



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

WIRELESS EARPHONE

MODEL NUMBER: A1763

**FCC ID: BCG-A1763
IC: 579C-A1763**

REPORT NUMBER: 16U23788-E1V2

ISSUE DATE: DECEMBER 15, 2016

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	12/14/2016	Initial Issue	Mengistu Mekuria
V2	12/15/2016	Address TCB's Question	Chin Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: WIRELESS EARPHONE

MODEL: A1763

SERIAL NUMBER: (Radiated) FTRSQ01YH18V, FTRSQ01ZH18V, FTRSQ01SH18V,
FTRSQ01TH18V, (Conducted) FTRSQ00GH18V,
FTRSQ009H18V,
FTRSQ003H18V

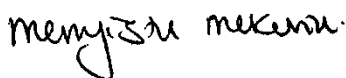
DATE TESTED: NOVEMBER 30, 2016 – DECEMBER 03, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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
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MENGISTU MEKURIA
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Prepared By:



ERIC YU
EMC 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 v03r05, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

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
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F
	<input type="checkbox"/> Chamber G
	<input checked="" type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	± 3.84dB
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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a wireless earphone. It has an integral battery, microphone and antenna. It can play music from a Bluetooth audio source. It has a Lightning port for charging. It has 4 buttons, power, vol up, vol down, and play/pause.

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	10.69	11.72

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	-2.50

5.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was Version 6.5.6.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case mode and channel used for 30-1000 MHz radiated emissions and AC line conducted emission were including AC/DC charger, mode and channel with the highest output power. EUT is transmitting while in charging mode

Above 1G radiated emission were performed with low, middle and high channels. And above 18GHz radiated emission were performed with the EUT only 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 (Flatbed), Y (Landscape) and Z (Portrait), it was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.

Data rate tested:

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Apple	A1424	NSW25679	N/A
Laptop	Apple	MacBook AIR	C02P41R2G086	N/A
USB	Apple	N/A	N/A	N/A
AC/DC Adapter	Apple	A1385	D292365A20FDHLHCW	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	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	2	N/A

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
None Used						

I/O CABLES (RADAITED BELOW 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A

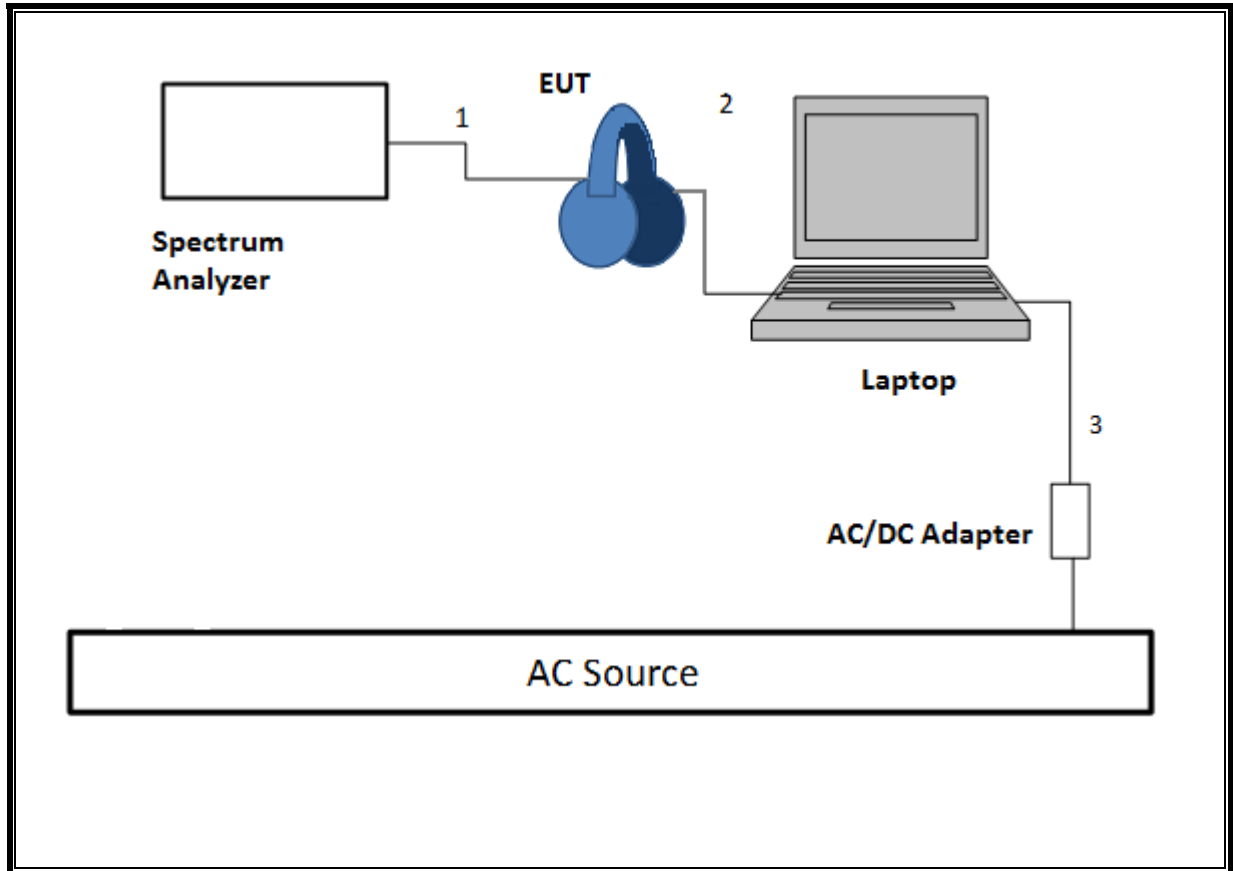
I/O CABLES (AC LINE CONDUCTED: AC/DC ADAPTER)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC/DC Adapter	Un-shielded	2	N/A

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

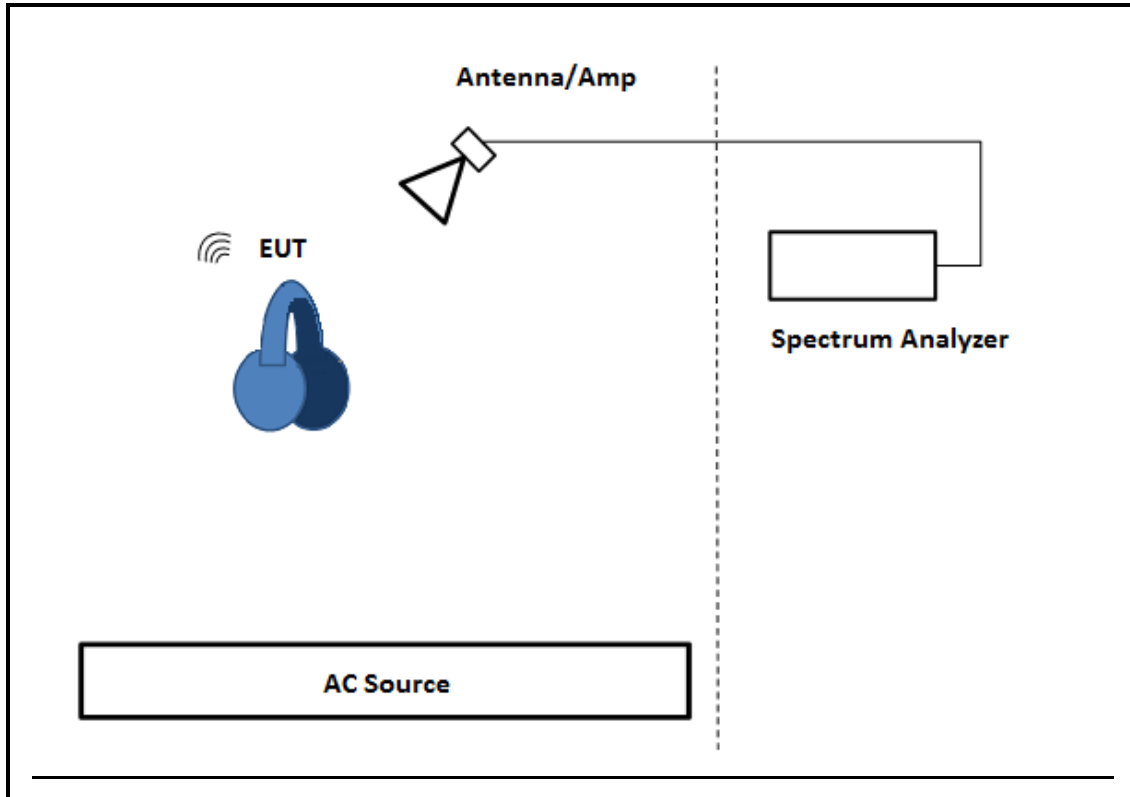
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was powered battery. Test software exercised the EUT.

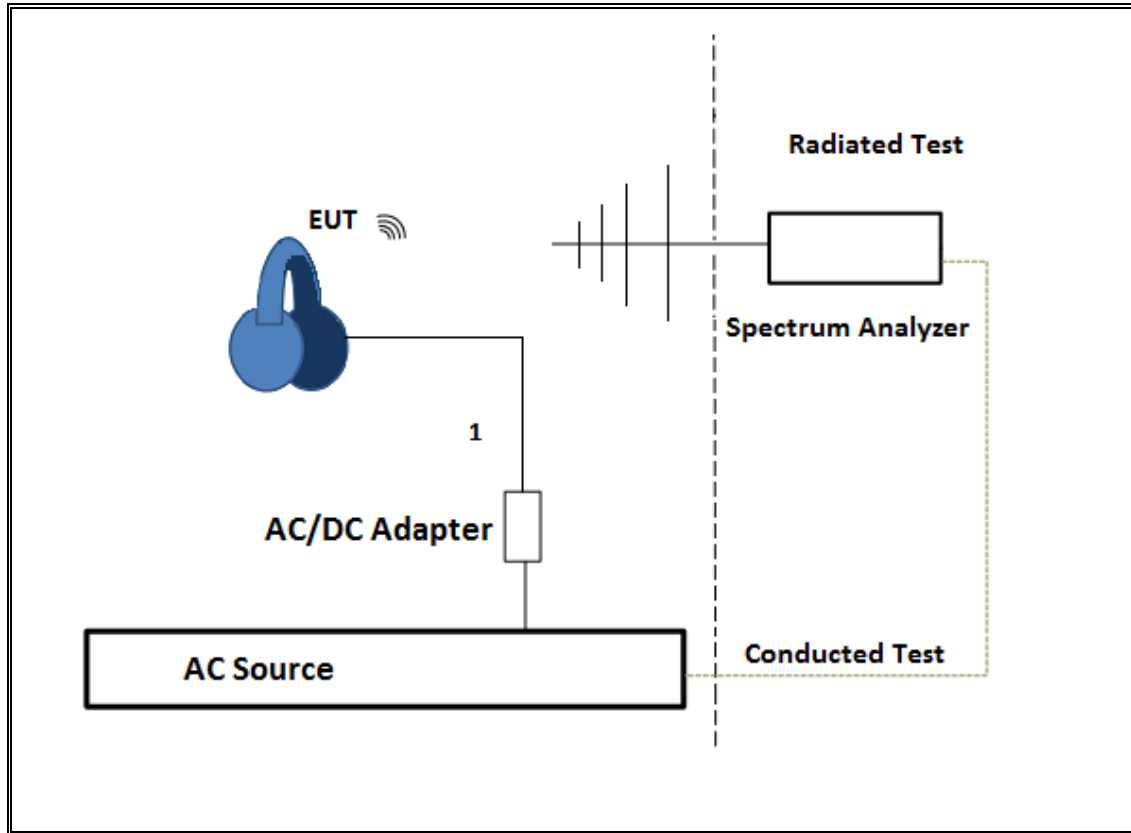
SETUP DIAGRAM



TEST SETUP- BELOW 1GHz

The EUT was tested with earphone connected and powered by AC adapter. Test software exercised the EUT.

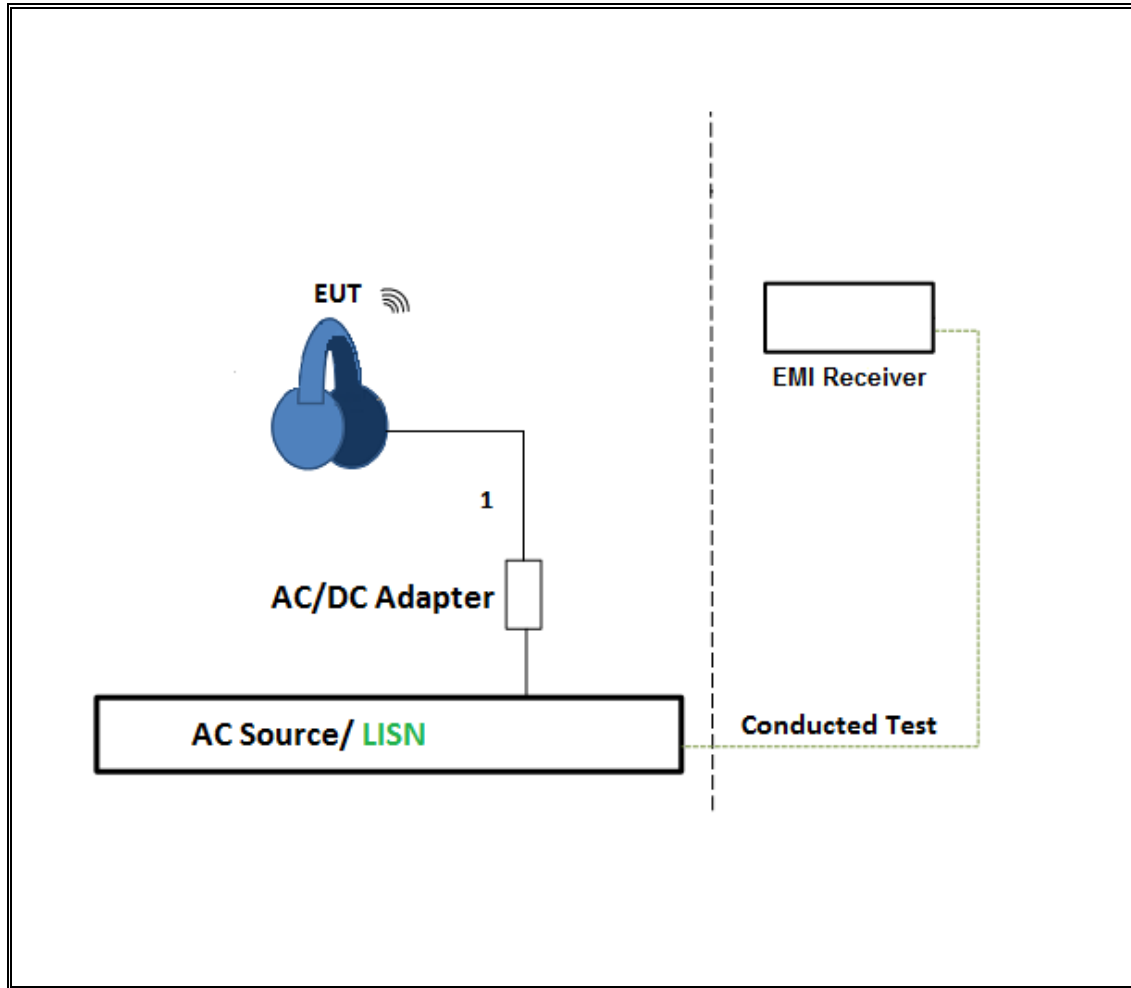
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER

The EUT was tested with earphone connected and powered by AC/DC adapter via USB cable. Test software exercised the EUT.

