



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

**BLUETOOTH LOW ENERGY  
CERTIFICATION TEST REPORT**

**FOR**

**WIRELESS EARPHONES**

**MODEL NUMBER: A1747**

**FCC ID: BCG-A1747**

**IC: 579C-A1747**

**REPORT NUMBER: 16U23787-E4V3**

**ISSUE DATE: AUGUST 29, 2016**

*Prepared for*

**APPLE, INC.**

**1 INFINITE LOOP**

**CUPERTINO, CA 95014, U.S.A.**

*Prepared by*

**UL VERIFICATION SERVICES INC.**

**47173 BENICIA STREET**

**FREMONT, CA 94538, U.S.A.**

**TEL: (510) 771-1000**

**FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	08/23/2016	Initial Review	Chin Pang
V2	08/26/2016	Address TCB's Questions	Chin Pang
V3	08/29/2016	Updated Section 5.5	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 EARPHONES

**MODEL:** A1747

**SERIAL NUMBER:** FTRS3004G066 (Conducted) FTRS308UGQ65 (Radiated)

**DATE TESTED:** AUGUST 15, 2016 - AUGUST 17, 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  
UL Verification Services Inc. By:



CHIN PANG  
SENIOR ENGINEER  
UL VERIFICATION SERVICES INC.

Prepared By:



JOE VANG  
EMC WISE 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 earphones. It has an integral battery, microphone and antenna. It can play music from a Bluetooth audio source. It has a USB Micro port for charging. It has 4 buttons, power, volume up, volume 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	8.83	7.64

### 5.3. 8.83DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain
2.4	0.34

### 5.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was 1A460

### 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 test:

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
Test jig	Apple	N/A	920-02191-02	N/A
USB	Apple	N/A	N/A	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/DC	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						

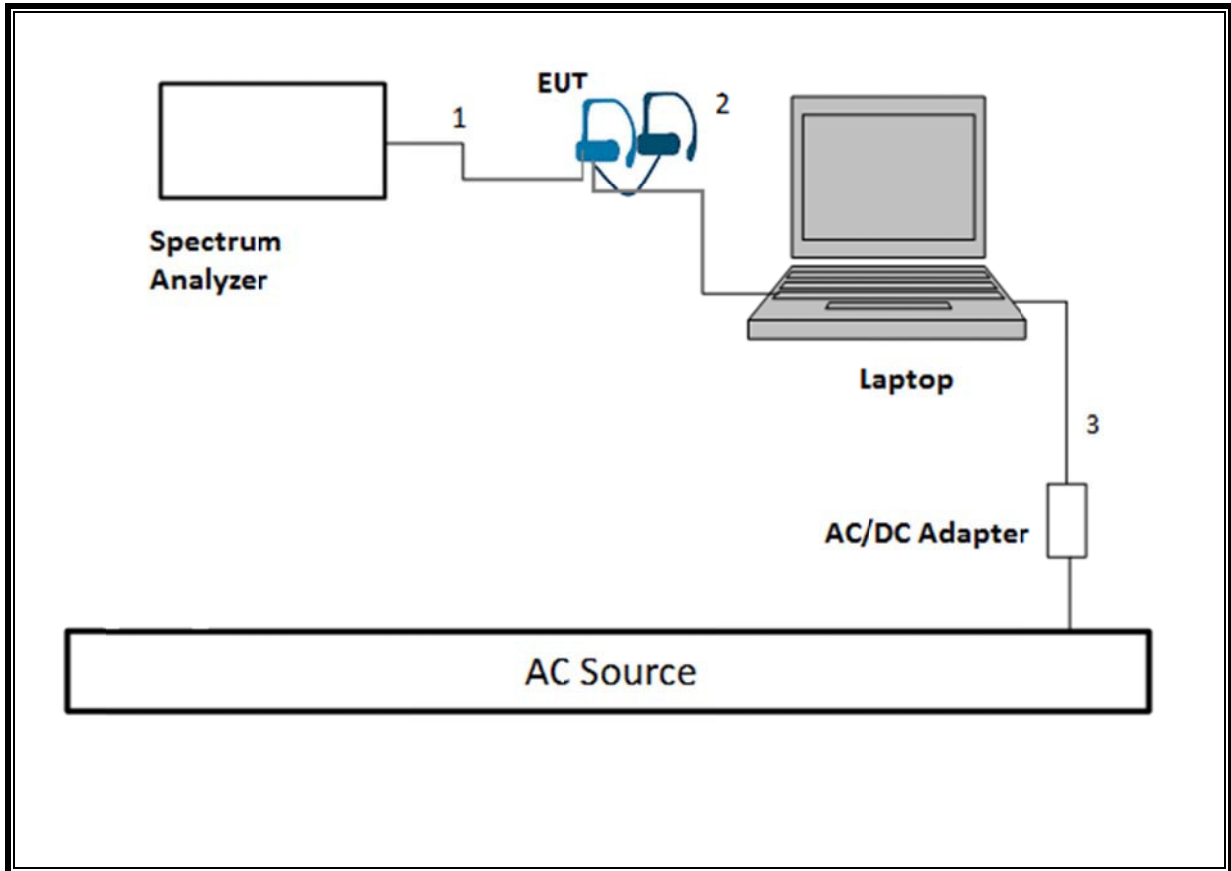
### I/O CABLES (LC AND RADAITED BELOW 1 GHZ)

