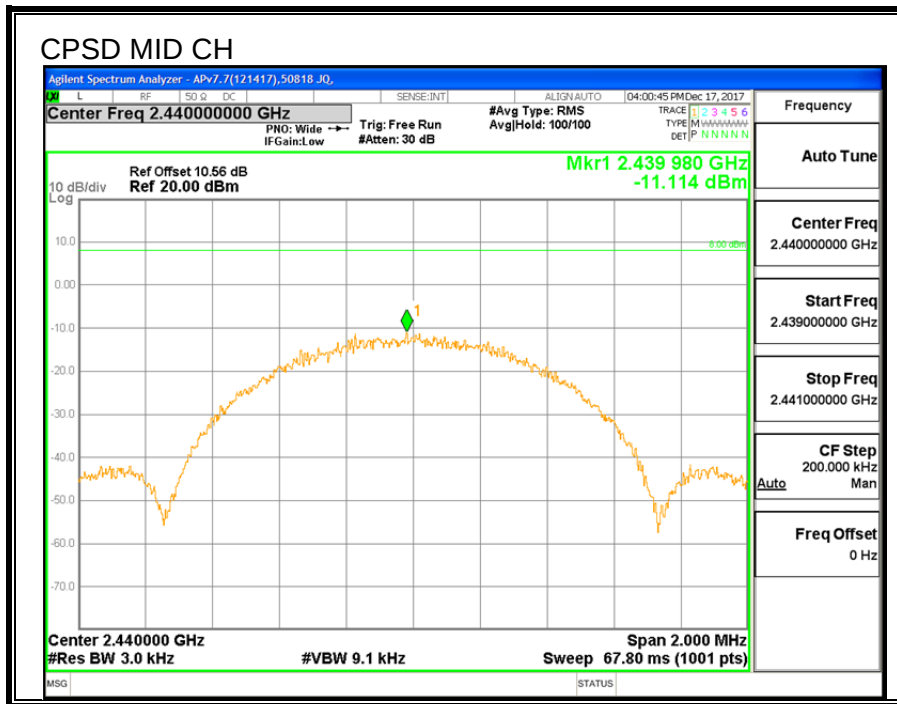
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

POWER SPECTRAL DENSITY (1Mbps)

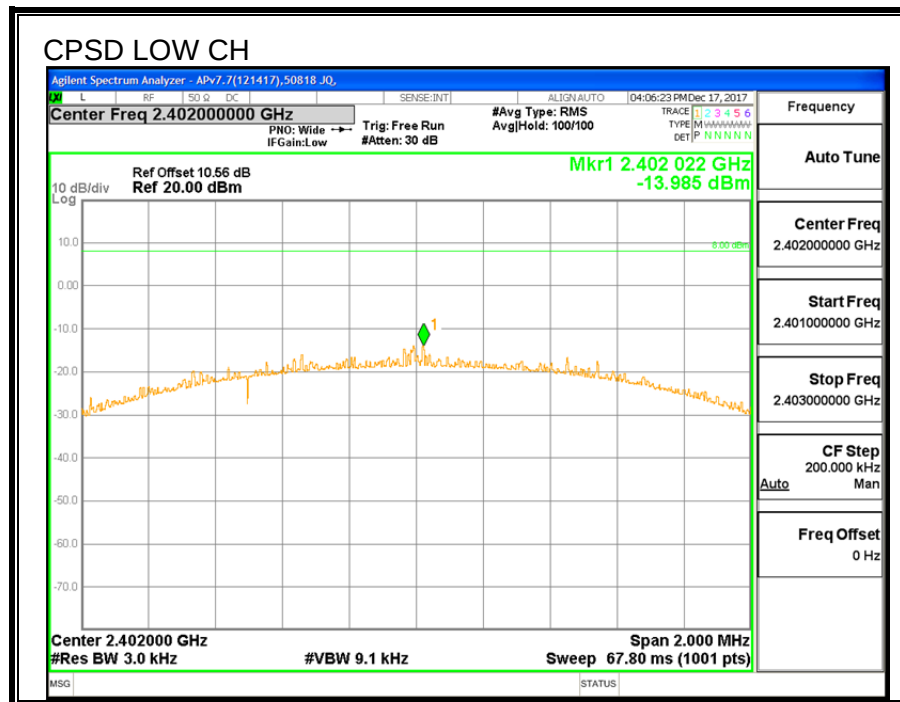
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-11.383	8	-19.383
Middle	2440	-11.114	8	-19.114
High	2480	-11.346	8	-19.346

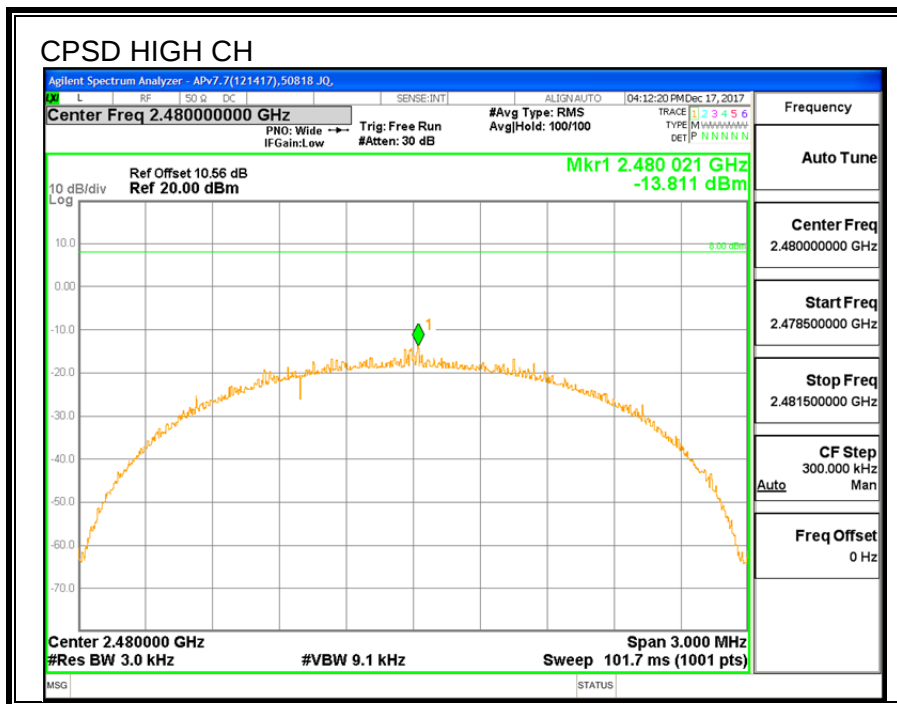
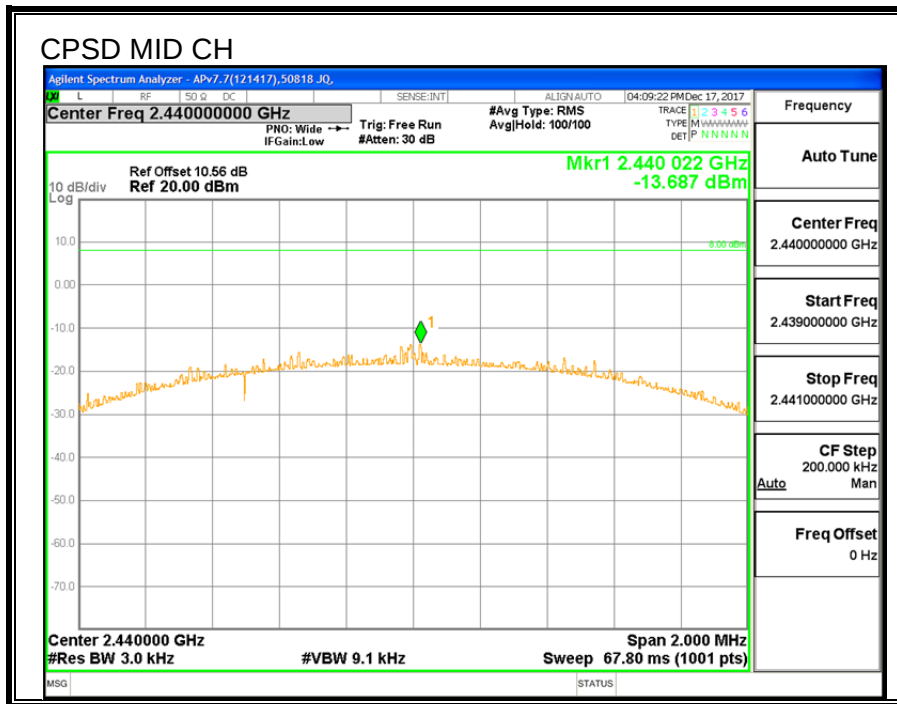




POWER SPECTRAL DENSITY (2Mbps)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-13.985	8	-21.985
Middle	2440	-13.687	8	-21.687
High	2480	-13.811	8	-21.811





8.8. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

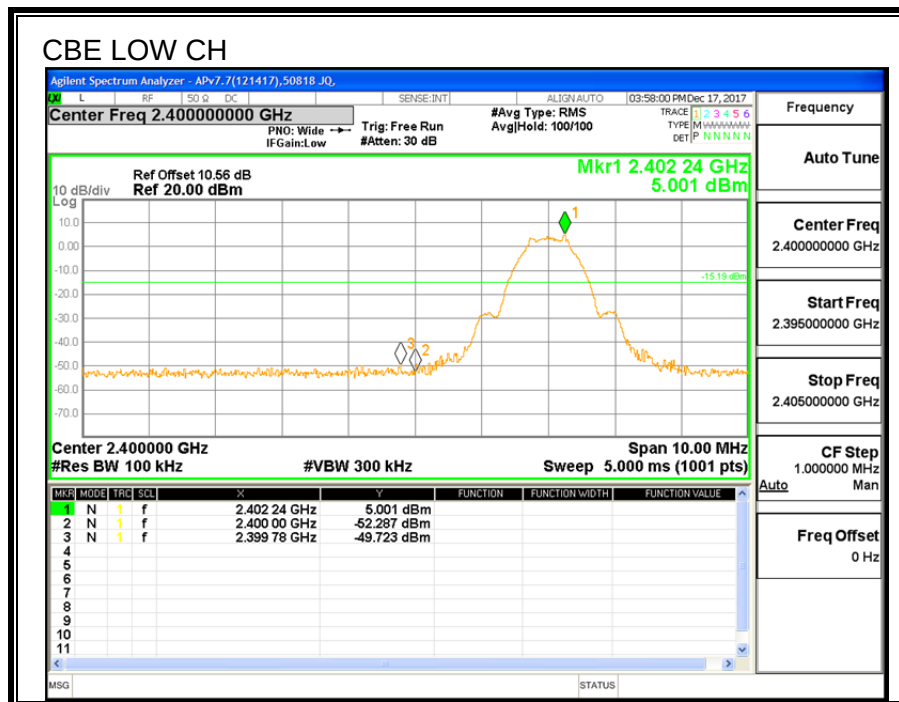
LIMITS

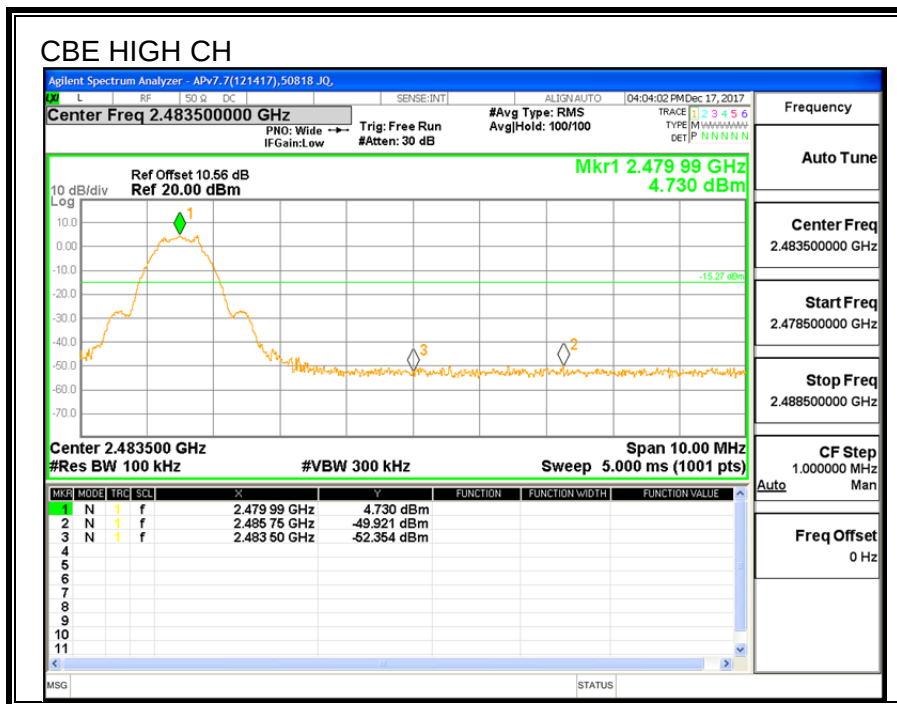
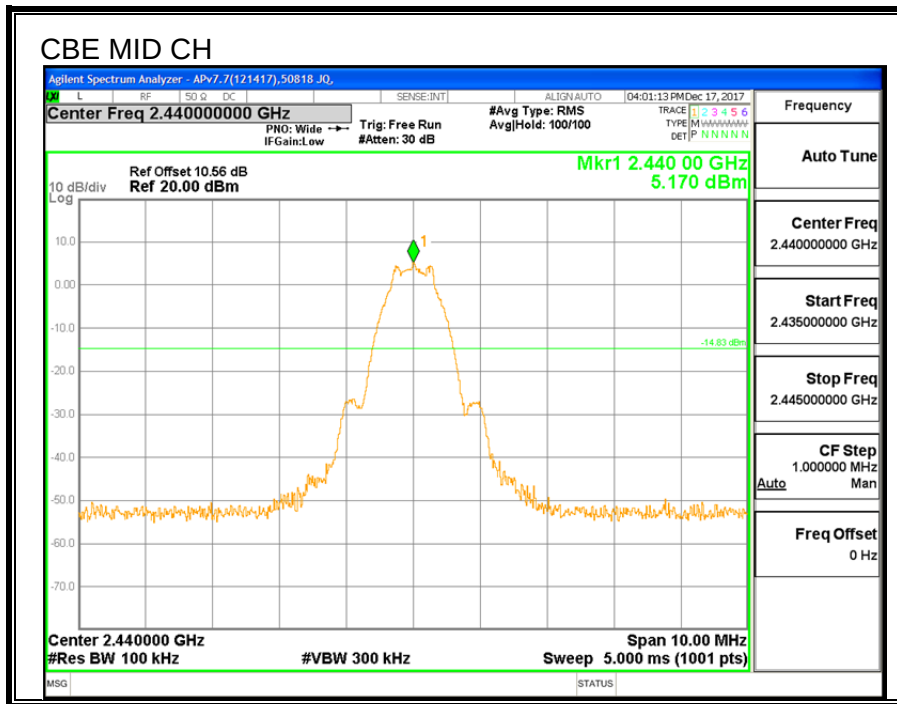
FCC §15.247 (d)