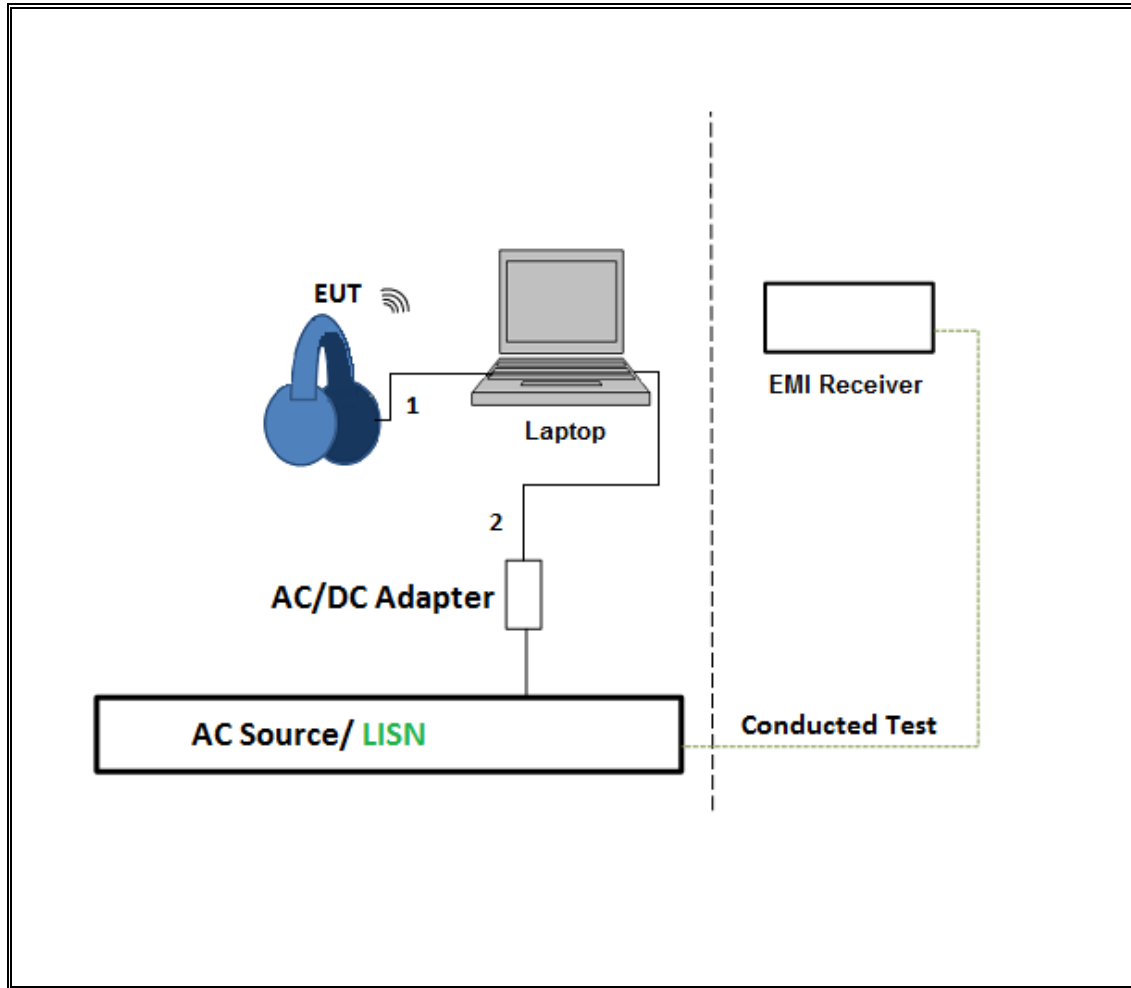
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION

The EUT was tested with earphone connected and powered by host PC via USB cable. Test software exercised the EUT.

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	T Number	Cal Due
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T339	9/22/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T341	10/25/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T344	2/22/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/3/2017
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T863	4/26/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	6/18/2017
EMI Reciever	Rohde & Schwarz	ESR-EMI	1436	12/19/16
LISN	FISCHER	LISN-50/250-25-	1310	06/08/17
Power Meter, P-series single channel	Agilent	N1911A	T1271	7/8/2017
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	T1228	6/20/2017
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	T447	6/16/2017
Spectrum Analyzer, 40 GHz	Agilent	8564E	T106	9/7/2017
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T402	7/5/2017
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/13/2017
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	161124	9/16/2017
Power Cable, Line Conducted Emissions	UL	PG1	T861	9/1/2017
UL SOFTWARE				
* Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015	
* Conducted Software	UL	UL EMC	Ver 4.0, January 11, 2016	
* AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

Note: * indicates automation software version used in the compliance certification testing

7. ANTENNA PORT TEST RESULTS

7.1. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r05, Section 8.1.

Output Power: KDB 558074 D01 v03r05, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r05, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r05, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r05, Section 12.1.

Band-edge: KDB 558074 D01 v03r05, Section 12.1.

7.2. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

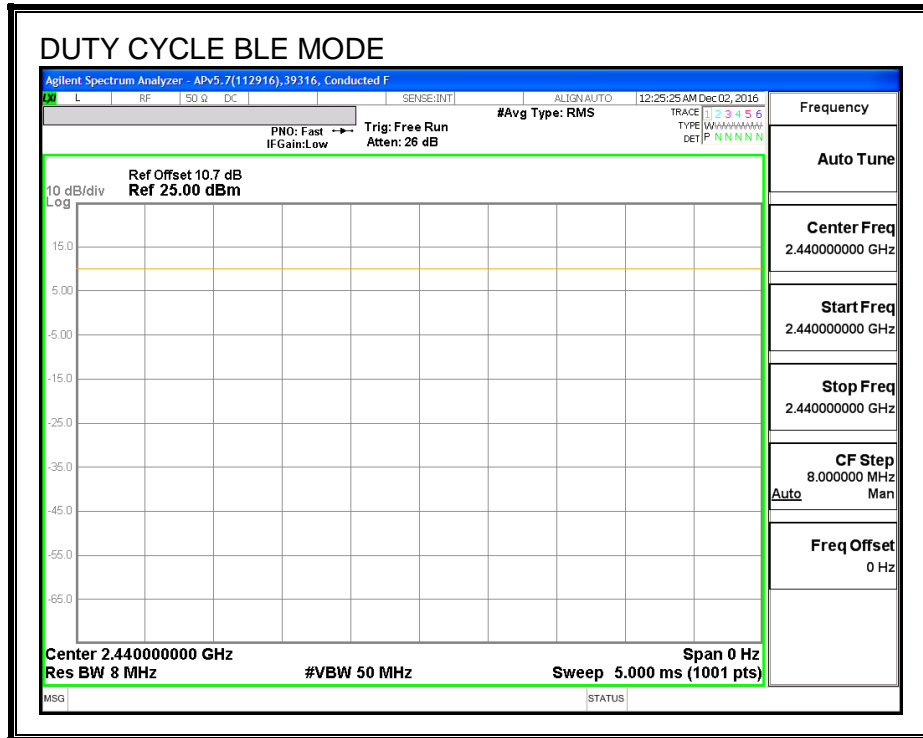
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	1.000	1.000	1.000	100.00%	0.00	0.010

DUTY CYCLE PLOTS



7.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

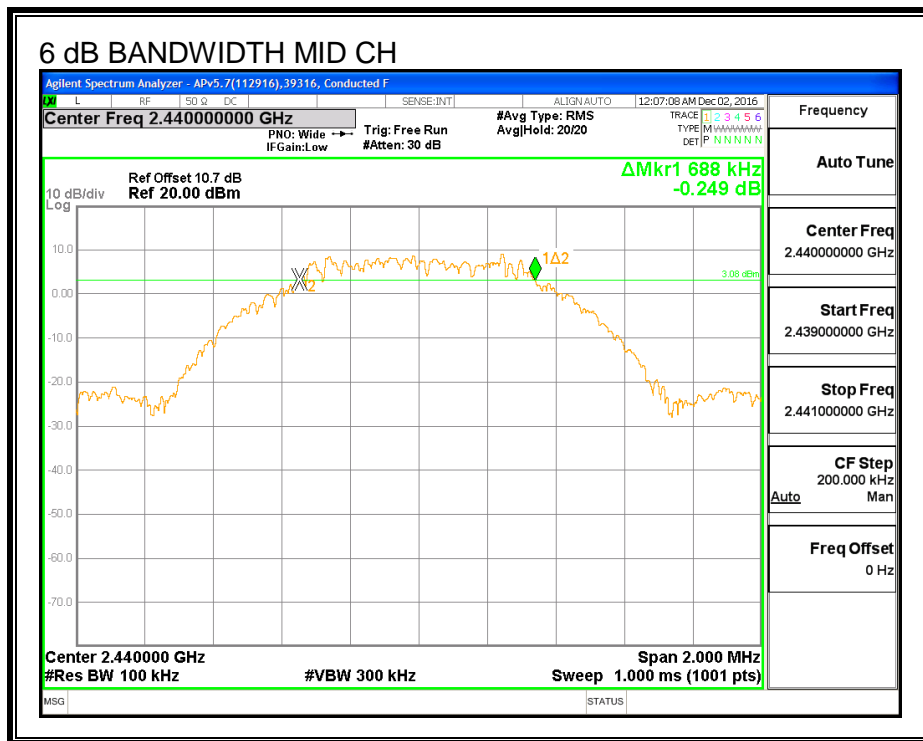
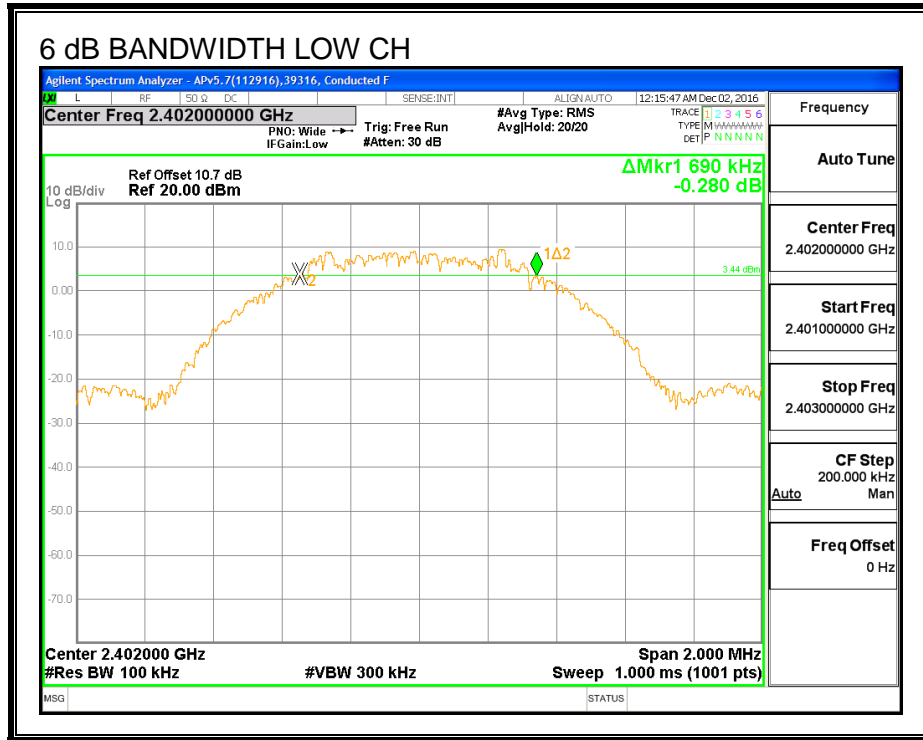
IC RSS-247 (5.2) (1)

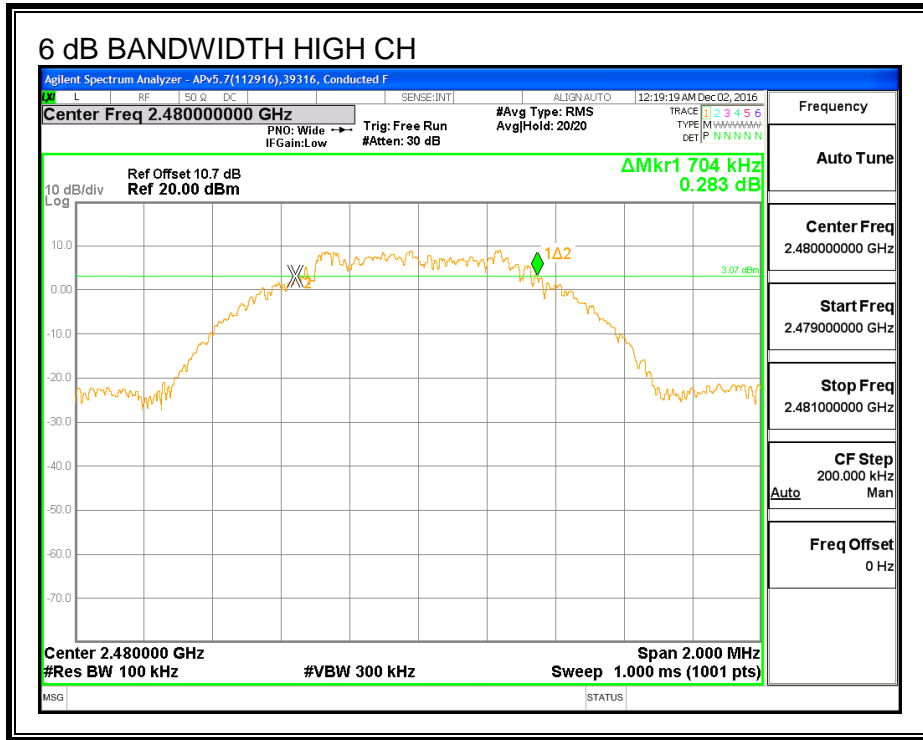
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.690	0.5
Middle	2440	0.688	0.5
High	2480	0.704	0.5

