CERTIFICATION TEST REPORT

Report Number. : 12073310-E3V1

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

FCC ID : PY7-21831A

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 08, 2018

Prepared by:

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

NVLAP TESTING

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	01/08/18	Initial Issue	Dan Coronia

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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: QV70003P12 (RADIATED)
QV7000SD15 (CONDUCTED)

DATE TESTED: DECEMBER 7-26, 2017

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.

Reviewed By:

Kiya Kedida
Project Engineer
UL Verification Services Inc.

Prepared By:

Eric Yu
Test Engineer
UL Verification Services Inc.

Approved & Released For
UL Verification Services Inc By:

Dan Coronia
Operations Leader
UL Verification Services Inc.

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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.

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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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

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

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

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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)	5.56	3.60
2402 - 2480	BLE (2Mbps)	5.86	3.85

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes Loop Type antennas, with the following maximum gains:

Frequency Band (GHz)	Antenna Gain (dBi)
2402-2480	-0.60

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was s_atp_XXX_0_00333_A_11.
The test utility software used during testing was Tera Term Ver 4.79.

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5.5. WORST-CASE CONFIGURATION AND MODE

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, and it was determined that X-Axis with AC/DC Adapter was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis with AC/DC Adapter orientation.

Worst-case data rates as provided by the client were:
1Mbps
2Mbps

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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

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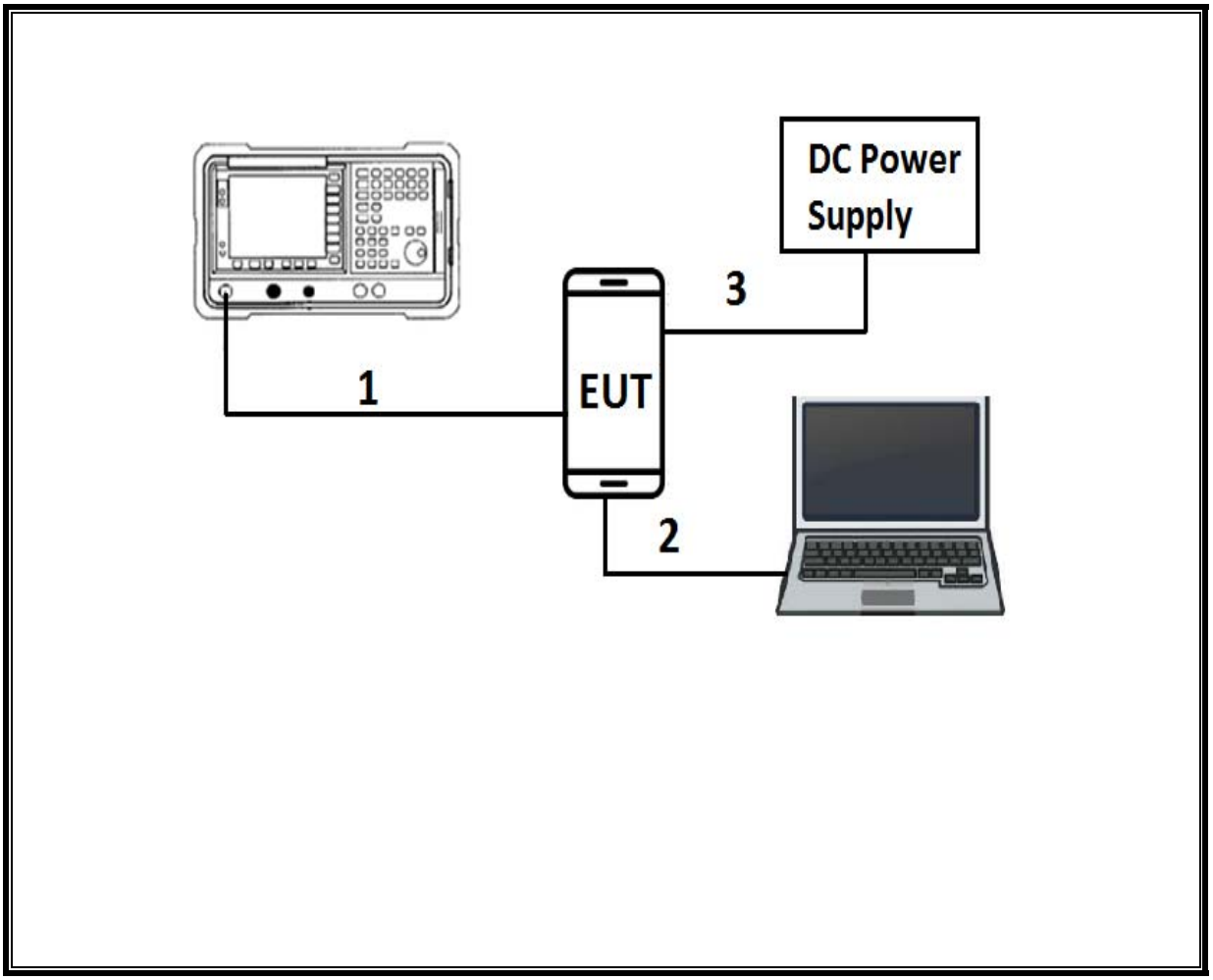
TEST SETUP

CONDCUTED TEST SETUP DIAGRAM



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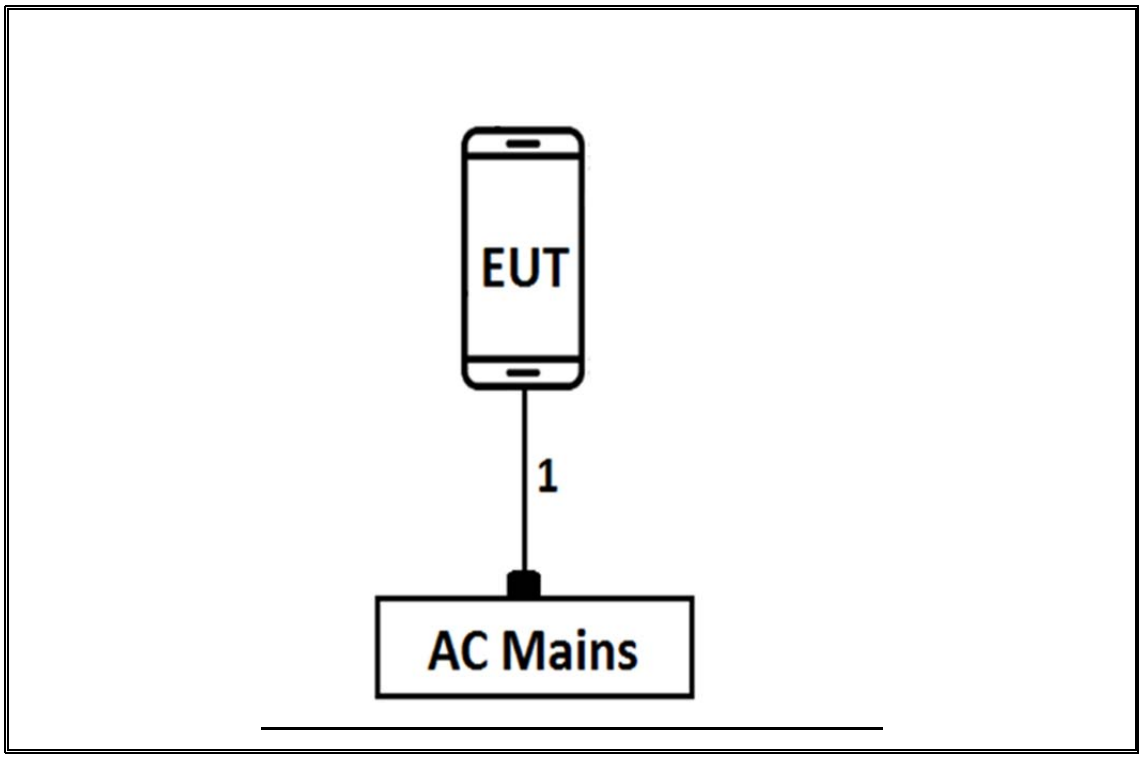
TEST SETUP

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	ID Num	Cal Due
Spectrum Analyzer	Keysight	E4446A	T146	07/17/2018
Spectrum Analyzer	Keysight	N9030A	T1466	04/11/2018
Antenna, Biconolog, 30MHz – 1GHz	Sunol Sciences	JB1	T130	10/16/2018
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T862	06/09/2018
RF Preamplifier, 10kHz - 1GHz	Sonoma	310N	T300	12/11/2018
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	06/24/2018
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T493	02/15/2018
Spectrum Analyzer	Keysight	N9030A	T907	01/23/2018
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T931	06/21/2018
Spectrum Analyzer	Keysight	N9030A	T1454	12/31/2017
Antenna, Horn, 18-26-GHz	ARA	MWH-1826	T449	06/12/2018
Antenna, Active Loop 9KHz to 30MHz	COM-POWER	AL-130R	T1866	10/10/2018
RF Preamplifier, 1-26GHz	Agilent	8449B	T404	07/23/2018
Power Meter	Keysight	N1911A	T1271	07/17/2018
Power Sensor	Keysight	N1921A	T413	06/22/2018
EMI Receiver	Rohde & Schwarz	ESR	T1436	01/06/2018
LISN	Fischer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/15/2018

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, Apr 26, 2016
Antenna Port Software	UL	UL RF	Ver 7.6, Nov 11, 2017

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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

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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 9.1.3

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.

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8.2. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

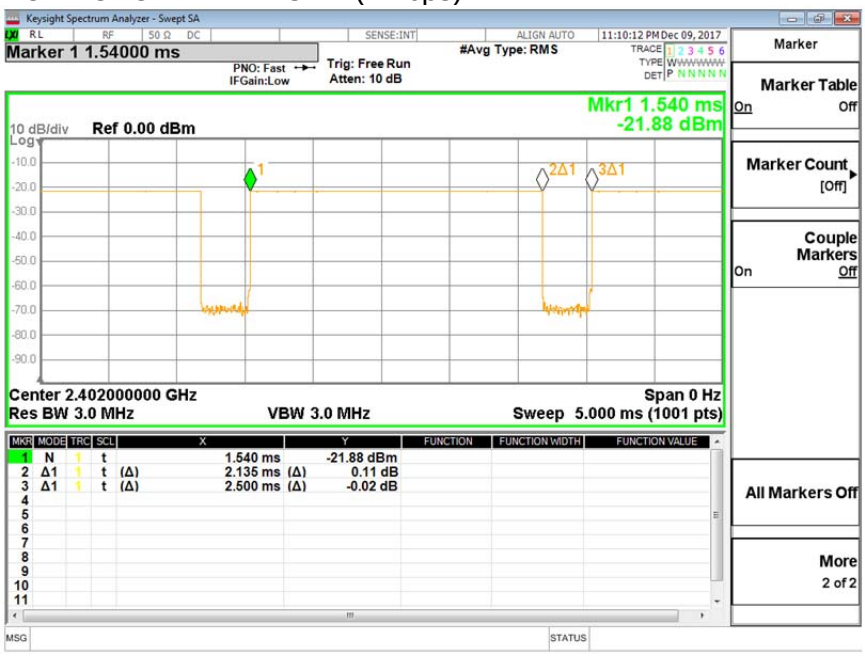
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
BLE 1Mbps	2.135	2.500	0.85	85.40%	0.69	0.47
BLE 2Mbps	2.886	3.755	0.77	76.86%	1.14	0.35

DUTY CYCLE PLOT

DUTY CYCLE BLE MODE (1Mbps)



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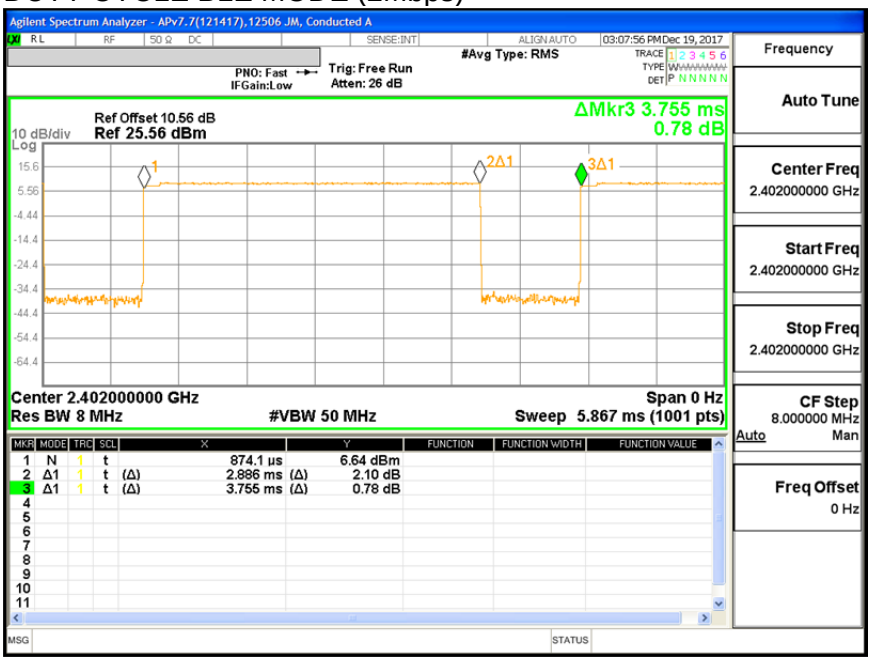
DUTY CYCLE BLE MODE (2Mbps)



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8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

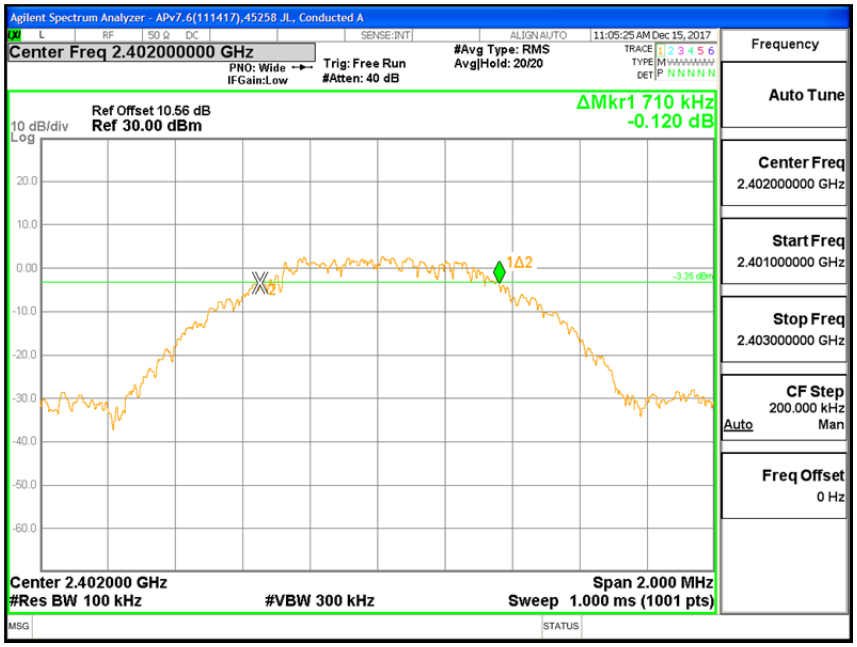
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

6 dB BANDWIDTH (1Mbps)

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	**0.710**	0.5
Middle	2440	0.636	0.5
High	2480	0.690	0.5

6dB LOW CH



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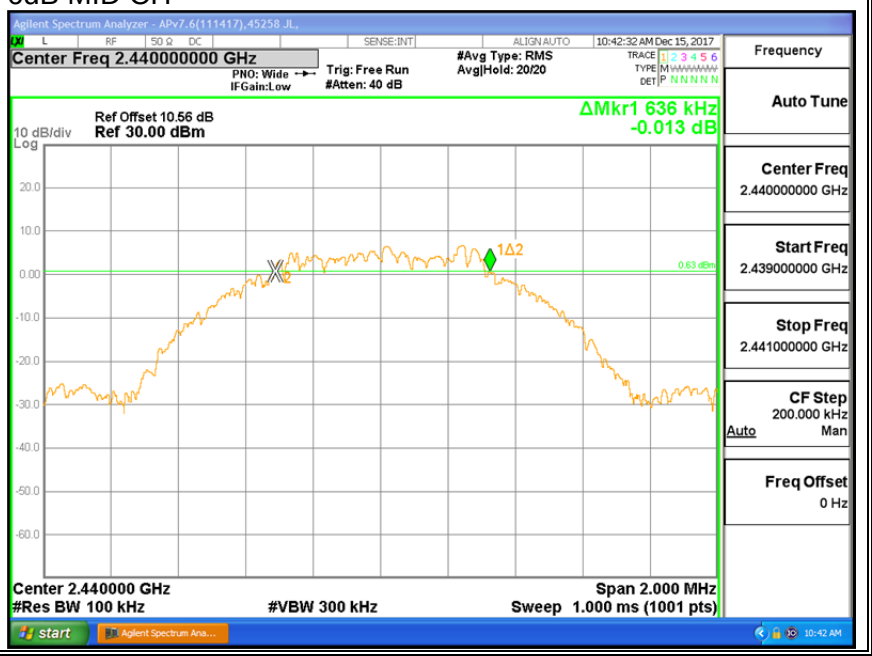
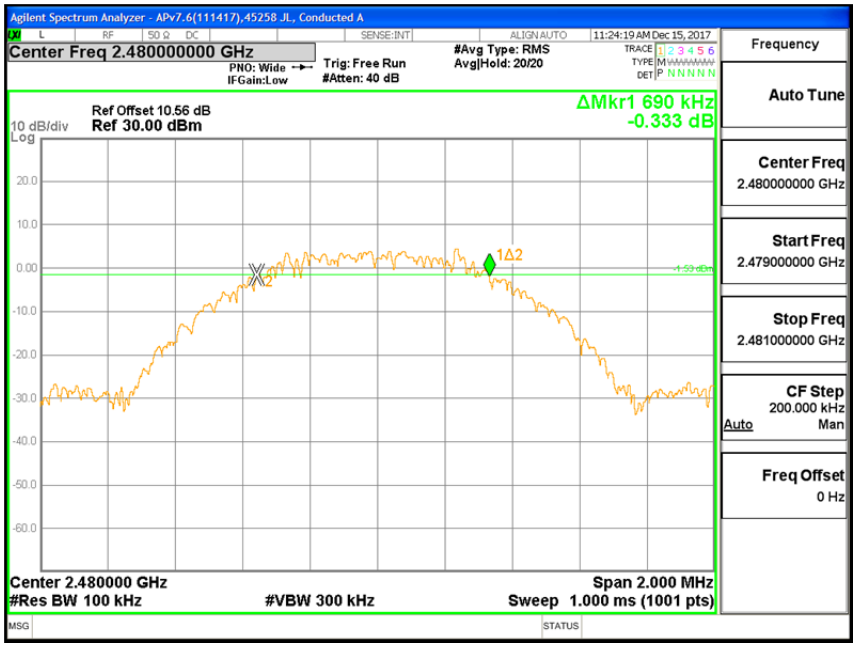
6dB MID CH