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

**TEST SETUP- CONDUCTED PORT**

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

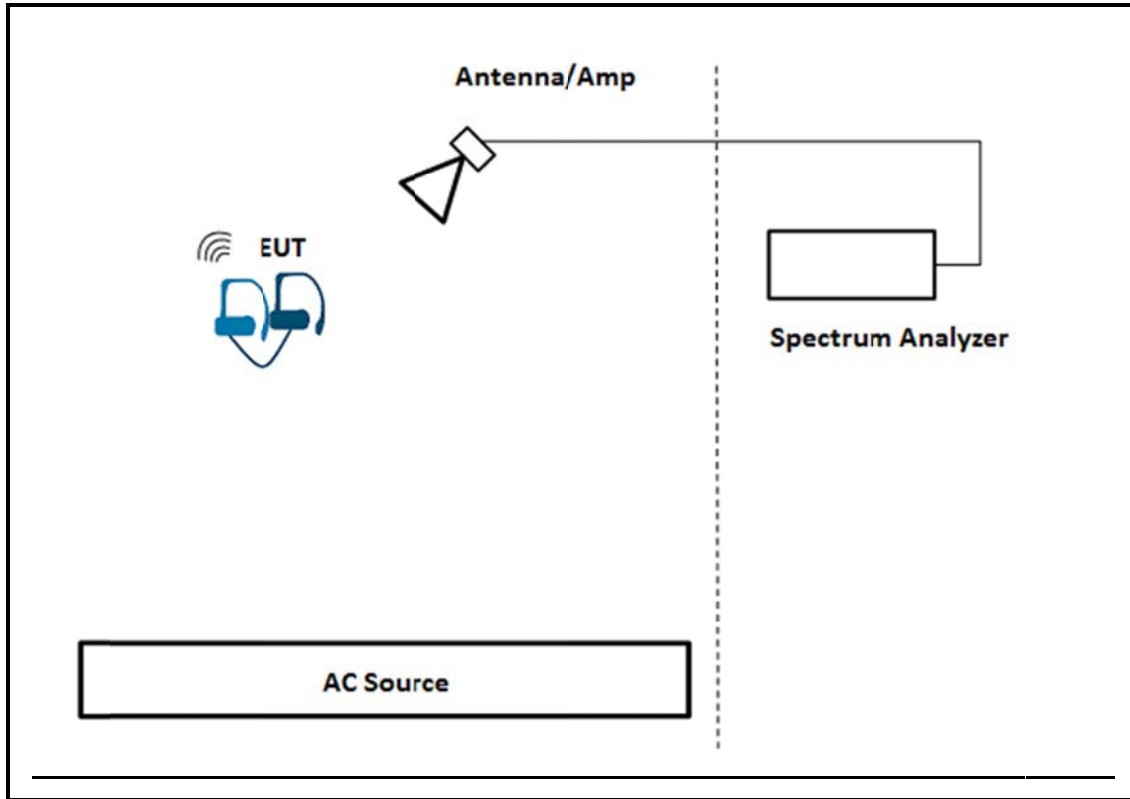
**SETUP DIAGRAM**



**TEST SETUP- RADIATED-ABOVE 1 GHZ**

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

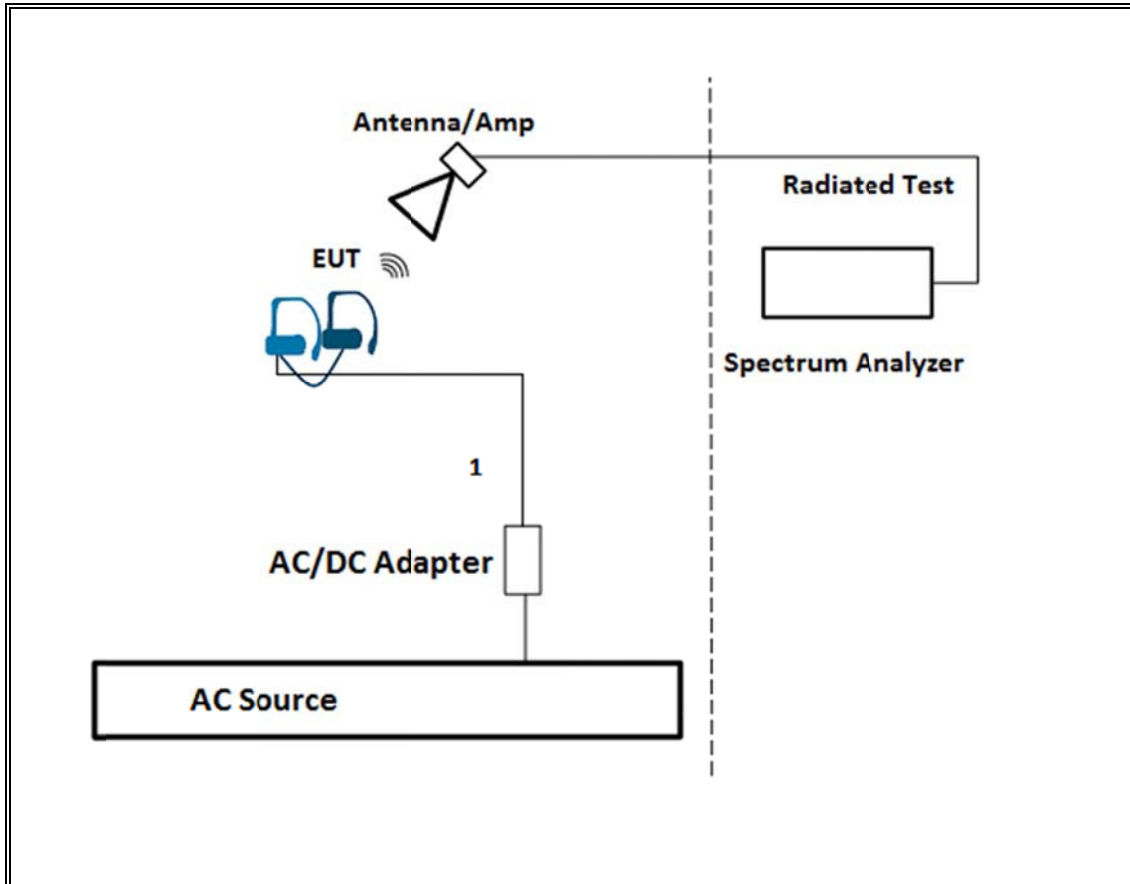
**SETUP DIAGRAM**



**TEST SETUP- BELOW 1GHz**

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

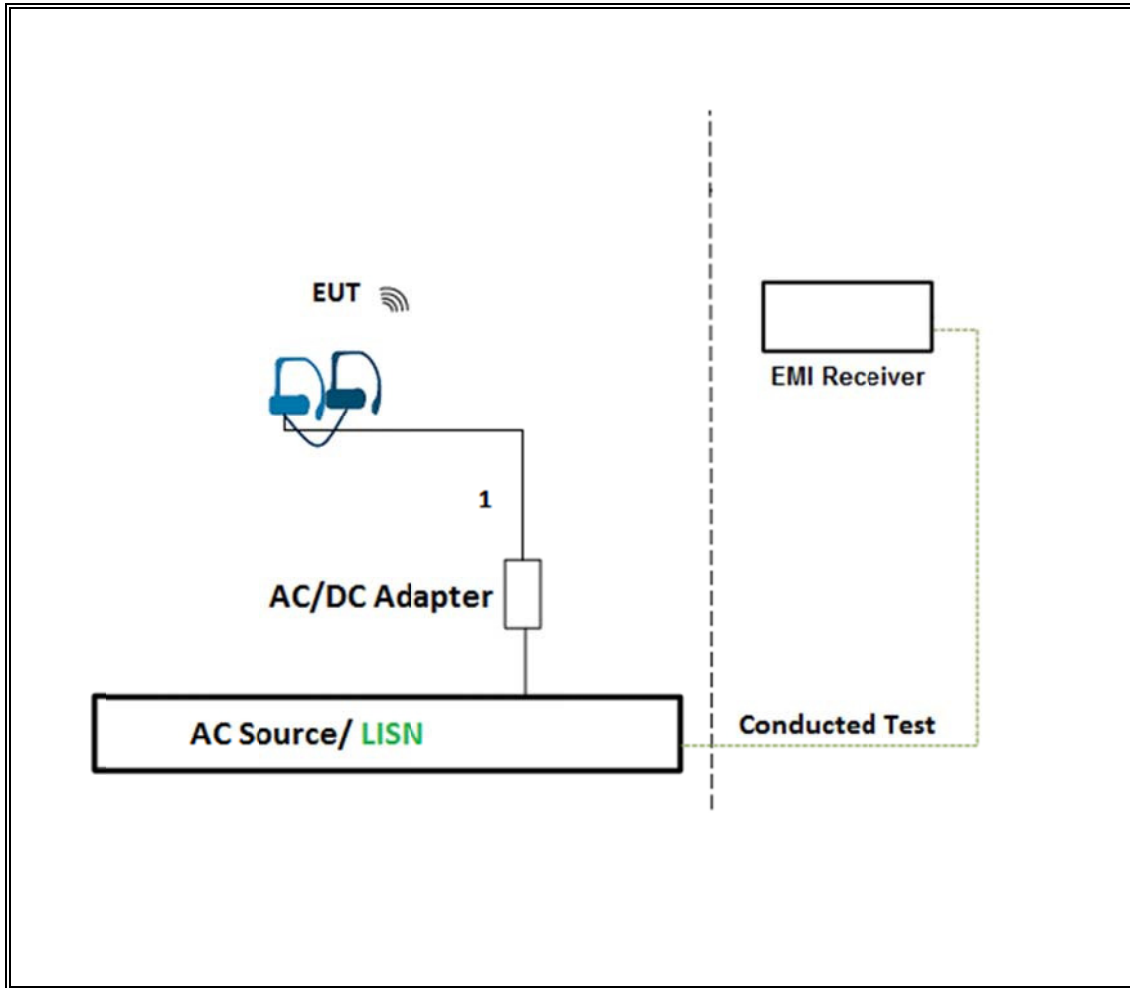
**SETUP DIAGRAM**



**TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER**

The EUT was tested powered by AC/DC adapter 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
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T863	4/26/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/3/2017