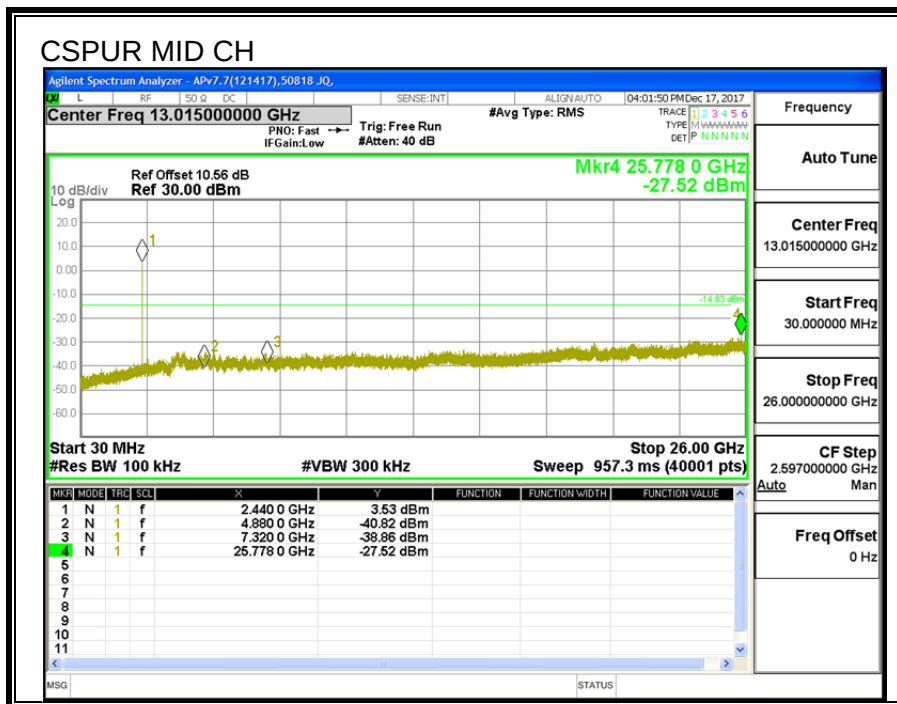
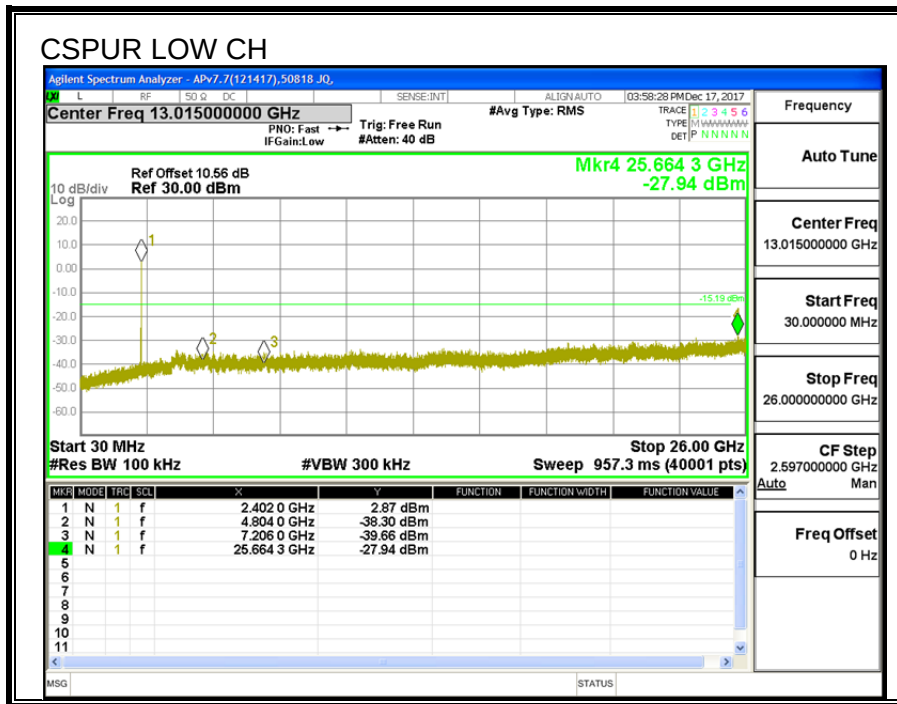
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

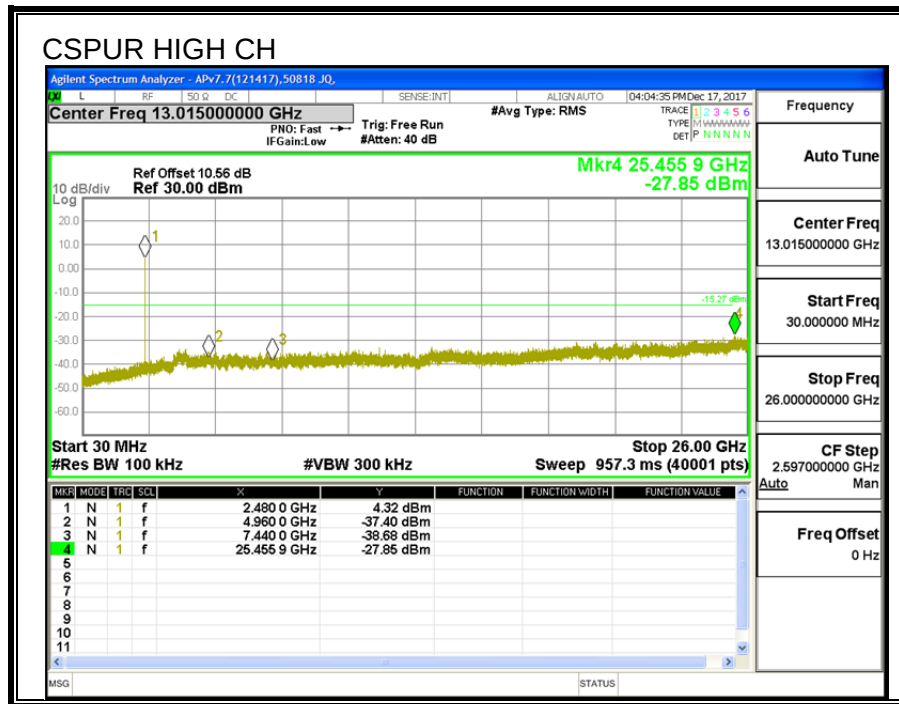
RESULTS

CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS (1Mbps)

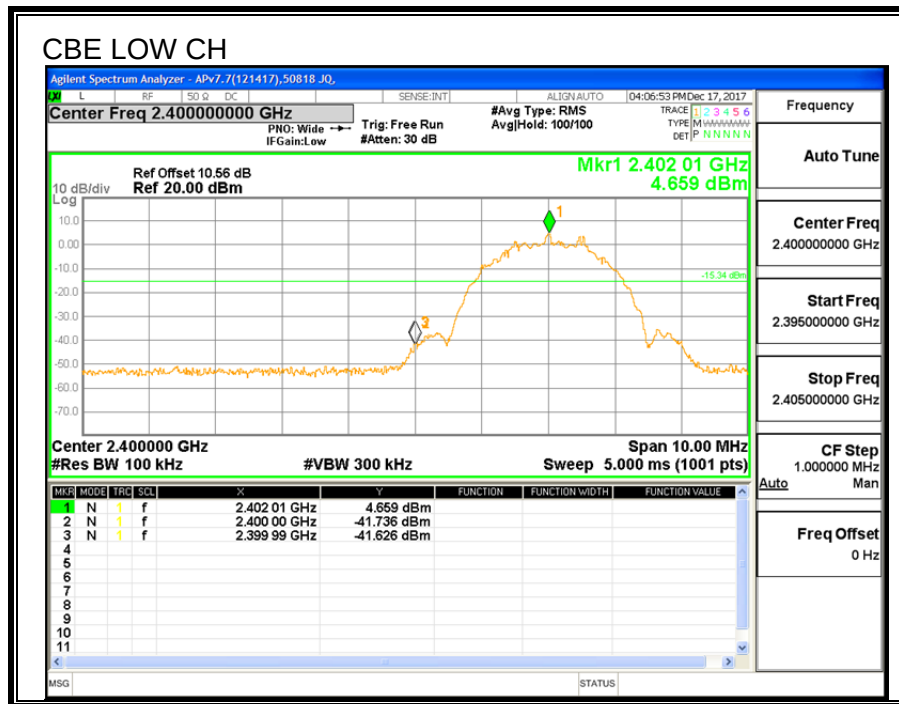


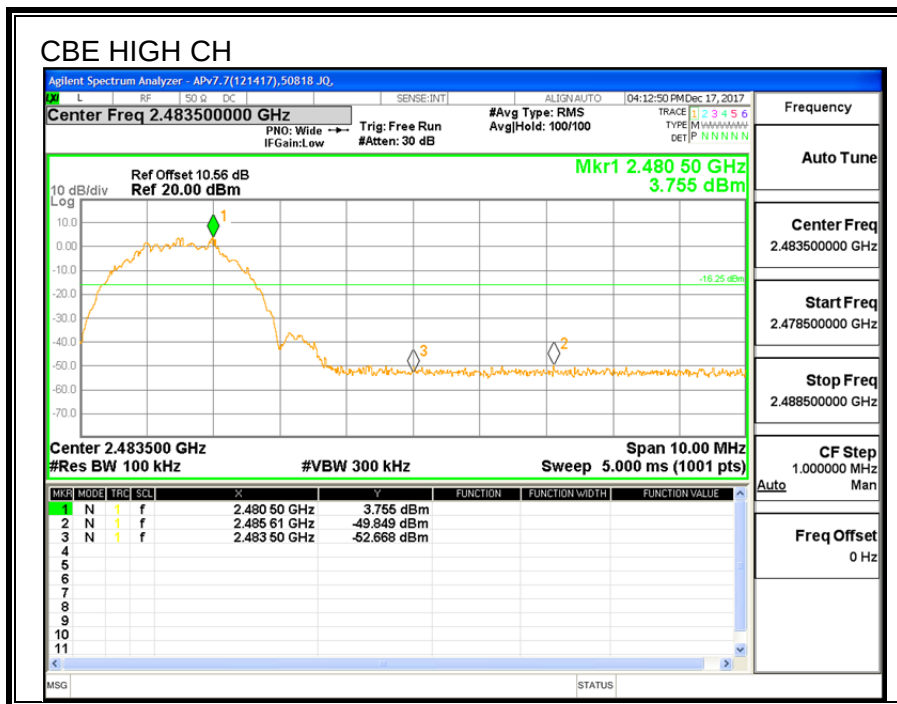
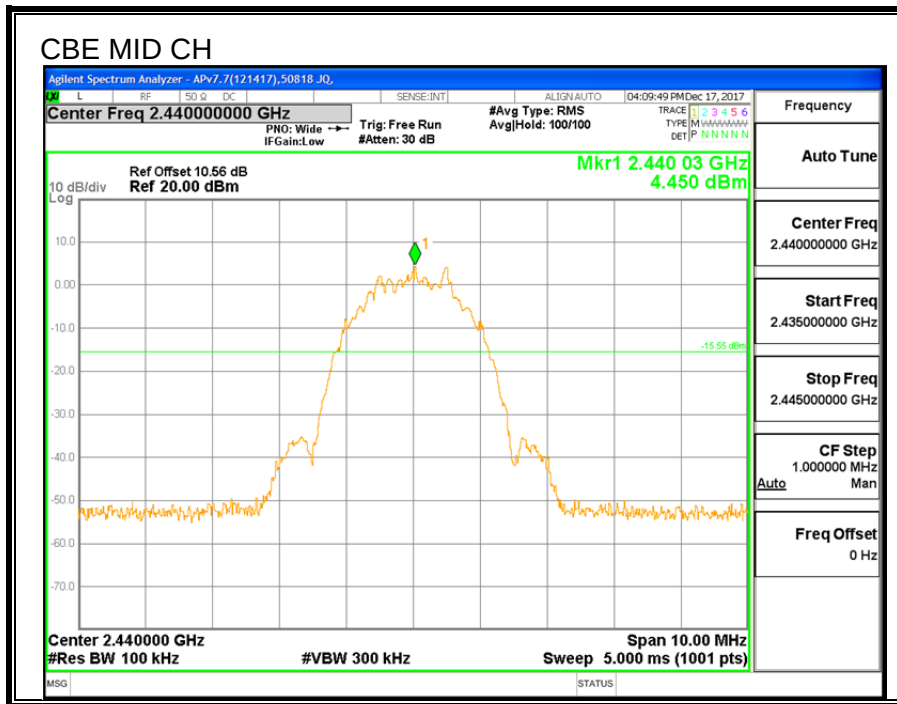


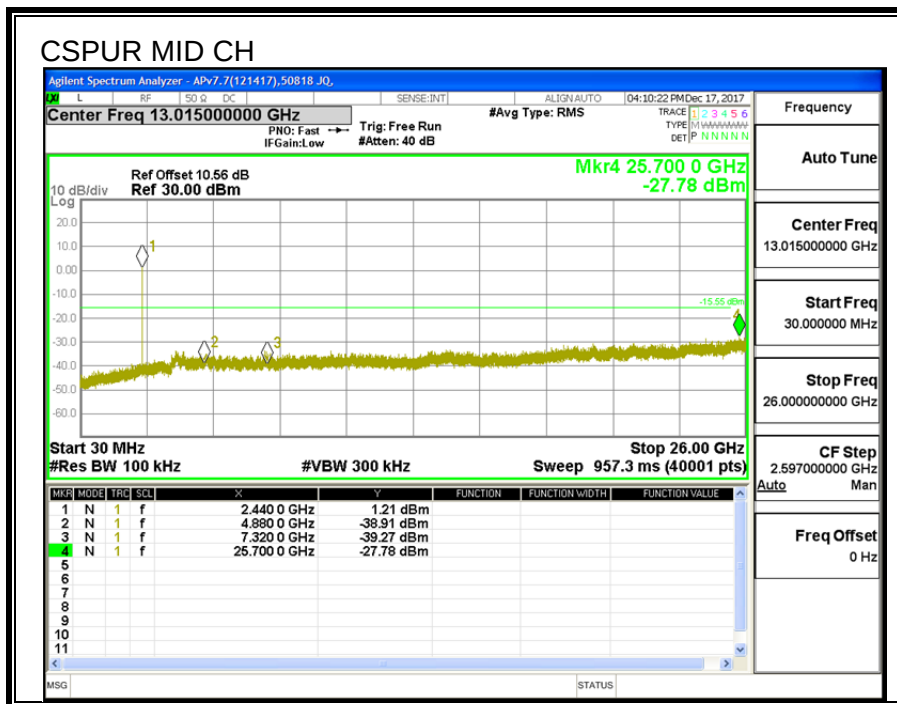
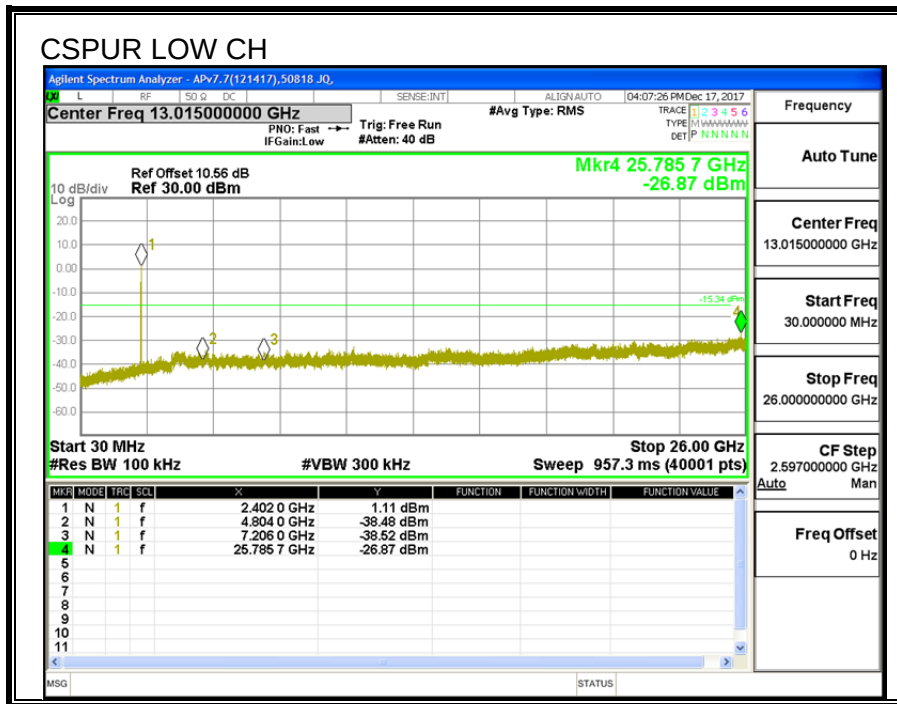