6dB HIGH CH



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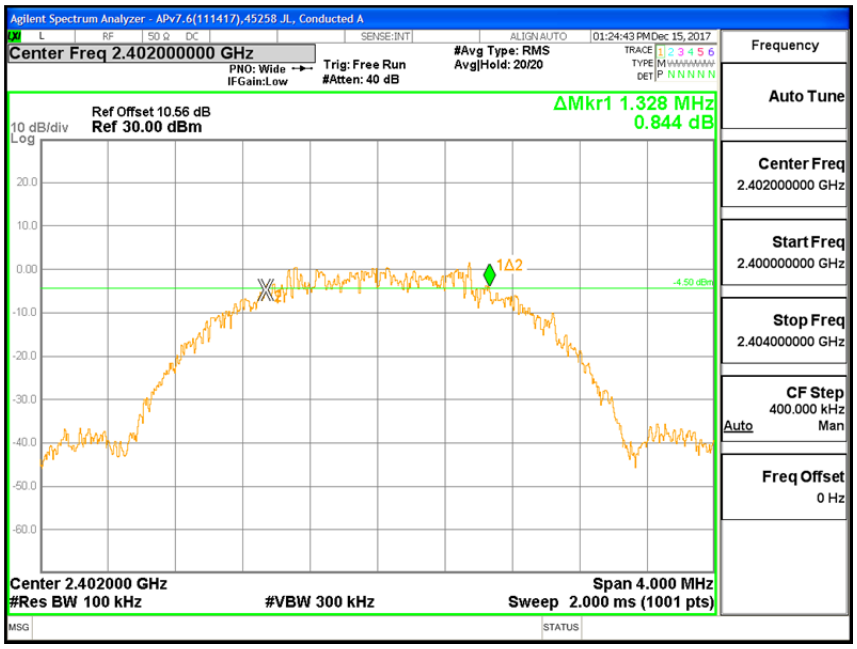
6 dB BANDWIDTH (2Mbps)

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.328	0.5
Middle	2440	**1.372**	0.5
High	2480	1.344	0.5

6dB LOW CH



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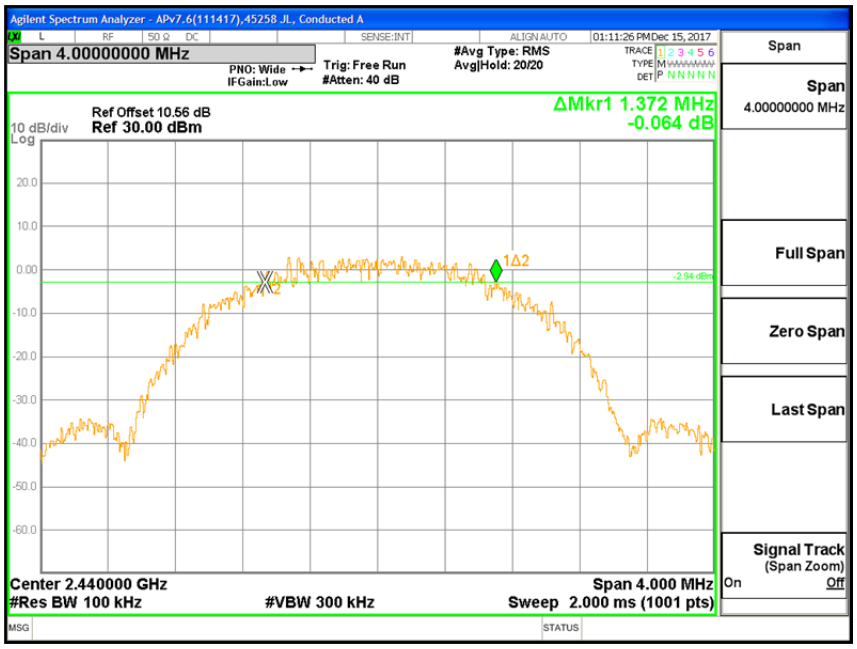
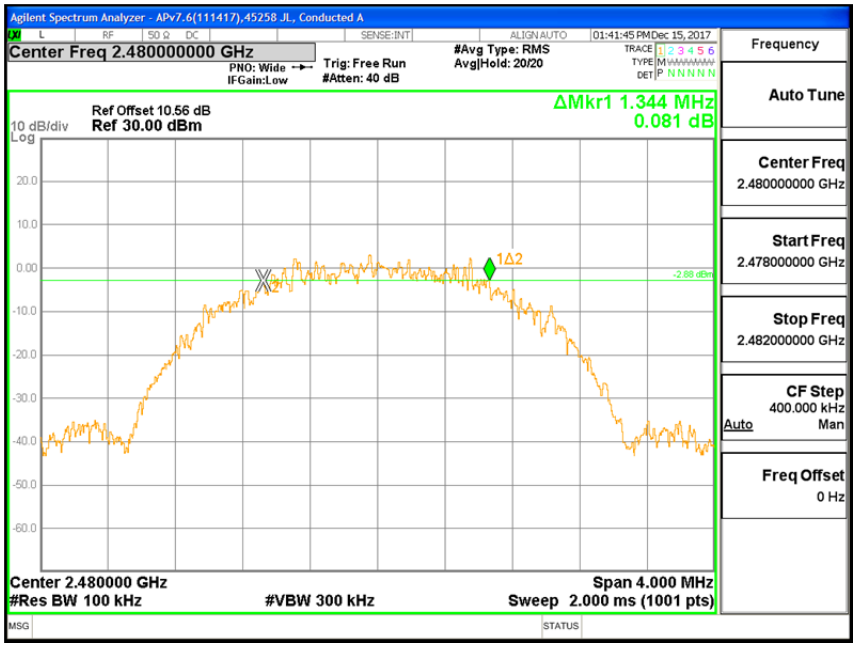
6dB MID CH



6dB HIGH CH



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8.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

Test Procedure

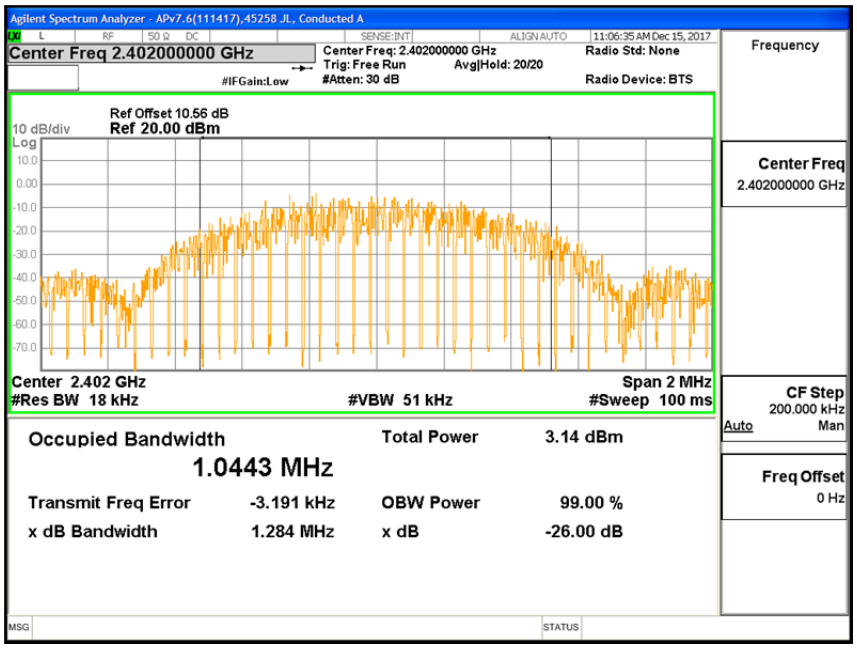
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% BANDWIDTH (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0443
Middle	2440	**1.0480**
High	2480	1.0400

OBW LOW CH



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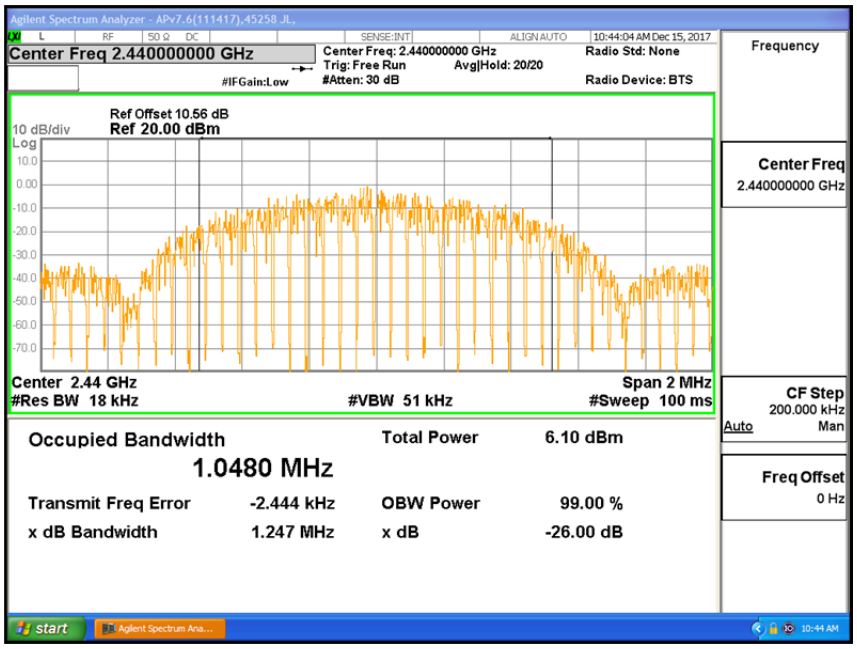
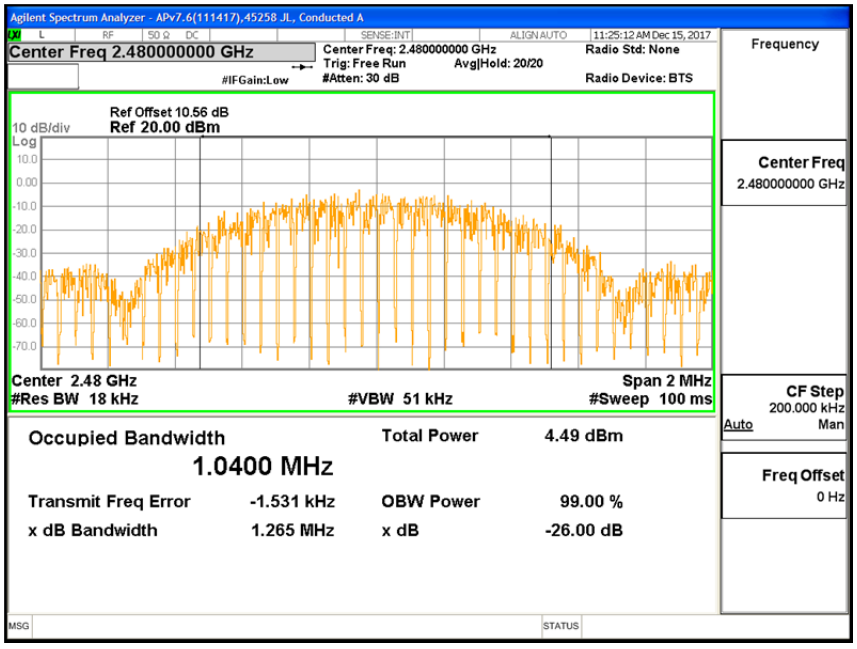
OBW MID CH



OBW HIGH CH



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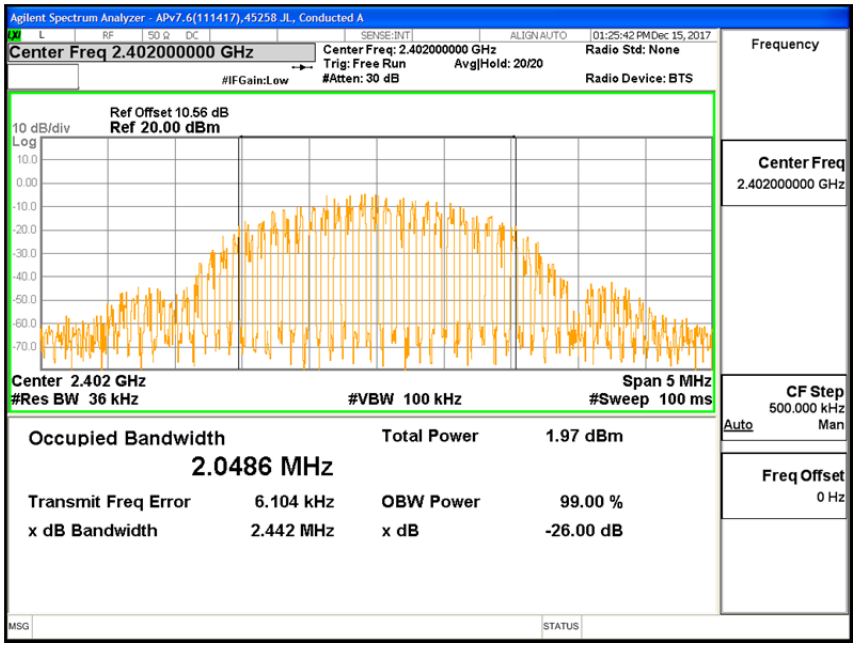
99% BANDWIDTH (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0486
Middle	2440	1.9981
High	2480	**2.1074**

OBW LOW CH



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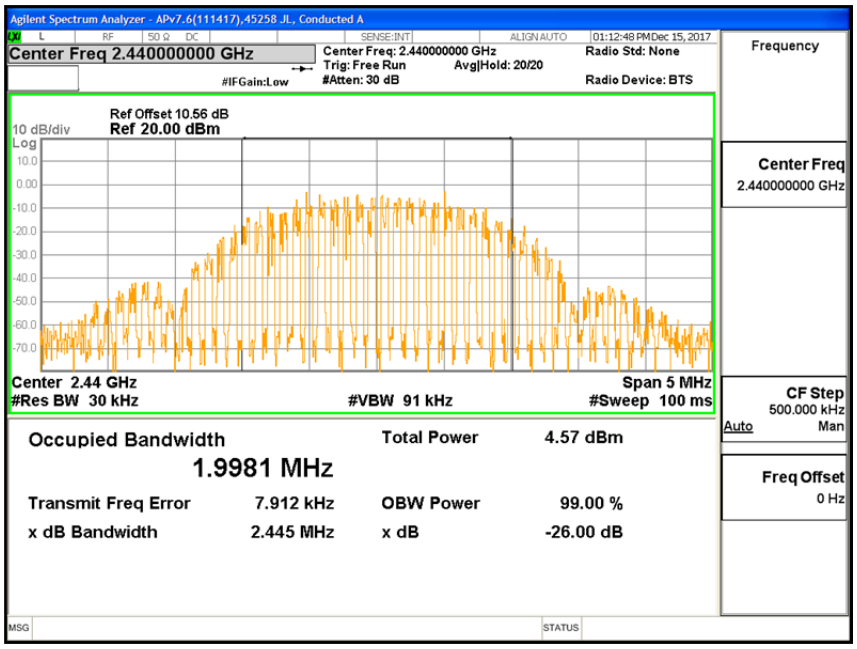
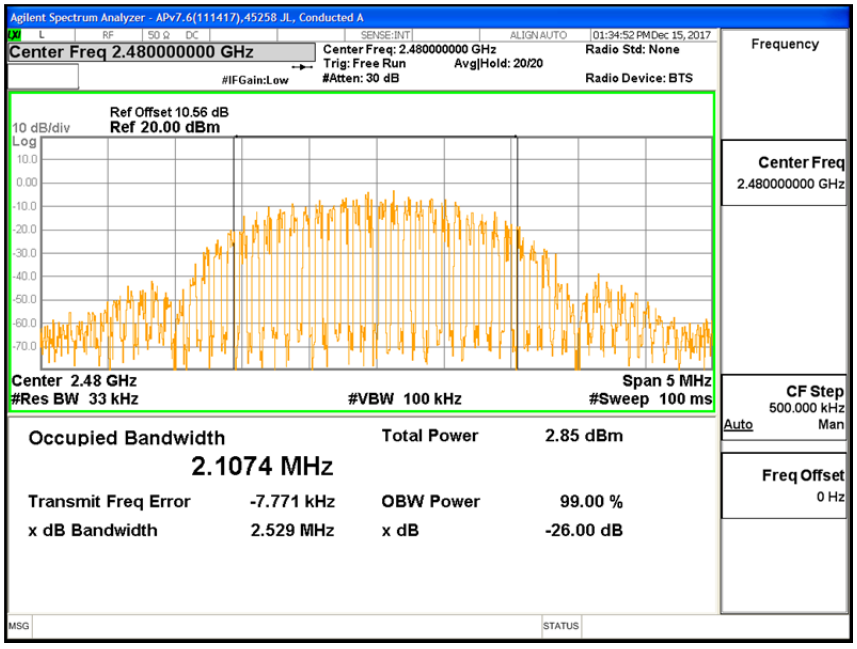
OBW MID CH



OBW HIGH CH



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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 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:	29435 TC	**Date:**	12/07/17

1Mbps

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	3.58
Middle	2440	**5.36**
High	2480	4.22

2Mbps

Channel	Frequency (MHz)	AV Power (dBm)
Low	2402	3.58
Middle	2440	**5.33**
High	2480	4.21

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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:	29435 TC	Date:	12/07/17

OUTPUT POWER (1Mbps)

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.92	30.00	-26.08
Middle	2440	**5.56**	30.00	-24.44
High	2480	4.52	30.00	-25.48

OUTPUT POWER (2Mbps)

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.12	30.00	-25.88
Middle	2440	**5.86**	30.00	-24.14
High	2480	4.78	30.00	-25.22

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8.7. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

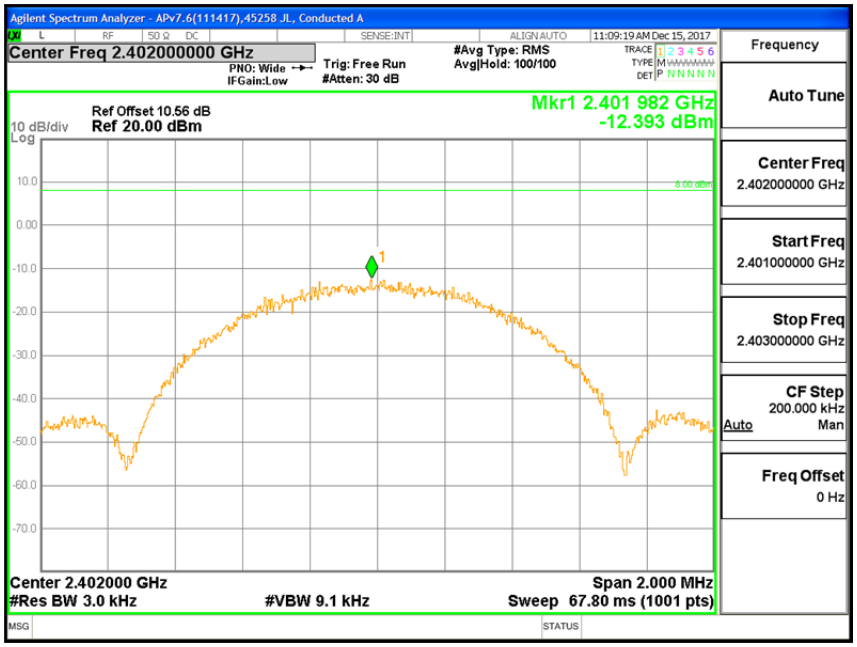
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

POWER SPECTRAL DENSITY (1Mbps)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-12.393	8	-20.393
Middle	2440	**-9.598**	8	-17.598
High	2480	-11.156	8	-19.156