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T495	10/20/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T835	6/18/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T906	2/3/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1454	12/9/2016
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	N9030A	T340	11/15/2016
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	T1436	12/19/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	6/8/2017
AC Source	Shaffner	NSG 1007	T134	9/11/2016
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.

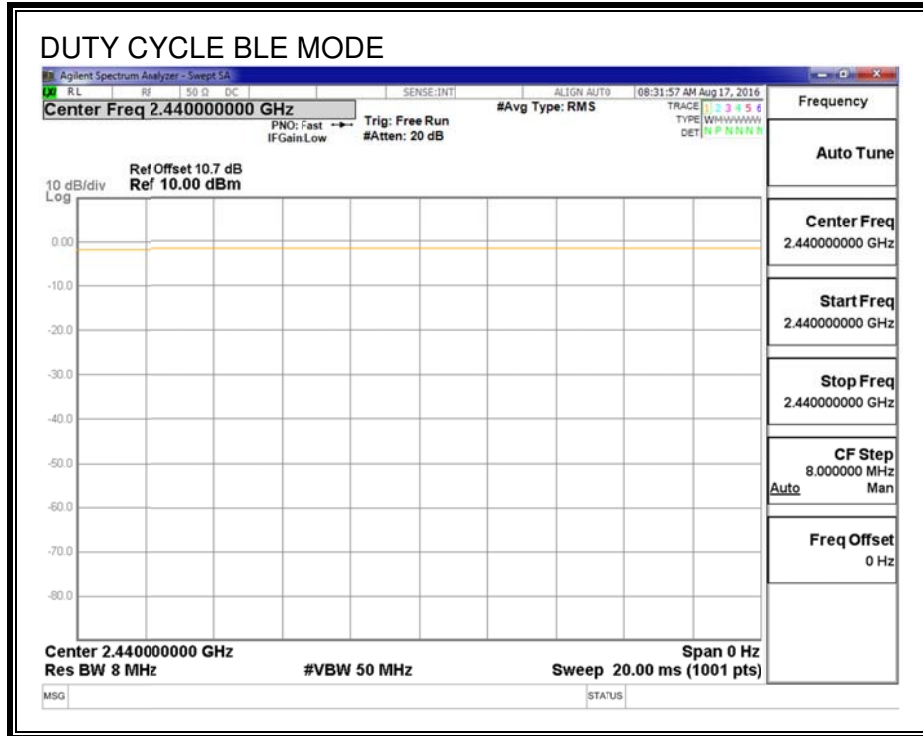
### ON TIME AND DUTY CYCLE RESULTS

<b>ID:</b>	50820	<b>Date:</b>	8/17/16
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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)

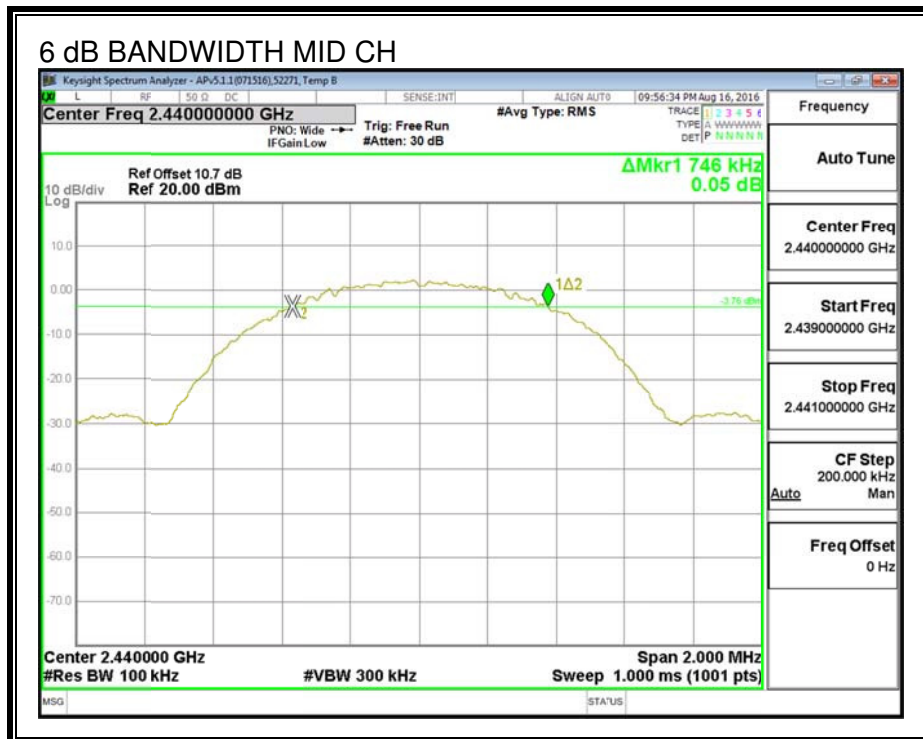
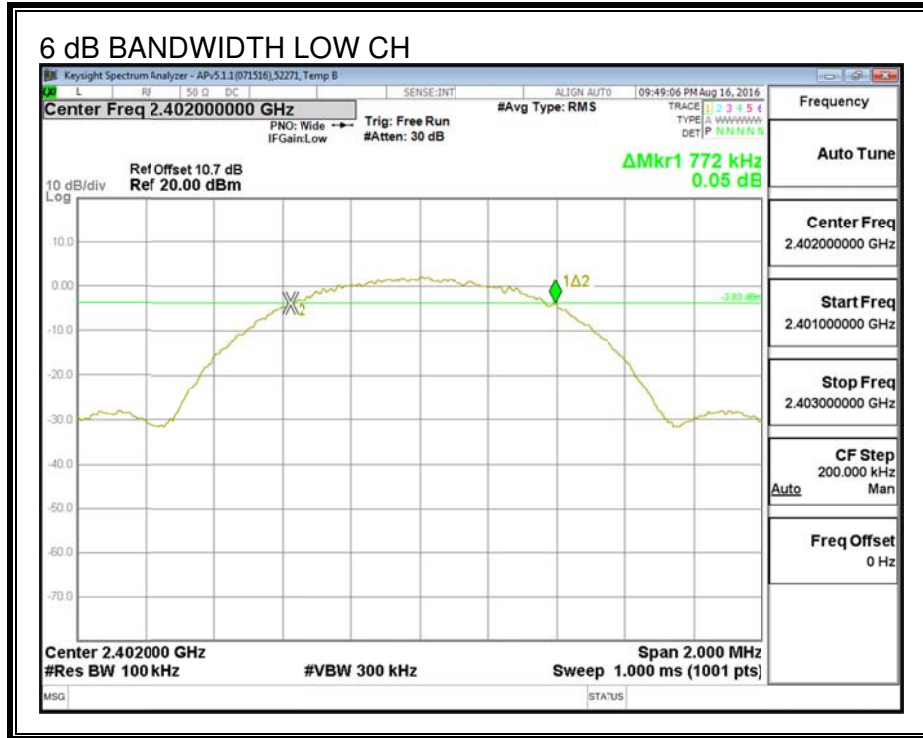
IC RSS-247 (5.2) (1)