6 dB BANDWIDTH





7.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

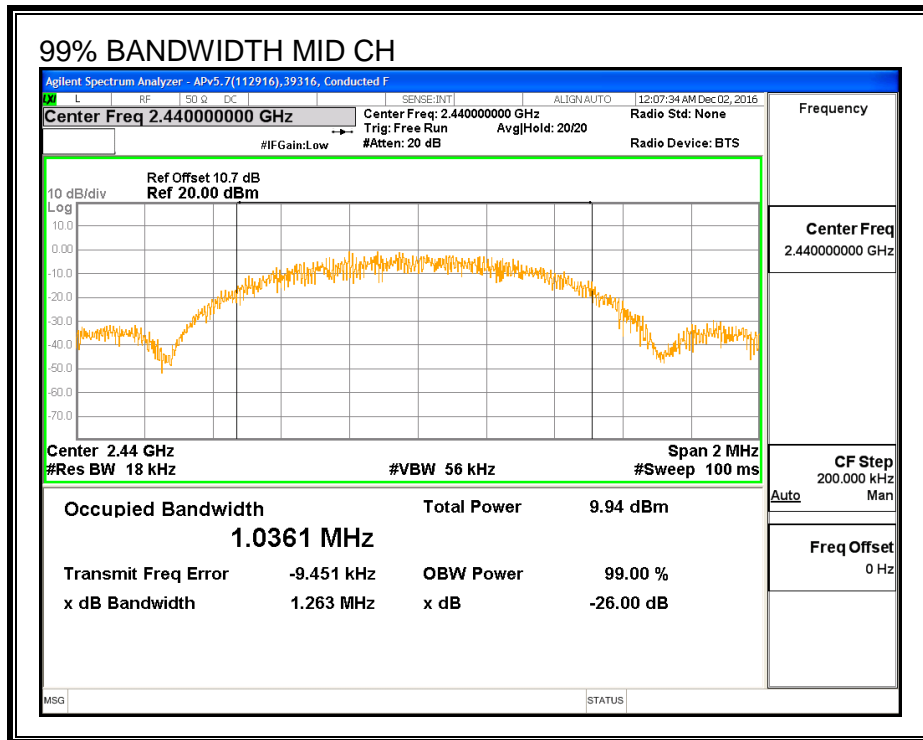
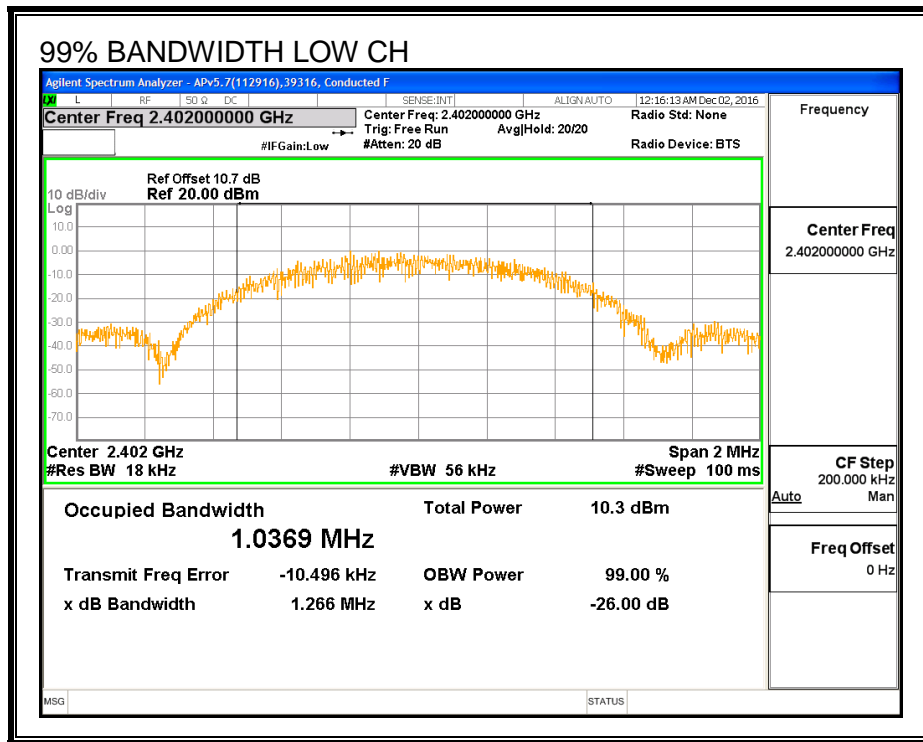
TEST PROCEDURE

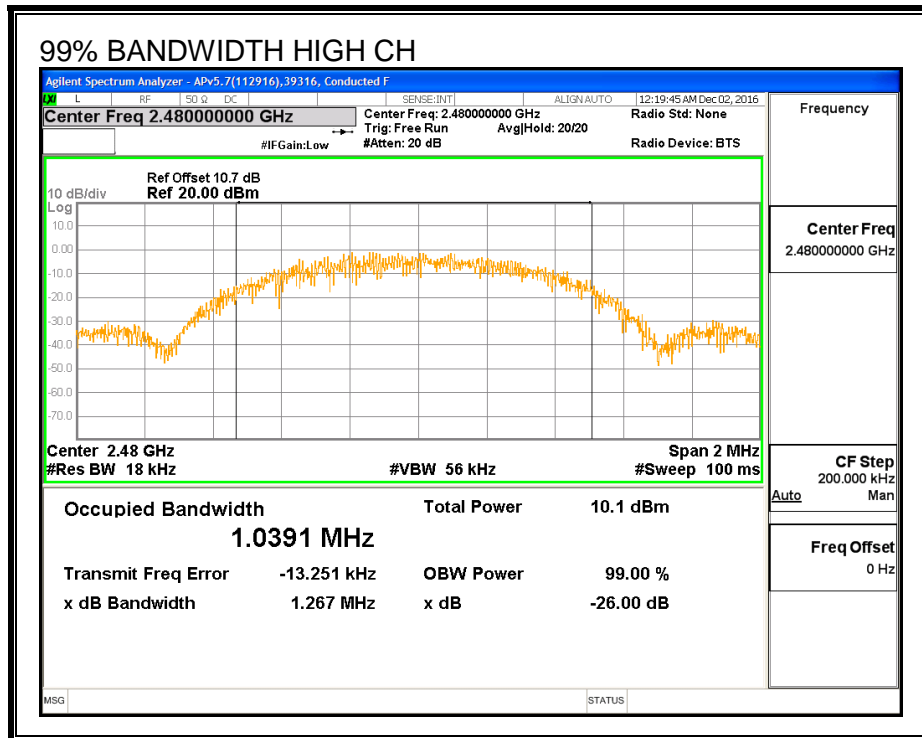
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0369
Middle	2440	1.0361
High	2480	1.0391

99% BANDWIDTH





7.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

ID:	43573	Date:	12/2/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	10.00
Middle	2440	9.86
High	2480	9.96

7.6. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-247 (5.4) (4)

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.

RESULTS

ID:	43573	Date:	12/2/16
------------	-------	--------------	---------

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.69	30	-19.310
Middle	2440	10.42	30	-19.580
High	2480	10.61	30	-19.390

7.7. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

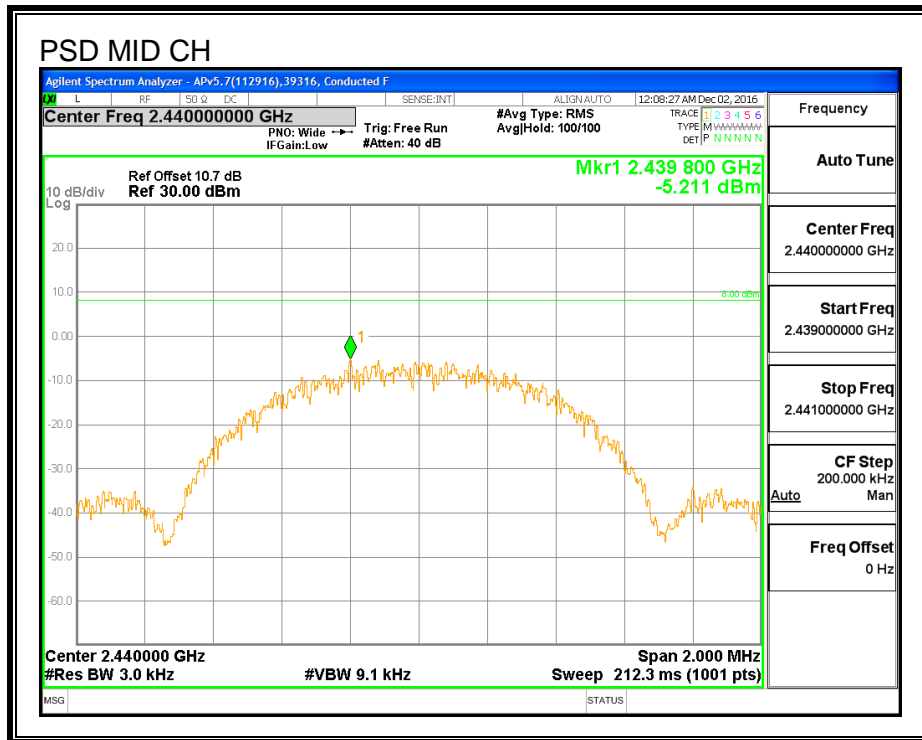
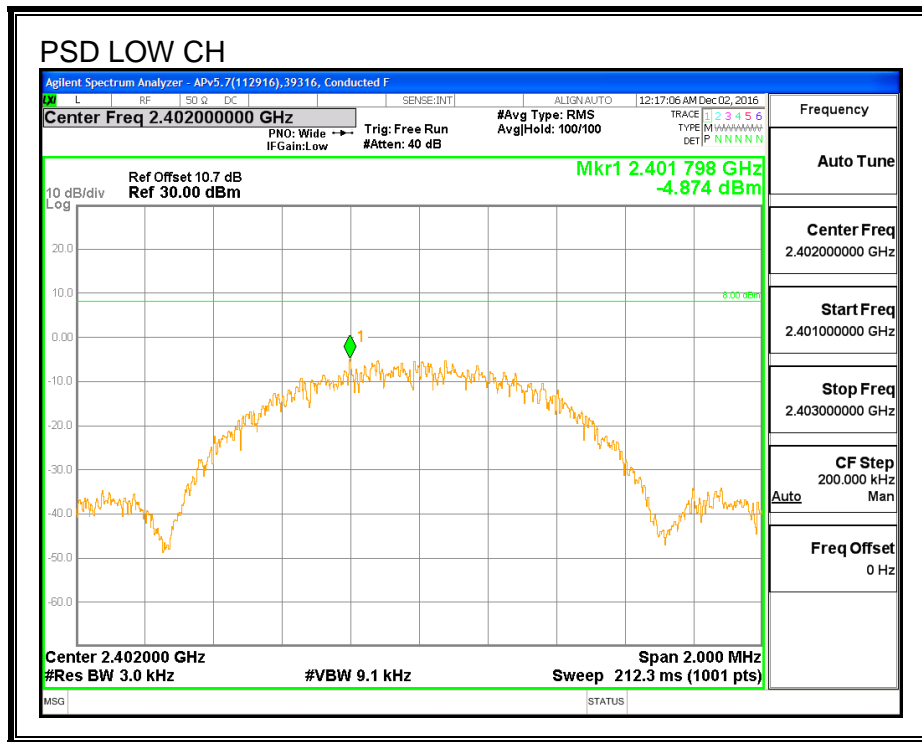
IC RSS-247 (5.2) (2)

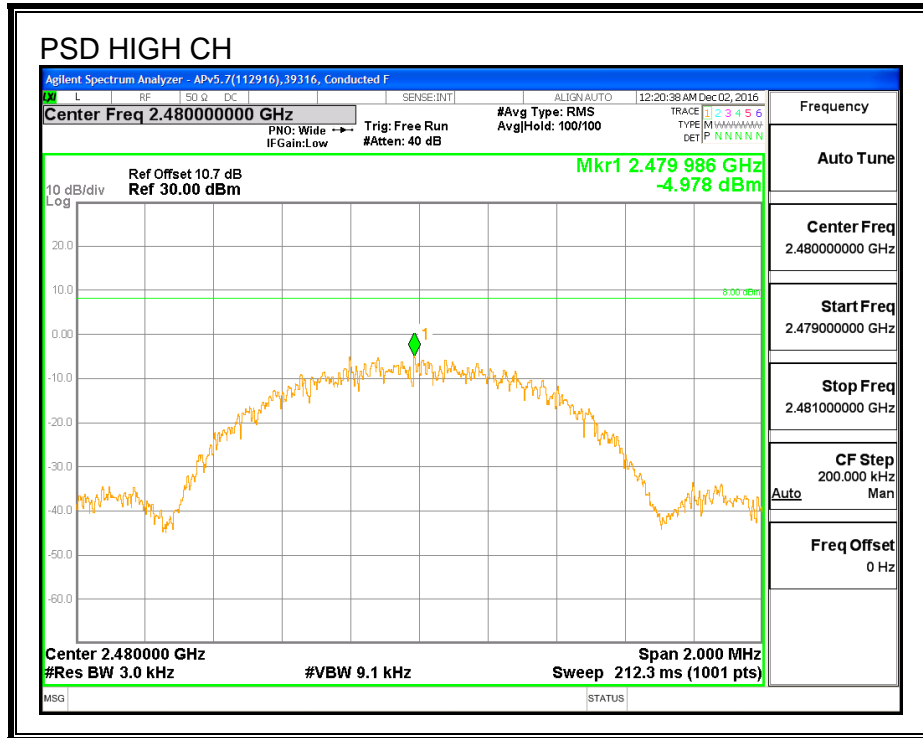
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-4.87	8	-12.87
Middle	2440	-5.21	8	-13.21
High	2480	-4.98	8	-12.98