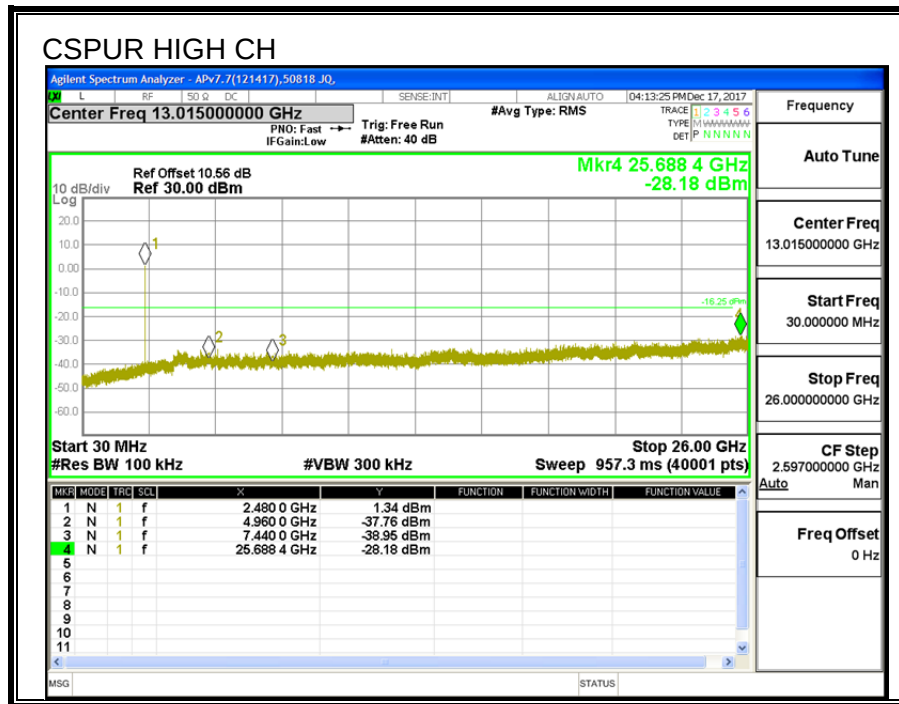


CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS (2Mbps)









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.

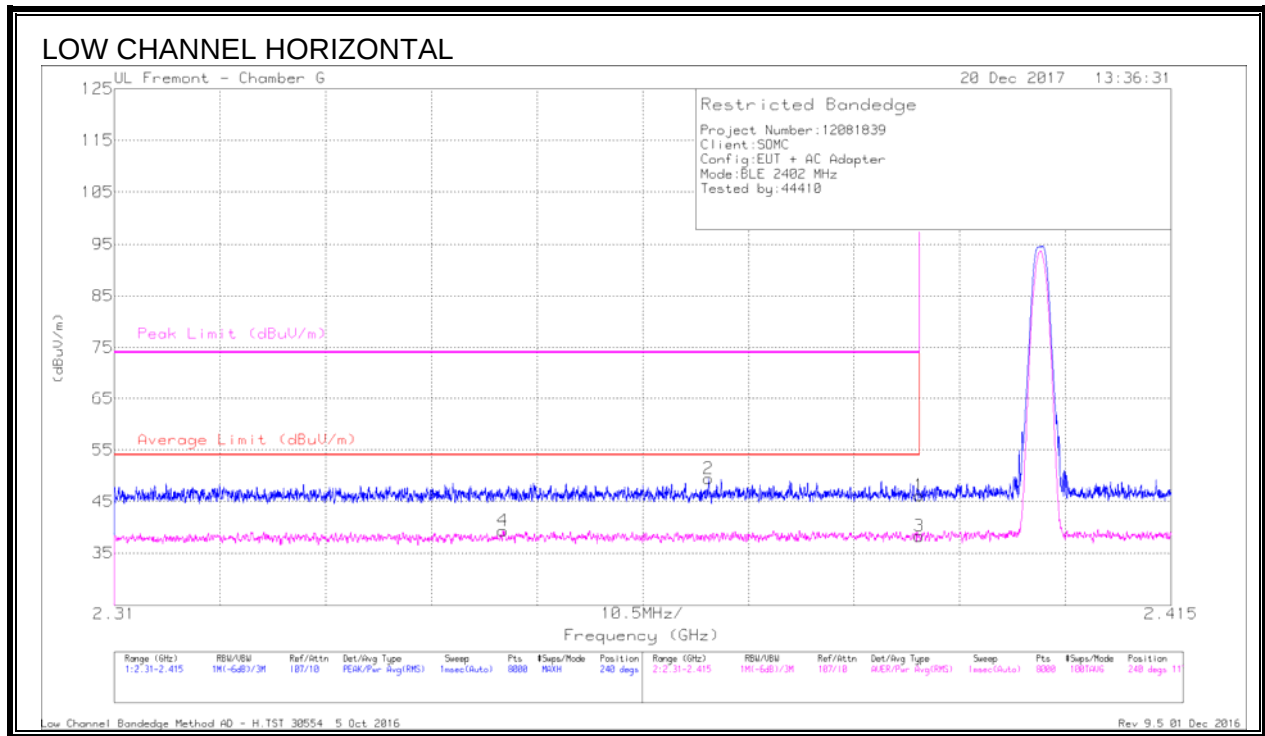
The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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.

Results

9.2. TRANSMITTER ABOVE 1 GHz 1Mbps

9.2.1. RESTRICTED BANDEDGE (LOW CHANNEL)



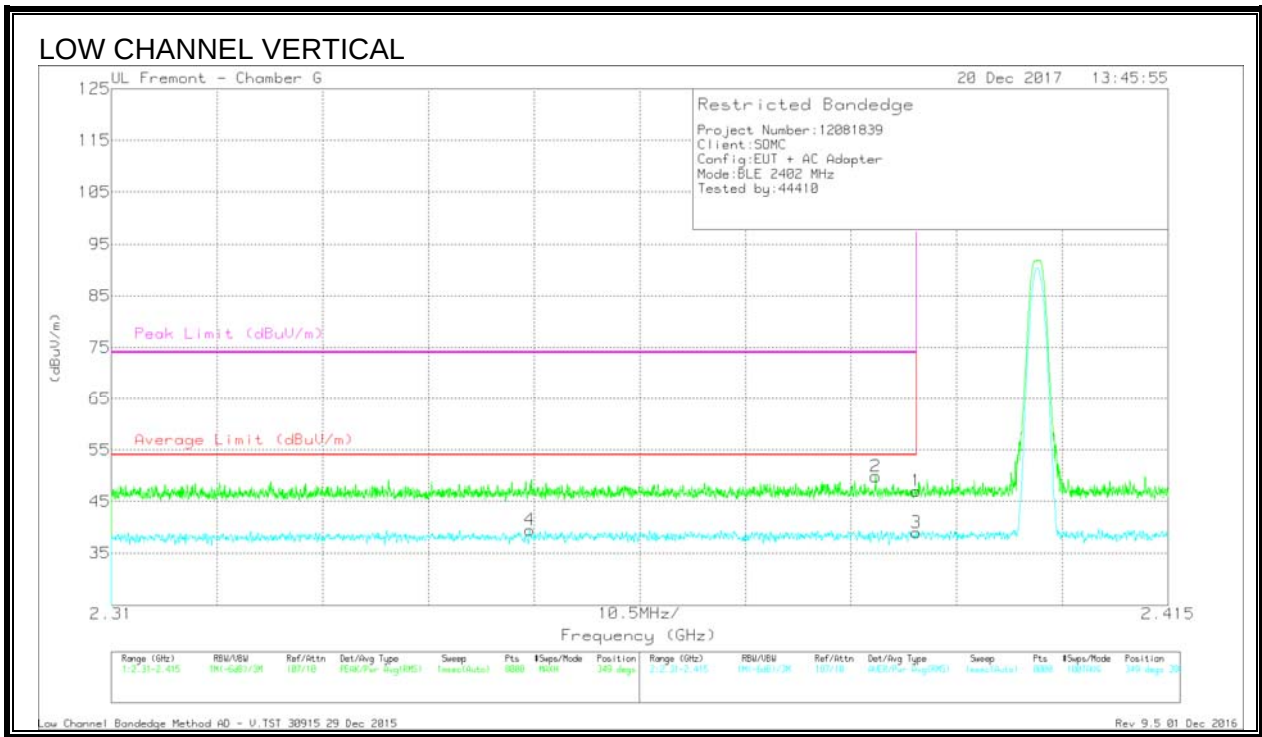
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/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	38.48	Pk	32	-24.3	0	46.18	-	-	74	-27.82	240	117	H
2	* 2.369	41.83	Pk	31.9	-24.3	0	49.43	-	-	74	-24.57	240	117	H
3	* 2.39	29.91	RMS	32	-24.3	.69	38.3	54	-15.7	-	-	240	117	H
4	* 2.349	31.18	RMS	31.8	-24.3	.69	39.37	54	-14.63	-	-	240	117	H

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

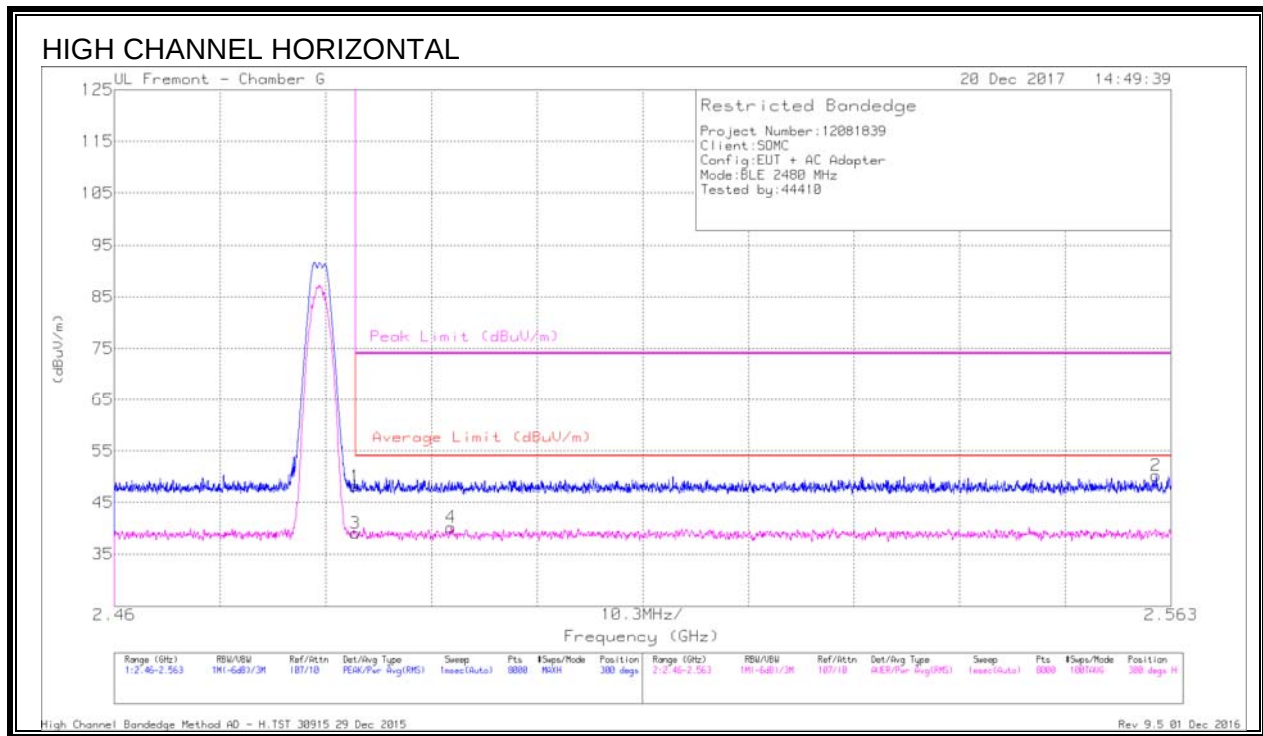
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.34	Pk	32	-24.3	0	47.04	-	-	74	-26.96	349	396	V
2	* 2.386	42.17	Pk	32	-24.3	0	49.87	-	-	74	-24.13	349	396	V
3	* 2.39	30.58	RMS	32	-24.3	.69	38.97	54	-15.03	-	-	349	396	V
4	* 2.352	31.2	RMS	31.9	-24.3	.69	39.49	54	-14.51	-	-	349	396	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection

9.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)



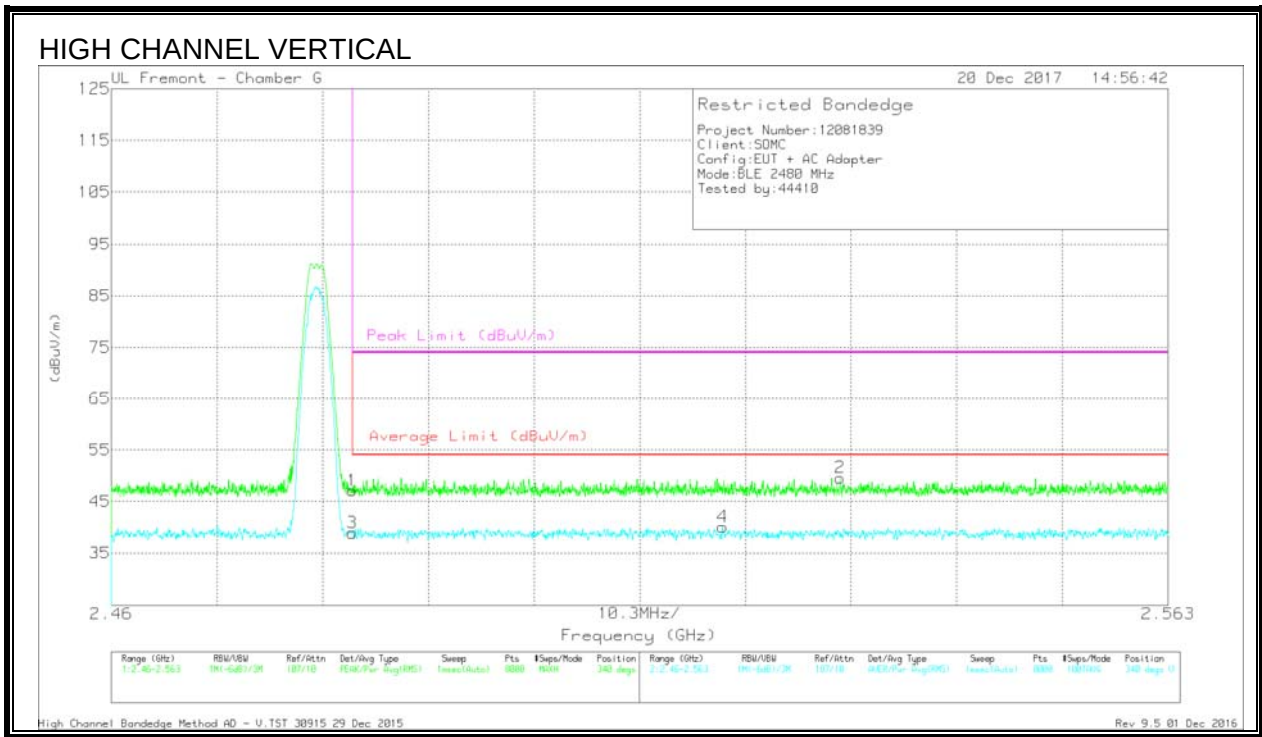
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/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	40.38	Pk	32.1	-24.3	0	48.18	-	-	74	-25.82	300	370	H
3	* 2.484	30.58	RMS	32.1	-24.3	.69	39.07	54	-14.93	-	-	300	370	H
4	* 2.493	31.69	RMS	32.1	-24.3	.69	40.18	54	-13.82	-	-	300	370	H
2	2.562	42.23	Pk	32.2	-24.2	0	50.23	-	-	74	-23.77	300	370	H