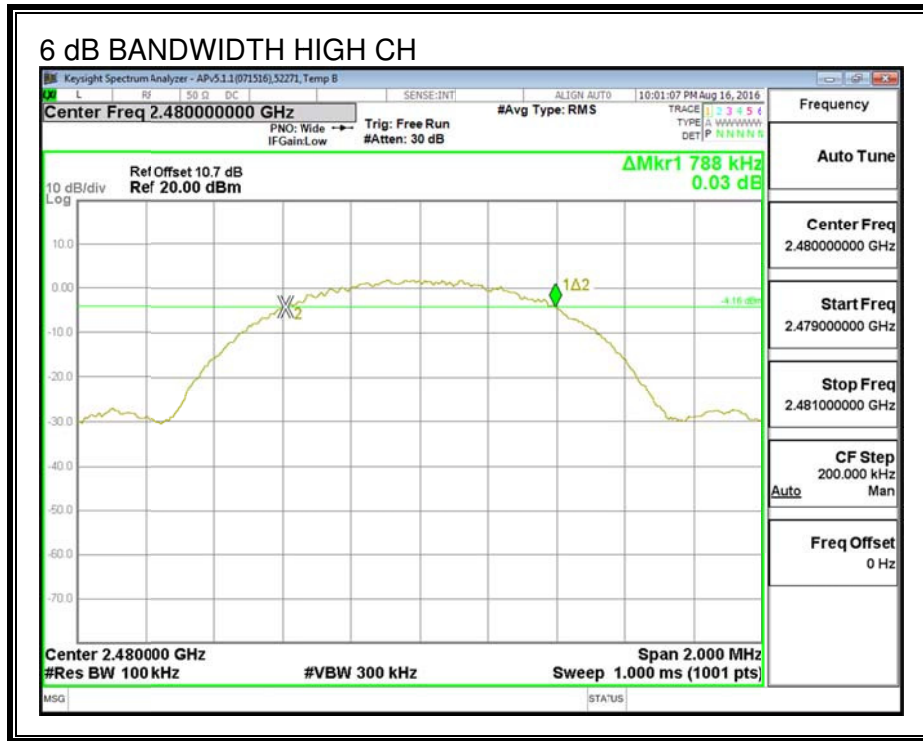
The minimum 6 dB bandwidth shall be at least 500 kHz.

#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.772	0.5
Middle	2440	0.746	0.5
High	2480	0.788	0.5

**6 dB BANDWIDTH**





## 7.4. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

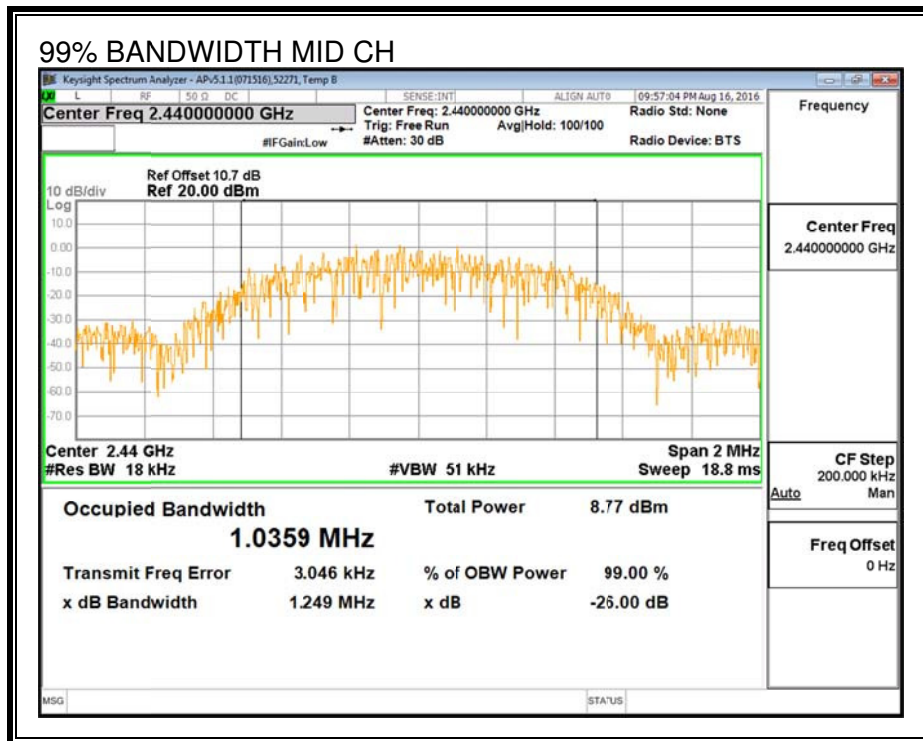
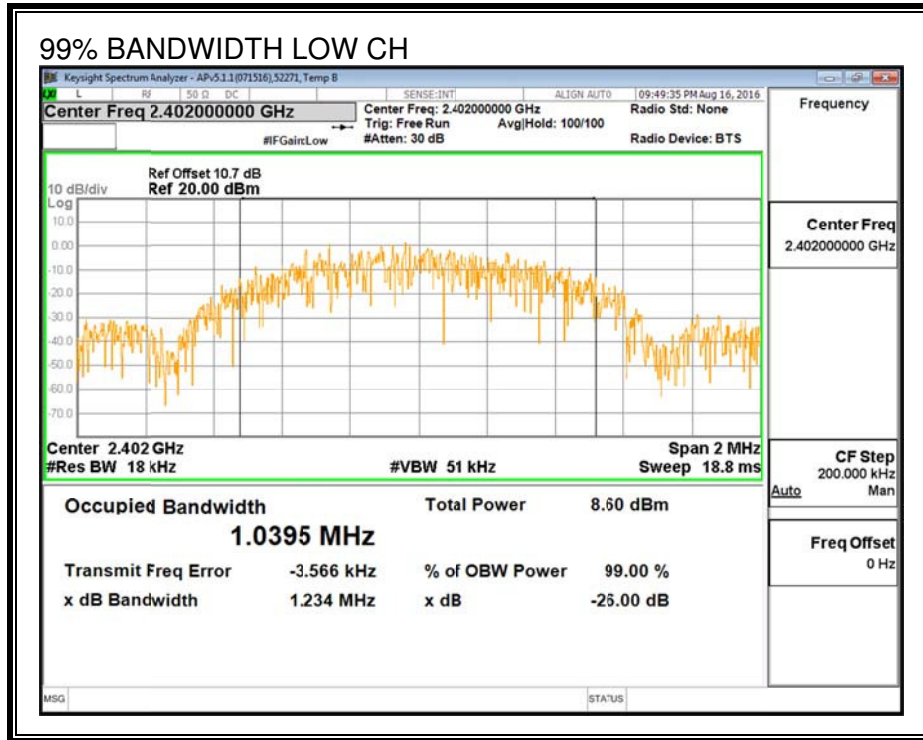
### TEST PROCEDURE