POWER SPECTRAL DENSITY





7.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

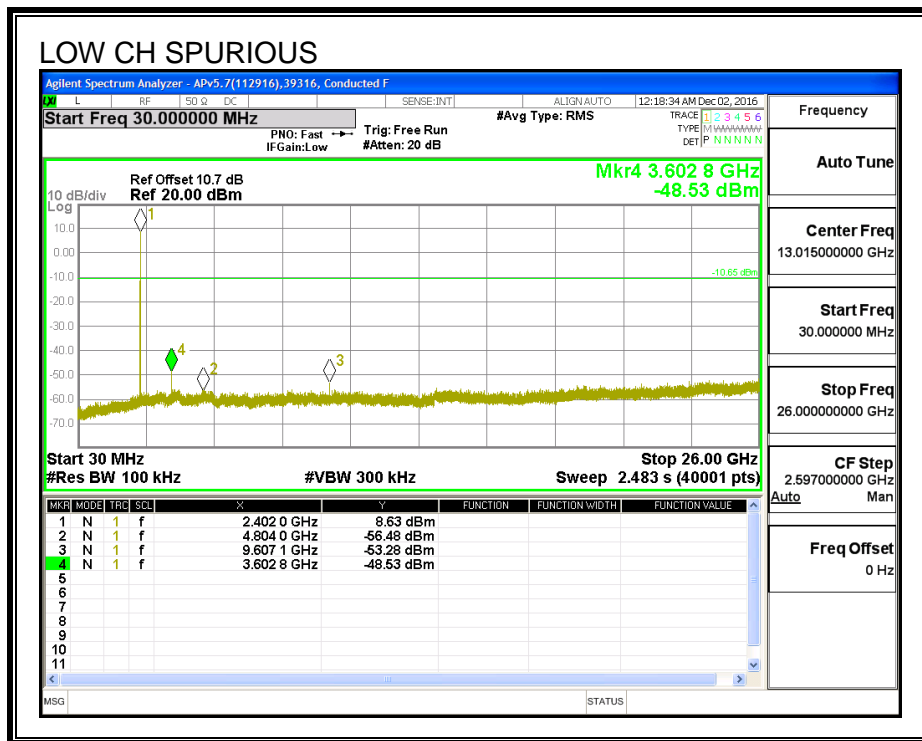
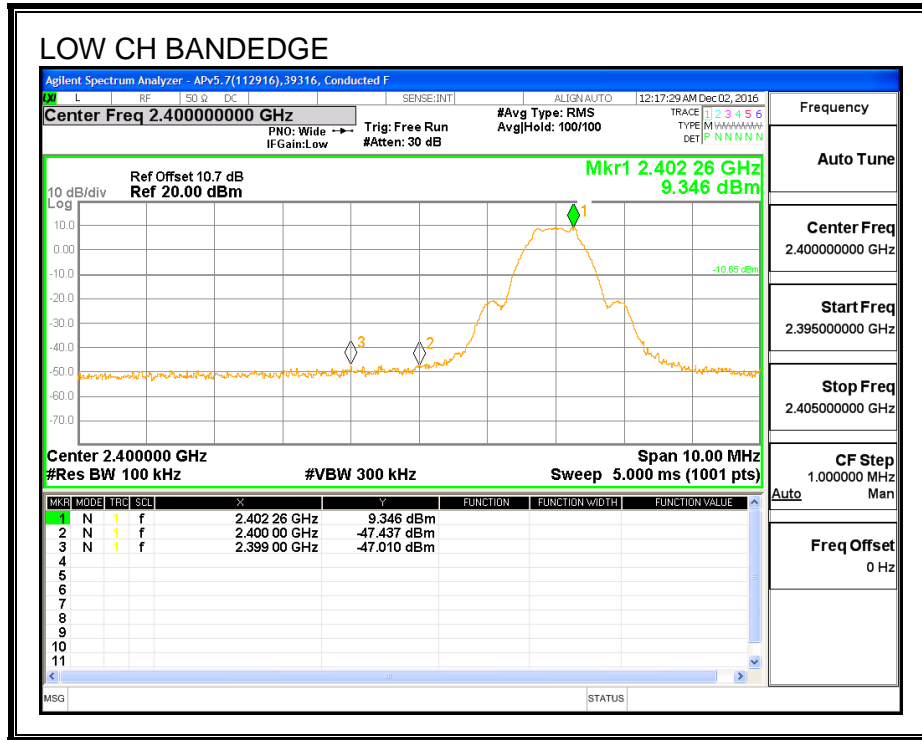
FCC §15.247 (d)

IC RSS-247 (5.5)

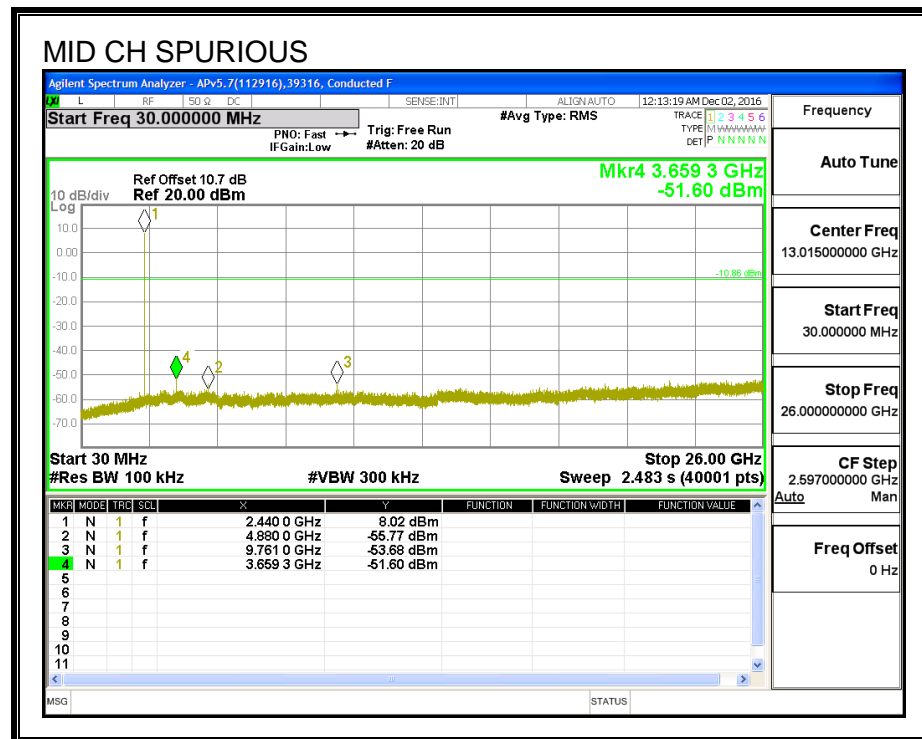
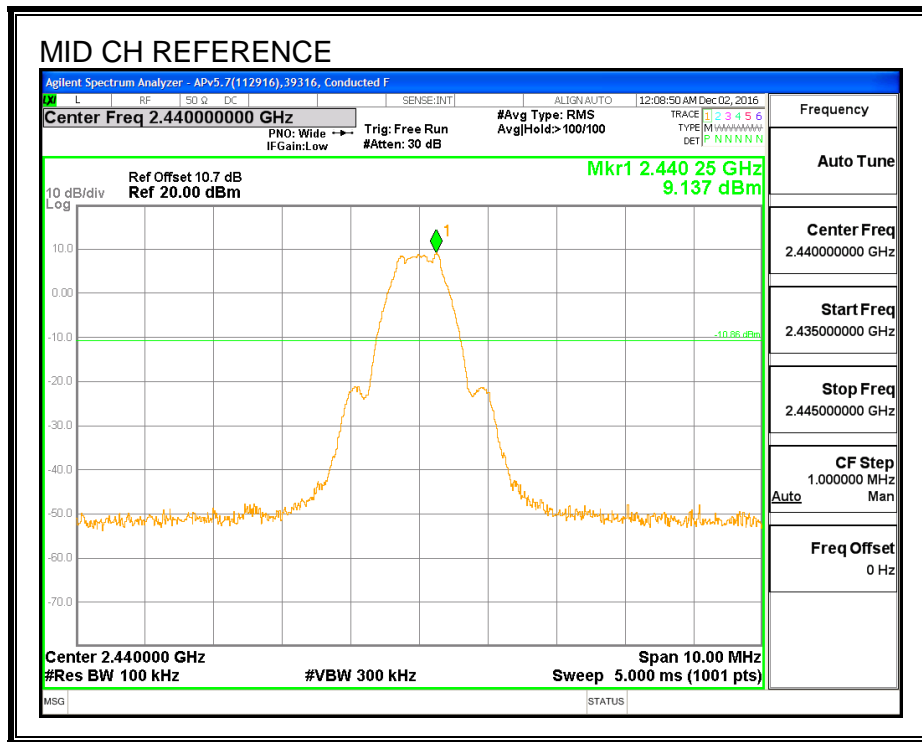
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

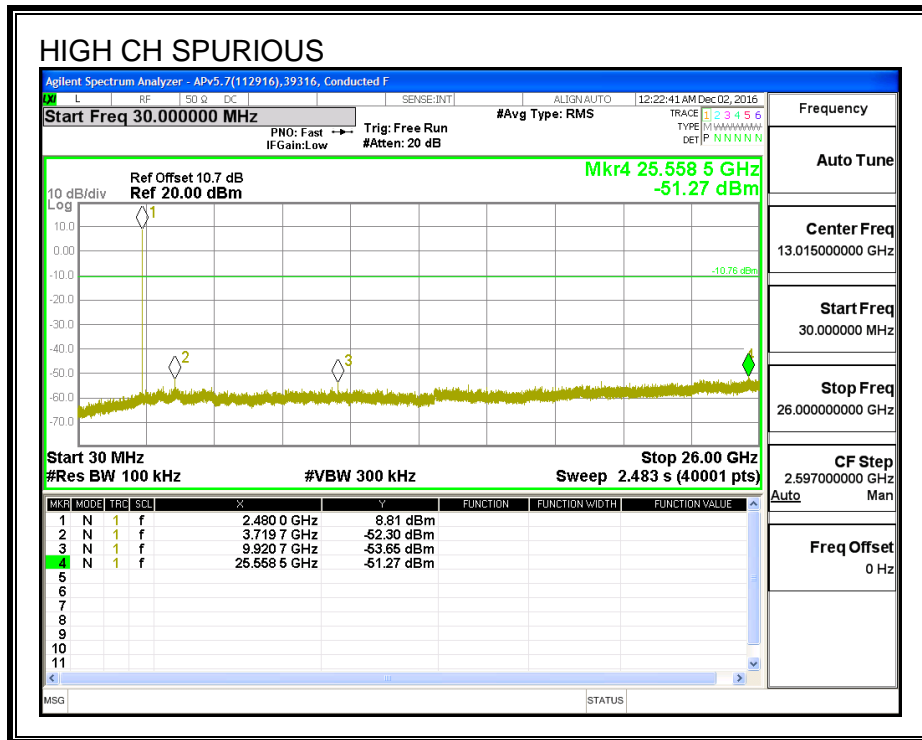
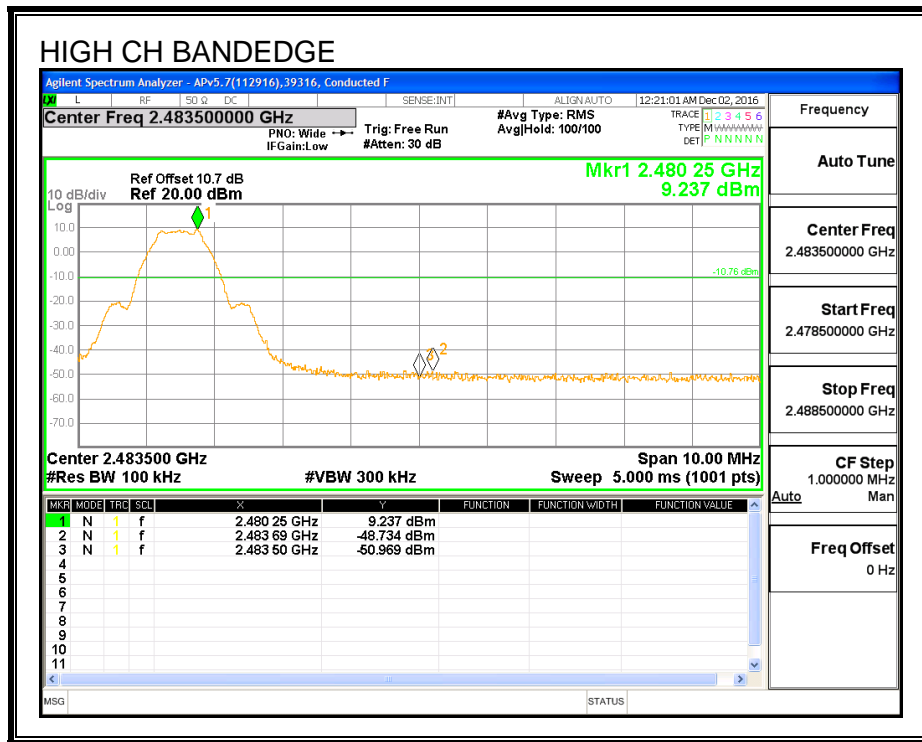
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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.