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

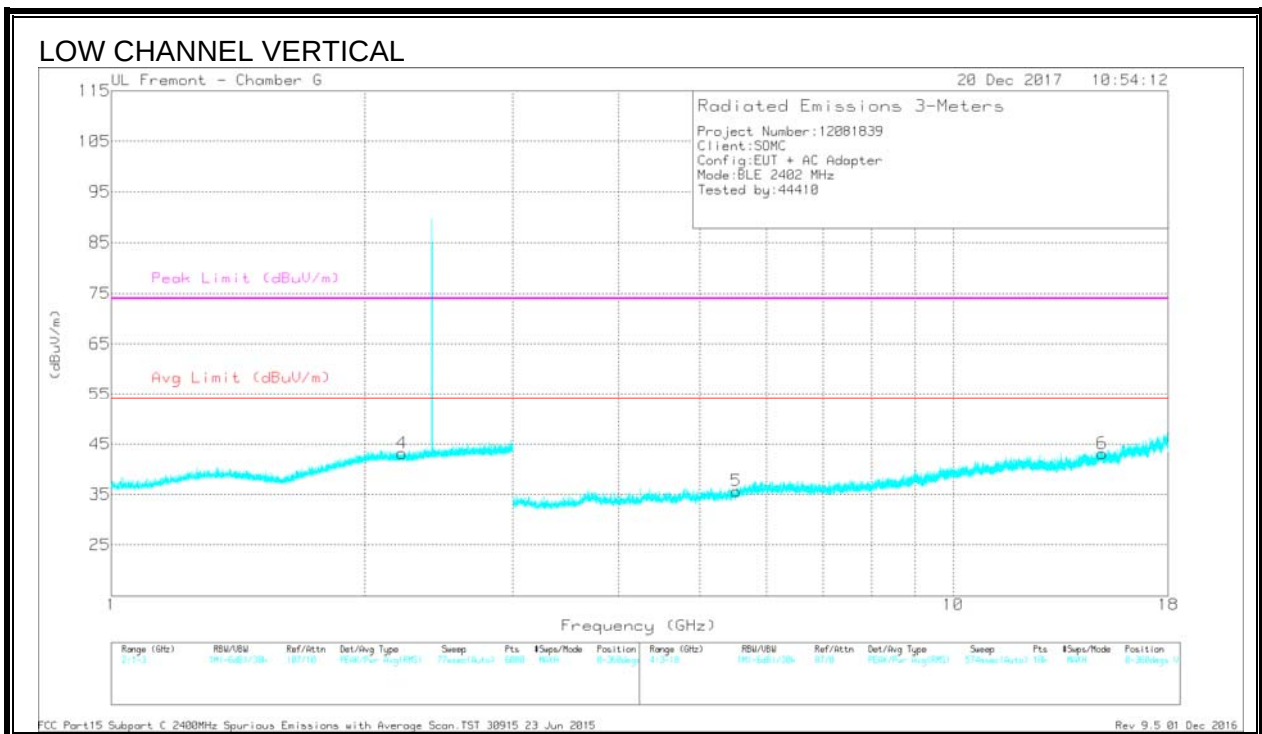
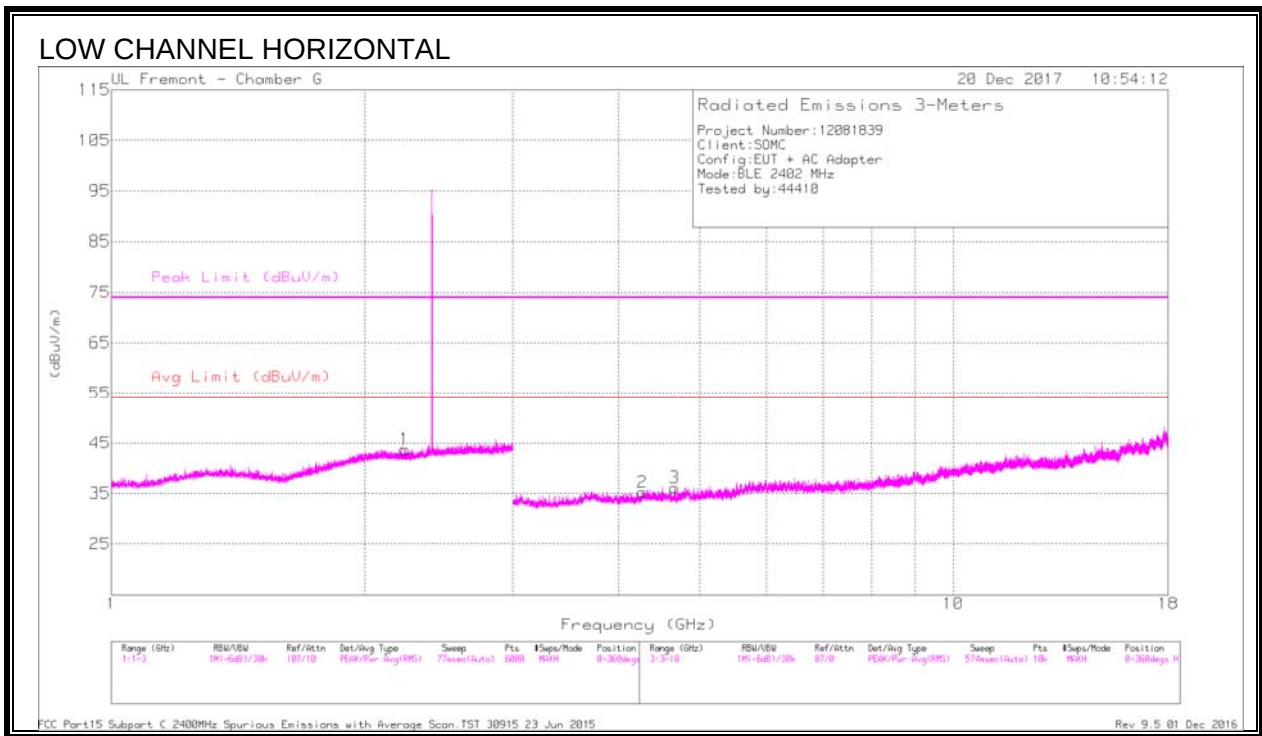
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.3	Pk	32.1	-24.3	0	47.1	-	-	74	-26.9	340	366	V
3	* 2.484	30.43	RMS	32.1	-24.3	.69	38.92	54	-15.08	-	-	340	366	V
4	2.52	31.59	RMS	32.1	-24.3	.69	40.08	54	-13.92	-	-	340	366	V
2	2.531	41.7	Pk	32.2	-24.3	0	49.6	-	-	74	-24.4	340	366	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection

9.2.3. HARMONICS AND SPURIOUS



Radiated Emissions

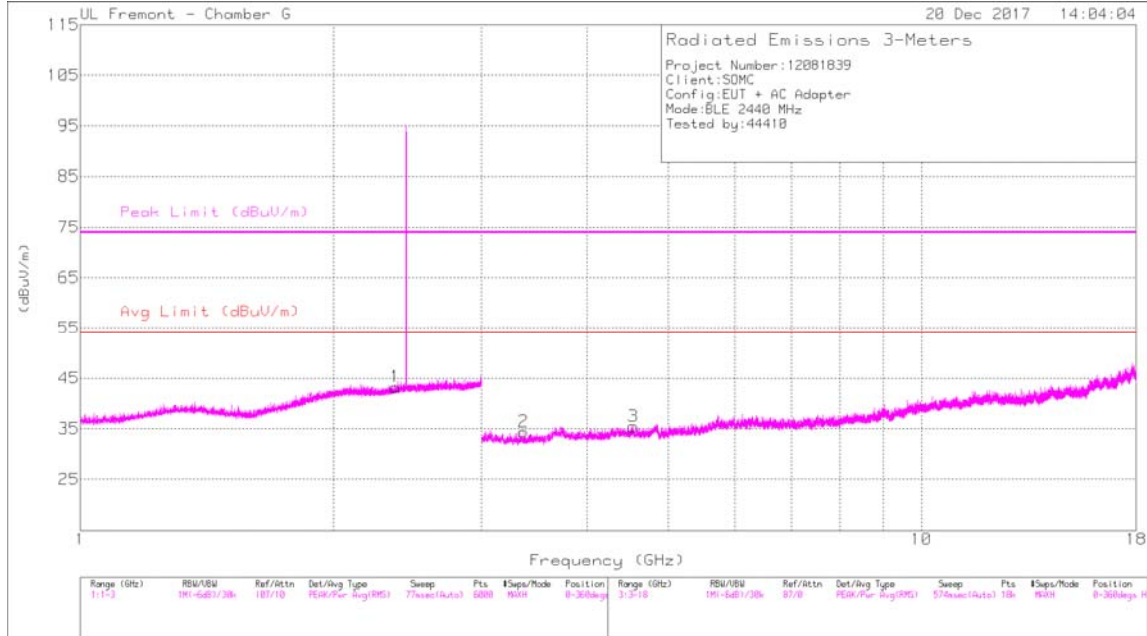
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.233	42.96	PK2	31.6	-24.5	0	50.06	-	-	74	-23.94	271	238	H
	* 2.231	30.37	MAv1	31.6	-24.5	.69	38.16	54	-15.84	-	-	271	238	H
4	* 2.212	42.4	PK2	31.6	-24.5	0	49.5	-	-	74	-24.5	102	264	V
	* 2.213	30.22	MAv1	31.6	-24.5	.69	38.01	54	-15.99	-	-	102	264	V
2	* 4.277	39.77	PK2	33.8	-31.8	0	41.77	-	-	74	-32.23	24	274	H
	* 4.278	27.9	MAv1	33.8	-31.8	.69	30.59	54	-23.41	-	-	24	274	H
3	* 4.669	39.24	PK2	34	-32.1	0	41.14	-	-	74	-32.86	355	203	H
	* 4.667	27.62	MAv1	34	-32.1	.69	30.21	54	-23.79	-	-	355	203	H
5	5.525	39.89	PK2	34.7	-32.3		42.29	-	-	-	-	162	247	V
6	15.031	35.21	PK2	40.7	-26.7		49.21	-	-	-	-	319	164	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