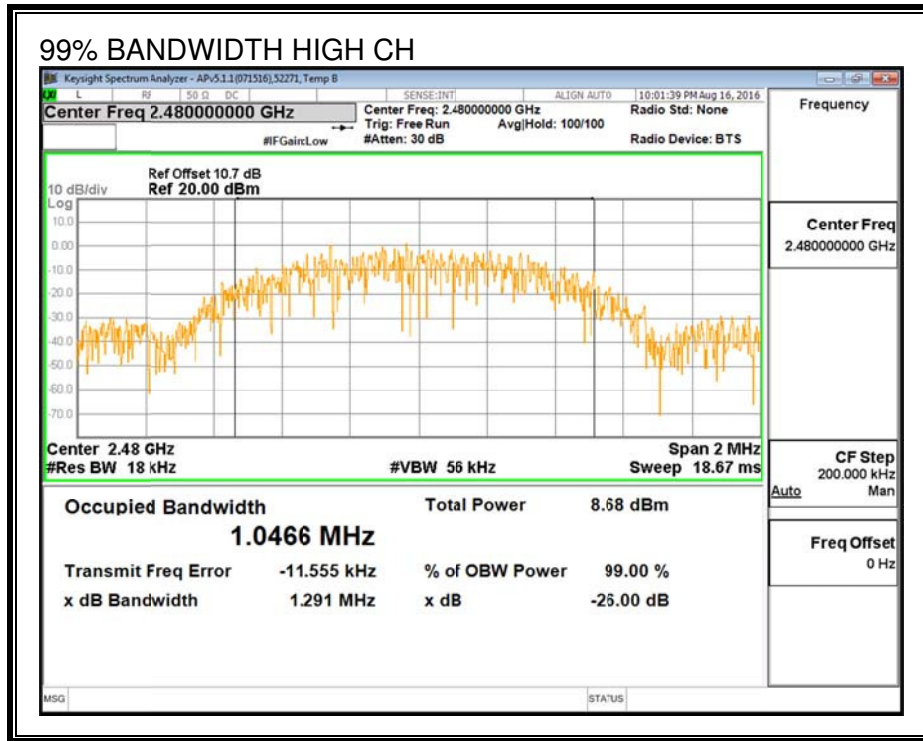
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0395
Middle	2440	1.0359
High	2480	1.0466

**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 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

<b>ID:</b>	50820	<b>Date:</b>	8/15/16
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<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	2402	8.43
Middle	2440	8.49
High	2480	8.48



## 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

<b>ID:</b>	50820	<b>Date:</b>	8/15/16
------------	-------	--------------	---------

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	2402	8.71	30	-21.292
Middle	2440	8.83	30	-21.170
High	2480	8.75	30	-21.254

## 7.7. POWER SPECTRAL DENSITY

### LIMITS

FCC §15.247 (e)

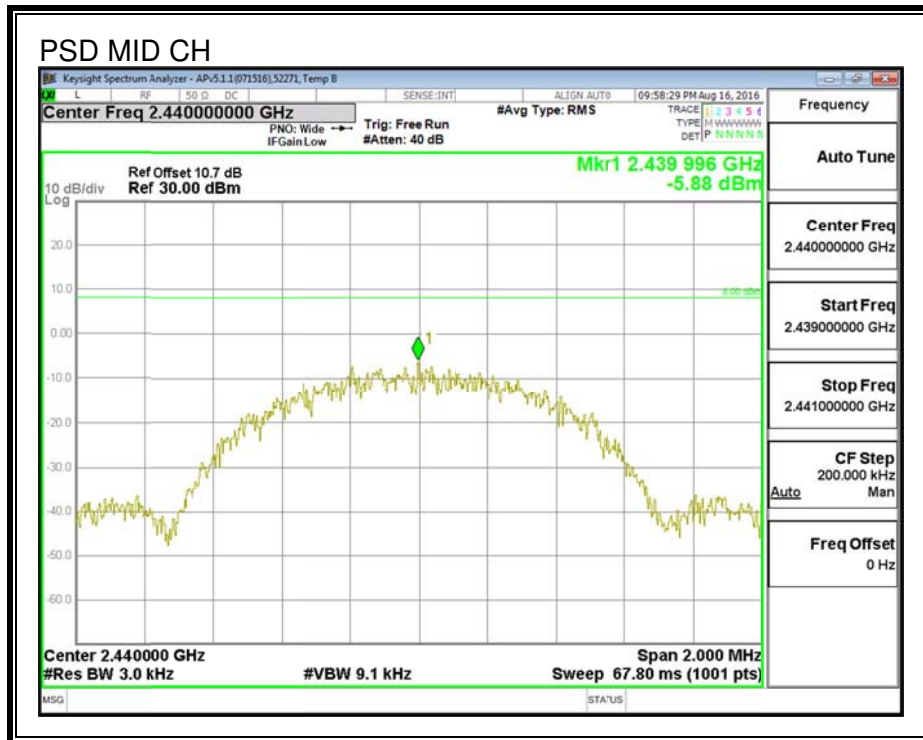
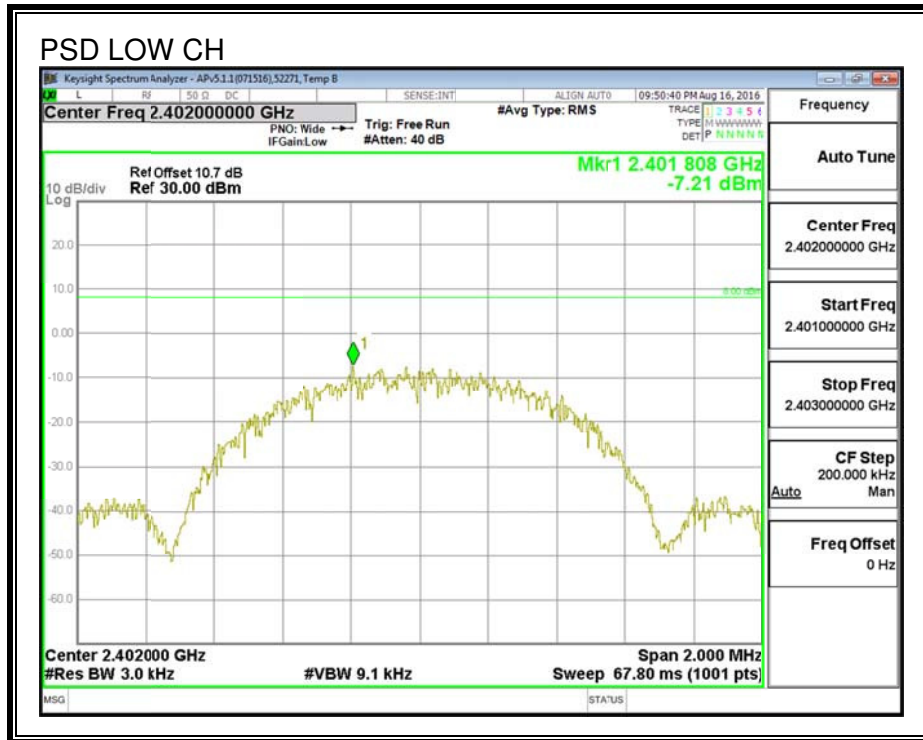
IC RSS-247 (5.2) (2)