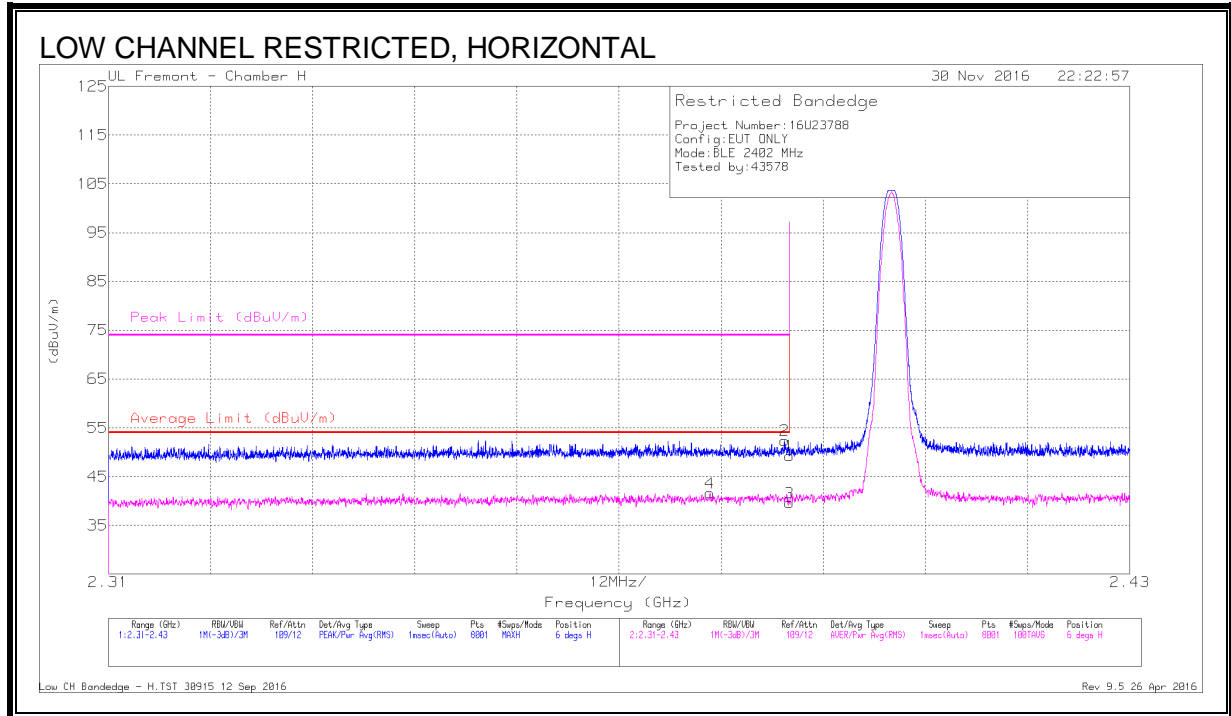
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. RESTRICTED BANDEGE



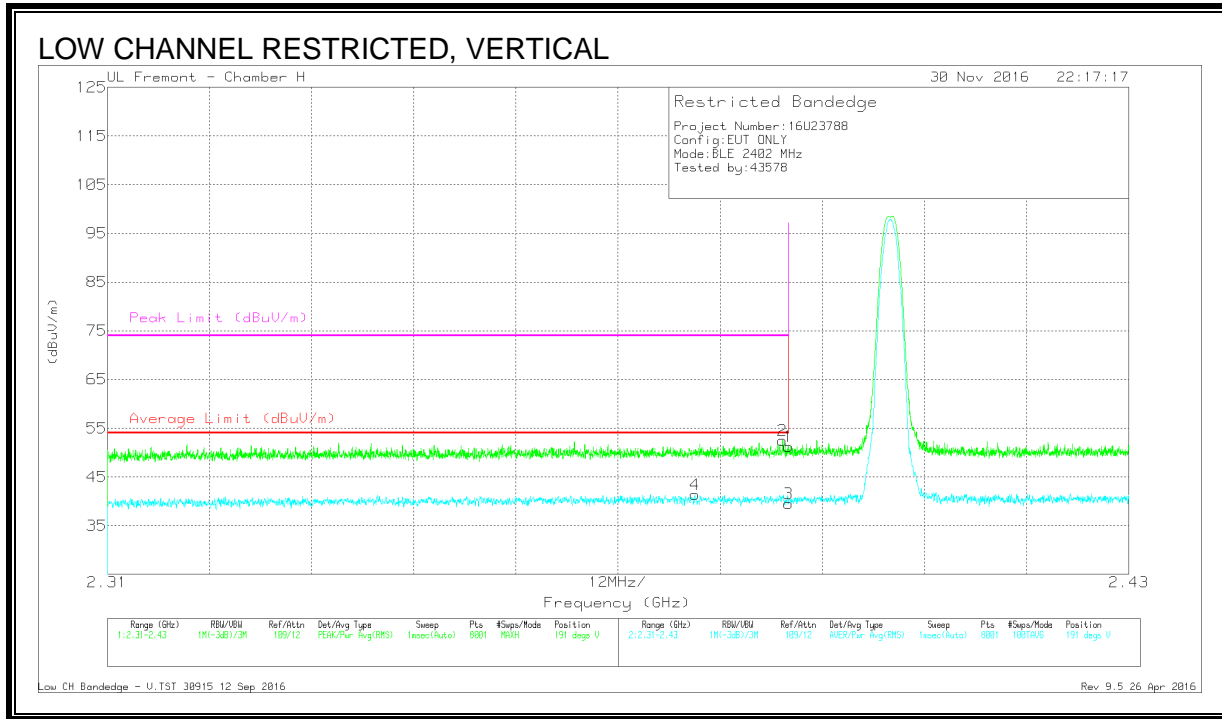
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.381	29.3	RMS	31.9	-19.6	41.6	54	-12.4	-	-	6	315	H
2	* 2.389	40.14	Pk	31.9	-19.6	52.44	-	-	74	-21.56	6	315	H
1	* 2.39	36.98	Pk	31.9	-19.6	49.28	-	-	74	-24.72	6	315	H
3	* 2.39	27.3	RMS	31.9	-19.6	39.6	54	-14.4	-	-	6	315	H

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

Pk - Peak detector

RMS - RMS detection



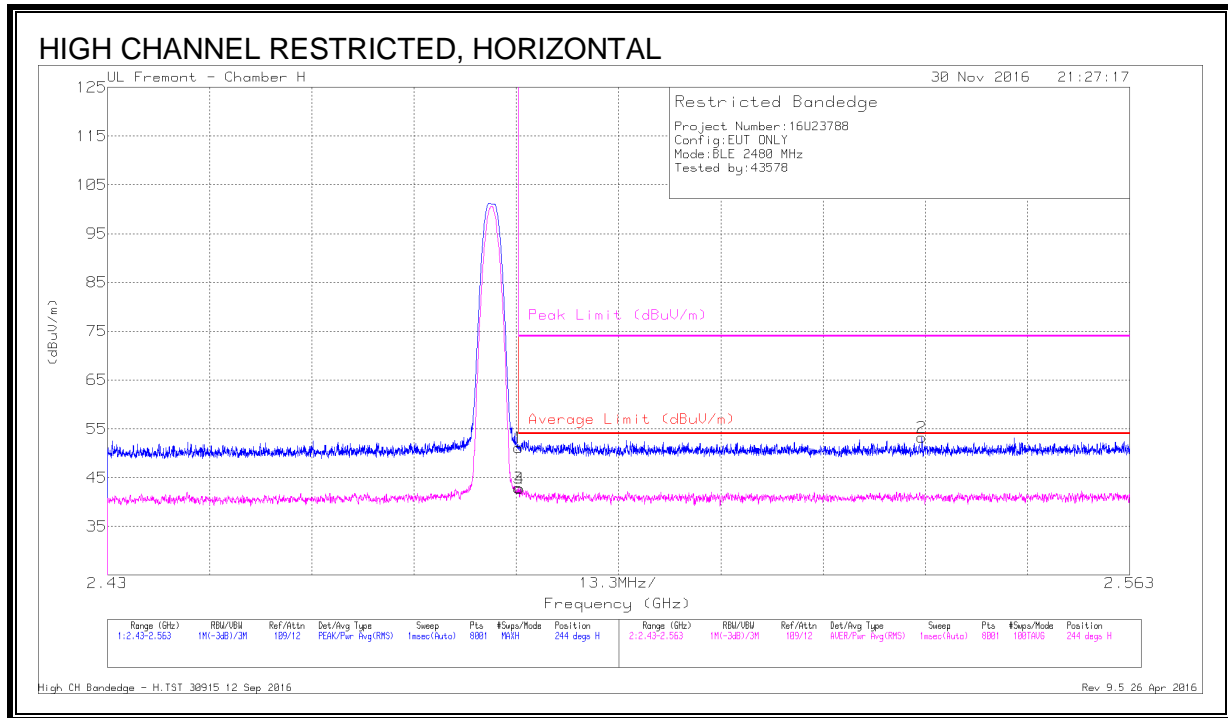
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.91	Pk	31.9	-19.6	51.21	-	-	74	-22.79	191	252	V
2	* 2.389	40.17	Pk	31.9	-19.6	52.47	-	-	74	-21.53	191	252	V
3	* 2.39	27.26	RMS	31.9	-19.6	39.56	54	-14.44	-	-	191	252	V
4	* 2.379	29.16	RMS	31.9	-19.6	41.46	54	-12.54	-	-	191	252	V

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

Pk - Peak detector

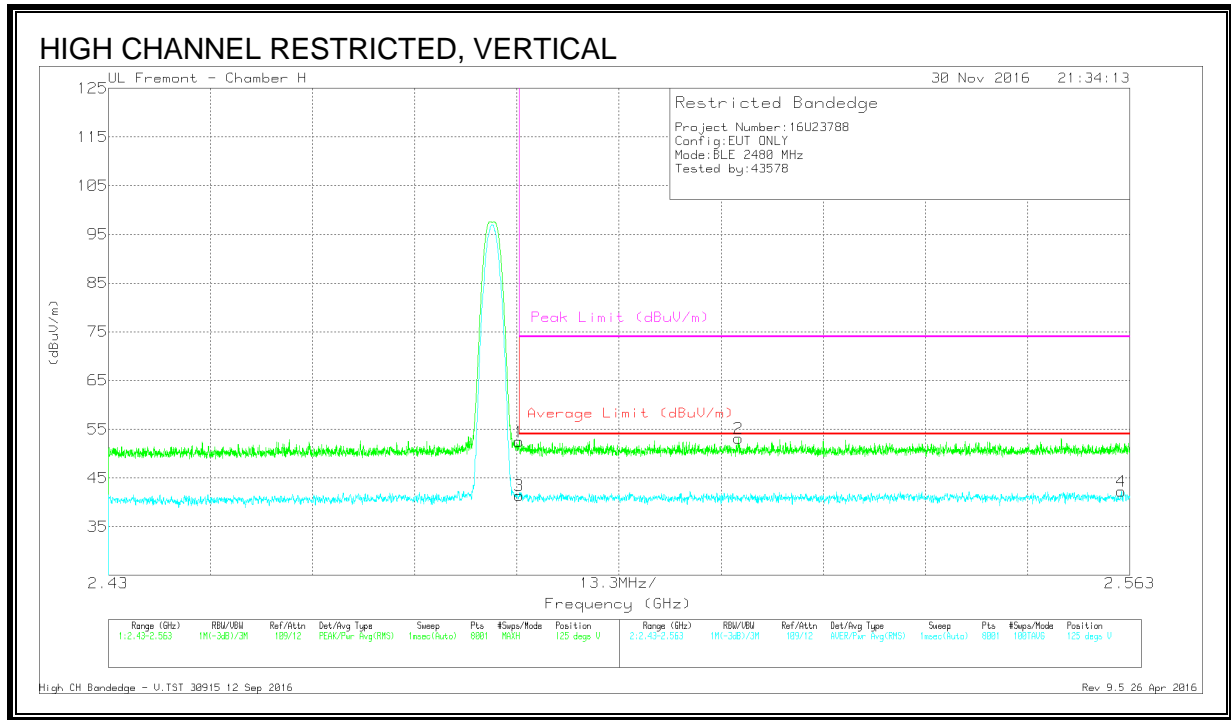
RMS - RMS detection



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.44	Pk	32.2	-19.5	51.14	-	-	74	-22.86	244	124	H
3	* 2.484	30.24	RMS	32.2	-19.5	42.94	54	-11.06	-	-	244	124	H
4	* 2.484	30.13	RMS	32.2	-19.6	42.73	54	-11.27	-	-	244	124	H
2	2.536	40.47	Pk	32.2	-19.4	53.27	-	-	74	-20.73	244	124	H