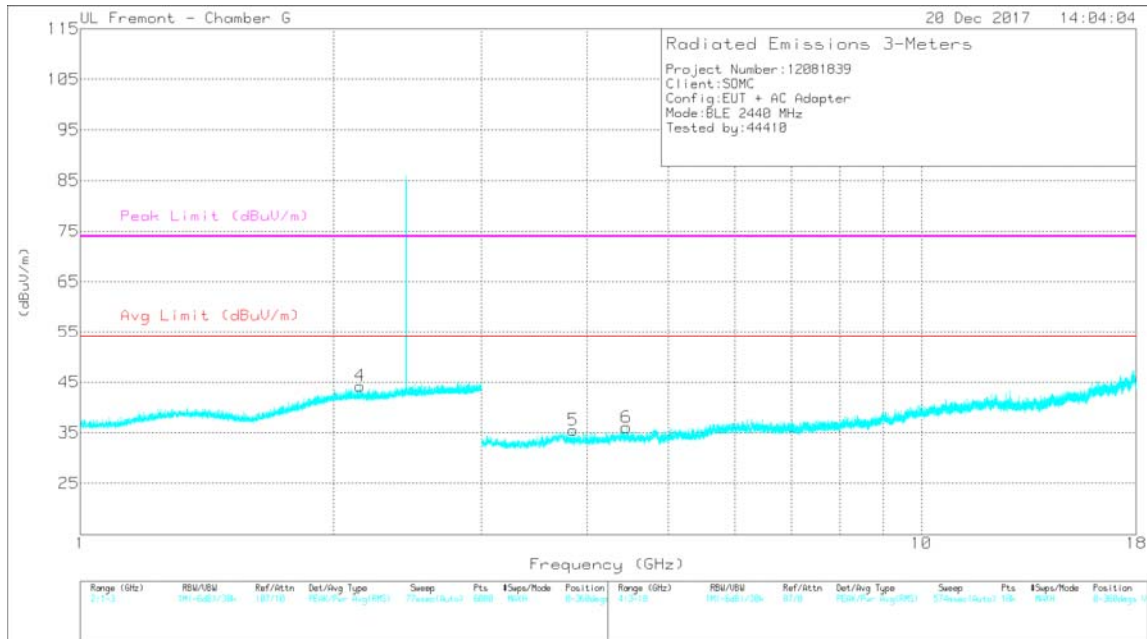
MID CHANNEL HORIZONTAL



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 23 Jun 2015

Rev 9.5 01 Dec 2016

MID CHANNEL VERTICAL



FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 23 Jun 2015

Rev 9.5 01 Dec 2016

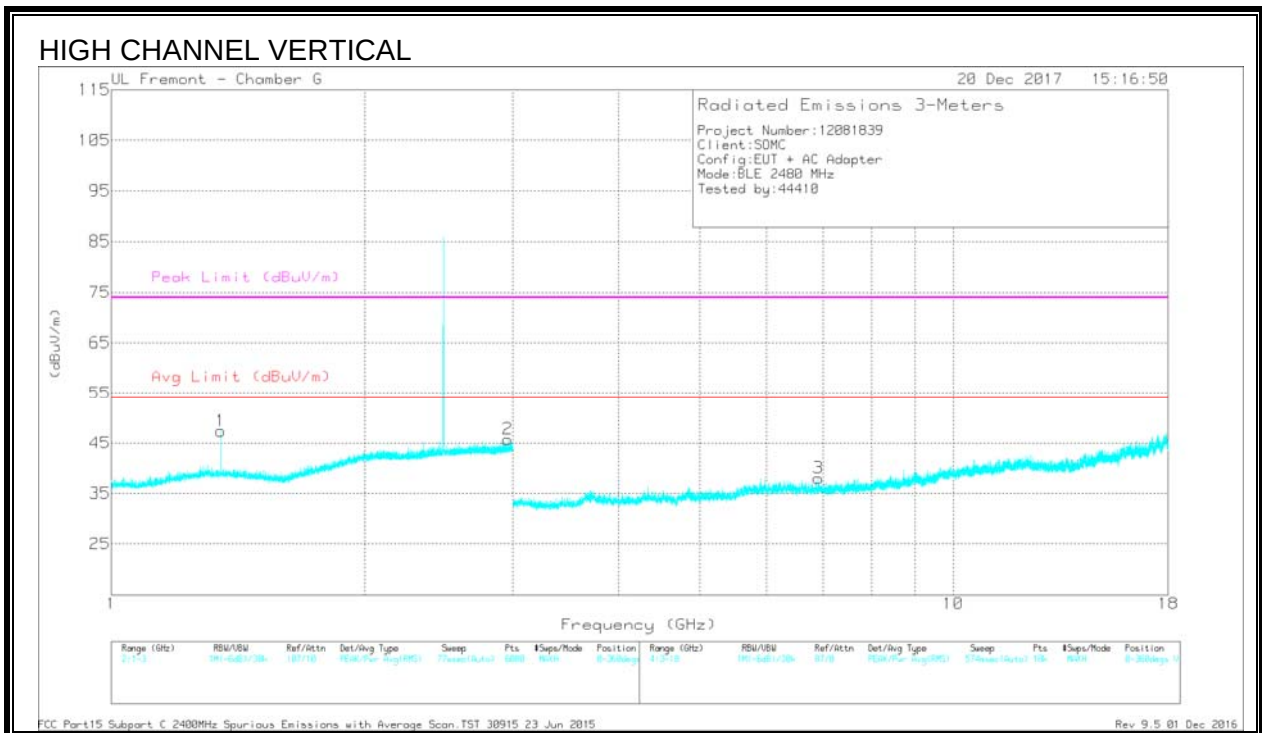
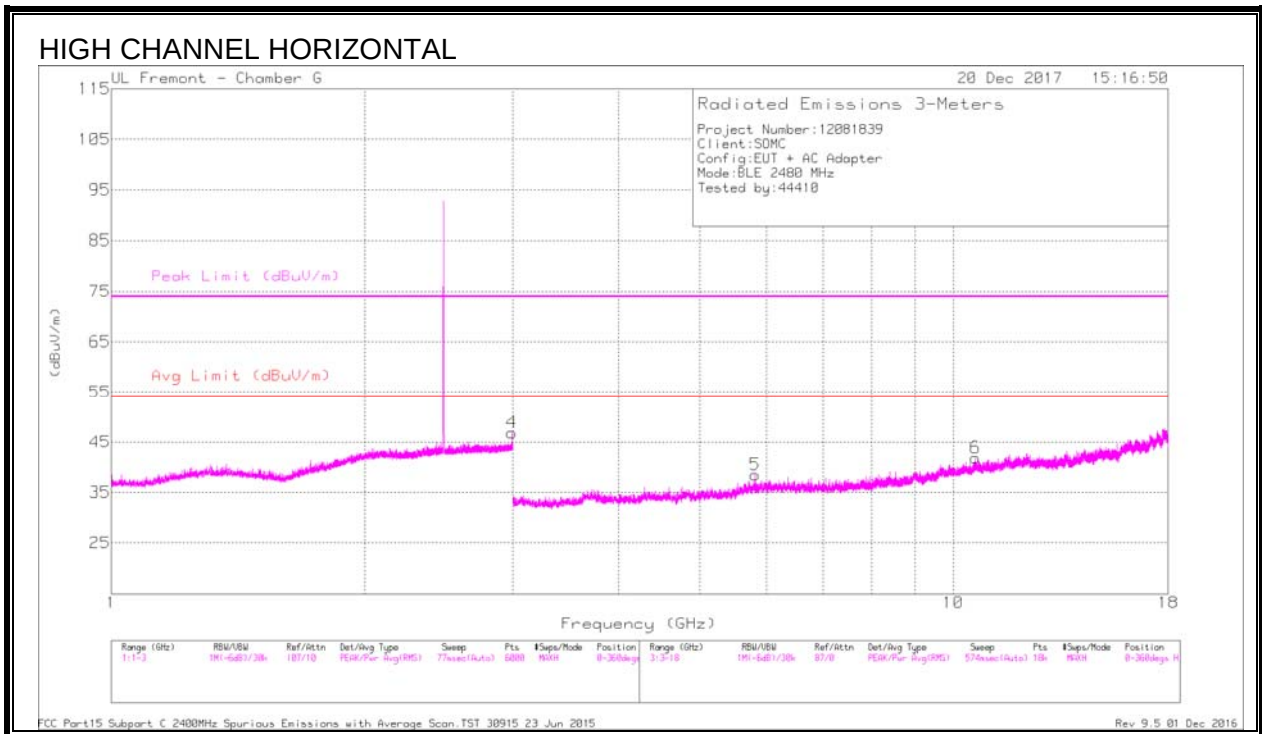
Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/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	* 2.368	42.09	PK2	31.9	-24.3	0	49.69	-	-	74	-24.31	129	130	H
	* 2.371	30.3	MAv1	31.9	-24.3	.69	38.59	54	-15.41	-	-	129	130	H
3	* 4.544	39.71	PK2	34.2	-32.3	0	41.61	-	-	74	-32.39	321	368	H
	* 4.543	27.69	MAv1	34.2	-32.3	.69	30.28	54	-23.72	-	-	321	368	H
5	* 3.855	40.98	PK2	33.5	-32.8	0	41.68	-	-	74	-32.32	38	197	V
	* 3.855	28.59	MAv1	33.5	-32.8	.69	29.98	54	-24.02	-	-	38	197	V
4	2.149	42.65	PK2	31.7	-24.5	0	49.85	-	-	-	-	235	271	V
2	3.364	40.43	PK2	32.8	-32.7	0	40.53	-	-	-	-	278	400	H
6	4.461	39.59	PK2	34.1	-32.5	0	41.19	-	-	-	-	283	360	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/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	* 1.349	42.63	PK2	28.8	-25.5	0	45.93	-	-	74	-28.07	81	278	V
	* 1.35	30.6	MAv1	28.8	-25.5	.69	34.59	54	-19.41	-	-	81	278	V
6	* 10.634	36.29	PK2	37.9	-26	0	48.19	-	-	74	-25.81	103	264	H
	* 10.635	23.75	MAv1	37.9	-26.1	.69	36.24	54	-17.76	-	-	103	264	H
2	2.959	42.15	PK2	32.6	-23.8	0	50.95	-	-	-	-	121	137	V
4	2.99	42.19	PK2	32.6	-23.8	0	50.99	-	-	-	-	331	239	H
5	5.816	39.06	PK2	35.3	-31.8	0	42.56	-	-	-	-	178	152	H
3	6.915	38.69	PK2	35.4	-30.6	0	43.49	-	-	-	-	297	211	V

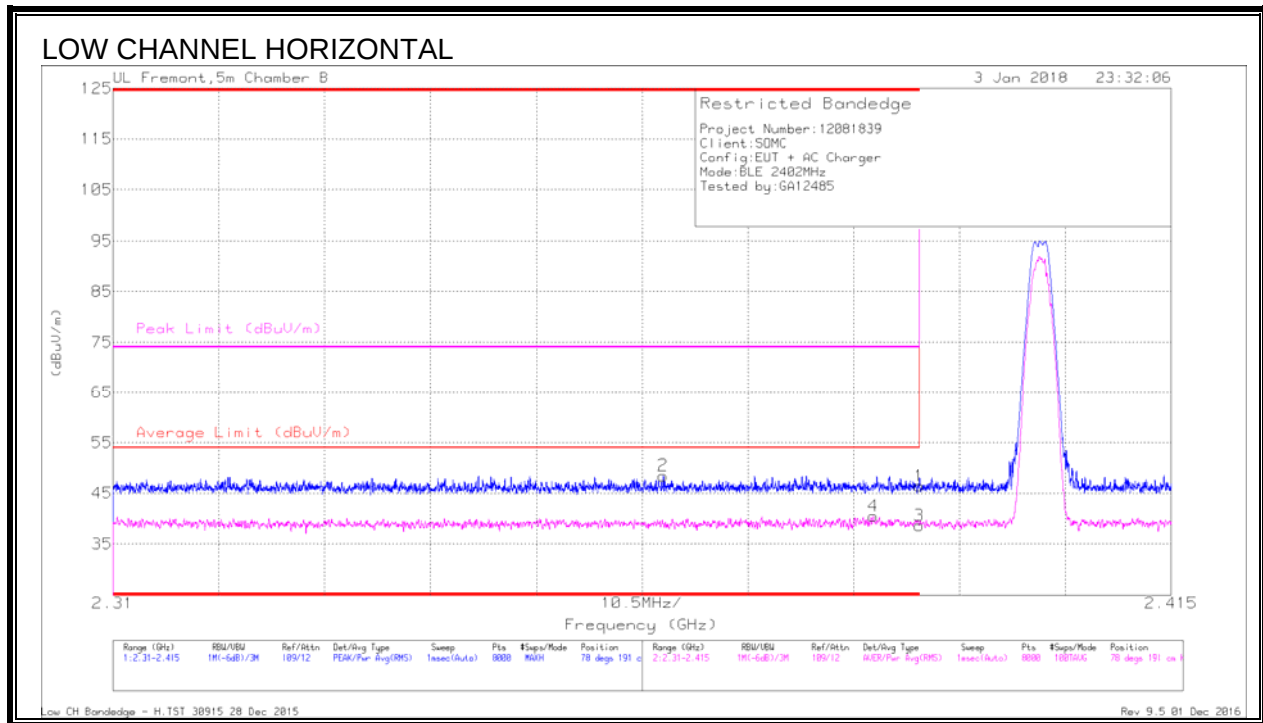
* - indicates frequency in CFR47 Pt 15 - Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. TRANSMITTER ABOVE 1 GHz 2Mbps

9.3.1. RESTRICTED BANDEDGE (LOW CHANNEL)



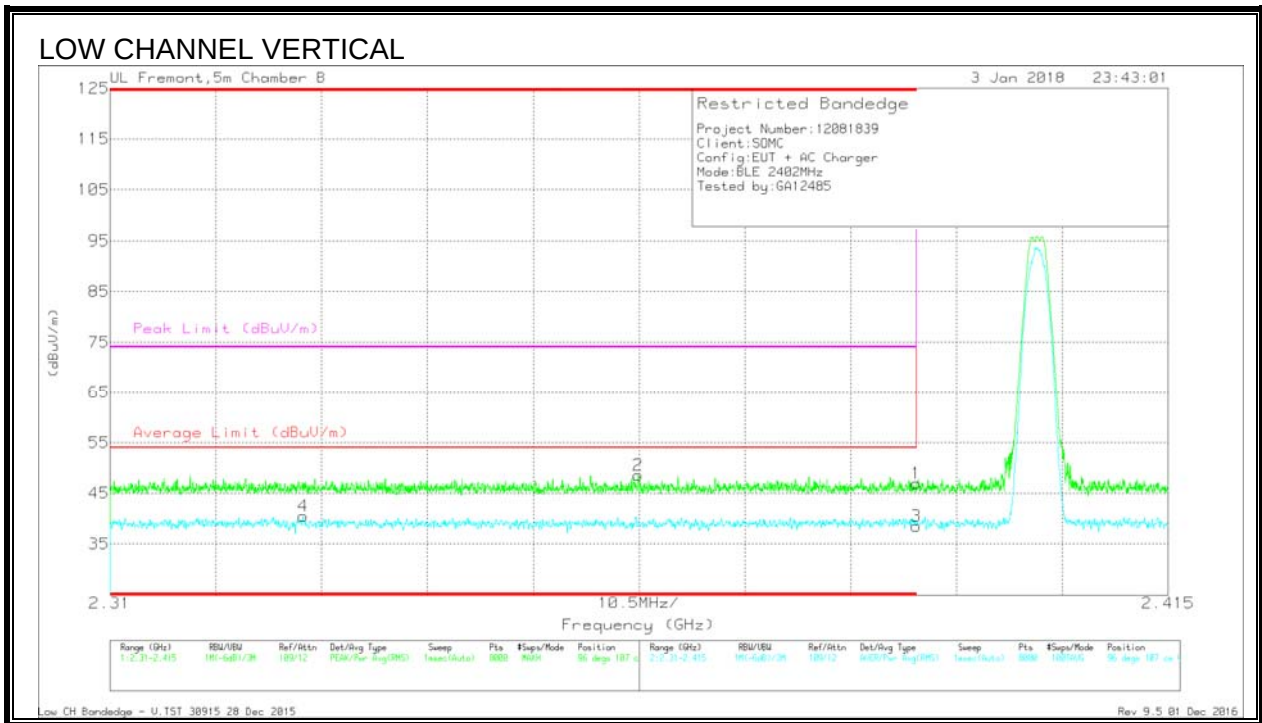
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/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
1	* 2.39	35.75	Pk	32	-21.3	0	46.45	-	-	74	-27.55	78	191	H
2	* 2.365	37.89	Pk	31.9	-21.3	0	48.49	-	-	74	-25.51	78	191	H
3	* 2.39	25.55	RMS	32	-21.3	2.42	38.67	54	-15.33	-	-	78	191	H
4	* 2.385	27.38	RMS	32	-21.3	2.42	40.5	54	-13.5	-	-	78	191	H

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

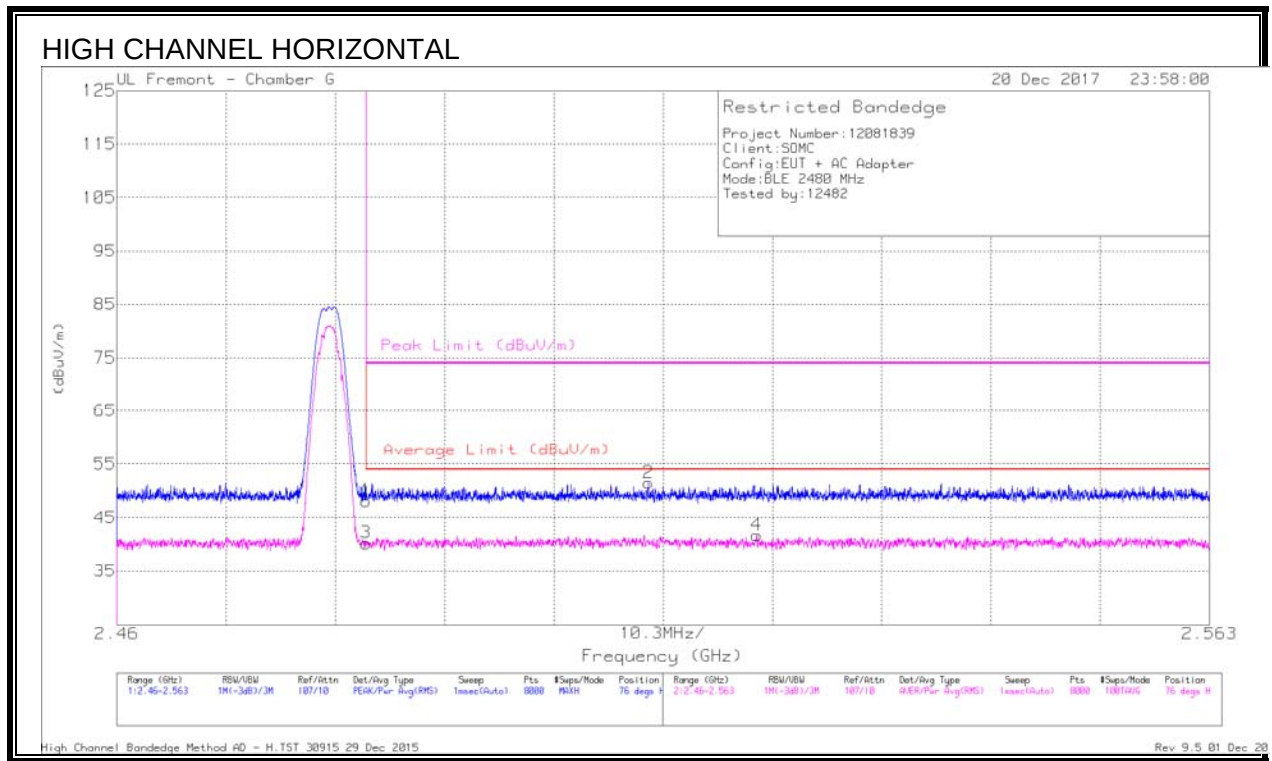
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.22	Pk	32	-21.3	0	46.92	-	-	74	-27.08	96	107	V
2	* 2.362	38.02	Pk	31.9	-21.4	0	48.52	-	-	74	-25.48	96	107	V
3	* 2.39	25.4	RMS	32	-21.3	2.42	38.52	54	-15.48	-	-	96	107	V
4	* 2.329	27.44	RMS	31.9	-21.3	2.42	40.46	54	-13.54	-	-	96	107	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection

9.3.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)