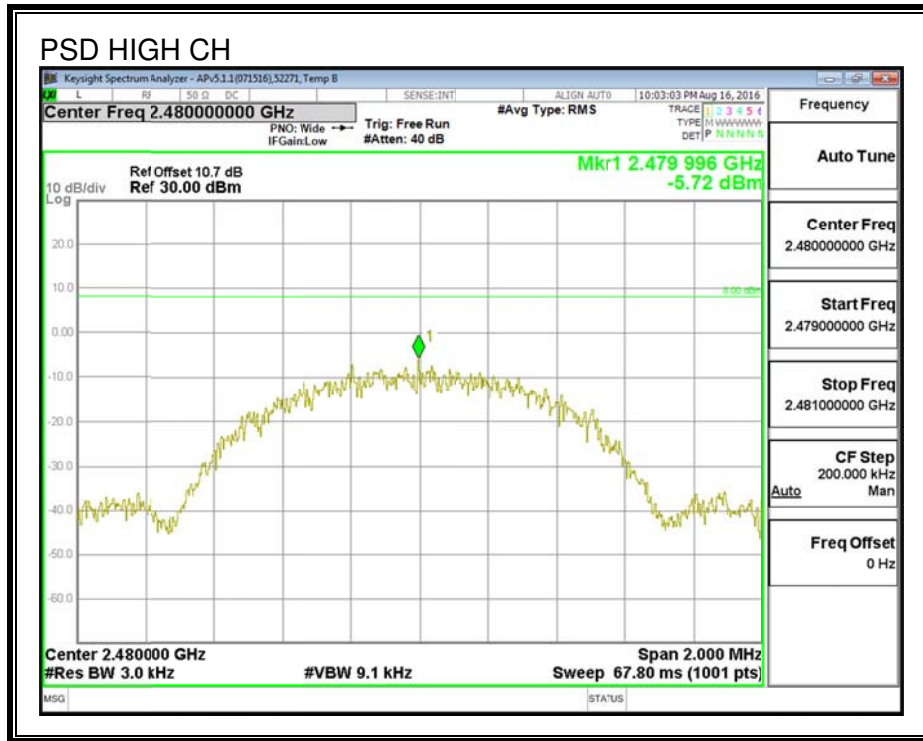
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-7.21	8	-15.21
Middle	2440	-5.88	8	-13.88
High	2480	-5.72	8	-13.72

**POWER SPECTRAL DENSITY**





## 7.8. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

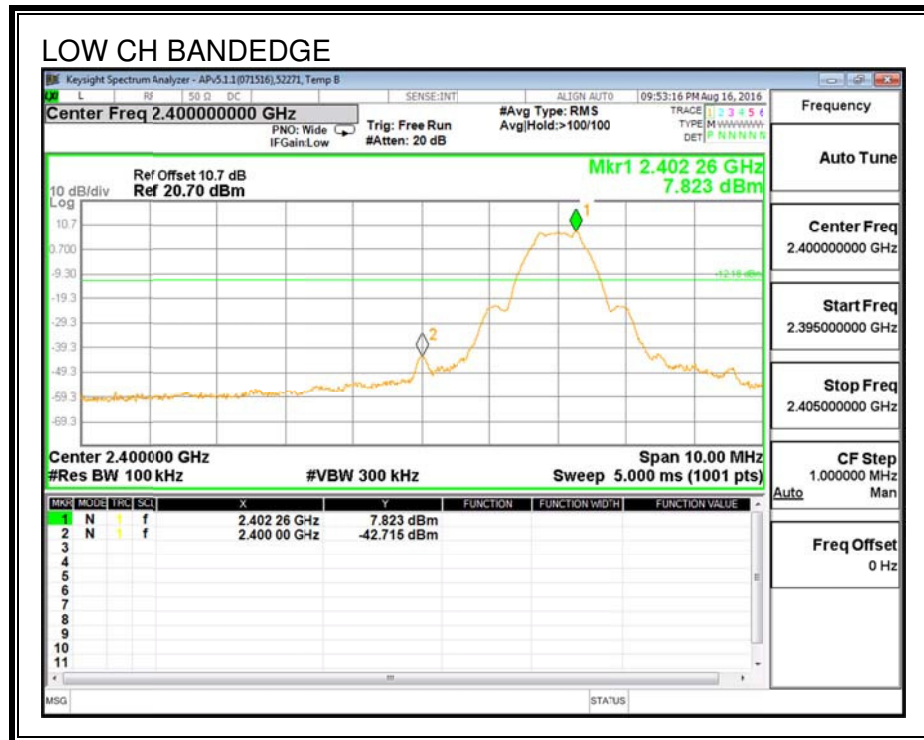
FCC §15.247 (d)