CPSD LOW CH



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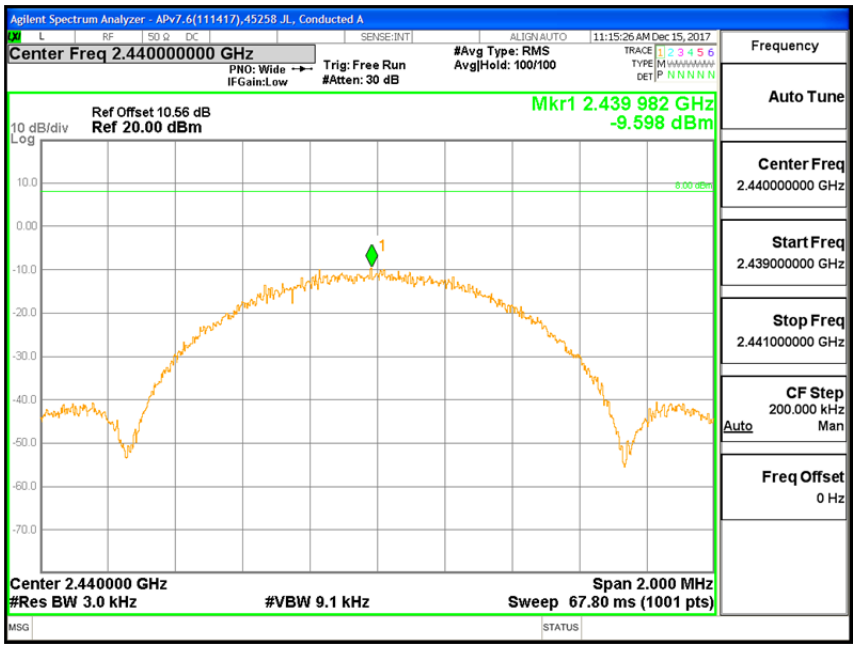
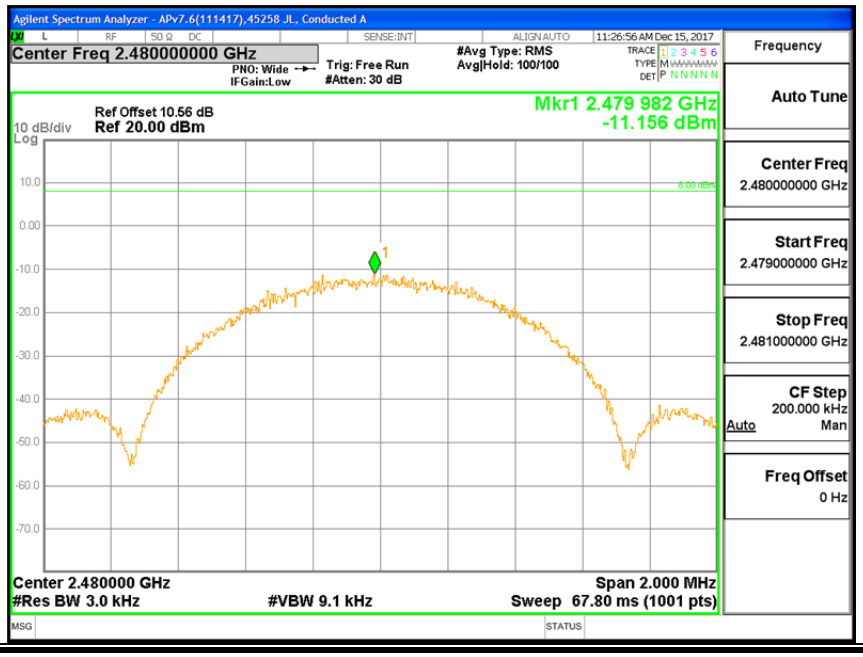
CPSD MID CH



CPSD HIGH CH



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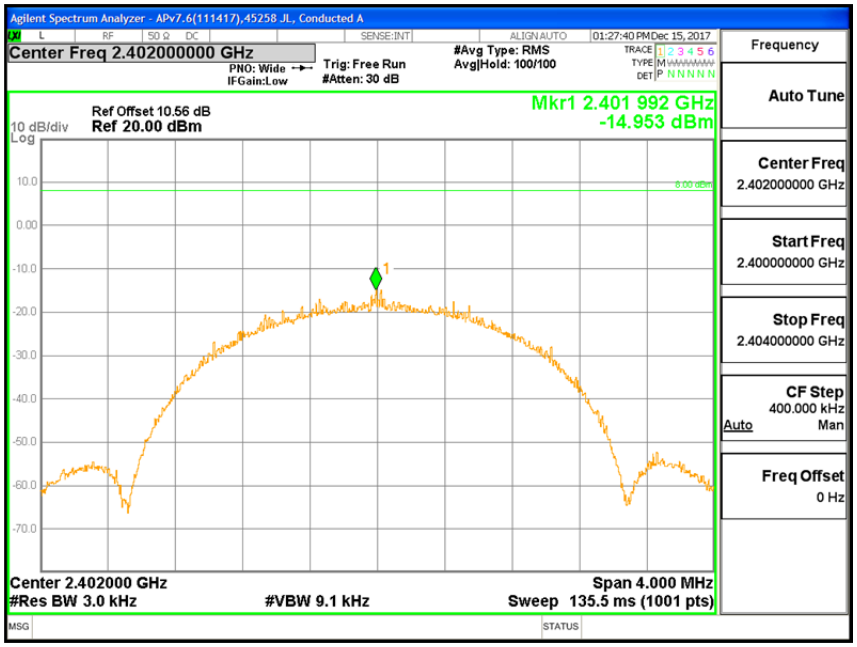
POWER SPECTRAL DENSITY (2Mbps)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-14.953	8	-22.953
Middle	2440	**-12.083**	8	-20.083
High	2480	-13.470	8	-21.470

CPSD LOW CH



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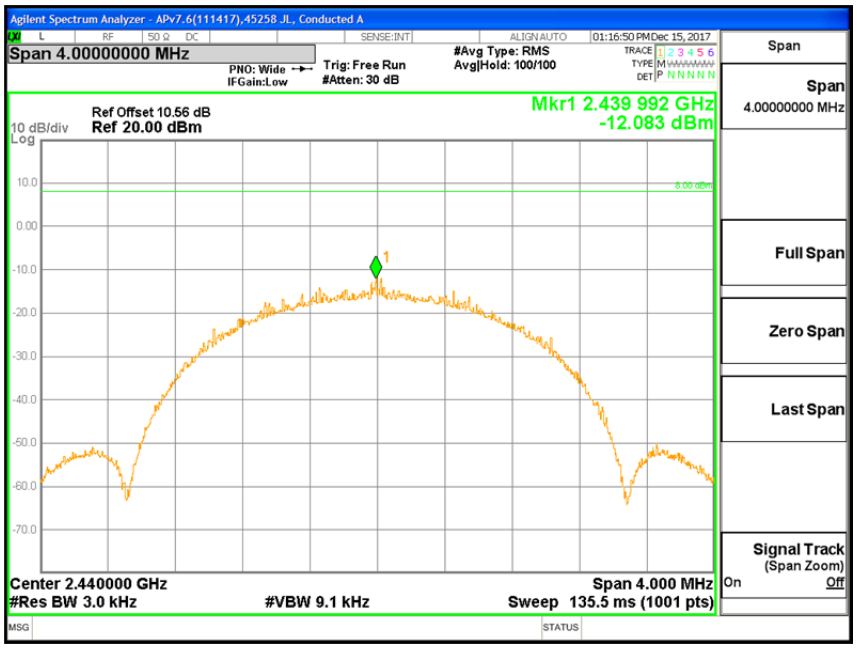
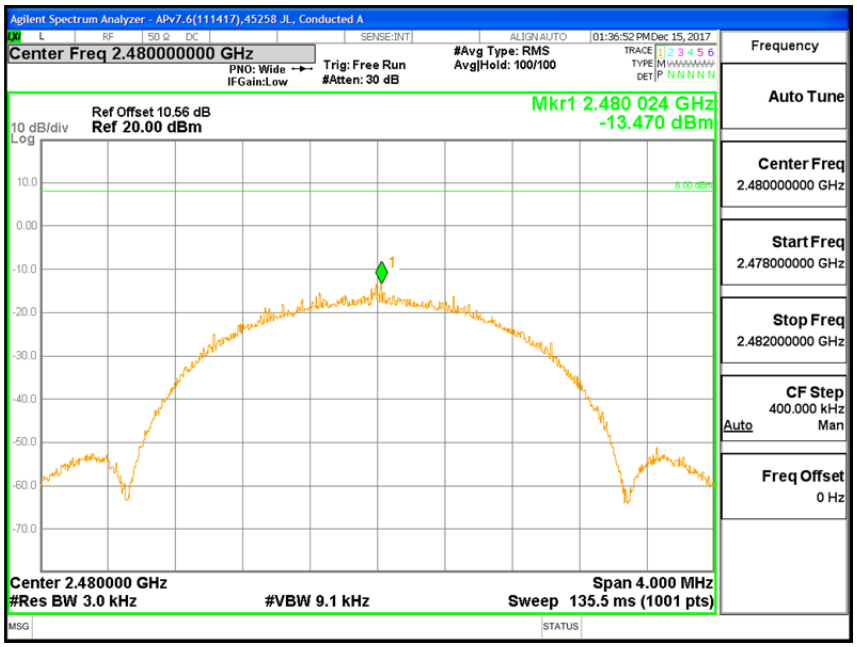
CPSD MID CH



CPSD HIGH CH



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8.8. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

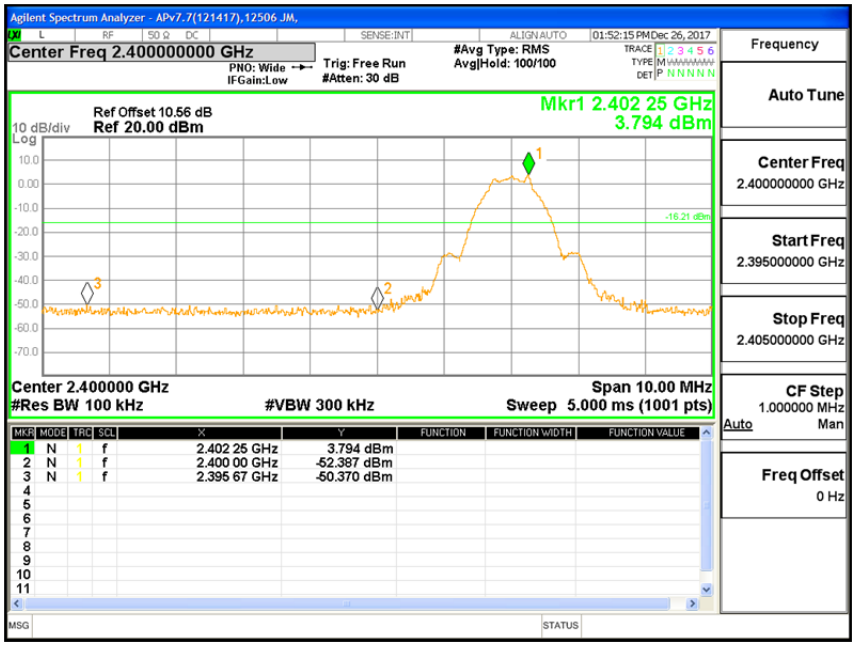
FCC §15.247 (d)

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)

CBE LOW CH



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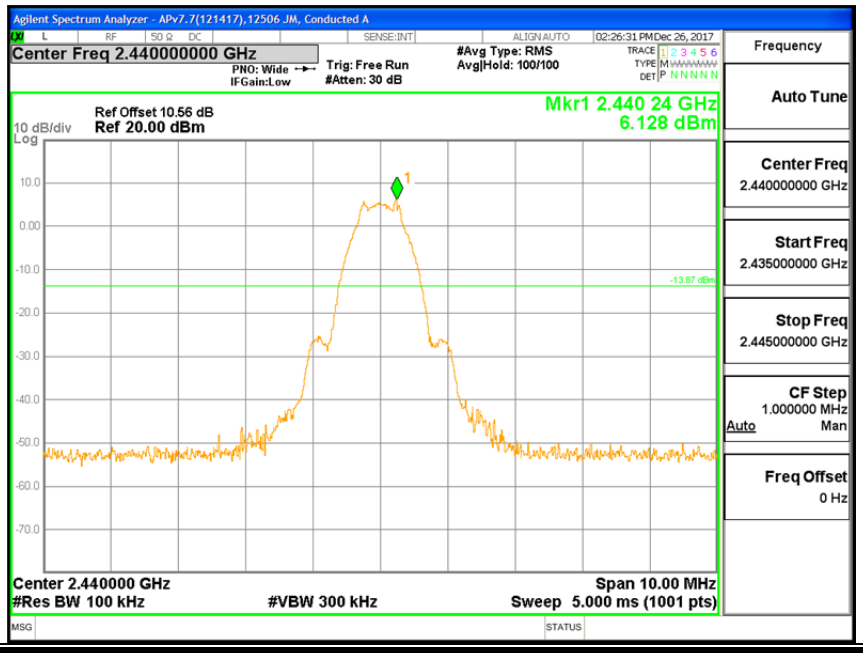
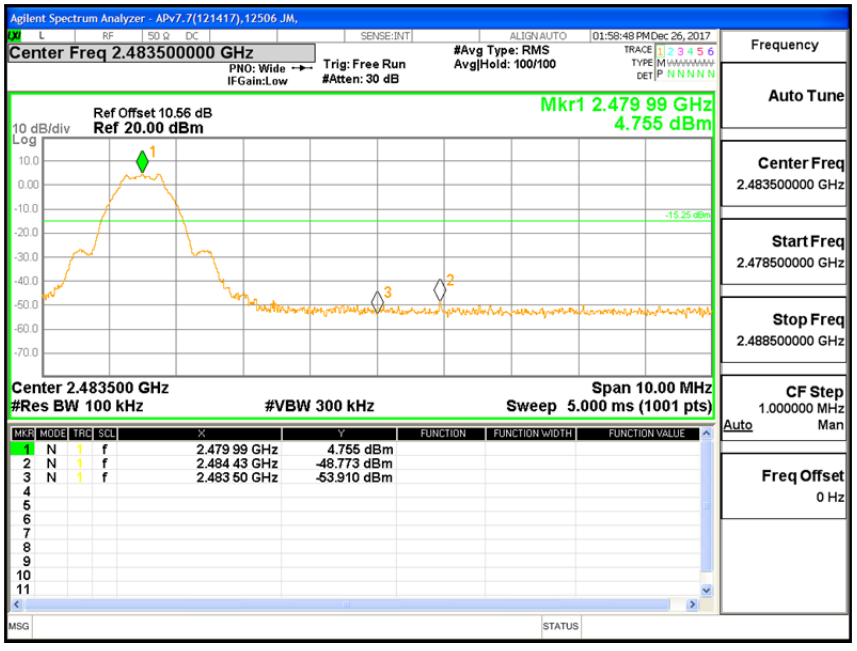
CBE MID CH



CBE HIGH CH



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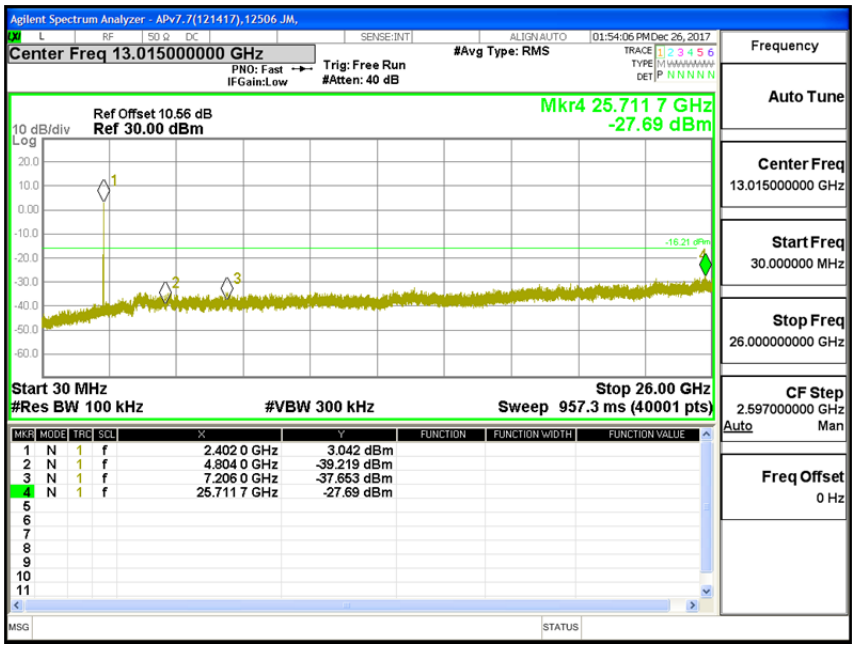
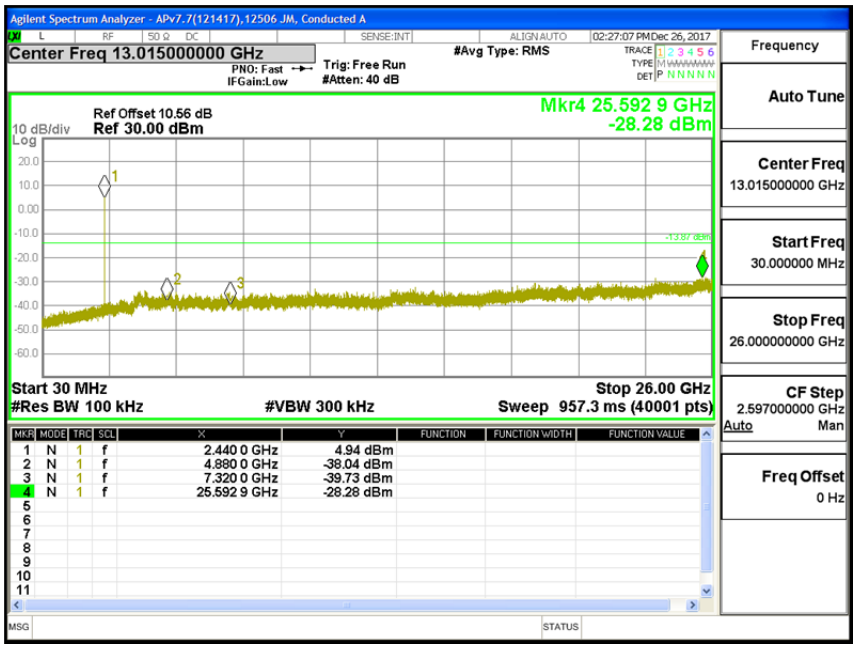
CSPUR LOW CH



CSPUR MID CH



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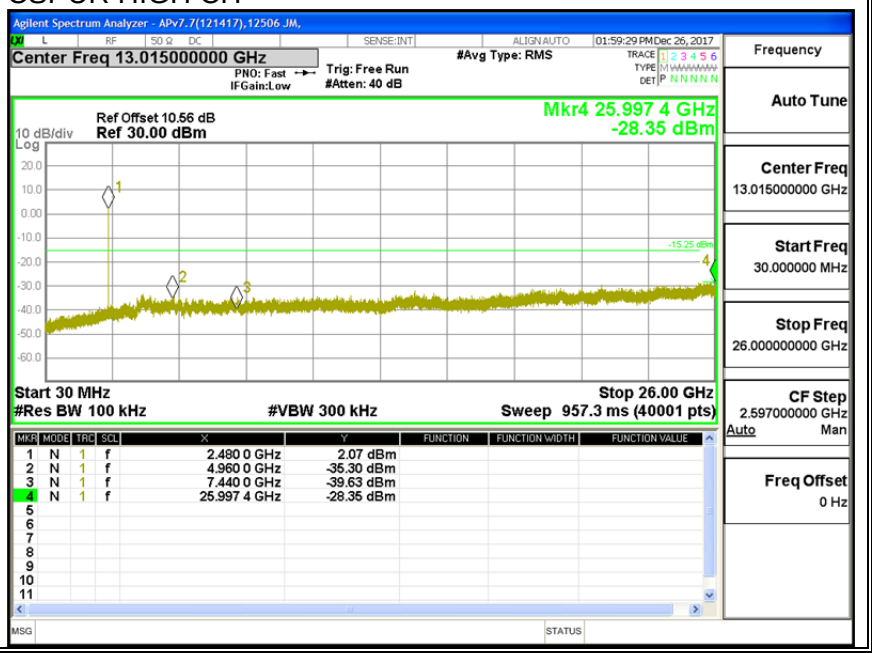
CSPUR HIGH CH