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

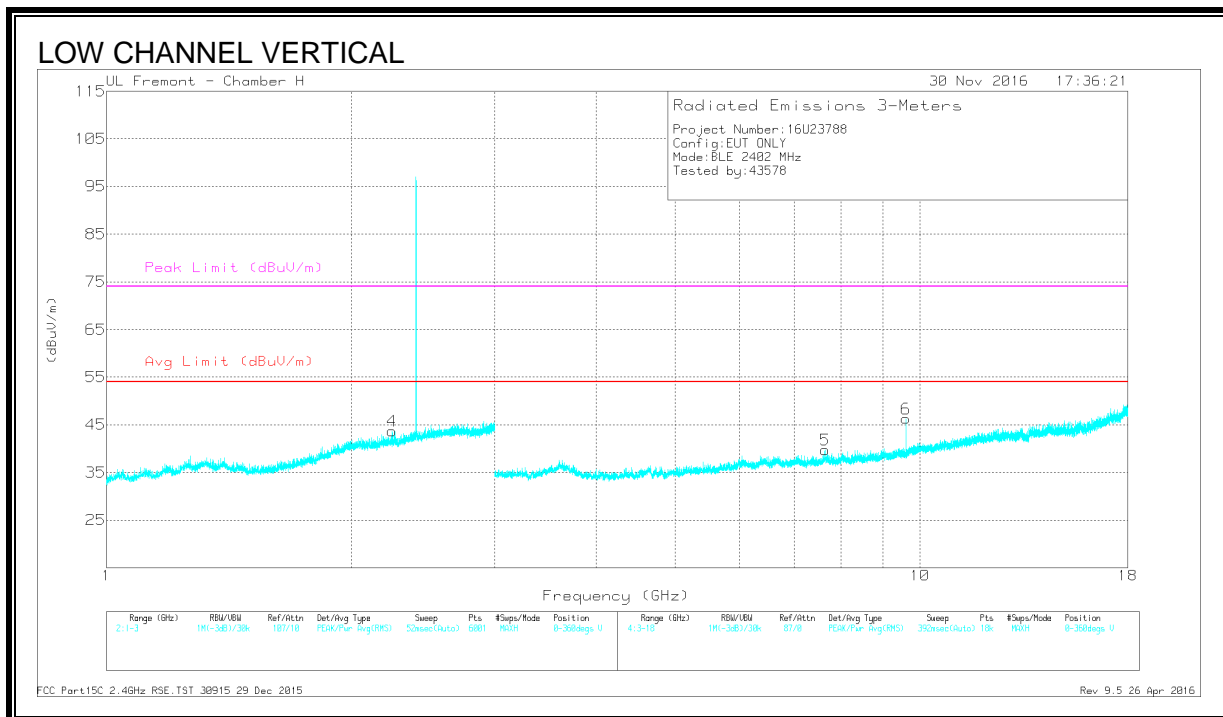
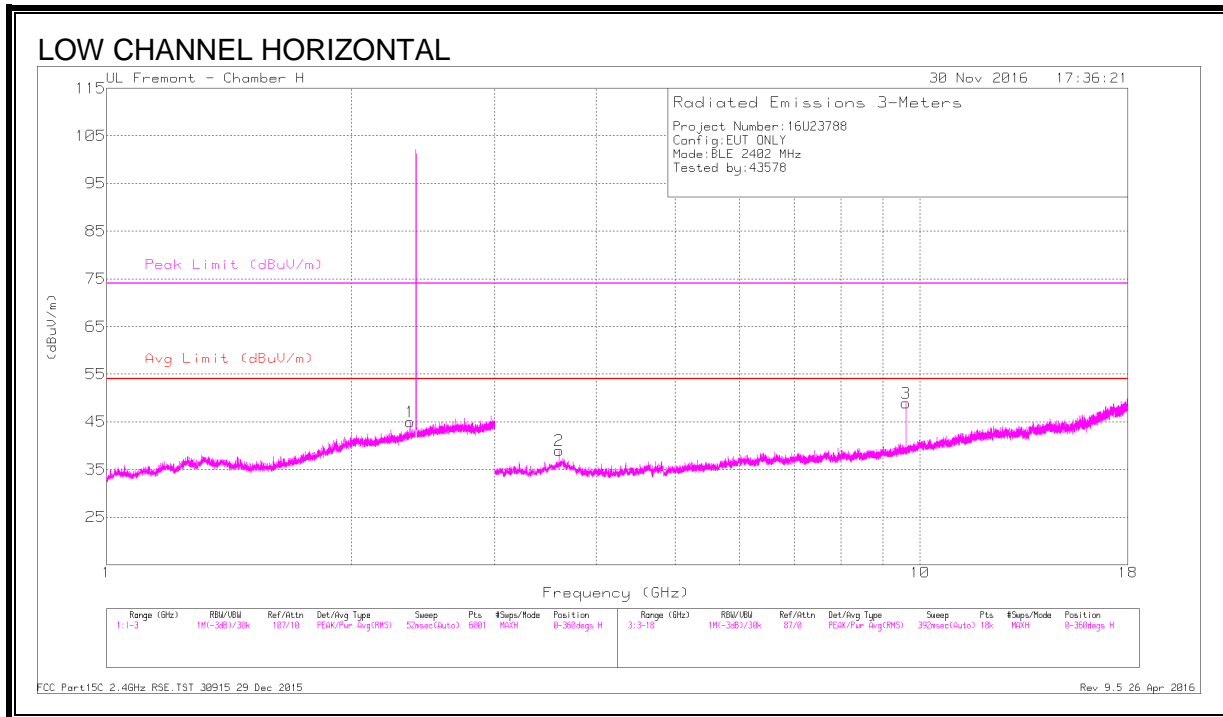


DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.75	Pk	32.2	-19.5	52.45	-	-	74	-21.55	125	102	V
3	* 2.484	28.74	RMS	32.2	-19.5	41.44	54	-12.56	-	-	125	102	V
2	2.512	40.47	Pk	32.2	-19.5	53.17	-	-	74	-20.83	125	102	V
4	2.562	29.44	RMS	32.2	-19.4	42.24	54	-11.76	-	-	125	102	V

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

8.2.2. HARMONICS AND SPURIOUS EMISSIONS



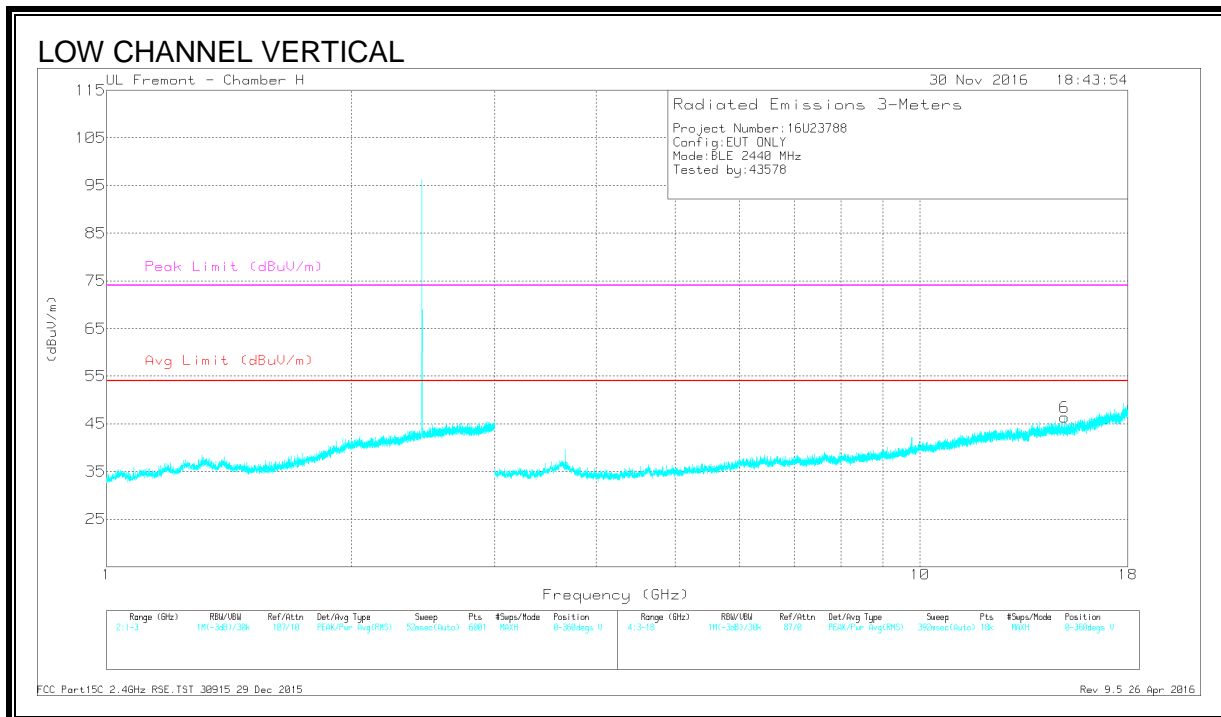
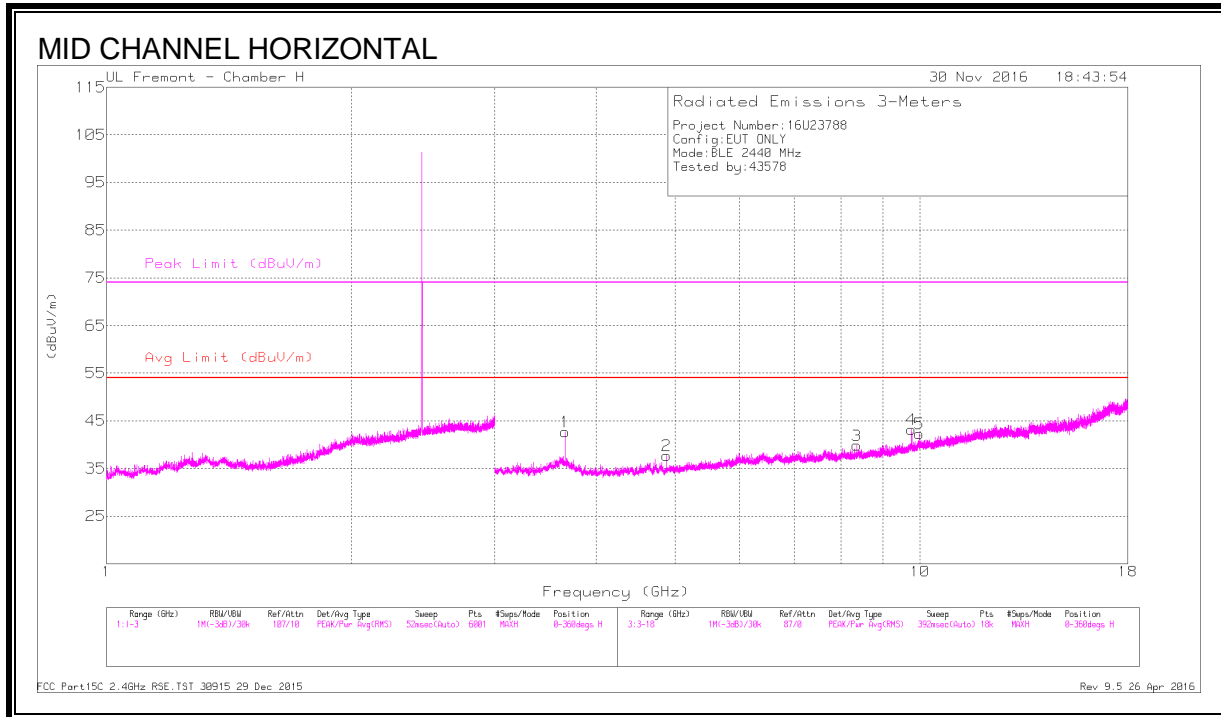
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Fitr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.362	39.26	PK2	31.8	-19.7	51.36	-	-	74	-22.64	15	200	H
	* 2.362	24.02	MAv1	31.8	-19.7	36.12	54	-17.88	-	-	15	200	H
4	* 2.244	38.34	PK2	31.6	-20.1	49.84	-	-	74	-24.16	284	173	V
	* 2.244	22.62	MAv1	31.6	-20.1	34.12	54	-19.88	-	-	284	173	V
2	* 3.603	45.65	PK2	34.9	-35.6	44.95	-	-	74	-29.05	334	103	H
	* 3.603	37.56	MAv1	34.9	-35.6	36.86	54	-17.14	-	-	334	103	H
5	* 7.638	40.06	PK2	35.8	-30.1	45.76	-	-	74	-28.24	194	191	V
	* 7.637	28.66	MAv1	35.8	-30.2	34.26	54	-19.74	-	-	194	191	V
3	9.609	43.88	PK2	37	-29.1	51.78	-	-	-	-	337	192	H
6	9.609	41.12	PK2	37	-29.1	49.02	-	-	-	-	146	141	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