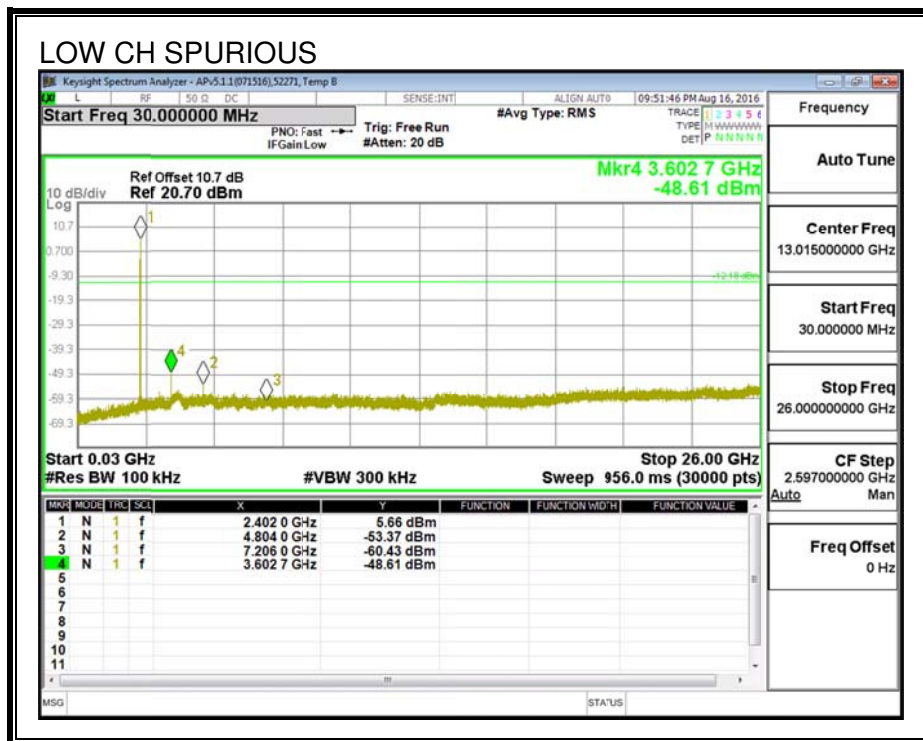
IC RSS-247 (5.5)