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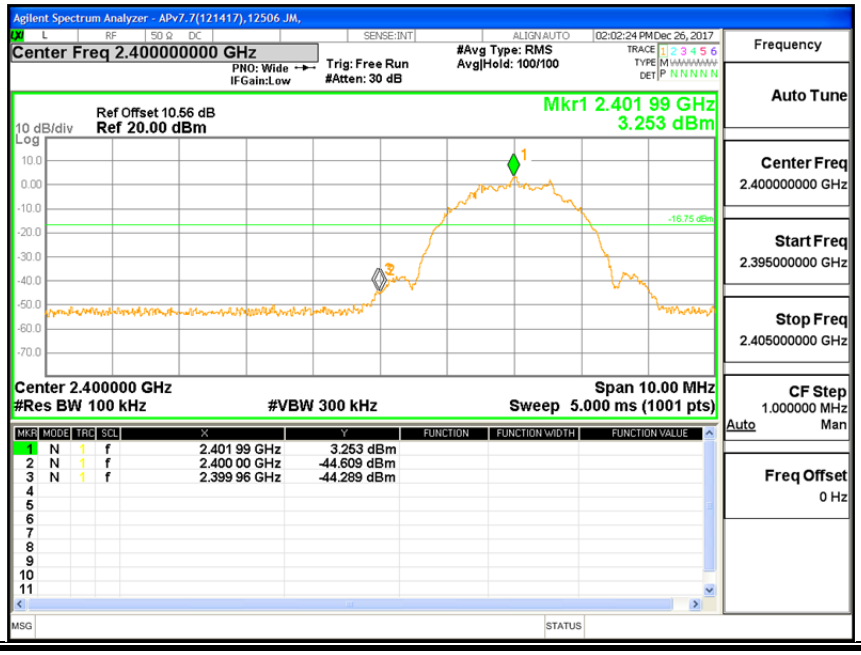
CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS (2Mbps)

CBE LOW CH



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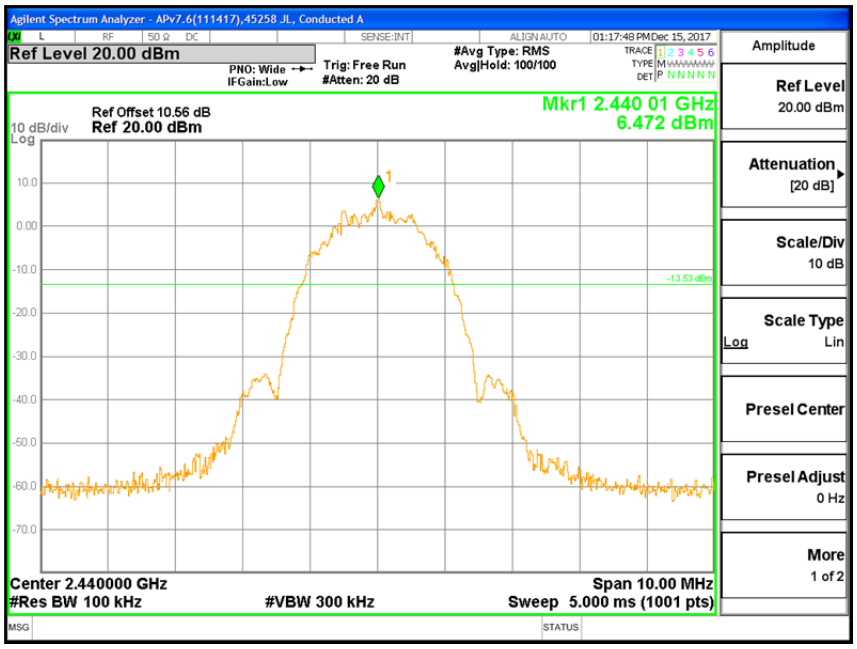
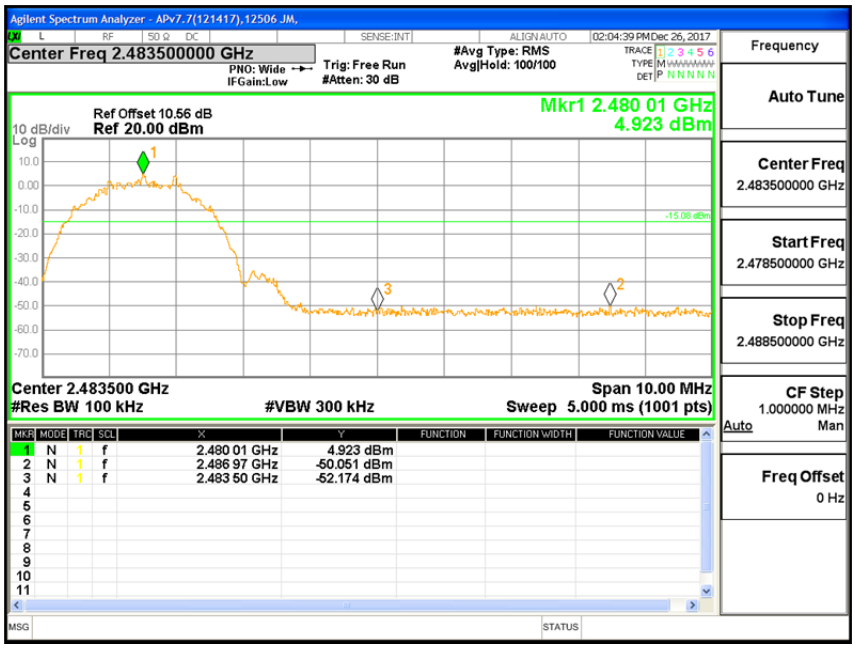
CBE MID CH



CBE HIGH CH



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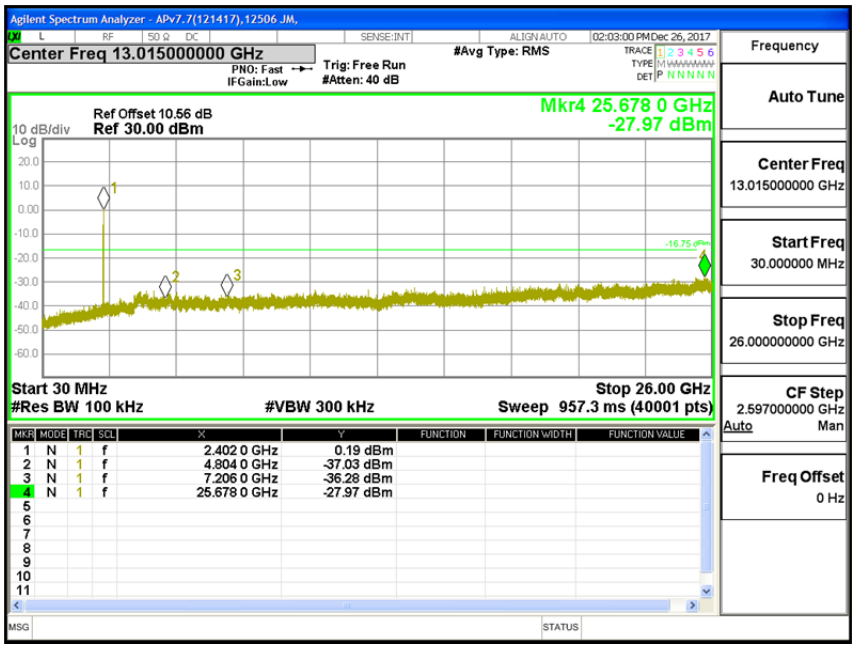
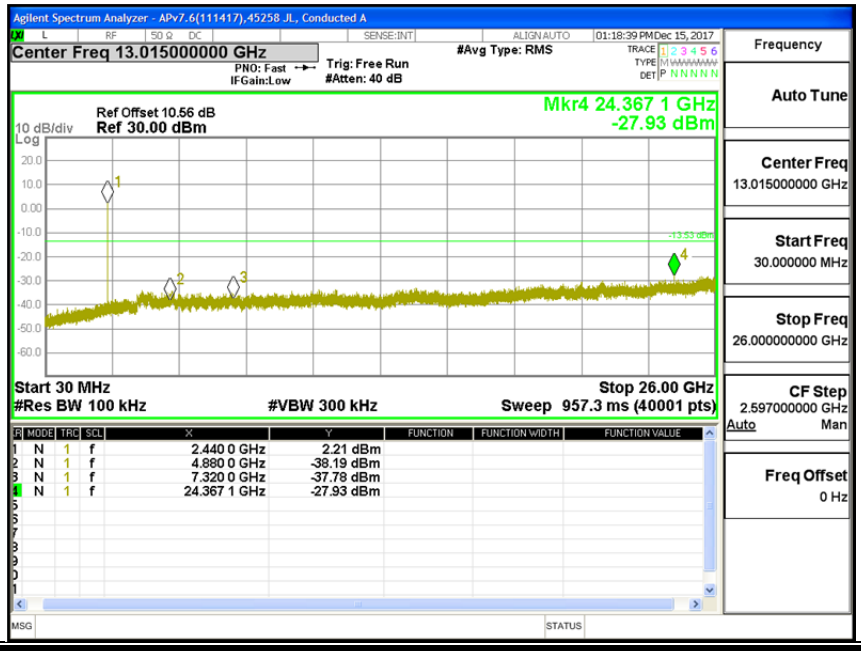
CSPUR LOW CH



CSPUR MID CH



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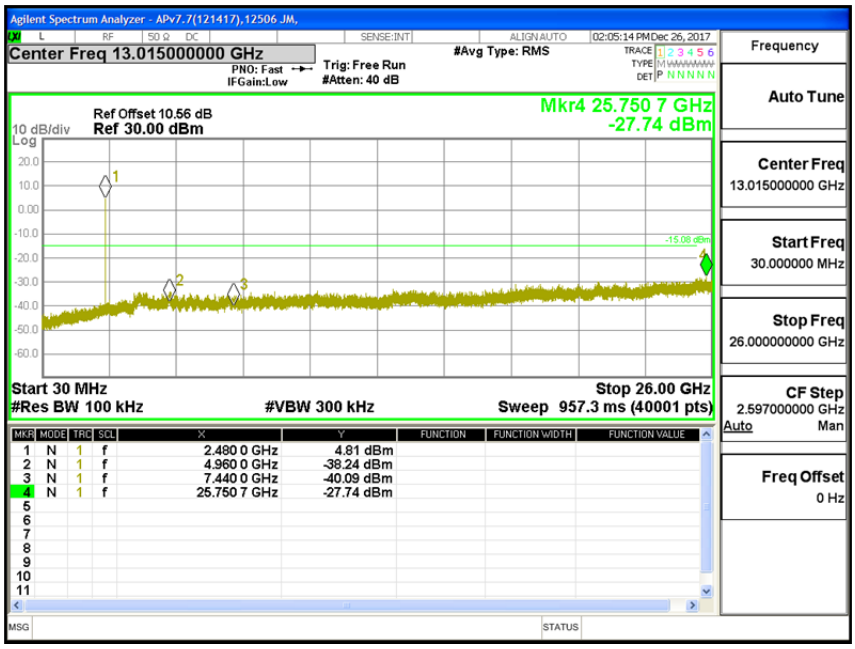
CSPUR HIGH CH



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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

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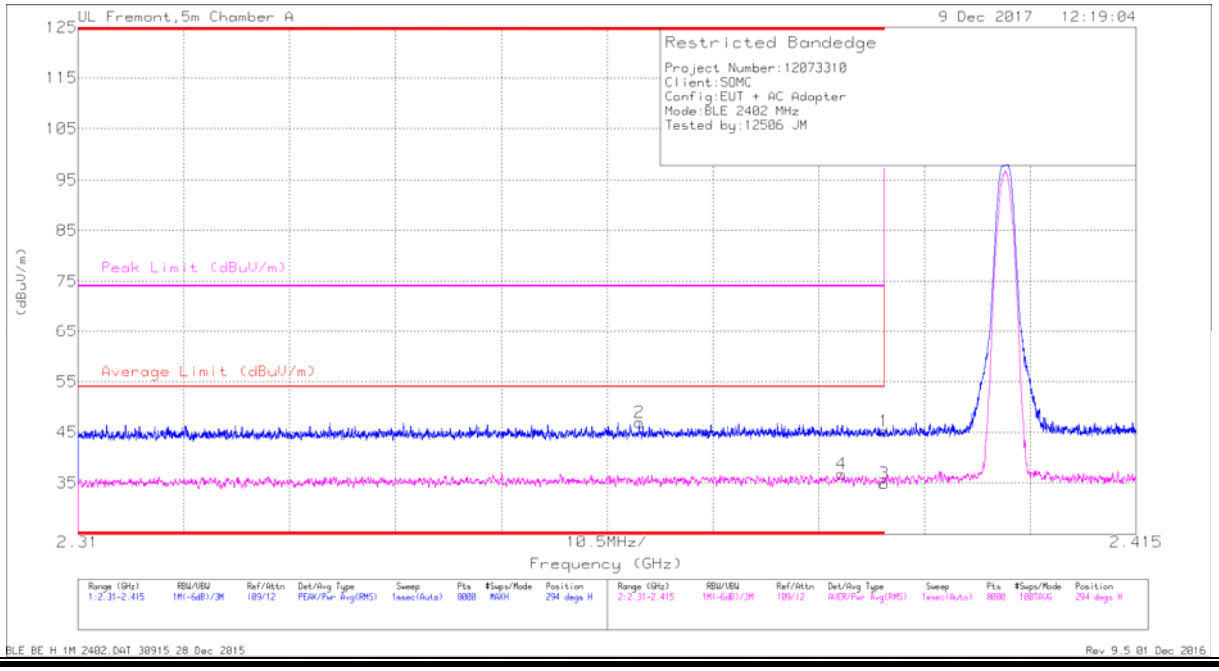
9.2. TRANSMITTER ABOVE 1 GHz 1Mbps

9.2.1. RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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
2	* 2.366	38.73	Pk	31.6	-23.4	0	46.93	-	-	74	-27.07	294	99	H
4	* 2.386	27.64	RMS	31.8	-23.4	.69	36.73	54	-17.27	-	-	294	99	H
1	* 2.39	36.68	Pk	31.8	-23.3	0	45.18	-	-	74	-28.82	294	99	H
3	* 2.39	25.73	RMS	31.8	-23.3	.69	34.92	54	-19.08	-	-	294	99	H

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

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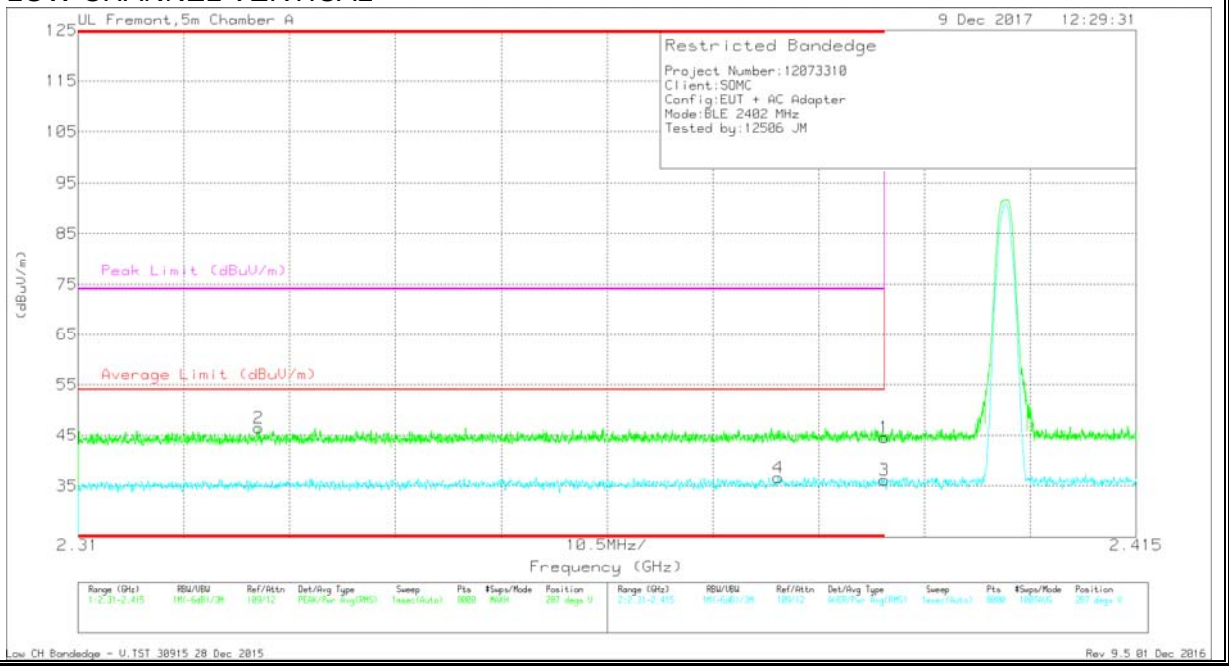
LOW CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	36.11	Pk	31.8	-23.3	0	44.61	-	-	74	-29.39	287	379	V
2	* 2.328	38.28	Pk	31.6	-23.4	0	46.48	-	-	74	-27.52	287	379	V
3	* 2.39	26.95	RMS	31.8	-23.3	.69	36.14	54	-17.86	-	-	287	379	V
4	* 2.379	27.69	RMS	31.7	-23.4	.69	36.68	54	-17.32	-	-	287	379	V

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

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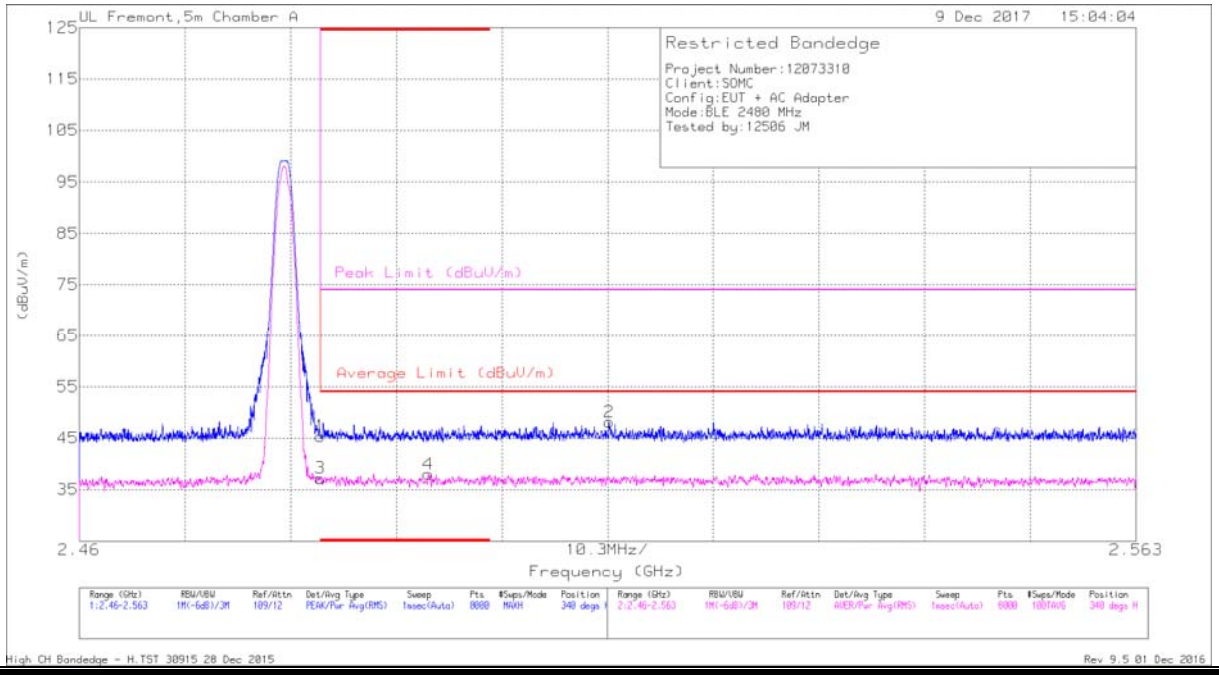
9.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	* 2.484	36.24	Pk	32.3	-23.2	0	45.34	-	-	74	-28.66	340	114	H
3	* 2.484	27.4	RMS	32.3	-23.2	.69	37.19	54	-16.81	-	-	340	114	H
4	* 2.494	28.19	RMS	32.4	-23.3	.69	37.98	54	-16.02	-	-	340	114	H
2	2.512	38.91	Pk	32.4	-23.2	0	48.11	-	-	74	-25.89	340	114	H