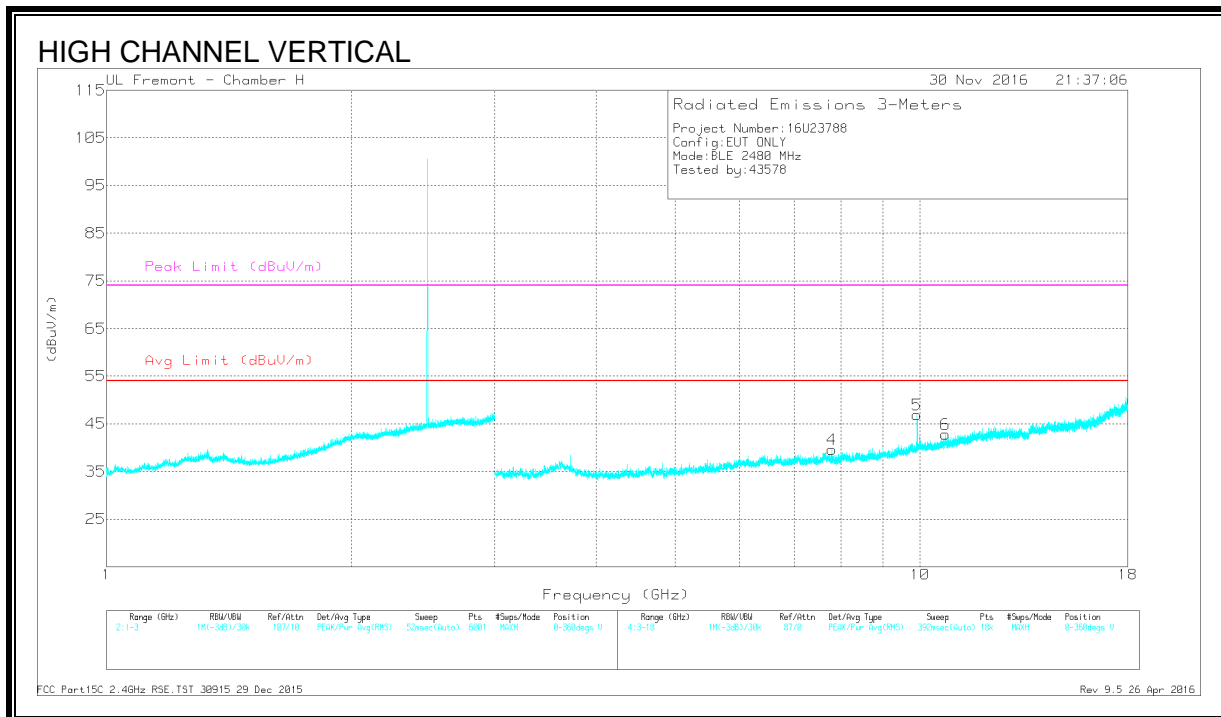
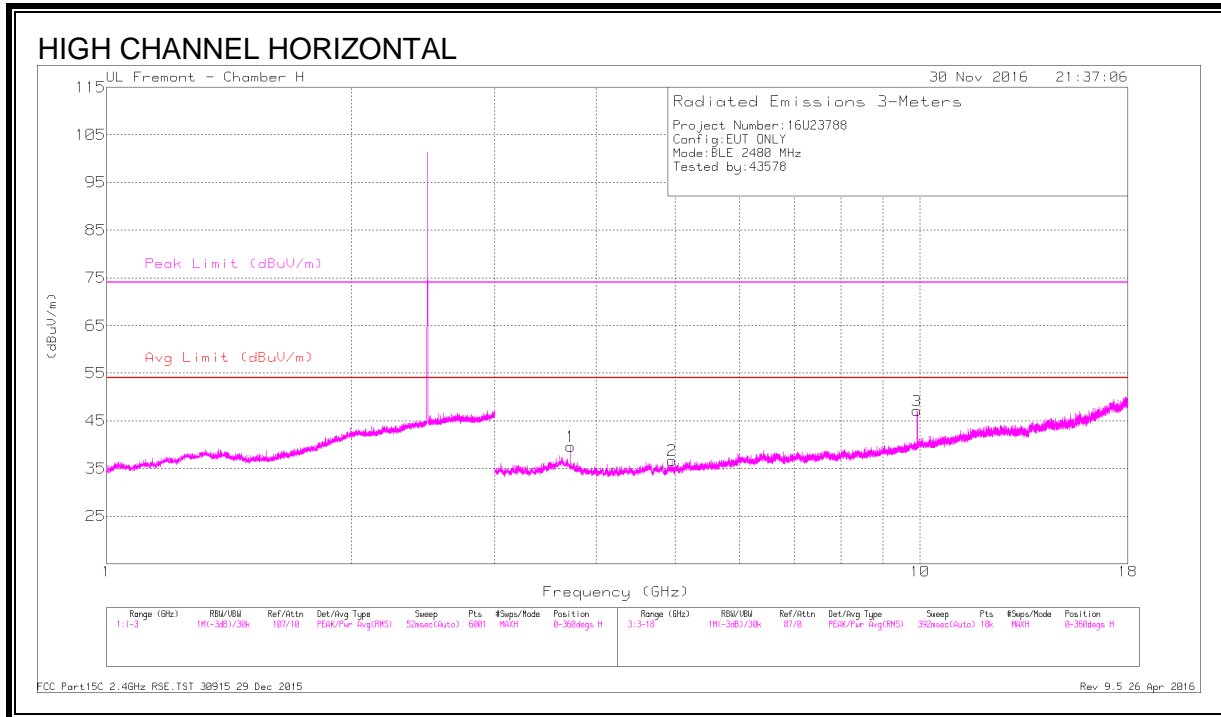
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.663	47.73	PK2	34.9	-35.8	46.83	-	-	74	-27.17	256	100	H
	* 3.663	41.01	MAv1	34.9	-35.8	40.11	54	-13.89	-	-	256	100	H
2	* 4.884	45.52	PK2	34	-34.8	44.72	-	-	74	-29.28	201	100	H
	* 4.884	36.24	MAv1	34	-34.8	35.44	54	-18.56	-	-	201	100	H
3	* 8.355	39.46	PK2	35.8	-29.9	45.36	-	-	74	-28.64	267	190	H
	* 8.354	28.37	MAv1	35.8	-29.9	34.27	54	-19.73	-	-	267	190	H
4	9.767	41.19	PK2	37.3	-29.2	49.29	-	-	-	-	201	100	H
5	9.982	38.96	PK2	37.6	-28.1	48.46	-	-	-	-	227	225	H
6	15.039	36.52	PK2	40.1	-24.1	52.52	-	-	-	-	63	204	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 3.72	47.37	PK2	34.7	-35.9	46.17	-	-	74	-27.83	14	122	H
	* 3.72	39.09	MAv1	34.7	-35.9	37.89	54	-16.11	-	-	14	122	H
3	* 4.959	45.12	PK2	34	-34.3	44.82	-	-	74	-29.18	286	116	H
	* 4.96	34.26	MAv1	34	-34.3	33.96	54	-20.04	-	-	286	116	H
6	* 10.746	38.44	PK2	38.1	-28	48.54	-	-	74	-25.46	129	116	V
	* 10.745	27.56	MAv1	38.1	-28.1	37.56	54	-16.44	-	-	129	116	V
4	7.788	28.92	MAv1	35.8	-30.8	33.92	-	-	-	-	212	109	V
	7.789	39.56	PK2	35.8	-30.8	44.56	-	-	-	-	212	109	V
3	9.919	44.4	PK2	37.5	-29	52.9	-	-	-	-	295	195	H
5	9.919	43.17	PK2	37.5	-29	51.67	-	-	-	-	256	100	V

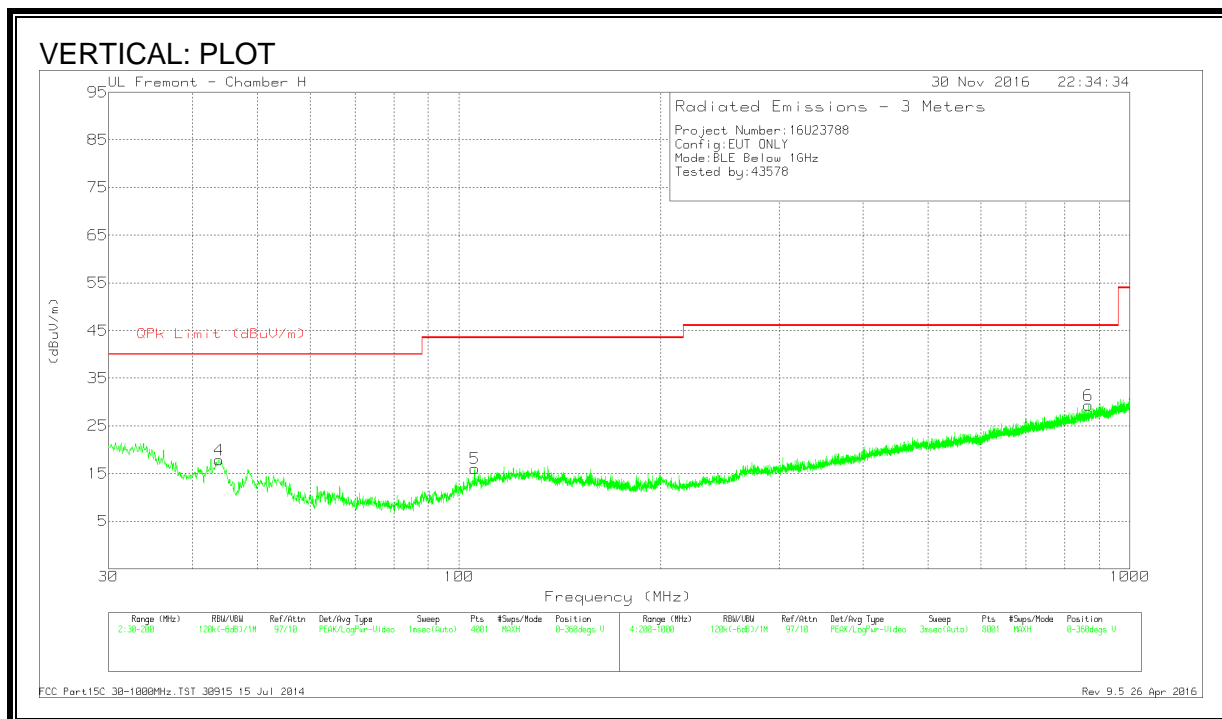
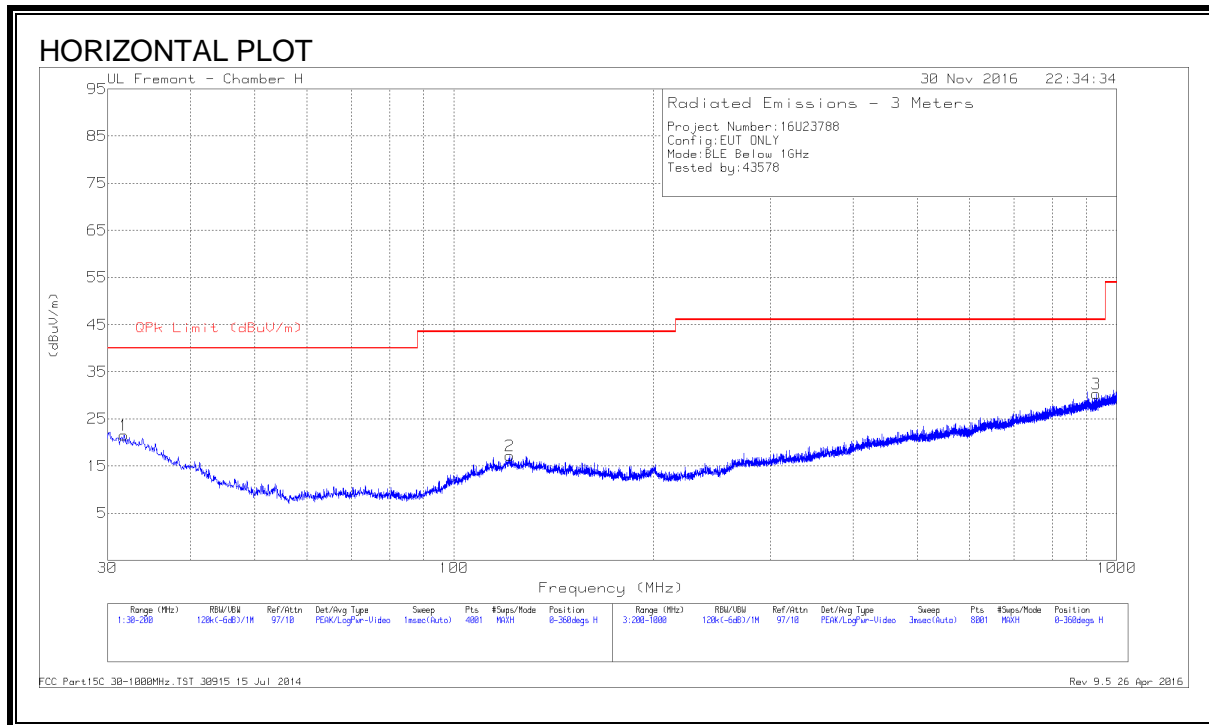
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

8.3. WORST-CASE BELOW 1 GHz

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



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT407 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 121.3325	29.64	Pk	17.8	-30.3	17.14	43.52	-26.38	0-360	201	H
1	31.785	28.82	Pk	24	-31.3	21.52	40	-18.48	0-360	201	H
4	43.855	33.97	Pk	15	-31.1	17.87	40	-22.13	0-360	100	V
5	105.48	30.97	Pk	15.6	-30.5	16.07	43.52	-27.45	0-360	100	V
6	866.7	30.34	Pk	25.8	-26.8	29.34	46.02	-16.68	0-360	399	V
3	932	30.37	Pk	26.1	-26.1	30.37	46.02	-15.65	0-360	399	H

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

Pk - Peak detector

DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T449 (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	18.726	41.3	Pk	32.4	-24.7	-9.5	39.5	54	-14.5	74	-34.5
2	22.763	41.97	Pk	33.4	-24.7	-9.5	41.17	54	-12.83	74	-32.83
3	23.902	43.23	Pk	34	-23.9	-9.5	43.83	54	-10.17	74	-30.17
4	19.838	43.57	Pk	32.6	-25	-9.5	41.67	54	-12.33	74	-32.33
5	20.738	41.43	Pk	33	-25.1	-9.5	39.83	54	-14.17	74	-34.17
6	23.975	43.87	Pk	34	-24.2	-9.5	44.17	54	-9.83	74	-29.83

Pk - Peak detector

9. 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.

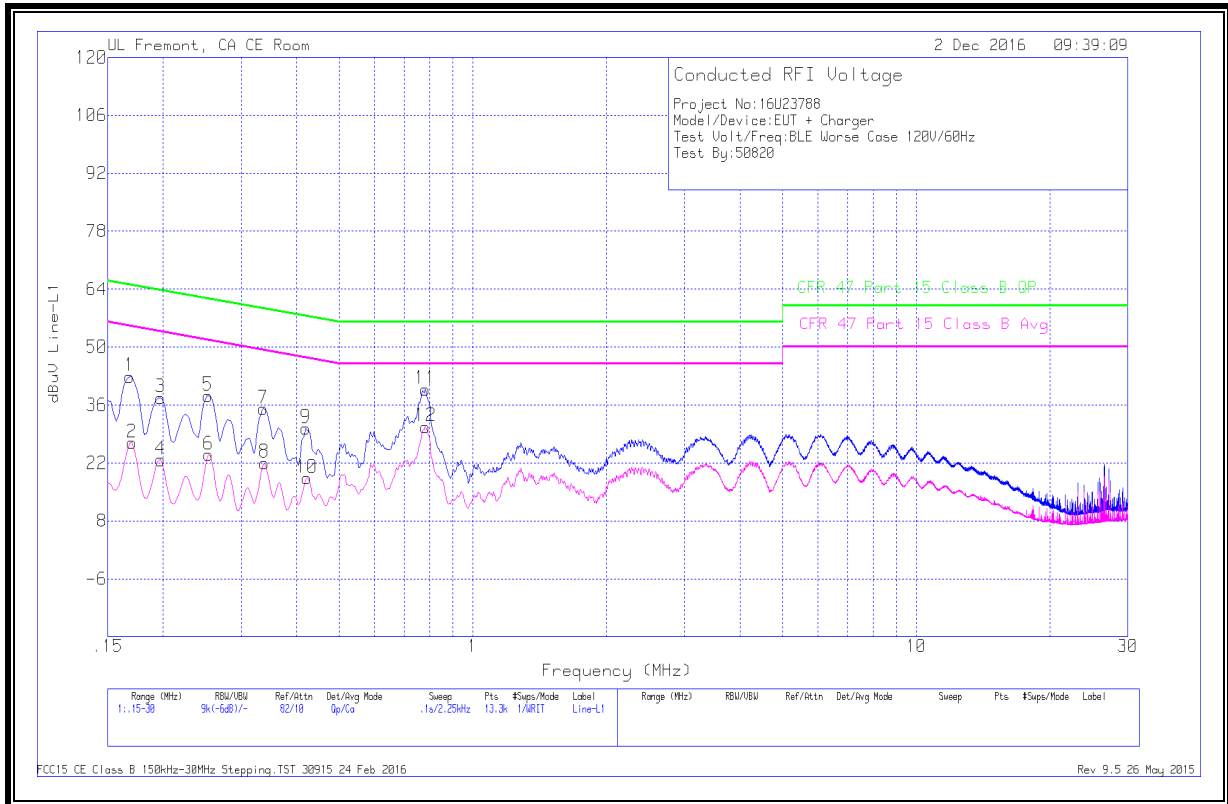
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