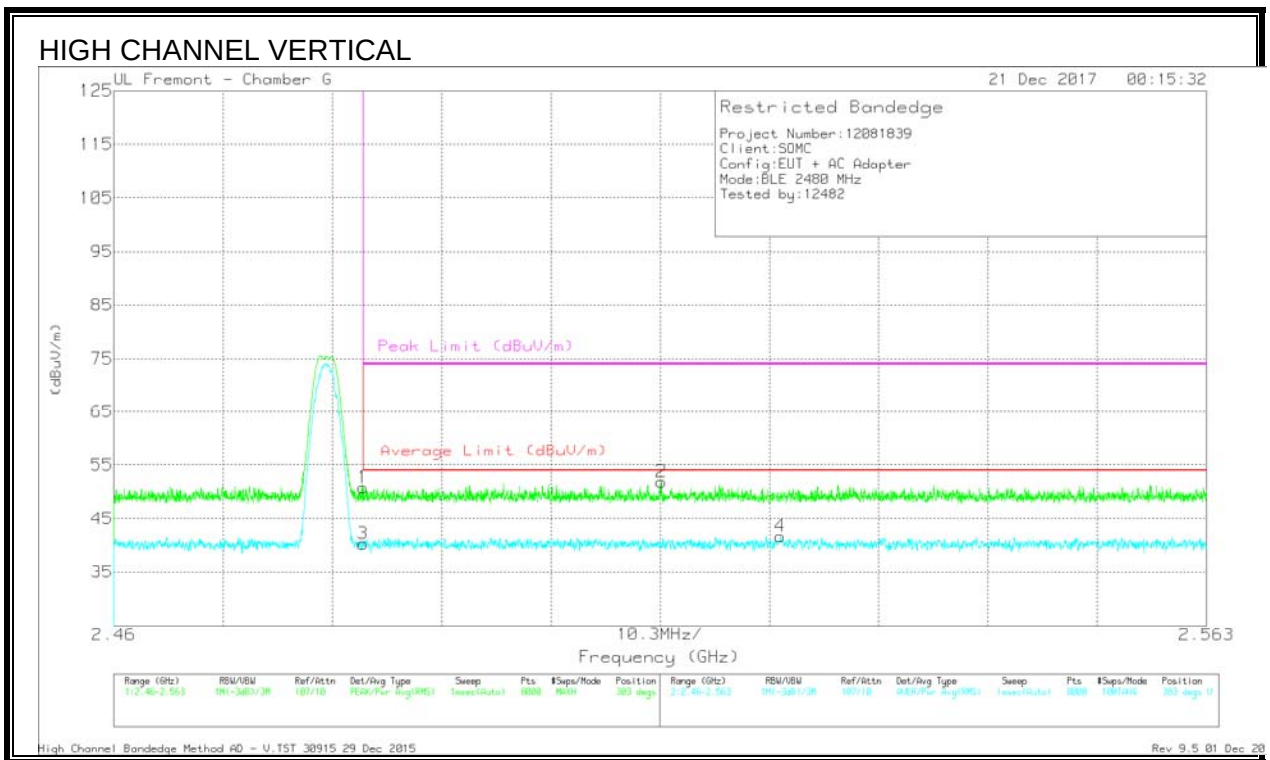
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/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	40.29	Pk	32.1	-24.3	0	48.09	-	-	74	-25.91	76	384	H
3	* 2.484	31.74	RMS	32.1	-24.3	2.42	41.96	54	-12.04	-	-	76	384	H
2	2.51	43.68	Pk	32.1	-24.3	0	51.48	-	-	74	-22.52	76	384	H
4	2.52	33.19	RMS	32.1	-24.3	2.42	43.41	54	-10.59	-	-	76	384	H

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection



Trace Markers

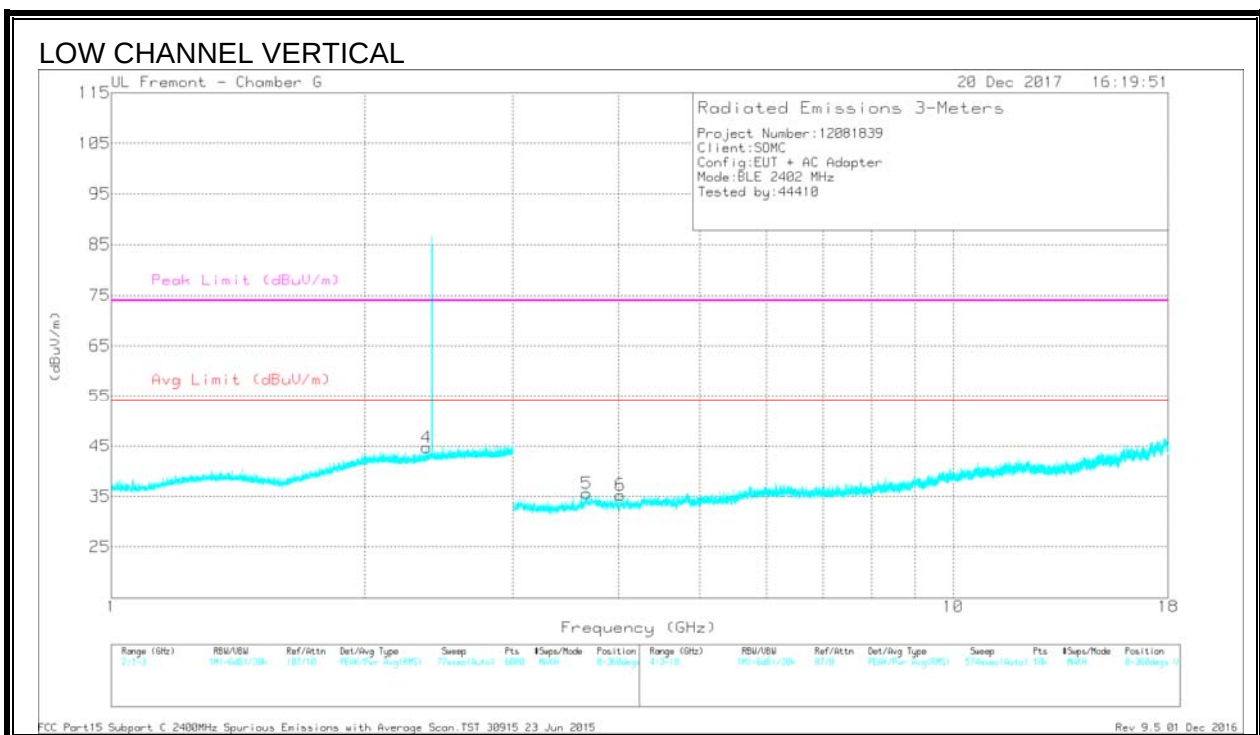
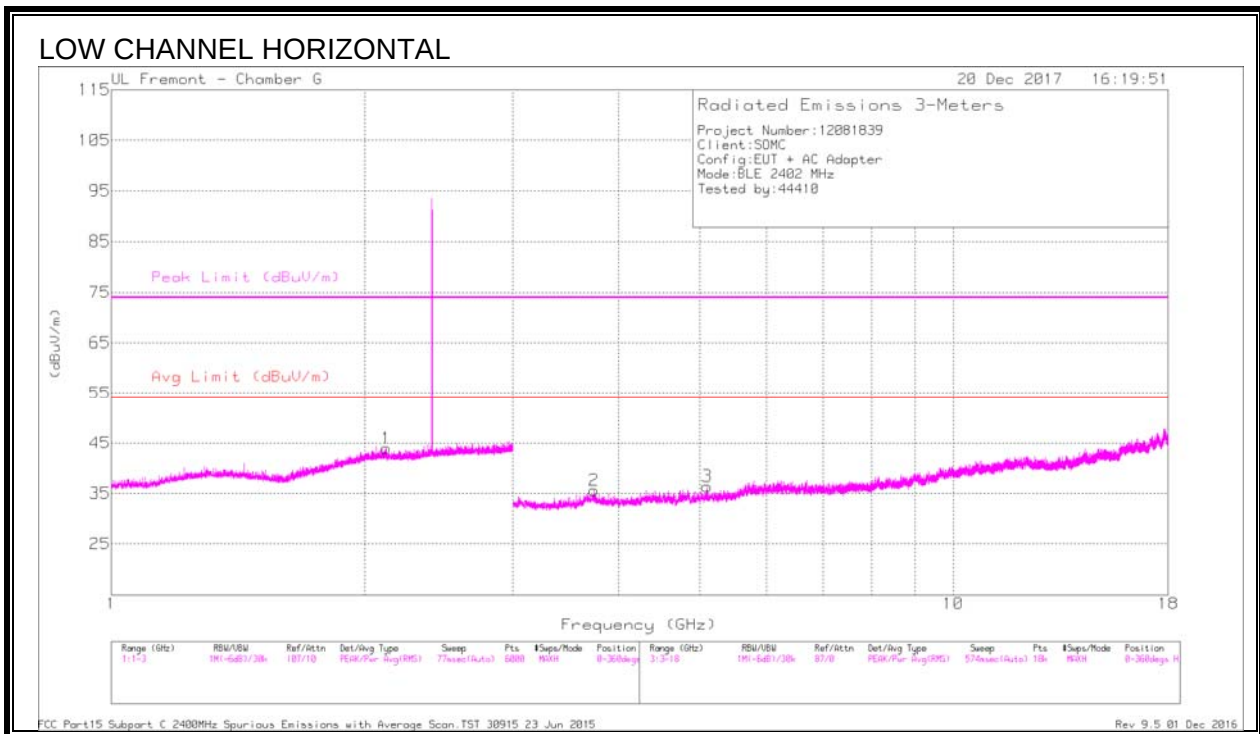
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43	Pk	32.1	-24.3	0	50.8	-	-	74	-23.2	303	383	V
3	* 2.484	31.8	RMS	32.1	-24.3	2.42	42.02	54	-11.98	-	-	303	383	V
2	2.512	44.03	Pk	32.1	-24.3	0	51.83	-	-	74	-22.17	303	383	V
4	2.523	33.16	RMS	32.1	-24.3	2.42	43.38	54	-10.62	-	-	303	383	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

RMS - RMS detection

9.3.3. HARMONICS AND SPURIOUS



Radiated Emissions

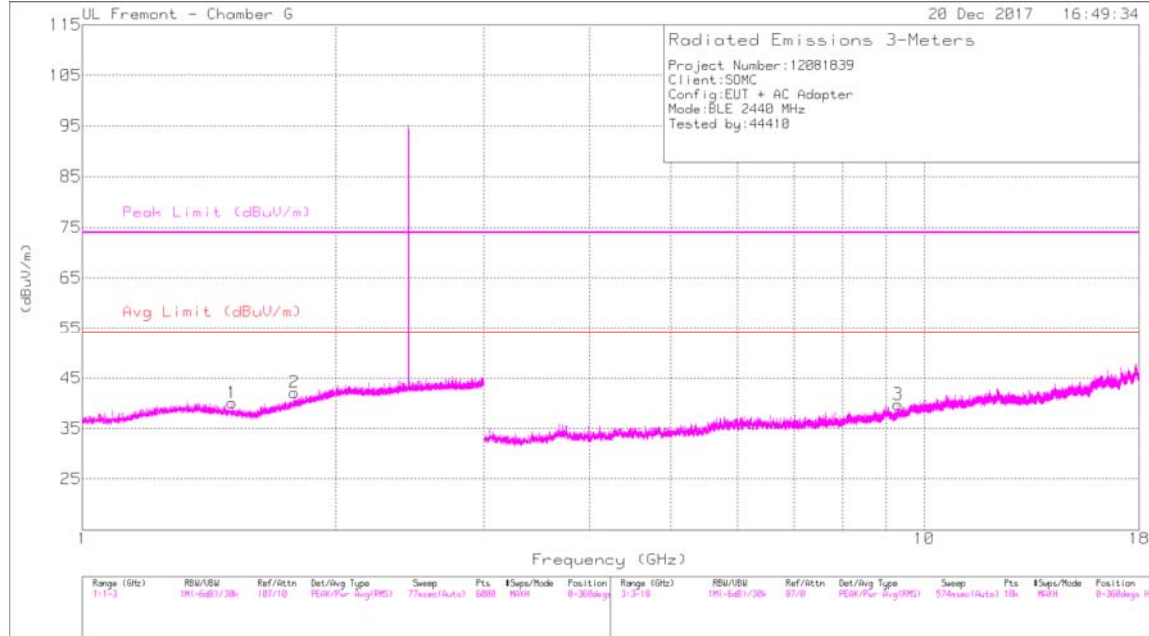
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.369	42.23	PK2	31.9	-24.3	0	49.83	-	-	74	-24.17	260	390	V
	* 2.369	30.36	MAv1	31.9	-24.3	2.42	40.38	54	-13.62	-	-	260	390	V
2	* 3.742	39.19	PK2	33.3	-31.2	0	41.29	-	-	74	-32.71	260	101	H
	* 3.742	28.11	MAv1	33.3	-31.2	2.42	32.63	54	-21.37	-	-	260	101	H
3	* 5.099	39.13	PK2	34.2	-31.7	0	41.63	-	-	74	-32.37	55	179	H
	* 5.098	27.53	MAv1	34.2	-31.7	2.42	32.45	54	-21.55	-	-	55	179	H
5	* 3.671	39.38	PK2	33.3	-31.4	0	41.28	-	-	74	-32.72	309	240	V
	* 3.669	27.71	MAv1	33.3	-31.4	2.42	32.03	54	-21.97	-	-	309	240	V
6	* 4.027	38.87	PK2	33.6	-31.9	0	40.57	-	-	74	-33.43	261	258	V
	* 4.027	27.21	MAv1	33.6	-31.9	2.42	31.33	54	-22.67	-	-	261	258	V
1	2.122	42.87	PK2	31.8	-24.5	0	50.17	-	-	-	-	179	374	H

* - indicates frequency in CFR47 Pt 15 - Restricted Band

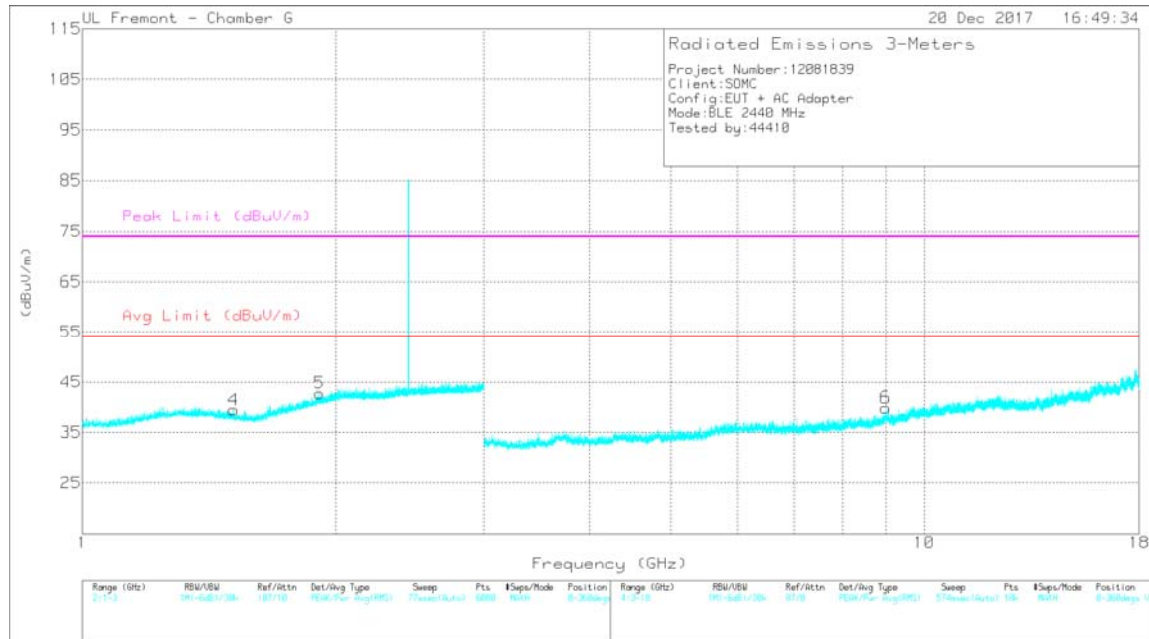
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Radiated Emissions