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

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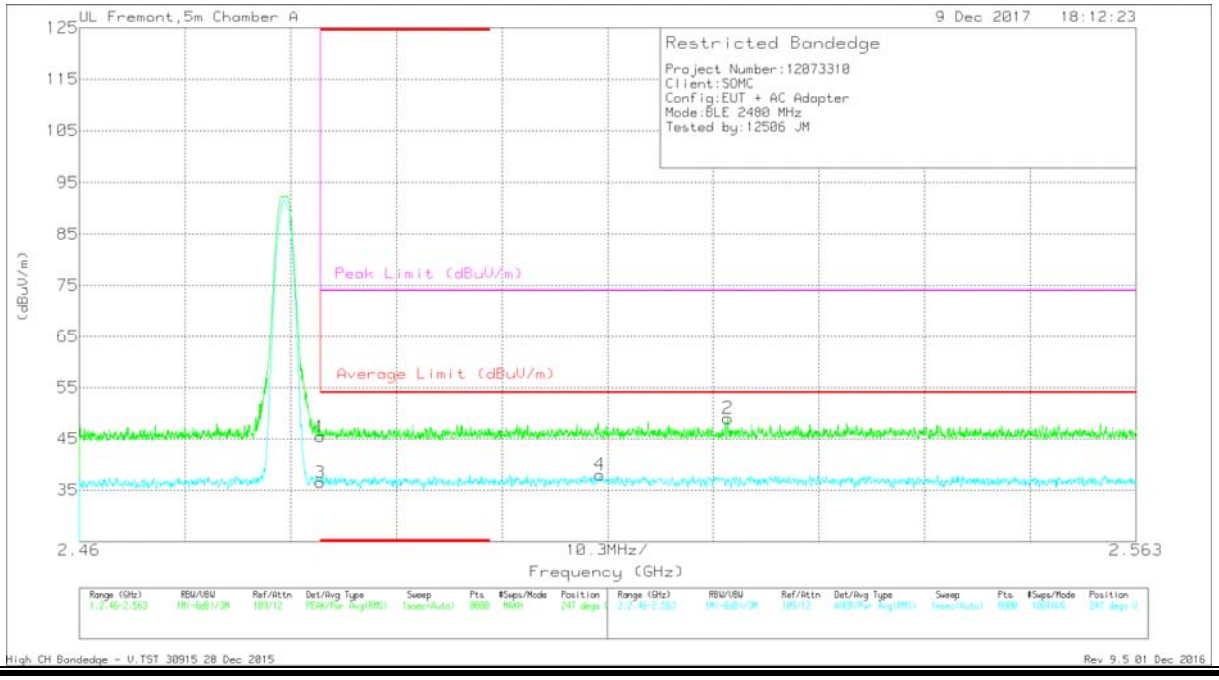
HIGH CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	* 2.484	36.35	Pk	32.3	-23.2	0	45.45	-	-	74	-28.55	247	362	V
3	* 2.484	26.73	RMS	32.3	-23.2	.69	36.52	54	-17.48	-	-	247	362	V
4	2.511	28.14	RMS	32.4	-23.2	.69	38.03	54	-15.97	-	-	247	362	V
2	2.523	39.82	Pk	32.4	-23.2	0	49.02	-	-	74	-24.98	247	362	V

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

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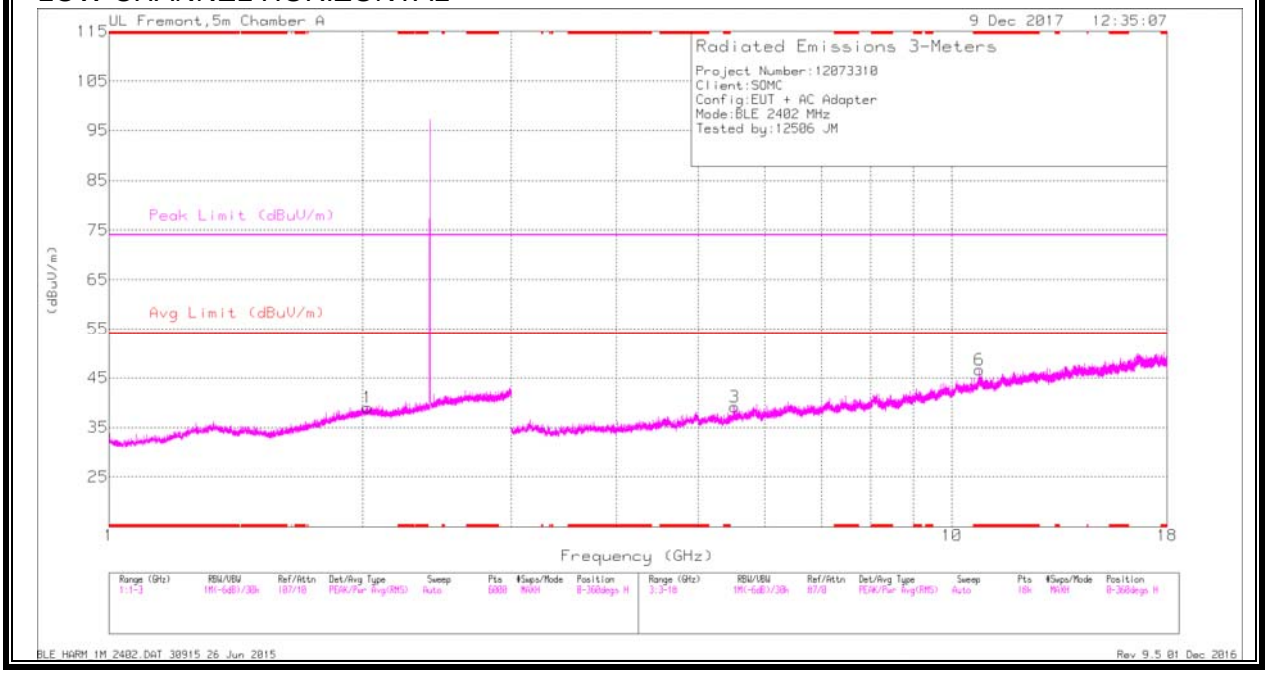
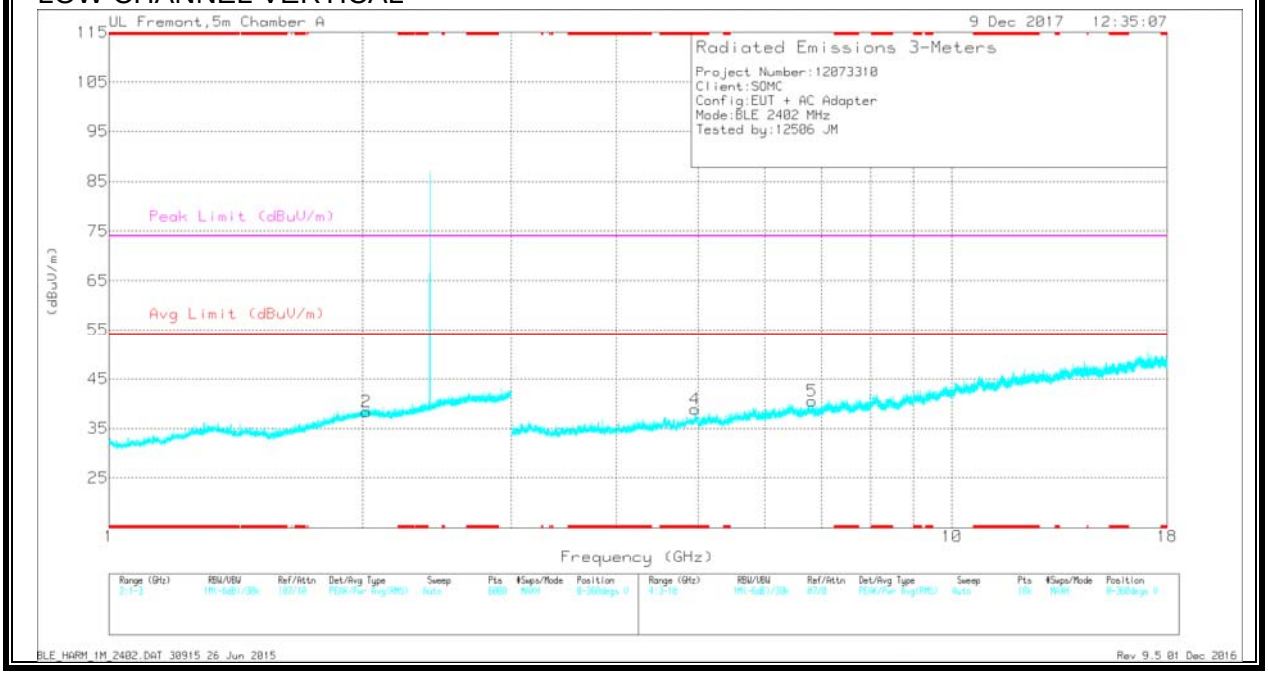
9.2.3. HARMONICS AND SPURIOUS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/ 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
* 10.779	31.7	PK2	37.8	-18.3	0	51.2	-	-	74	-22.8	214	251	H
* 10.776	20.31	MAv1	37.8	-18.3	.69	40.5	54	-13.5	-	-	214	251	H
* 4.953	36.06	PK2	34.2	-27	0	43.26	-	-	74	-30.74	263	258	V
* 4.954	24.91	MAv1	34.2	-27	.69	32.8	54	-21.2	-	-	263	258	V
2.018	36.72	PK2	31.4	-23.2	0	44.92	-	-	-	-	219	379	V
2.024	36.96	PK2	31.4	-23.2	0	45.16	-	-	-	-	79	366	H
5.521	34.38	PK2	34.9	-25.7	0	43.58	-	-	-	-	42	211	H
6.819	33.08	PK2	35.5	-22.9	0	45.68	-	-	-	-	108	137	V

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

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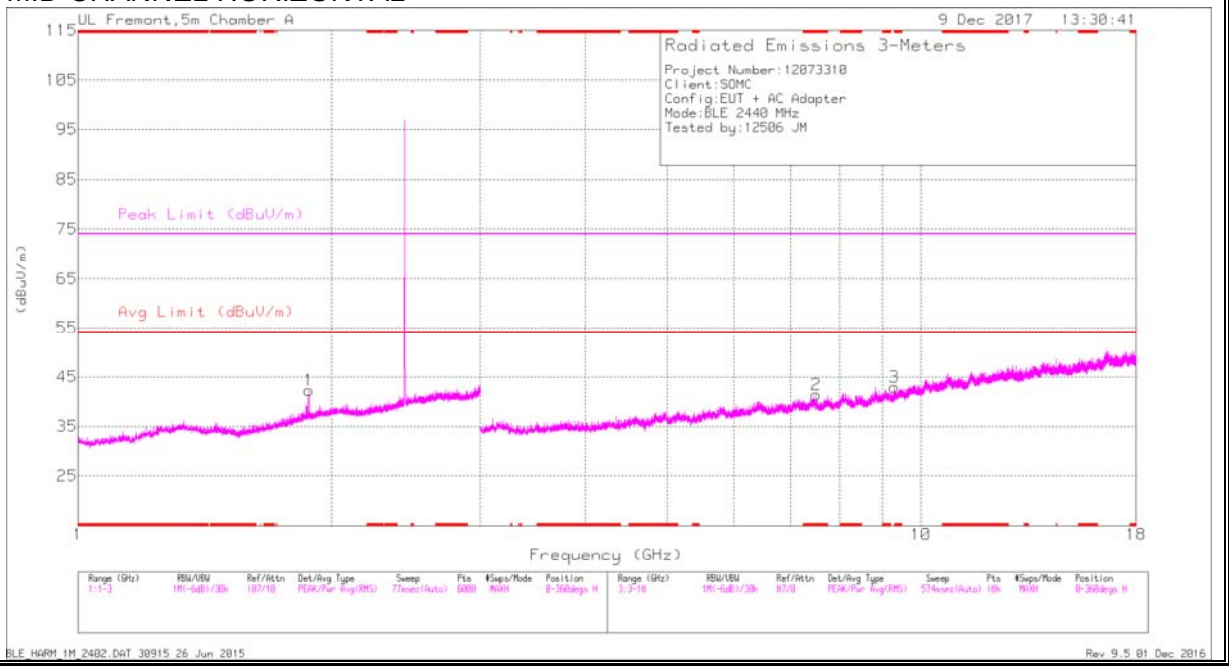
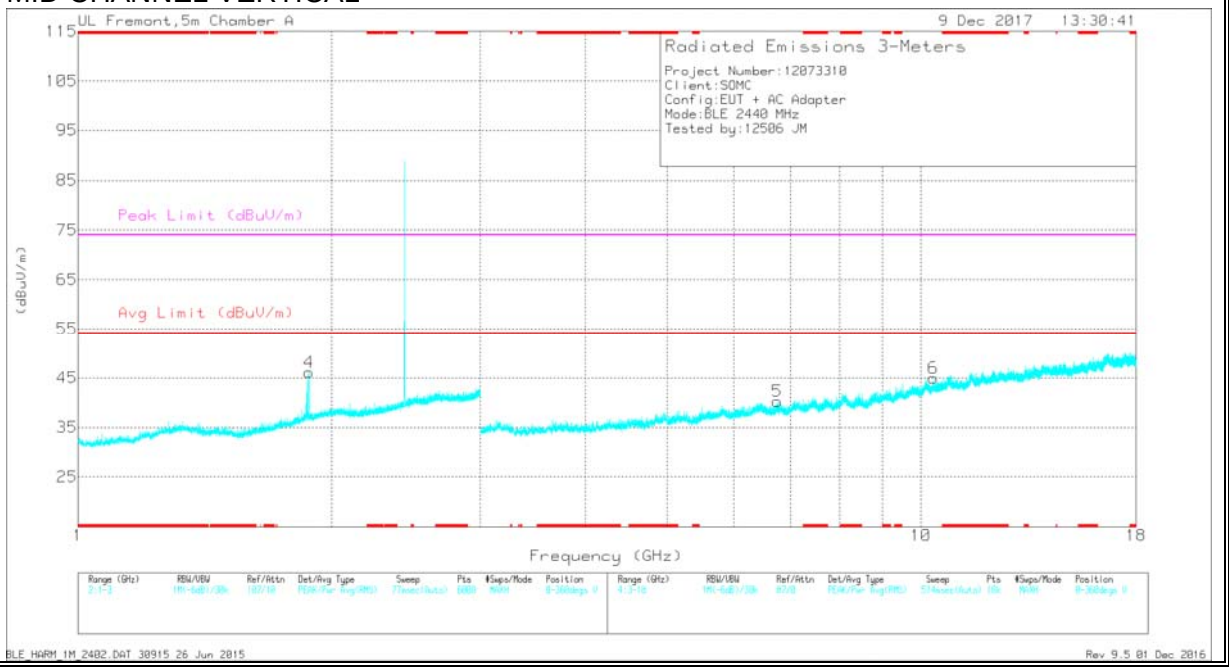
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
* 7.513	33.5	PK2	35.7	-22.2	0	47	-	-	74	-27	44	125	H
* 7.516	21.28	MAv1	35.7	-22.3	.69	35.37	54	-18.63	-	-	44	125	H
1.877	36.53	PK2	31	-23.3	0	44.23	-	-	-	-	244	219	V
1.878	37.56	PK2	31	-23.3	0	45.26	-	-	-	-	178	158	H
6.756	33.07	PK2	35.5	-23.2	0	45.37	-	-	-	-	142	102	V
9.294	32.66	PK2	36.6	-21.7	0	47.56	-	-	-	-	154	175	H
10.342	31.84	PK2	37.5	-19.4	0	49.94	-	-	-	-	349	187	V

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

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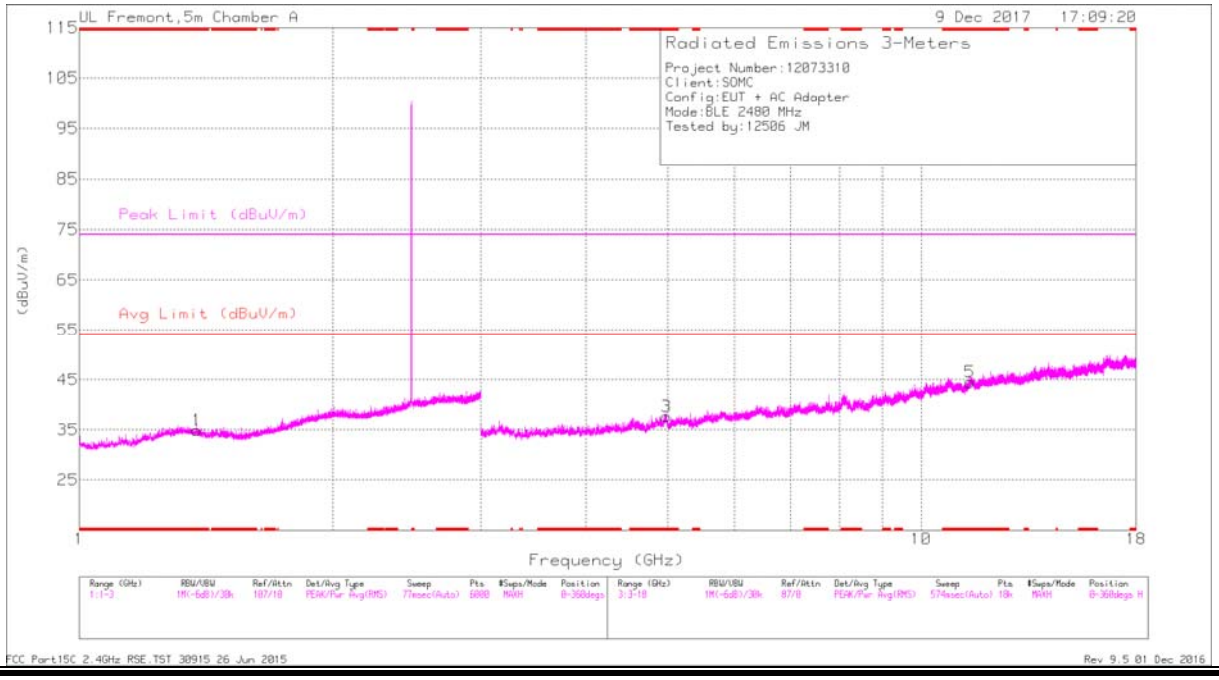
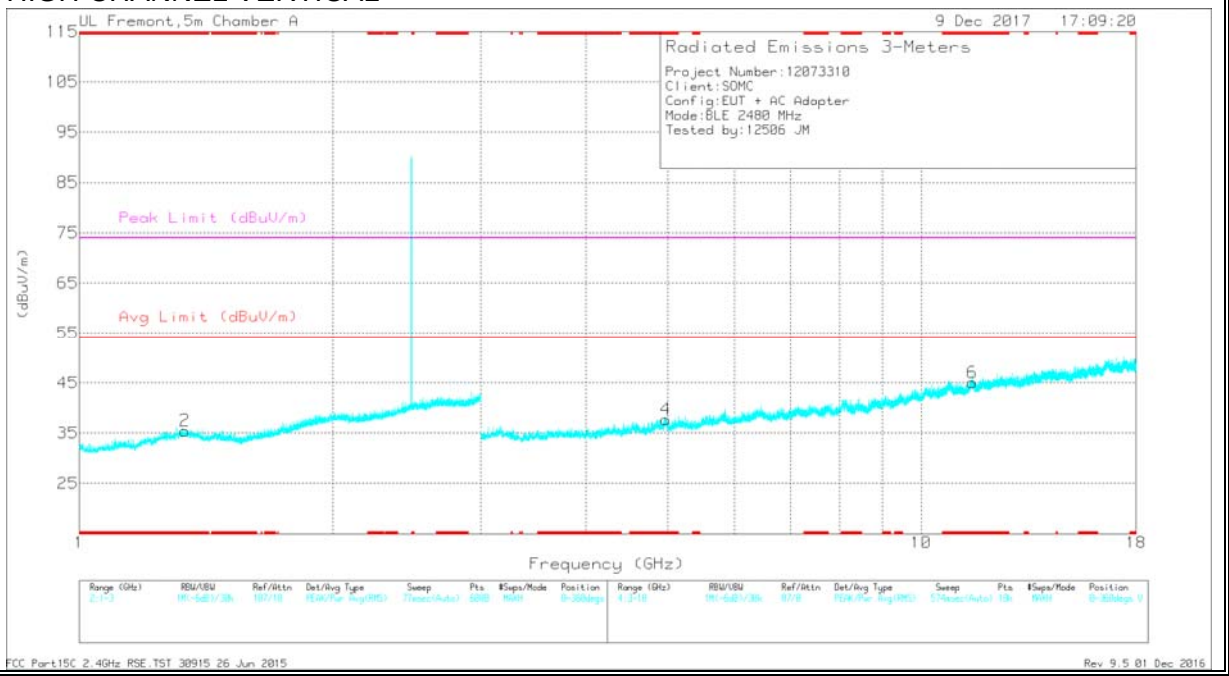
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
* 1.379	35.71	PK2	29	-23.5	0	41.21	-	-	74	-32.79	255	101	H
* 1.378	24.4	MAv1	29	-23.5	.69	30.59	54	-23.41	-	-	255	101	H
* 1.337	35.75	PK2	29.5	-23.7	0	41.55	-	-	74	-32.45	231	109	V
* 1.337	24.47	MAv1	29.5	-23.7	.69	30.96	54	-23.04	-	-	231	109	V
* 4.984	37.35	PK2	34.3	-27.3	0	44.35	-	-	74	-29.65	158	224	H
* 4.986	26	MAv1	34.3	-27.4	.69	33.59	54	-20.41	-	-	158	224	H
* 11.423	32.34	PK2	38.2	-18.6	0	51.94	-	-	74	-22.06	95	351	H
* 11.425	20.72	MAv1	38.2	-18.7	.69	40.91	54	-13.09	-	-	95	351	H
* 4.972	37.49	PK2	34.3	-27.2	0	44.59	-	-	74	-29.41	129	189	V
* 4.972	26.06	MAv1	34.3	-27.2	.69	33.85	54	-20.15	-	-	129	189	V
* 11.498	32.12	PK2	38.3	-18.4	0	52.02	-	-	74	-21.98	238	102	V
* 11.5	21.06	MAv1	38.3	-18.4	.69	41.65	54	-12.35	-	-	238	102	V