9.1. EUT POWERED BY AC/DC ADAPTER VIA USB CABLE

LINE 1 RESULTS



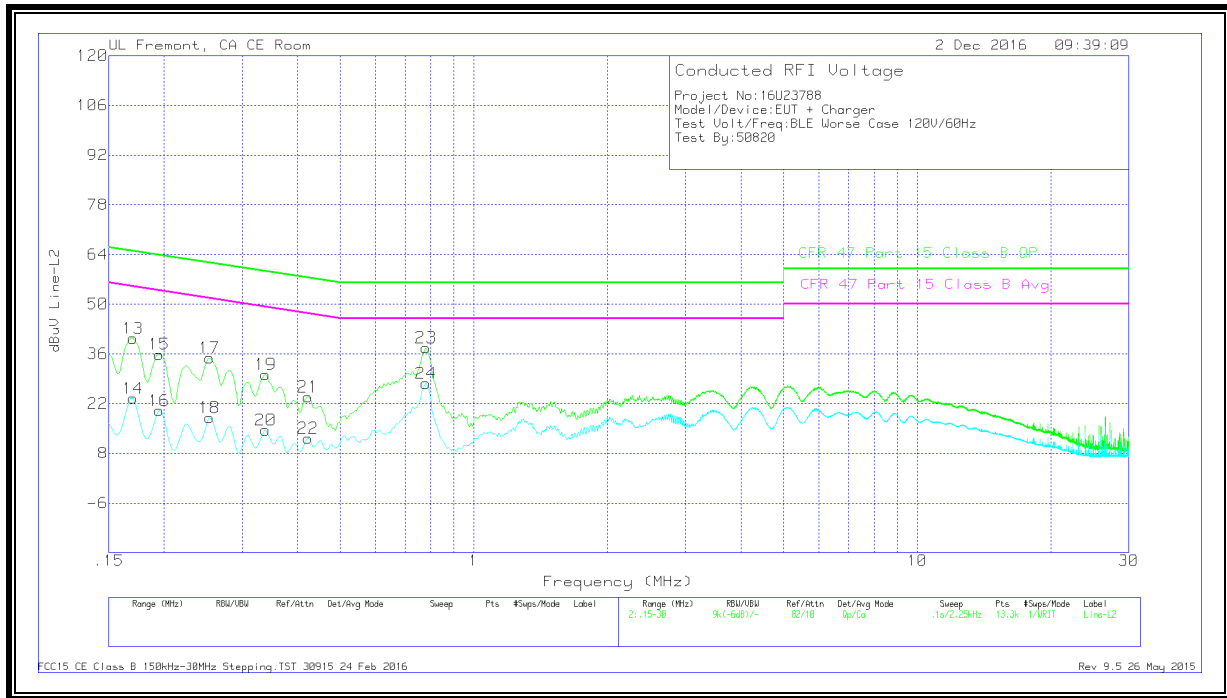
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables 1&3	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	.168	32.81	Qp	0	0	10.1	42.91	65.06	-22.15	-	-
2	.17025	16.82	Ca	0	0	10.1	26.92	-	-	54.95	-28.03
3	.19725	27.68	Qp	0	0	10.1	37.78	63.73	-25.95	-	-
4	.19725	12.66	Ca	0	0	10.1	22.76	-	-	53.73	-30.97
5	.25238	28.14	Qp	0	0	10.1	38.24	61.68	-23.44	-	-
6	.2535	13.91	Ca	0	0	10.1	24.01	-	-	51.64	-27.63
7	.33675	25	Qp	0	0	10.1	35.1	59.28	-24.18	-	-
8	.339	11.93	Ca	0	0	10.1	22.03	-	-	49.23	-27.2
9	.42	20.3	Qp	0	0	10.1	30.4	57.45	-27.05	-	-
10	.42225	8.23	Ca	0	0	10.1	18.33	-	-	47.4	-29.07
11	.78225	29.72	Qp	0	0	10.1	39.82	56	-16.18	-	-
12	.78225	20.66	Ca	0	0	10.1	30.76	-	-	46	-15.24

Qp - Quasi-Peak detector
 Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

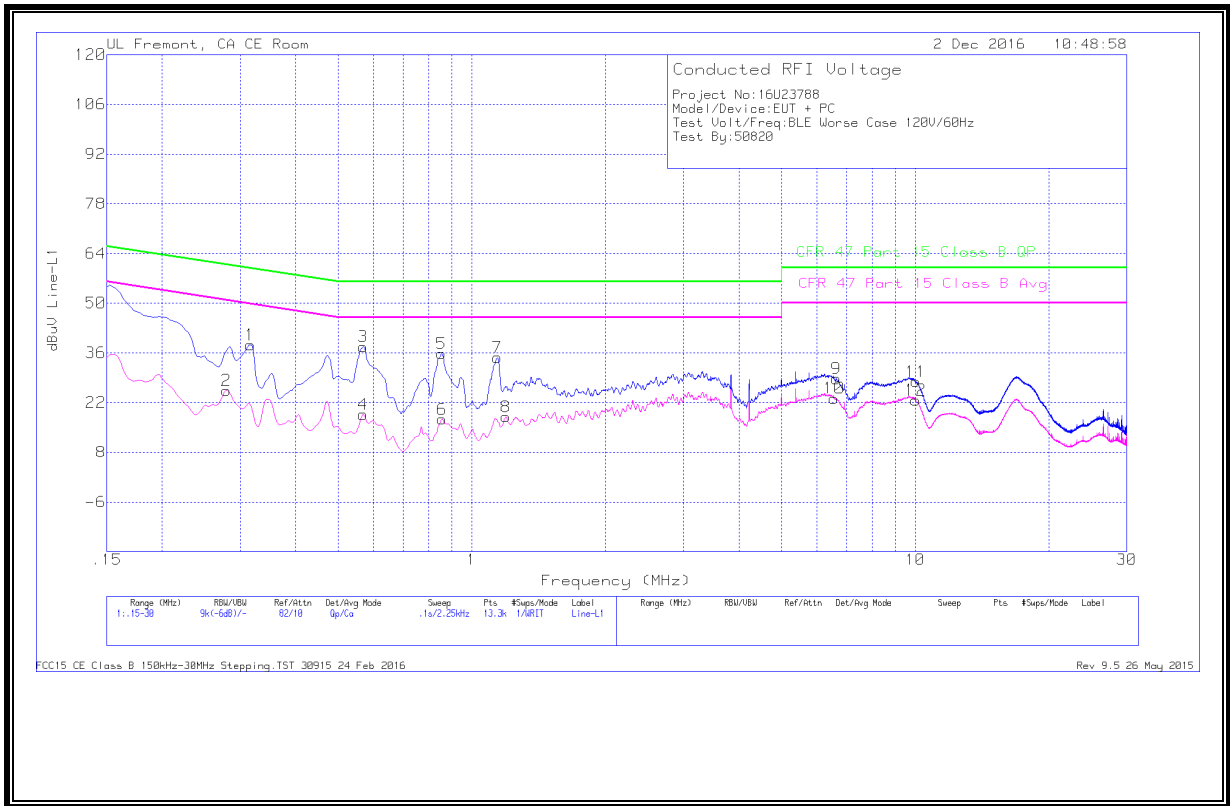
Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.17025	30.28	Qp	0	0	10.1	40.38	64.95	-24.57	-	-
14	.17025	13.4	Ca	0	0	10.1	23.5	-	-	54.95	-31.45
15	.195	25.79	Qp	0	0	10.1	35.89	63.82	-27.93	-	-
16	.195	9.96	Ca	0	0	10.1	20.06	-	-	53.82	-33.76
17	.2535	24.78	Qp	0	0	10.1	34.88	61.64	-26.76	-	-
18	.2535	7.95	Ca	0	0	10.1	18.05	-	-	51.64	-33.59
19	.339	20.1	Qp	0	0	10.1	30.2	59.23	-29.03	-	-
20	.339	4.45	Ca	0	0	10.1	14.55	-	-	49.23	-34.68
21	.42225	13.78	Qp	0	0	10.1	23.88	57.4	-33.52	-	-
22	.42225	2.13	Ca	0	0	10.1	12.23	-	-	47.4	-35.17
23	.78	27.66	Qp	0	0	10.1	37.76	56	-18.24	-	-
24	.78	17.61	Ca	0	0	10.1	27.71	-	-	46	-18.29

Qp - Quasi-Peak detector
 Ca - CISPR average detection

9.2. EUT POWERED BY HOST PC VIA USB CABLE

LINE 1 RESULTS



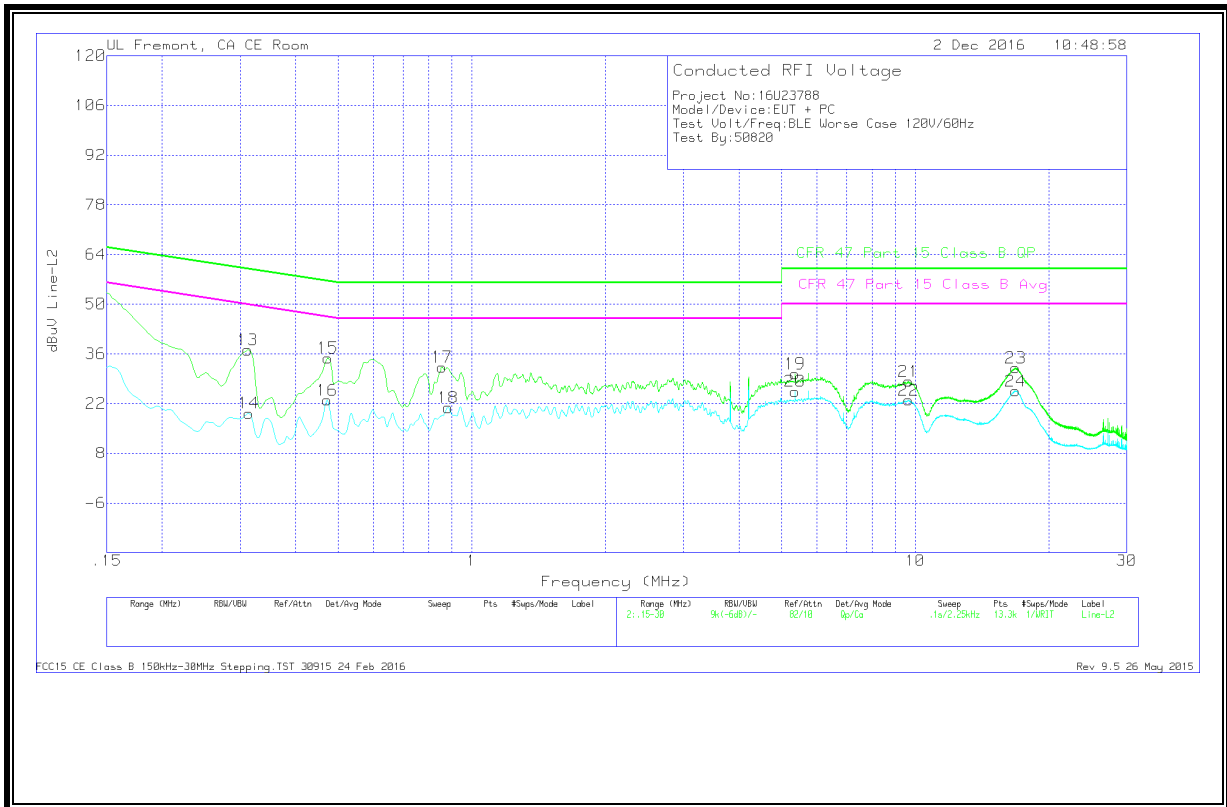
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables 1&3	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	.3165	28.15	Qp	0	0	10.1	38.25	59.8	-21.55	-	-
2	.27938	15.32	Ca	0	0	10.1	25.42	-	-	50.83	-25.41
3	.5685	27.67	Qp	0	0	10.1	37.77	56	-18.23	-	-
4	.5685	8.54	Ca	0	0	10.1	18.64	-	-	46	-27.36
5	.85425	25.7	Qp	0	0	10.1	35.8	56	-20.2	-	-
6	.8565	7.19	Ca	0	0	10.1	17.29	-	-	46	-28.71
7	1.14	24.61	Qp	0	0	10.1	34.71	56	-21.29	-	-
8	1.194	7.78	Ca	0	.1	10.1	17.98	-	-	46	-28.02
9	6.6345	18.44	Qp	0	.1	10.2	28.74	60	-31.26	-	-
10	6.56025	12.93	Ca	0	.1	10.2	23.23	-	-	50	-26.77
11	10.04325	17.54	Qp	0	.2	10.2	27.94	60	-32.06	-	-
12	10.02188	12.31	Ca	0	.2	10.2	22.71	-	-	50	-27.29

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	LISN L2	LC Cables 2&3	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	.312	27.01	Qp	0	0	10.1	37.11	59.92	-22.81	-	-
14	.31425	9.21	Ca	0	0	10.1	19.31	-	-	49.86	-30.55
15	.47287	24.75	Qp	0	0	10.1	34.85	56.46	-21.61	-	-
16	.47175	12.9	Ca	0	0	10.1	23	-	-	46.48	-23.48
17	.8565	22.15	Qp	0	0	10.1	32.25	56	-23.75	-	-
18	.8835	10.76	Ca	0	0	10.1	20.86	-	-	46	-25.14
19	5.35425	20.21	Qp	0	.1	10.1	30.41	60	-29.59	-	-
20	5.35425	15.26	Ca	0	.1	10.1	25.46	-	-	50	-24.54
21	9.65625	17.98	Qp	0	.1	10.2	28.28	60	-31.72	-	-
22	9.65625	12.64	Ca	0	.1	10.2	22.94	-	-	50	-27.06
23	16.84725	21.57	Qp	0	.2	10.3	32.07	60	-27.93	-	-
24	16.84613	15.04	Ca	0	.2	10.3	25.54	-	-	50	-24.46

Qp - Quasi-Peak detector
 Ca - CISPR average detection