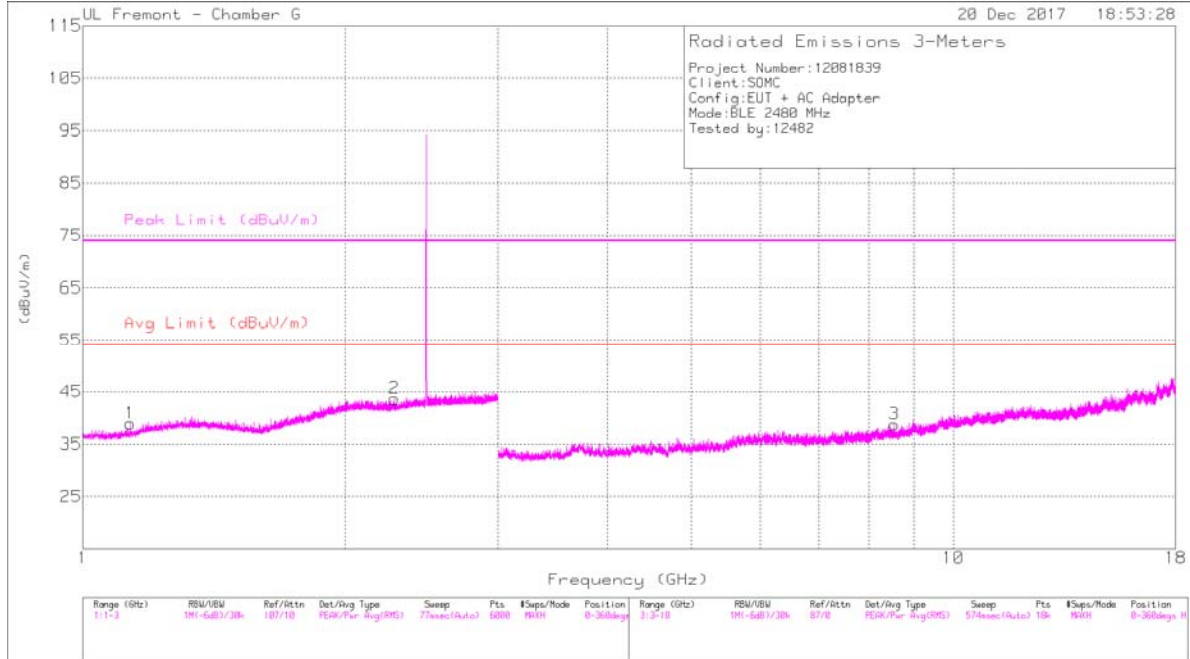
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.507	42.21	PK2	28	-25.1	0	45.11	-	-	74	-28.89	139	352	H
	* 1.504	30.52	MAv1	28	-25.1	2.42	35.84	54	-18.16	-	-	139	352	H
4	* 1.513	42.57	PK2	27.9	-25.1	0	45.37	-	-	74	-28.63	48	172	V
	* 1.514	30.5	MAv1	27.9	-25.1	2.42	35.72	54	-18.28	-	-	48	172	V
3	* 9.305	36.09	PK2	36.7	-28	0	44.79	-	-	74	-29.21	140	333	H
	* 9.306	24.8	MAv1	36.7	-28	2.42	35.92	54	-18.08	-	-	140	333	H
6	8.898	36.77	PK2	36.5	-29.4	0	43.87	-	-	-	-	332	242	V
2	1.786	42.9	PK2	29.6	-24.9	0	47.6	-	-	-	-	343	397	H
5	1.913	42.5	PK2	31	-24.9	0	48.6	-	-	-	-	6	245	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

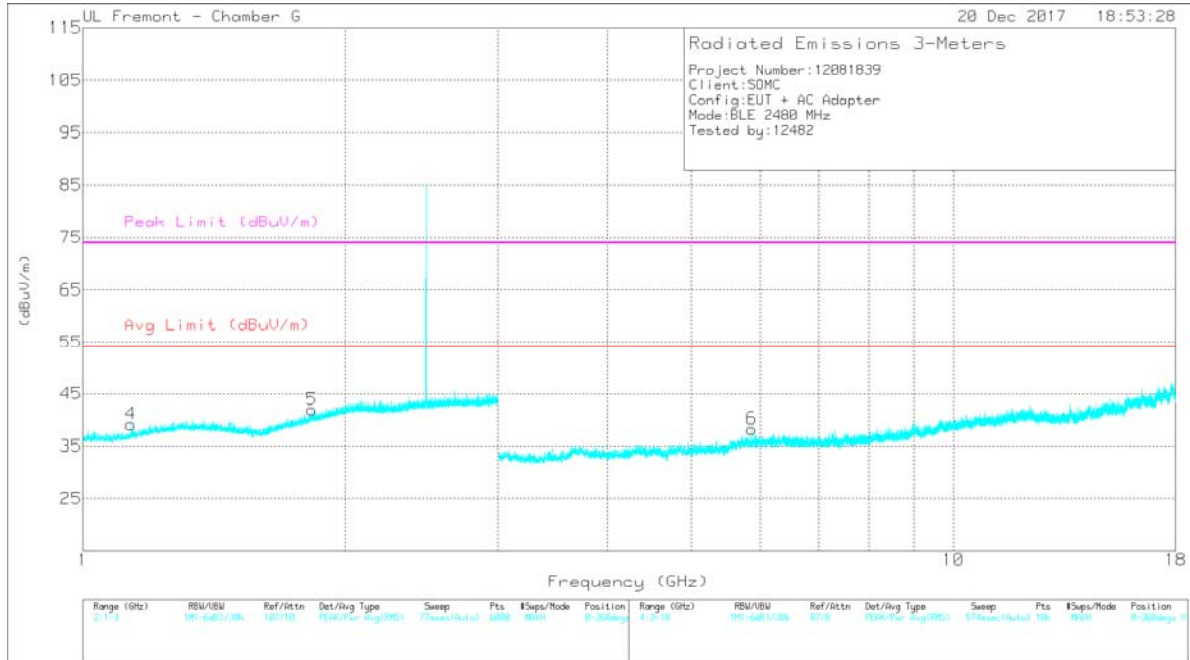
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/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	* 1.134	42.76	PK2	27.2	-25.5	0	44.46	-	-	74	-29.54	307	339	H
	* 1.134	30.57	MAv1	27.2	-25.5	2.42	34.69	54	-19.31	-	-	307	339	H
2	* 2.28	42.42	PK2	31.6	-24.4	0	49.62	-	-	74	-24.38	350	103	H
	* 2.278	29.88	MAv1	31.6	-24.4	2.42	39.5	54	-14.5	-	-	350	103	H
4	* 1.136	42.8	PK2	27.2	-25.6	0	44.4	-	-	74	-29.6	264	232	V
	* 1.136	30.77	MAv1	27.2	-25.6	2.42	34.79	54	-19.21	-	-	264	232	V
5	1.834	42.13	PK2	30.2	-24.9	0	47.43	-	-	-	-	85	213	V
6	5.866	39.02	PK2	35.4	-32.1	0	42.32	-	-	-	-	188	281	V
3	8.561	36.73	PK2	36.2	-29.4	0	43.53	-	-	-	-	298	225	H

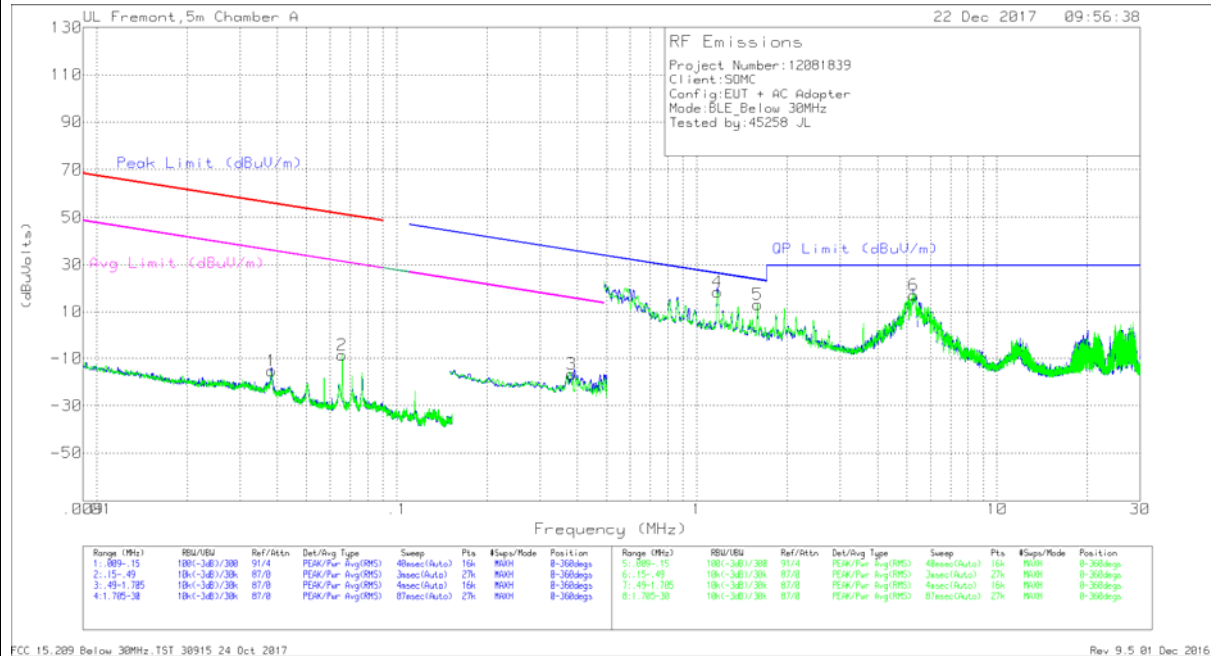
* - indicates frequency in CFR47 Pt 15 - Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.4. 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.

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.03821	49.66	Pk	15	.1	-80	-15.24	55.94	-71.18	35.94	-51.18	-	-	-	-	0-360
2	.06573	57.03	Pk	14.3	.1	-80	-8.57	51.23	-59.8	31.23	-39.8	-	-	-	-	0-360
3	.38232	49.44	Pk	13.8	.1	-80	-16.66	-	-	-	-	35.96	-52.62	15.96	-32.62	0-360

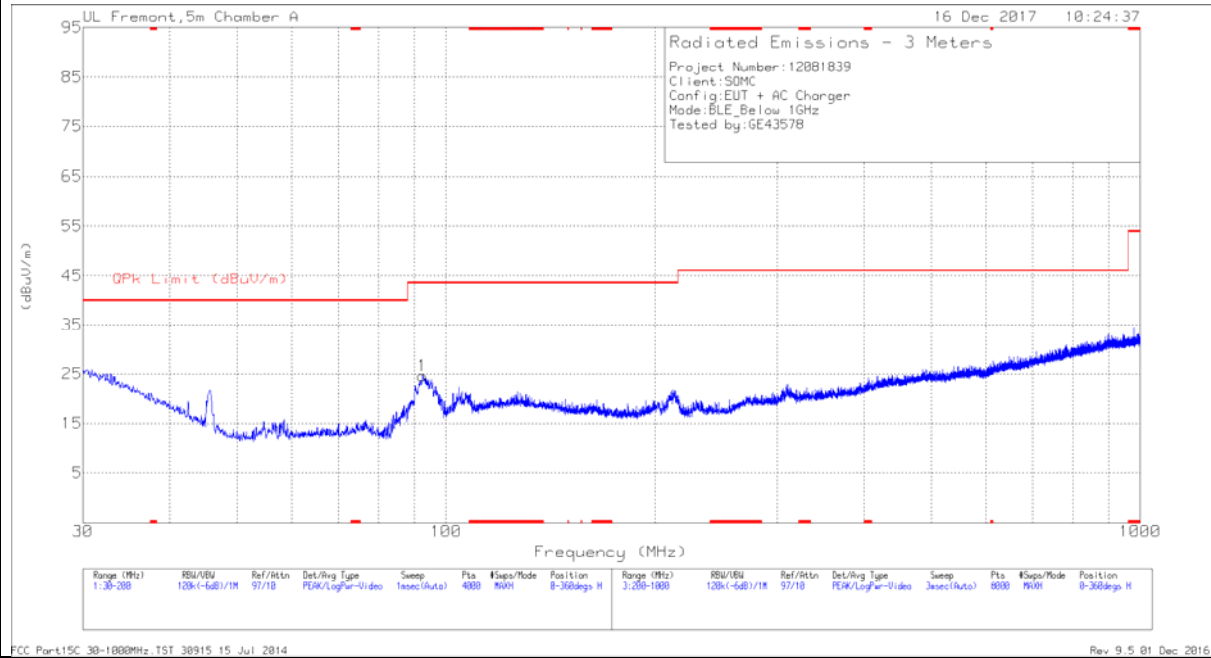
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	1.17054	43.98	Pk	14.3	.2	-40	18.48	26.26	-7.78	-	-	-	-	0-360
5	1.59082	38.52	Pk	14.4	.2	-40	13.12	23.6	-10.48	-	-	-	-	0-360
6	5.27396	42.46	Pk	14.4	.3	-40	17.16	29.5	-12.34	-	-	-	-	0-360