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

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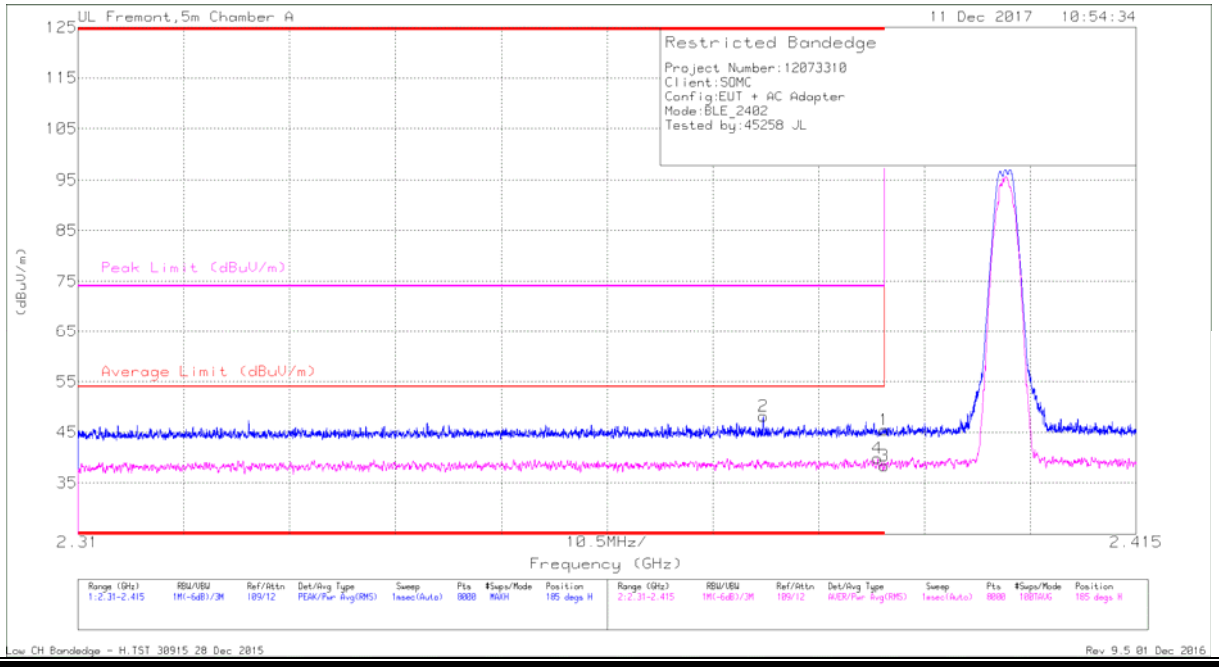
9.3. TRANSMITTER ABOVE 1 GHz 2Mbps

9.3.1. RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	36.99	Pk	31.8	-23.3	0	45.49	-	-	74	-28.51	185	130	H
2	* 2.378	39.83	Pk	31.7	-23.4	0	48.13	-	-	74	-25.87	185	130	H
3	* 2.39	26.18	RMS	31.8	-23.3	1.14	35.82	54	-18.18	-	-	185	130	H
4	* 2.389	27.58	RMS	31.8	-23.3	1.14	37.22	54	-16.78	-	-	185	130	H

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

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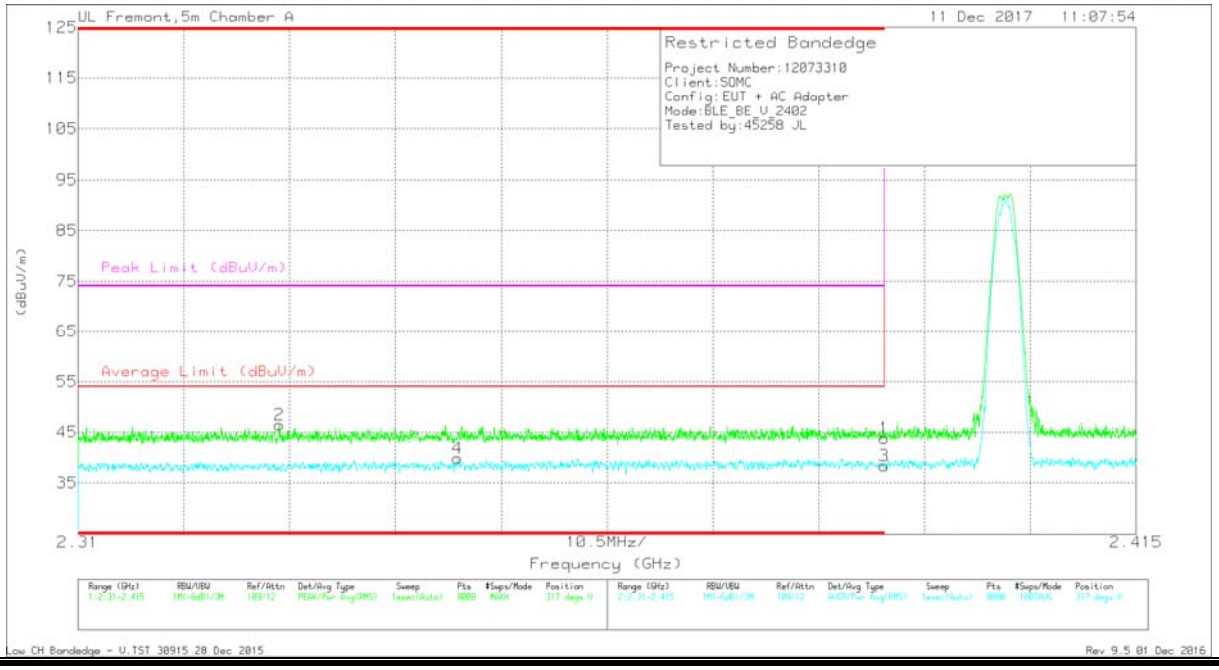
LOW CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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
2	* 2.33	38.29	Pk	31.6	-23.4	0	46.49	-	-	74	-27.51	317	375	V
4	* 2.348	27.9	RMS	31.6	-23.4	1.14	37.24	54	-16.76	-	-	317	375	V
1	* 2.39	35.31	Pk	31.8	-23.3	0	43.81	-	-	74	-30.19	317	375	V
3	* 2.39	26.13	RMS	31.8	-23.3	1.14	35.77	54	-18.23	-	-	317	375	V

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

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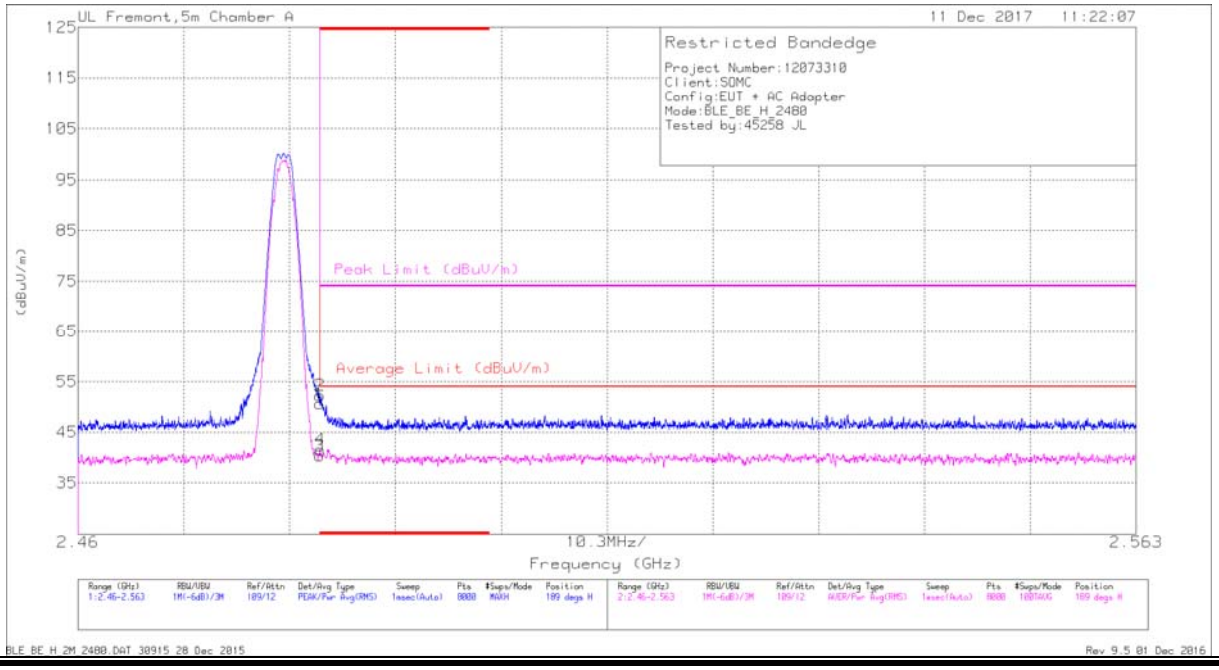
9.3.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	* 2.484	41.57	Pk	32.3	-23.2	0	50.67	-	-	74	-23.33	189	127	H
2	* 2.484	43.16	Pk	32.3	-23.2	0	52.26	-	-	74	-21.74	189	127	H
3	* 2.484	27.57	RMS	32.3	-23.2	1.14	37.81	54	-16.19	-	-	189	127	H
4	* 2.484	28.75	RMS	32.3	-23.2	1.14	38.99	54	-15.01	-	-	189	127	H

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

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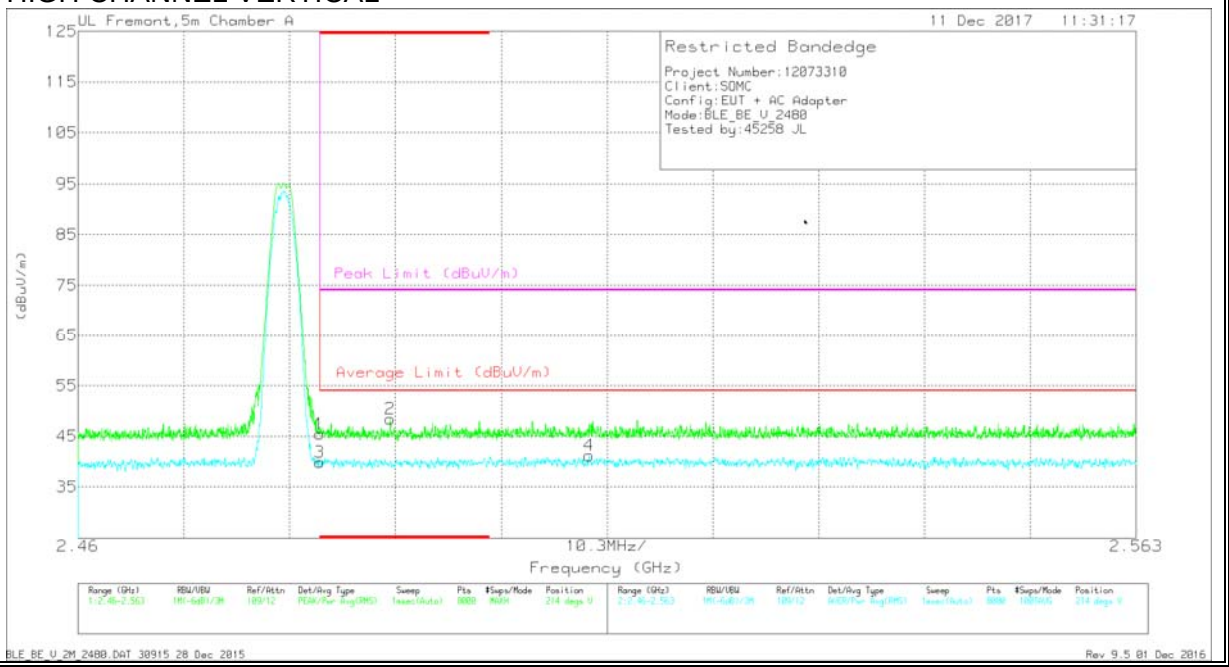
HIGH CHANNEL VERTICAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/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	* 2.484	36.36	Pk	32.3	-23.2	0	45.46	-	-	74	-28.54	214	370	V
3	* 2.484	27.02	RMS	32.3	-23.2	1.14	37.26	54	-16.74	-	-	214	370	V
2	* 2.49	39.28	Pk	32.4	-23.3	0	48.38	-	-	74	-25.62	214	370	V
4	2.51	28.13	RMS	32.4	-23.1	1.14	38.57	54	-15.43	-	-	214	370	V

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

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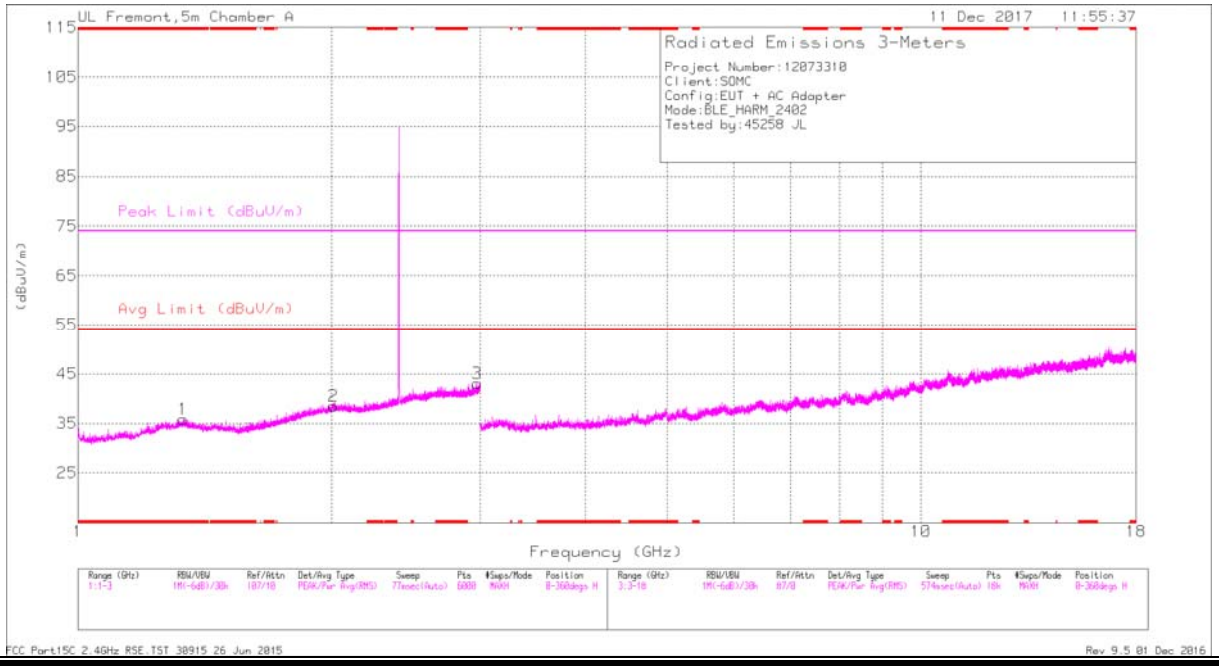
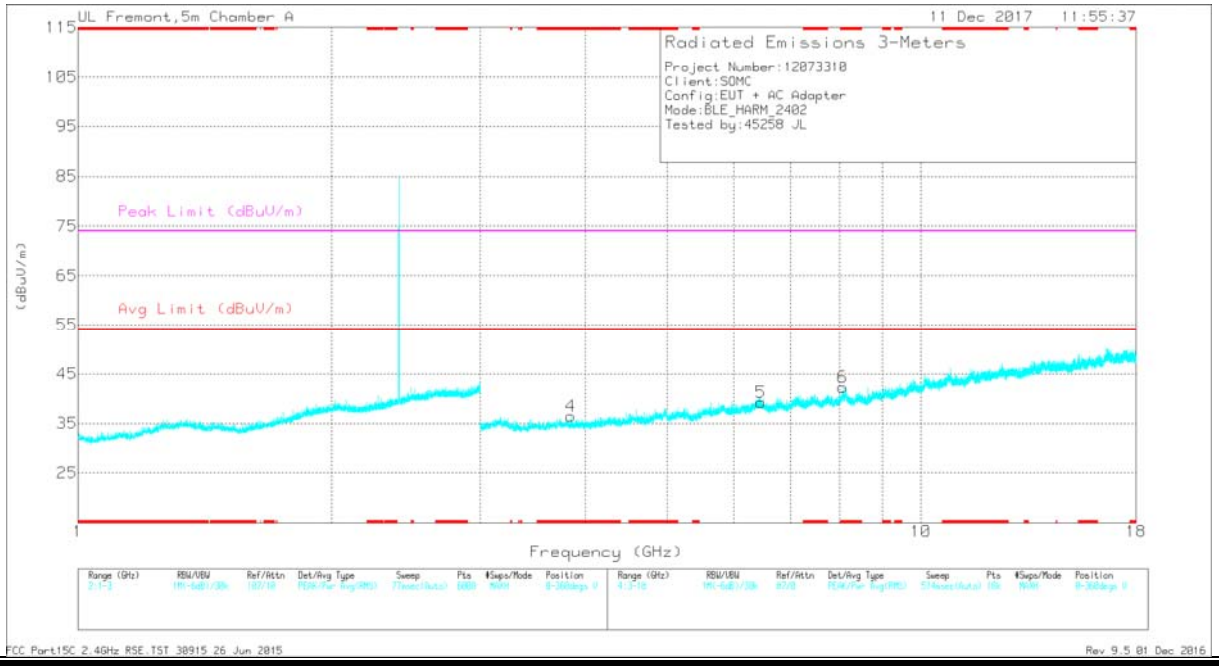
9.3.3. HARMONICS AND SPURIOUS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
* 1.333	36.33	PK2	29.5	-23.5	0	42.33	-	-	74	-31.67	348	298	H
* 1.333	23.95	MAv1	29.5	-23.5	1.14	31.07	54	-22.93	-	-	348	298	H
* 3.84	37.94	PK2	33	-28.4	0	42.54	-	-	74	-31.46	324	262	V
* 3.842	26.65	MAv1	33	-28.4	1.14	32.39	54	-21.61	-	-	324	262	V
* 8.083	33	PK2	35.8	-21.2	0	47.6	-	-	74	-26.4	209	182	V
* 8.083	21.71	MAv1	35.8	-21.2	1.14	37.45	54	-16.55	-	-	209	182	V
2.007	36.35	PK2	31.4	-23.2	0	44.55	-	-	-	-	261	150	H
2.973	37.27	PK2	32.2	-21.7	0	47.77	-	-	-	-	153	193	H
6.463	34.42	PK2	35.8	-23.7	0	46.52	-	-	-	-	65	219	V

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

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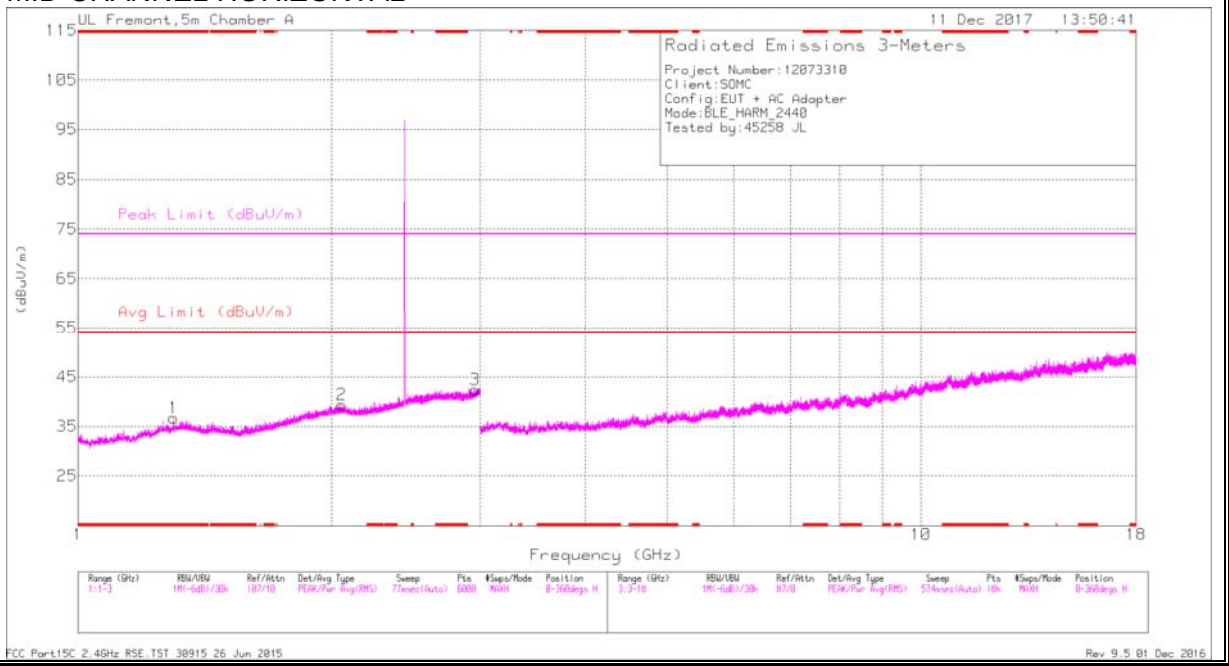
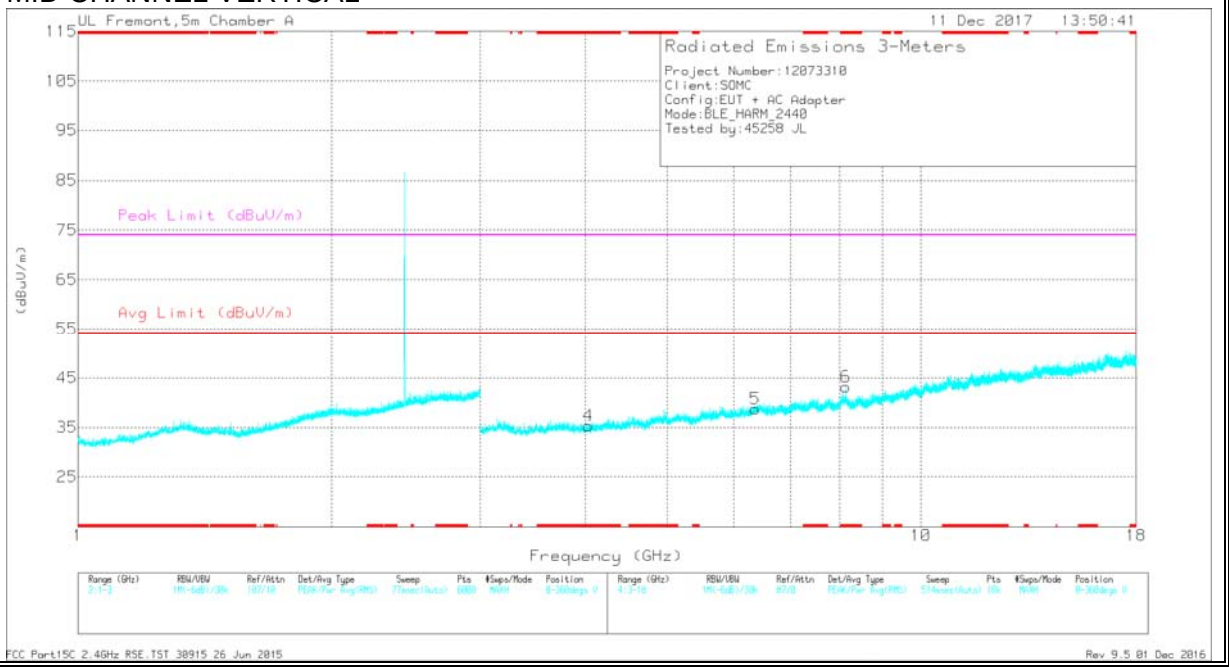
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
* 1.298	35.89	PK2	29.4	-23.7	0	41.59	-	-	74	-32.41	64	123	H
* 1.3	24.5	MAv1	29.4	-23.7	1.14	31.34	54	-22.66	-	-	64	123	H
* 4.034	37.01	PK2	33.4	-28.2	0	42.21	-	-	74	-31.79	139	179	V
* 4.032	25.88	MAv1	33.4	-28.2	1.14	32.22	54	-21.78	-	-	139	179	V
* 8.141	32.54	PK2	35.8	-20.7	0	47.64	-	-	74	-26.36	249	155	V
* 8.14	22.01	MAv1	35.8	-20.7	1.14	38.25	54	-15.75	-	-	249	155	V
2.055	36.48	PK2	31.4	-23.3	0	44.58	-	-	-	-	193	228	H
2.961	37.65	PK2	32.2	-21.8	0	48.05	-	-	-	-	294	189	H
6.356	34.57	PK2	35.8	-24.9	0	45.47	-	-	-	-	327	152	V

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

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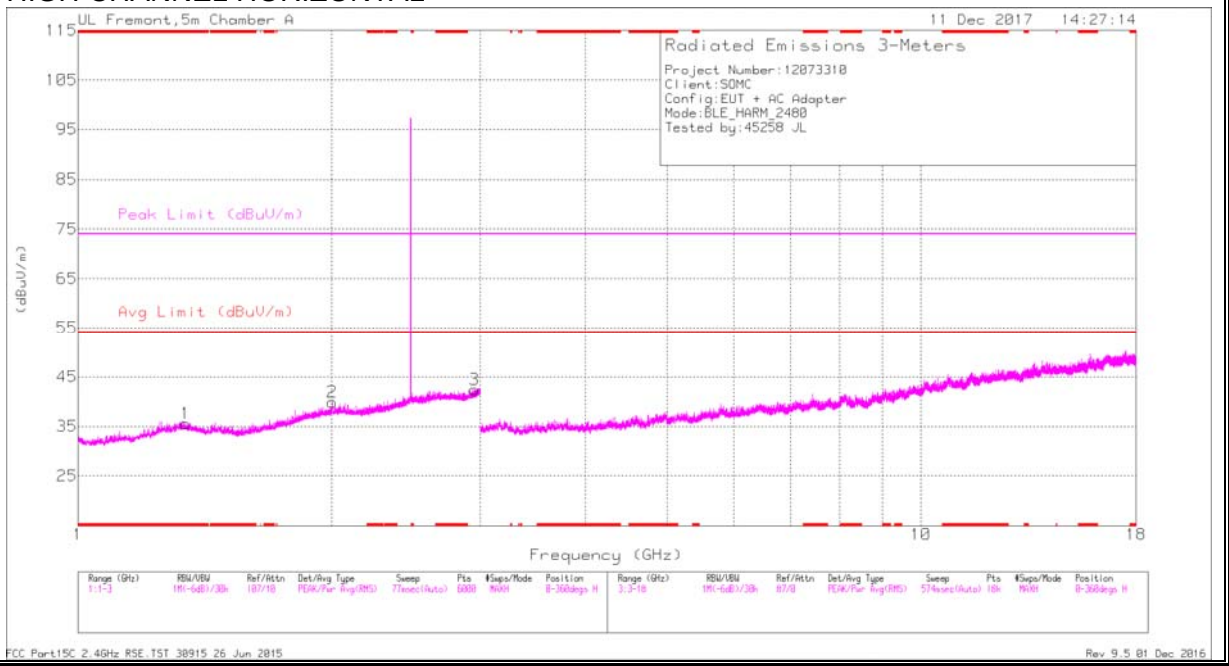
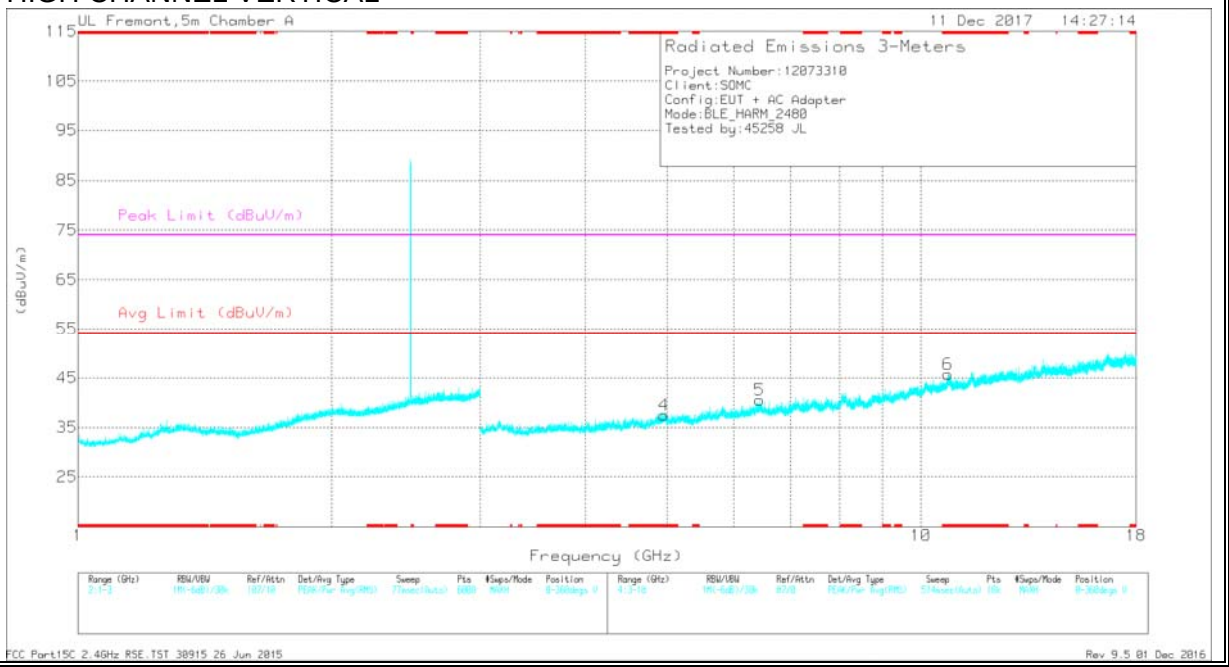
HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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
* 1.341	35.72	PK2	29.5	-23.6	0	41.62	-	-	74	-32.38	286	160	H
* 1.344	24.4	MAv1	29.5	-23.6	1.14	31.44	54	-22.56	-	-	286	160	H
* 4.96	36.94	PK2	34.2	-27.1	0	44.04	-	-	74	-29.96	137	202	V
* 4.957	25.7	MAv1	34.2	-27	1.14	34.04	54	-19.96	-	-	137	202	V
* 10.766	31.69	PK2	37.8	-18.3	0	51.19	-	-	74	-22.81	43	223	V
* 10.767	20.99	MAv1	37.8	-18.3	1.14	41.63	54	-12.37	-	-	43	223	V
2.004	36.18	PK2	31.4	-23.2	0	44.38	-	-	-	-	119	196	H
2.955	37.24	PK2	32.2	-21.8	0	47.64	-	-	-	-	232	156	H
6.439	33.78	PK2	35.8	-24	0	45.58	-	-	-	-	339	132	V

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

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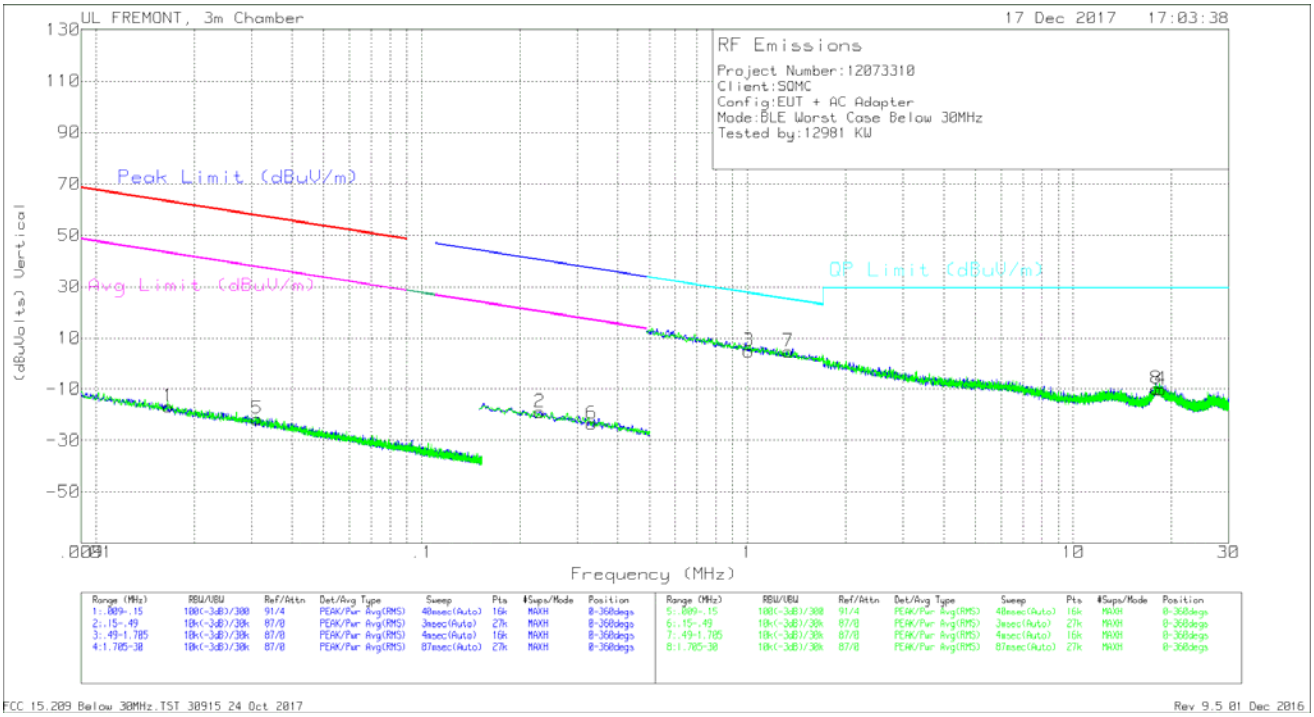
9.4. SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

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	.01665	46.63	Pk	15	1.4	-80	-16.97	63.16	-80.13	43.16	-60.13	-	-	-	-	0-360
5	.03122	41.52	Pk	15.4	1.4	-80	-21.68	57.7	-79.38	37.7	-59.38	-	-	-	-	0-360
2	.23037	45.52	Pk	13.9	1.5	-80	-19.08	-	-	-	-	40.37	-59.45	20.37	-39.45	0-360
6	.33228	41.24	Pk	13.8	1.5	-80	-23.46	-	-	-	-	37.18	-60.64	17.18	-40.64	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)	Azimuth (Degs)
3	1.00851	29.24	Pk	14.3	1.5	-40	5.04	27.55	-22.51	0-360
7	1.33428	29.03	Pk	14.3	1.5	-40	4.83	25.12	-20.29	0-360
8	17.97939	13.92	Pk	14.6	1.6	-40	-9.88	29.5	-39.38	0-360
4	18.59404	13.53	Pk	14.7	1.6	-40	-10.17	29.5	-39.67	0-360