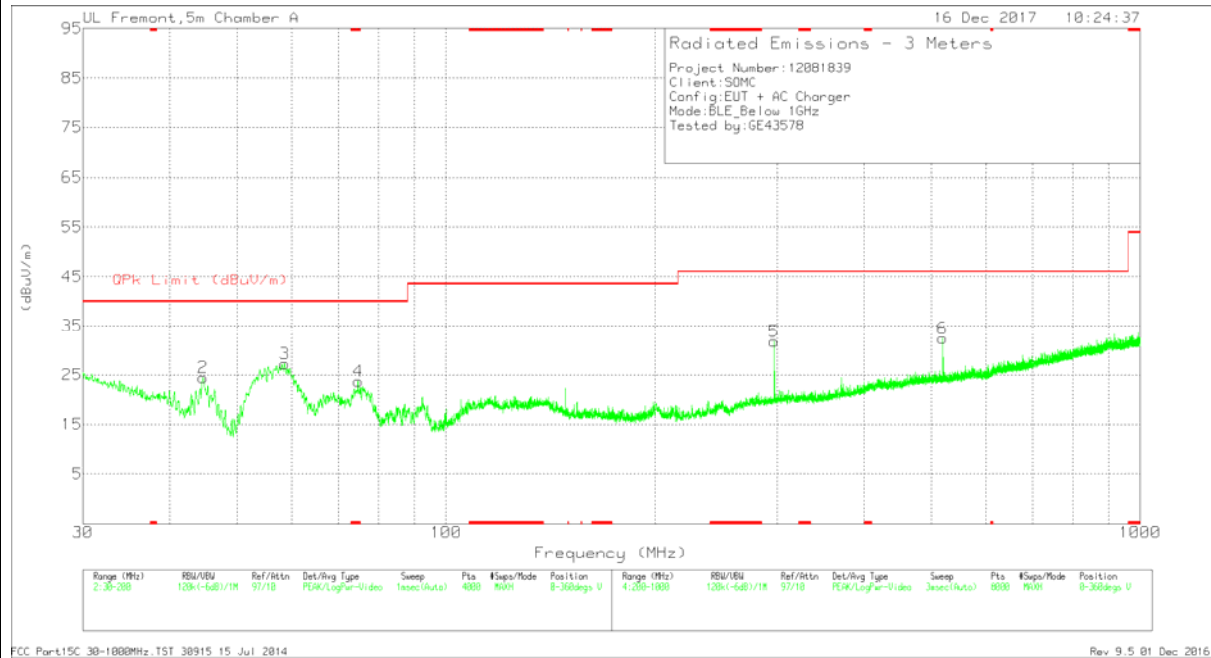
Pk - Peak detector

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

HORIZONTAL PLOT



VERTICAL PLOT



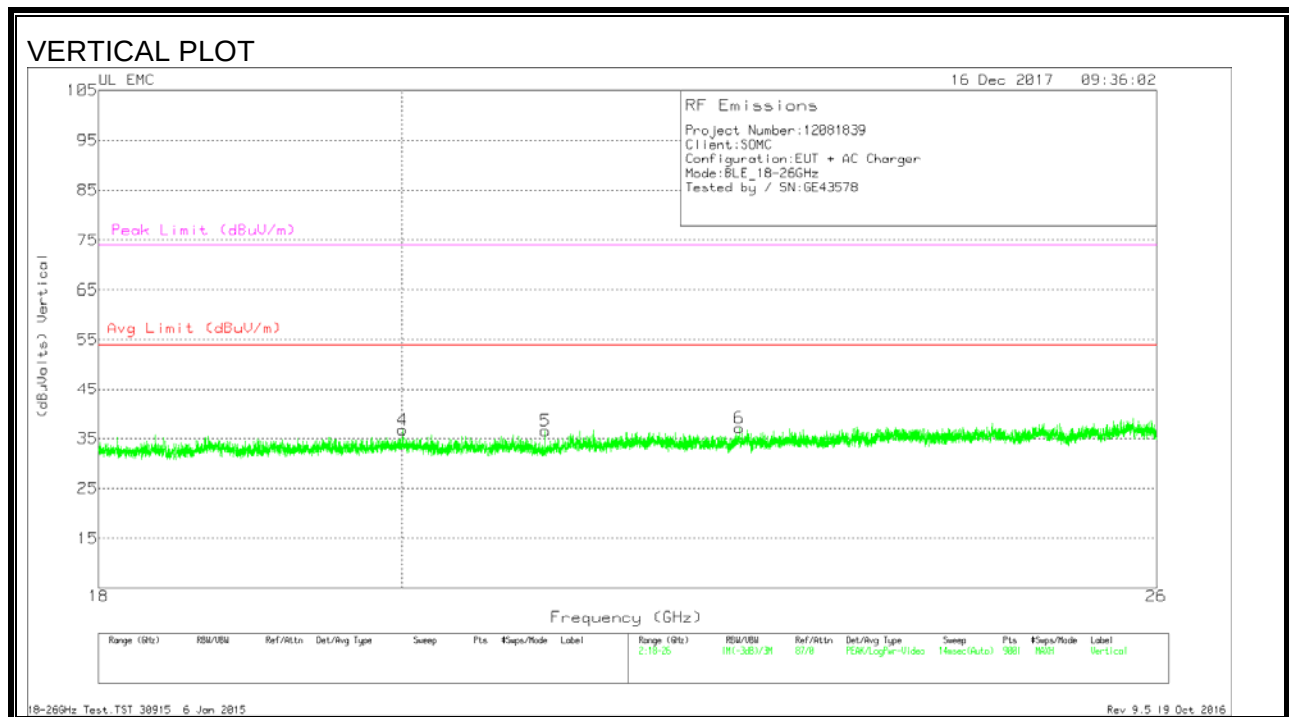
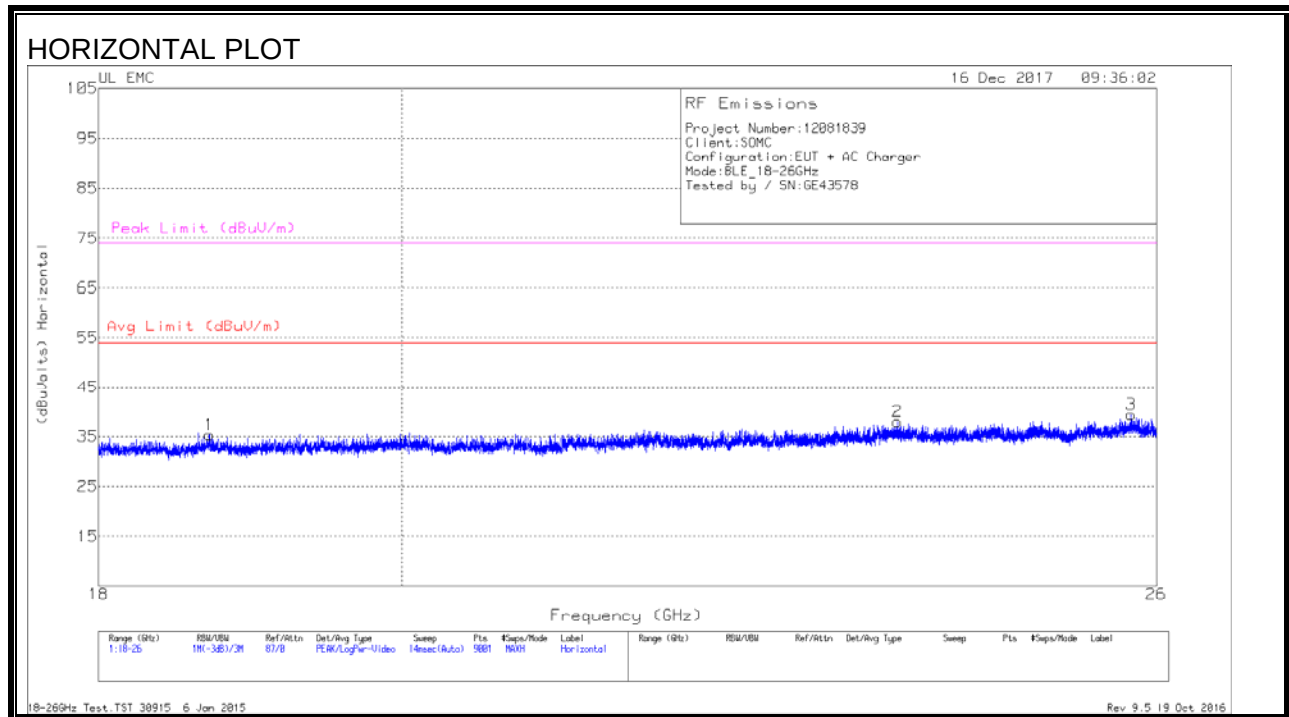
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	44.6876	37.09	Pk	14.5	-27.1	24.49	40	-15.51	0-360	100	V
3	58.5461	42.62	Pk	11.5	-26.9	27.22	40	-12.78	0-360	100	V
4	74.7216	38.55	Pk	11.9	-26.7	23.75	40	-16.25	0-360	100	V
1	92.5337	38.85	Pk	12.2	-26.5	24.55	43.52	-18.97	0-360	300	H
5	297.0126	39.1	Pk	17.3	-24.6	31.8	46.02	-14.22	0-360	100	V
6	519.7416	36.05	Pk	21.7	-25.3	32.45	46.02	-13.57	0-360	200	V

* - indicates frequency in CFR47 Pt 15 - Restricted Band

Pk - Peak detector

9.1. SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 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	18.707	36.79	Pk	32.5	-24.4	-9.5	35.39	54	-18.61	74	-38.61
2	23.762	37.89	Pk	33.8	-24.2	-9.5	37.99	54	-16.01	74	-36.01
3	25.774	39.62	Pk	34.1	-24.8	-9.5	39.42	54	-14.58	74	-34.58
4	20.006	38.43	Pk	33	-25.2	-9.5	36.73	54	-17.27	74	-37.27
5	21.023	38.93	Pk	32.5	-25.4	-9.5	36.53	54	-17.47	74	-37.47
6	22.492	38.01	Pk	33.4	-24.8	-9.5	37.11	54	-16.89	74	-36.89

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

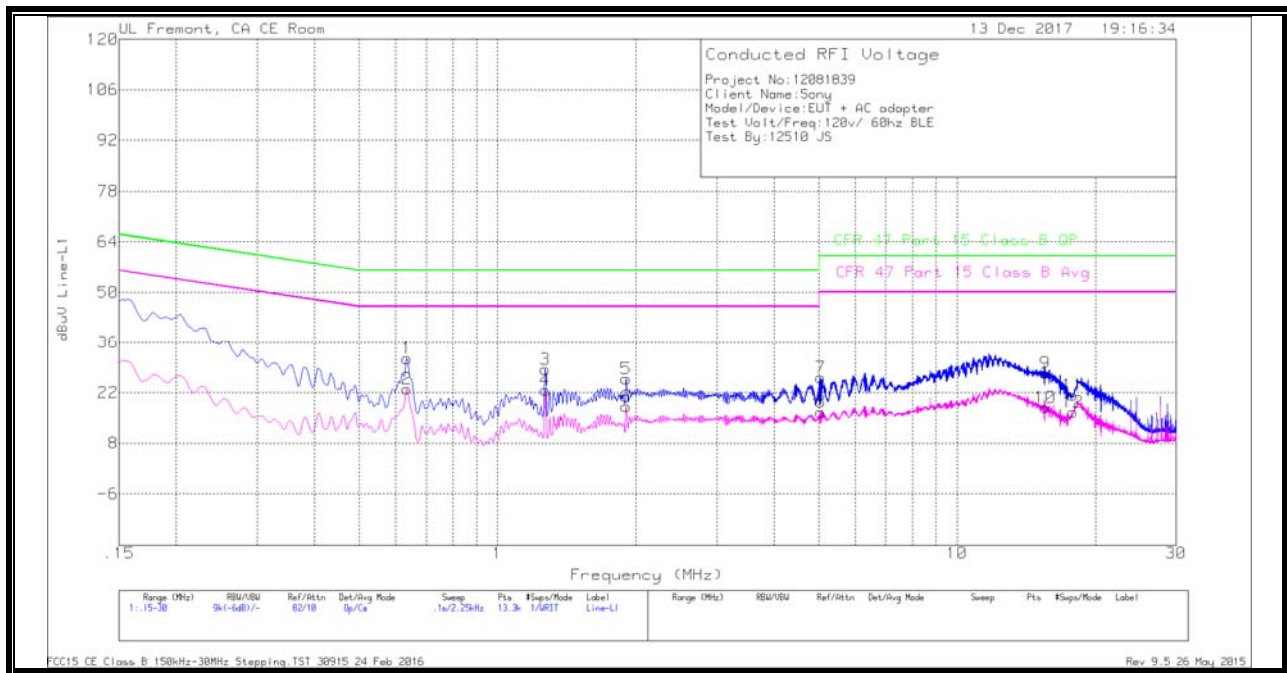
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

LINE 1 RESULTS



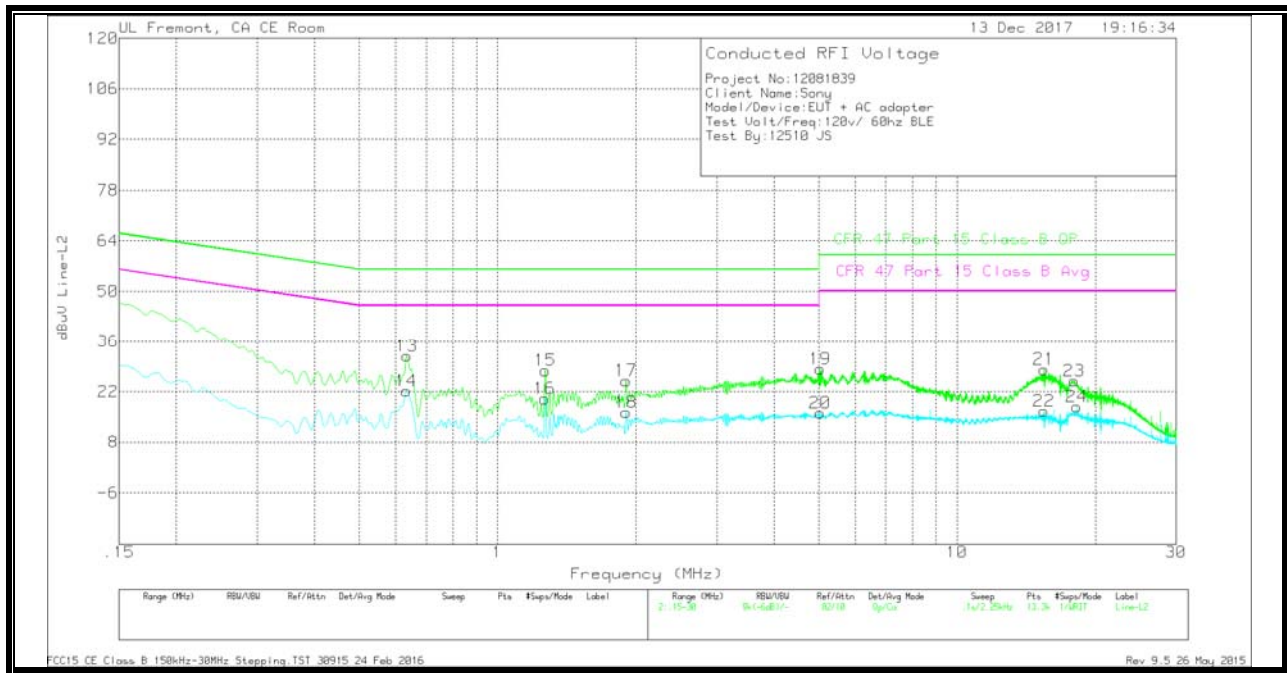
WORST EMISSIONS

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	.63487	21.39	Qp	0	0	10.1	31.49	56	-24.51	-	-
2	.636	13	Ca	0	0	10.1	23.1	-	-	46	-22.9
3	1.2705	18.23	Qp	0	.1	10.1	28.43	56	-27.57	-	-
4	1.2705	12.44	Ca	0	.1	10.1	22.64	-	-	46	-23.36
5	1.905	15.68	Qp	0	.1	10.1	25.88	56	-30.12	-	-
6	1.905	7.99	Ca	0	.1	10.1	18.19	-	-	46	-27.81
7	5.046	15.94	Qp	0	.1	10.2	26.24	60	-33.76	-	-
8	5.04713	6.41	Ca	0	.1	10.2	16.71	-	-	50	-33.29
9	15.567	16.85	Qp	0	.3	10.3	27.45	60	-32.55	-	-
10	15.56925	7.23	Ca	0	.3	10.3	17.83	-	-	50	-32.17
11	17.8935	10.69	Qp	0	.3	10.3	21.29	60	-38.71	-	-
12	17.8935	6.01	Ca	0	.3	10.3	16.61	-	-	50	-33.39

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	USN 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	.636	21.83	Qp	0	0	10.1	31.93	56	-24.07	-	-
14	.63375	12.15	Ca	0	0	10.1	22.25	-	-	46	-23.75
15	1.2705	17.64	Qp	0	.1	10.1	27.84	56	-28.16	-	-
16	1.26825	9.82	Ca	0	.1	10.1	20.02	-	-	46	-25.98
17	1.905	14.85	Qp	0	.1	10.1	25.05	56	-30.95	-	-
18	1.905	6.06	Ca	0	.1	10.1	16.26	-	-	46	-29.74
19	5.03925	18.04	Qp	0	.1	10.2	28.34	60	-31.66	-	-
20	5.037	5.77	Ca	0	.1	10.2	16.07	-	-	50	-33.93
21	15.47925	17.58	Qp	0	.3	10.3	28.18	60	-31.82	-	-
22	15.47925	6.07	Ca	0	.3	10.3	16.67	-	-	50	-33.33
23	18.01725	14.41	Qp	0	.3	10.3	25.01	60	-34.99	-	-
24	18.24675	7.29	Ca	0	.3	10.3	17.89	-	-	50	-32.11

Qp - Quasi-Peak detector

Ca - CISPR average detection