Pk - Peak detector

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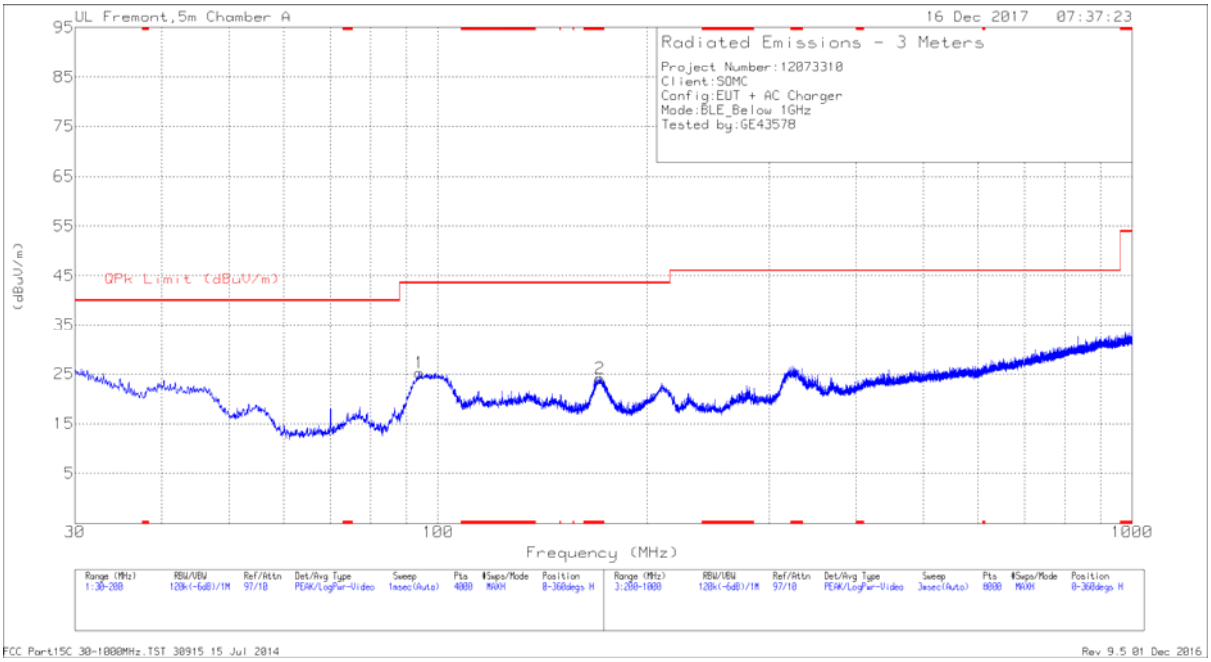
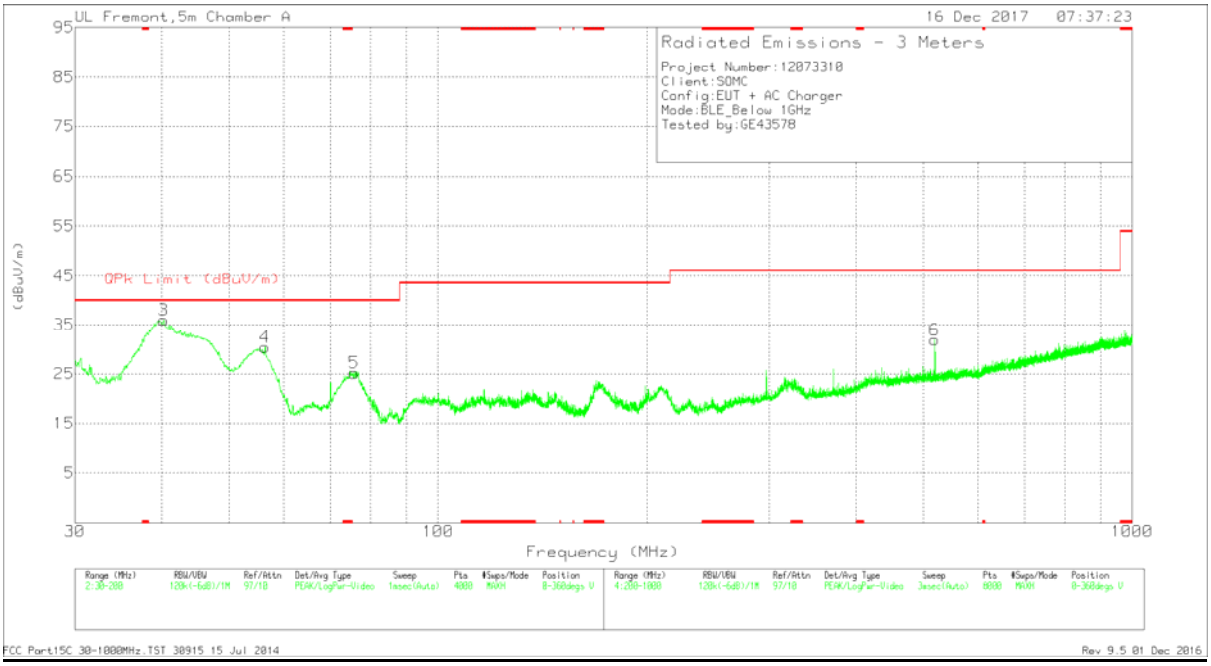
9.5. SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



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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	* 171.0515	33.96	Pk	15.7	-25.6	24.06	43.52	-19.46	0-360	100	H
3	40.2877	45.34	Pk	17.8	-27.1	36.04	40	-3.96	0-360	100	V
4	56.3568	46.27	Pk	11.1	-26.9	30.47	40	-9.53	0-360	100	V
5	75.7418	39.96	Pk	11.9	-26.7	25.16	40	-14.84	0-360	100	V
1	93.9791	39.23	Pk	12.5	-26.5	25.23	43.52	-18.29	0-360	200	H
6	519.7416	35.5	Pk	21.7	-25.3	31.9	46.02	-14.12	0-360	200	V

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

Radiated Emissions

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
40.2973	41.66	Qp	17.8	-27.1	32.36	40	-7.64	335	101	V

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

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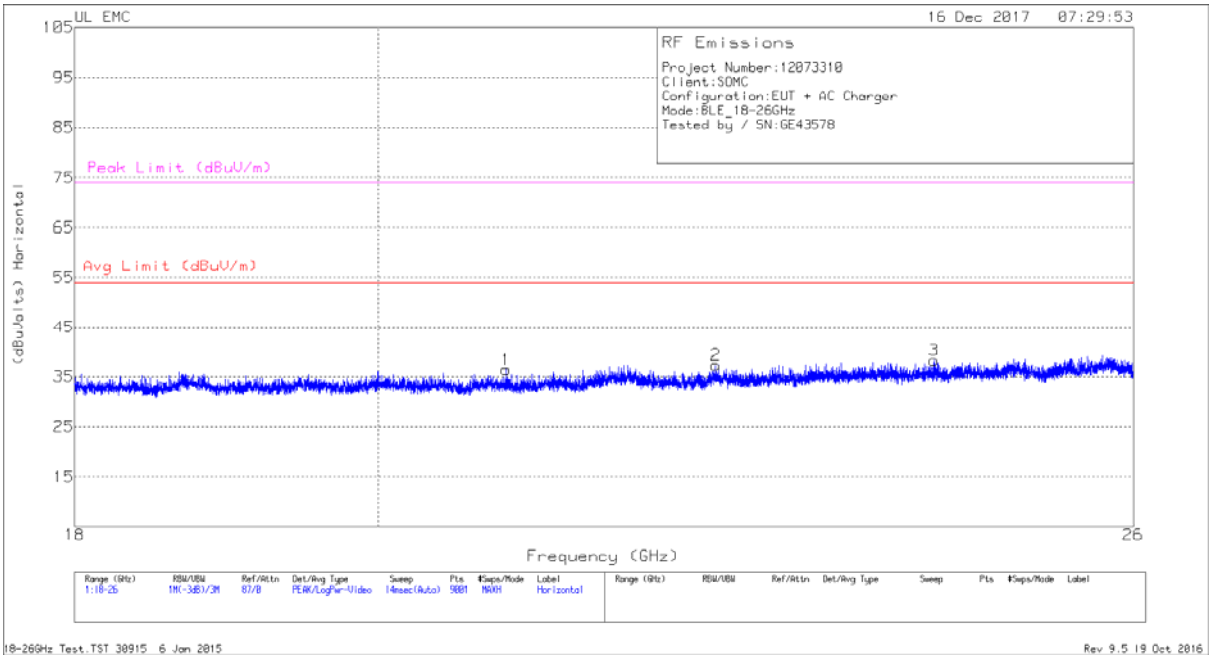
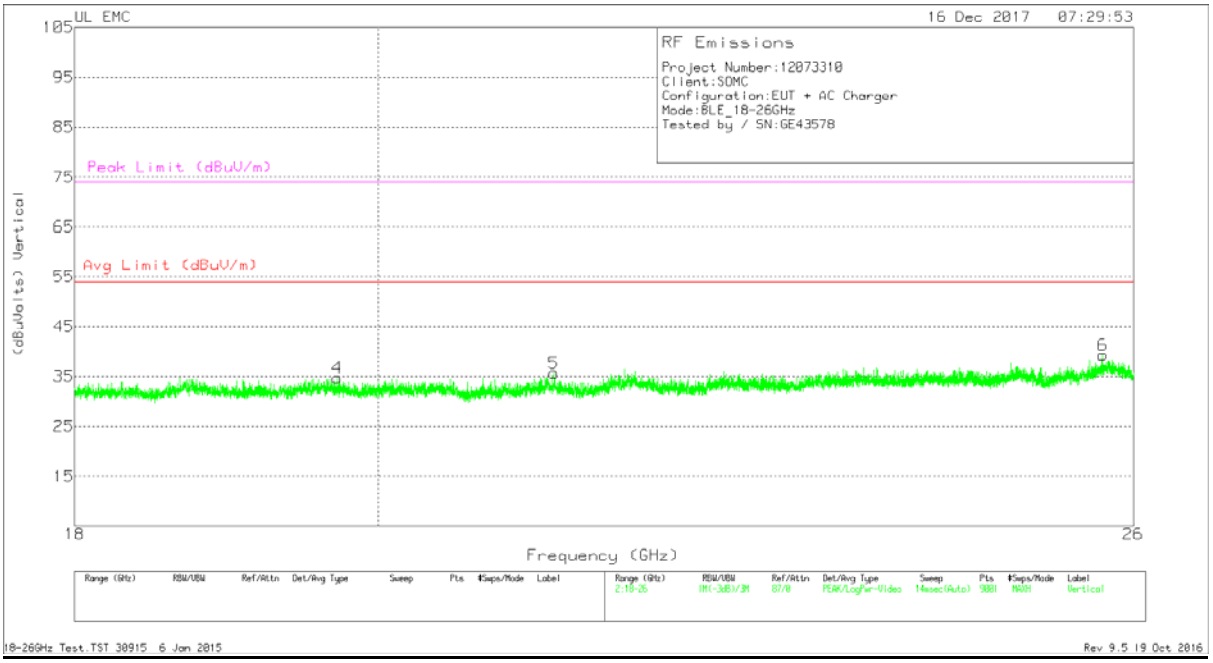
9.6. WORST-CASE 18 to 26 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

HORIZONTAL PLOT



VERTICAL PLOT



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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	20.911	38.63	Pk	32.5	-25.2	-9.5	36.43	54	-17.57	74	-37.57
2	22.488	38.17	Pk	33.4	-24.8	-9.5	37.27	54	-16.73	74	-36.73
3	24.261	38.39	Pk	33.6	-24.2	-9.5	38.29	54	-15.71	74	-35.71
4	19.72	36.71	Pk	32.5	-25	-9.5	34.71	54	-19.29	74	-39.29
5	21.26	37.4	Pk	33.2	-25.4	-9.5	35.7	54	-18.3	74	-38.3
6	25.725	39.39	Pk	34.1	-24.7	-9.5	39.29	54	-14.71	74	-34.71

Pk - Peak detector

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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

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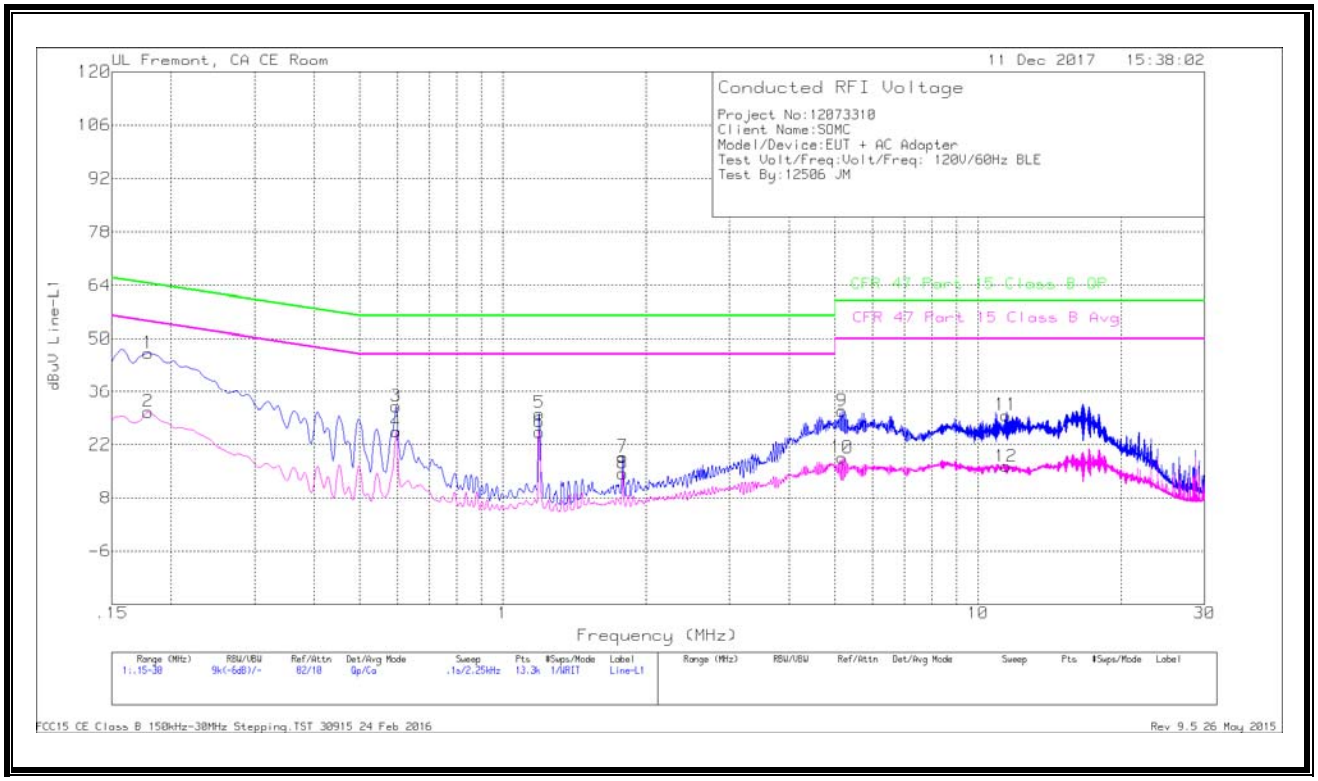
LINE 1 RESULTS



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	.17925	36.19	Qp	0	0	10.1	46.29	64.52	-18.23	-	-
2	.17925	20.51	Ca	0	0	10.1	30.61	-	-	54.52	-23.91
3	.5955	22.02	Qp	0	0	10.1	32.12	56	-23.88	-	-
4	.5955	15.27	Ca	0	0	10.1	25.37	-	-	46	-20.63
5	1.19175	20.05	Qp	0	.1	10.1	30.25	56	-25.75	-	-
6	1.19175	15.11	Ca	0	.1	10.1	25.31	-	-	46	-20.69
7	1.78575	8.58	Qp	0	.1	10.1	18.78	56	-37.22	-	-
8	1.78575	4.16	Ca	0	.1	10.1	14.36	-	-	46	-31.64
9	5.16975	20.53	Qp	0	.1	10.2	30.83	60	-29.17	-	-
10	5.1765	8.2	Ca	0	.1	10.2	18.5	-	-	50	-31.5
11	11.4495	19.24	Qp	.1	.2	10.2	29.74	60	-30.26	-	-
12	11.4495	5.81	Ca	.1	.2	10.2	16.31	-	-	50	-33.69

Qp - Quasi-Peak detector

Ca - CISPR average detection

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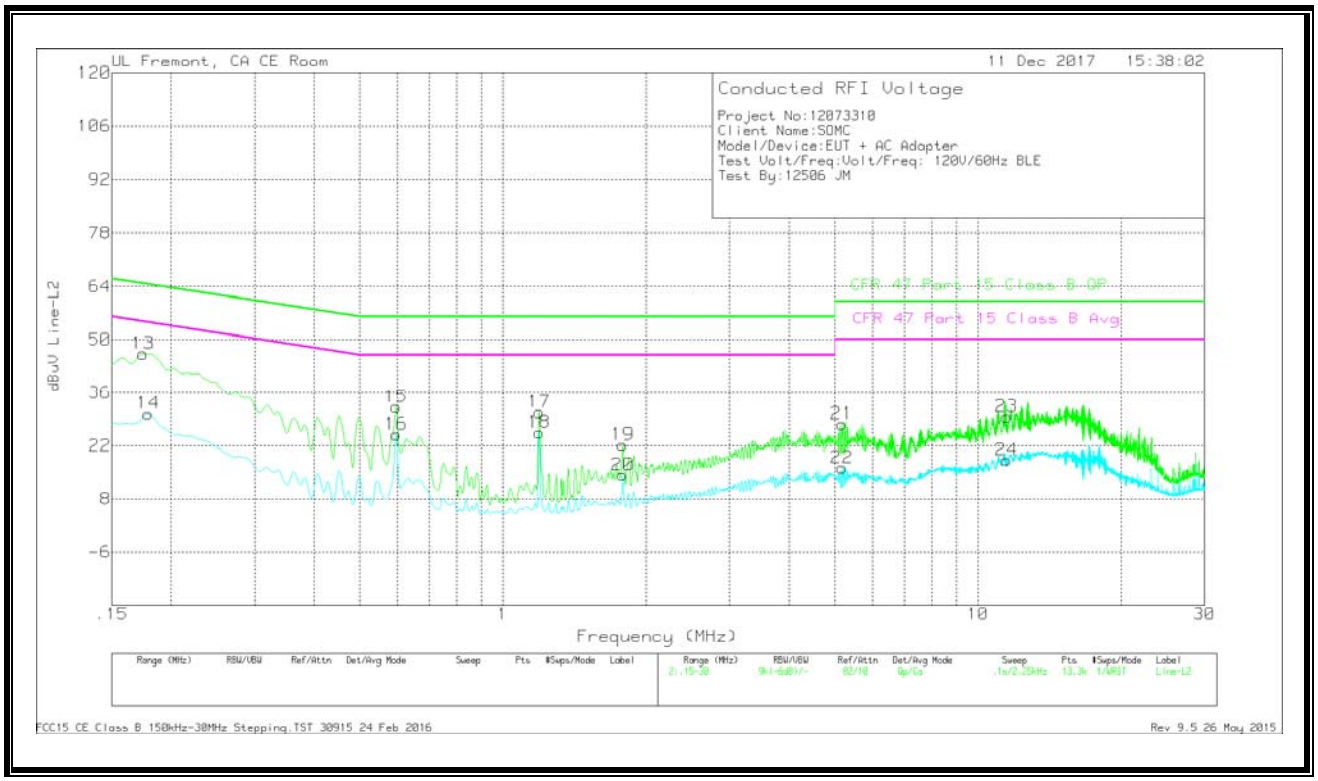
LINE 2 RESULTS



WORST EMISSIONS

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	.17475	36.24	Qp	0	0	10.1	46.34	64.73	-18.39	-	-
14	.17925	20.32	Ca	0	0	10.1	30.42	-	-	54.52	-24.1
15	.5955	22.12	Qp	0	0	10.1	32.22	56	-23.78	-	-
16	.5955	14.83	Ca	0	0	10.1	24.93	-	-	46	-21.07
17	1.19175	20.59	Qp	0	.1	10.1	30.79	56	-25.21	-	-
18	1.19175	15.25	Ca	0	.1	10.1	25.45	-	-	46	-20.55
19	1.788	11.97	Qp	0	.1	10.1	22.17	56	-33.83	-	-
20	1.788	4.05	Ca	0	.1	10.1	14.25	-	-	46	-31.75
21	5.16975	17.37	Qp	0	.1	10.2	27.67	60	-32.33	-	-
22	5.17425	5.84	Ca	0	.1	10.2	16.14	-	-	50	-33.86
23	11.49	19.19	Qp	0	.2	10.2	29.59	60	-30.41	-	-
24	11.50125	7.79	Ca	0	.2	10.2	18.19	-	-	50	-31.81

Qp - Quasi-Peak detector

Ca - CISPR average detection

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