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

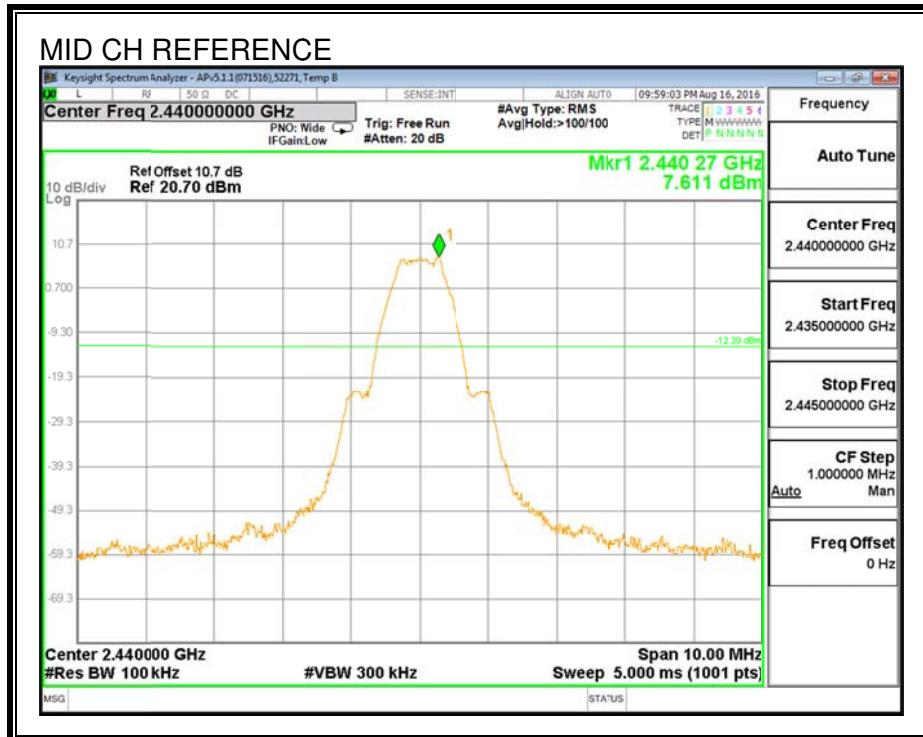
### RESULTS

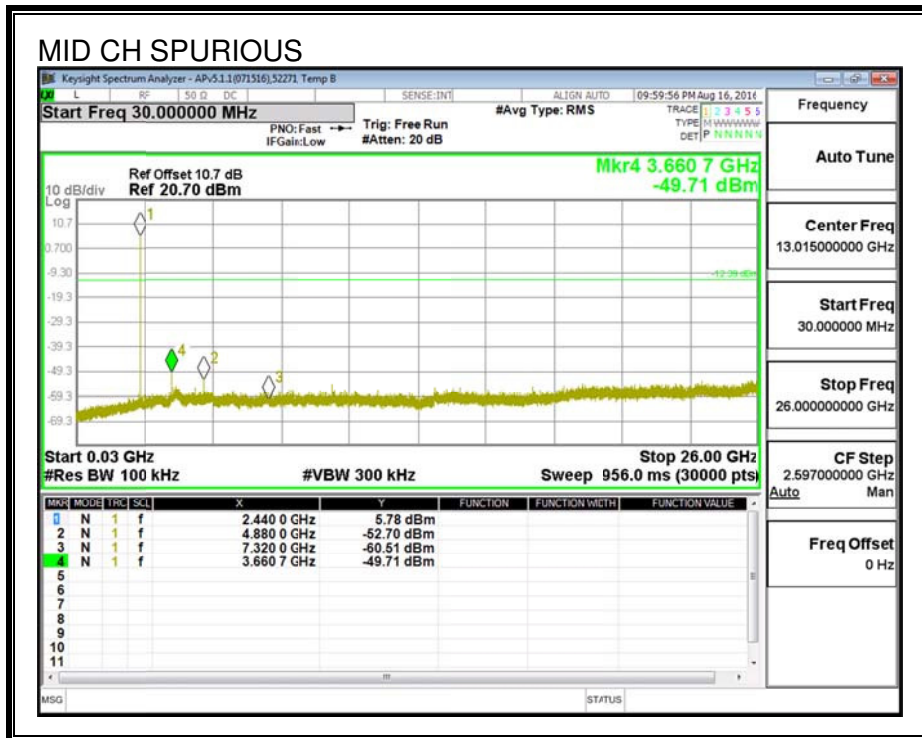
#### SPURIOUS EMISSIONS, LOW CHANNEL



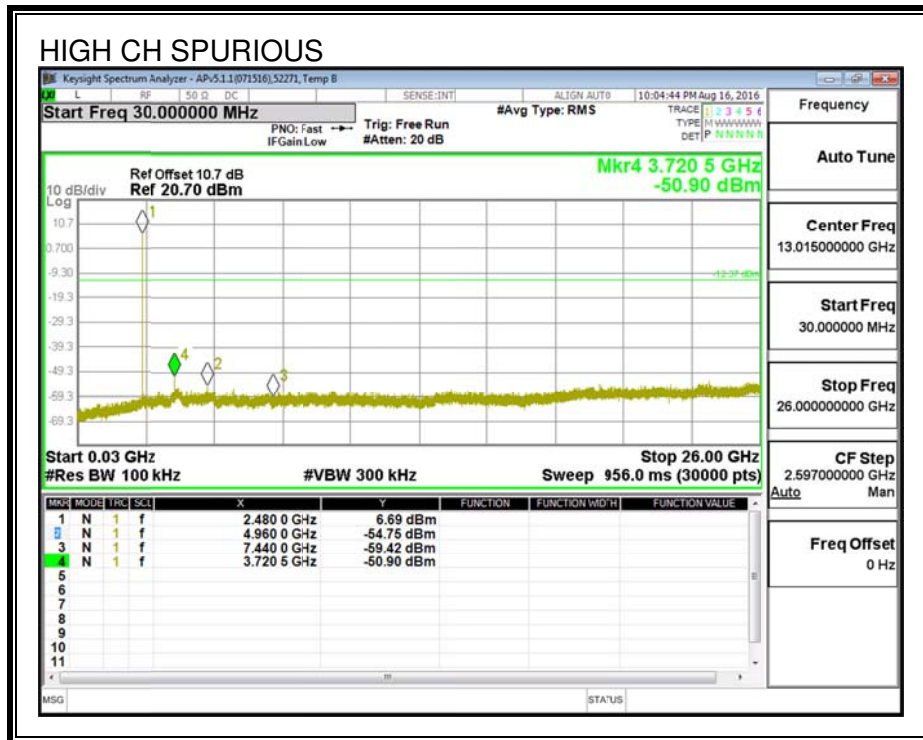
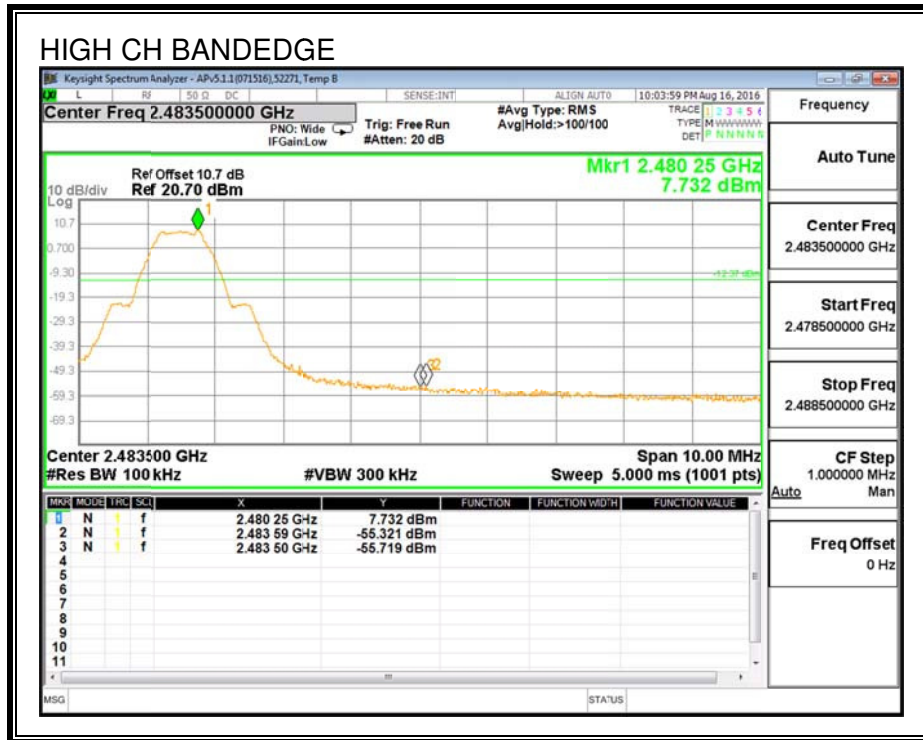


**SPURIOUS EMISSIONS, MID CHANNEL**





**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.

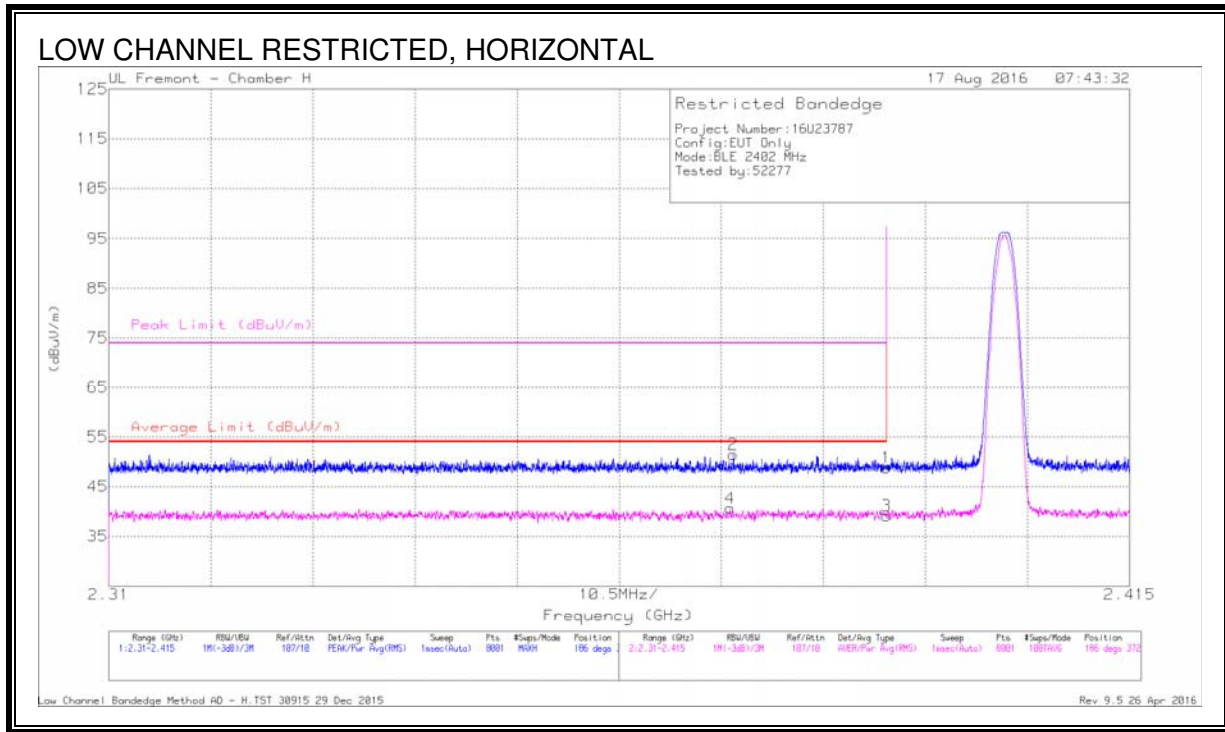
For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For 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 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 BANDEDGE

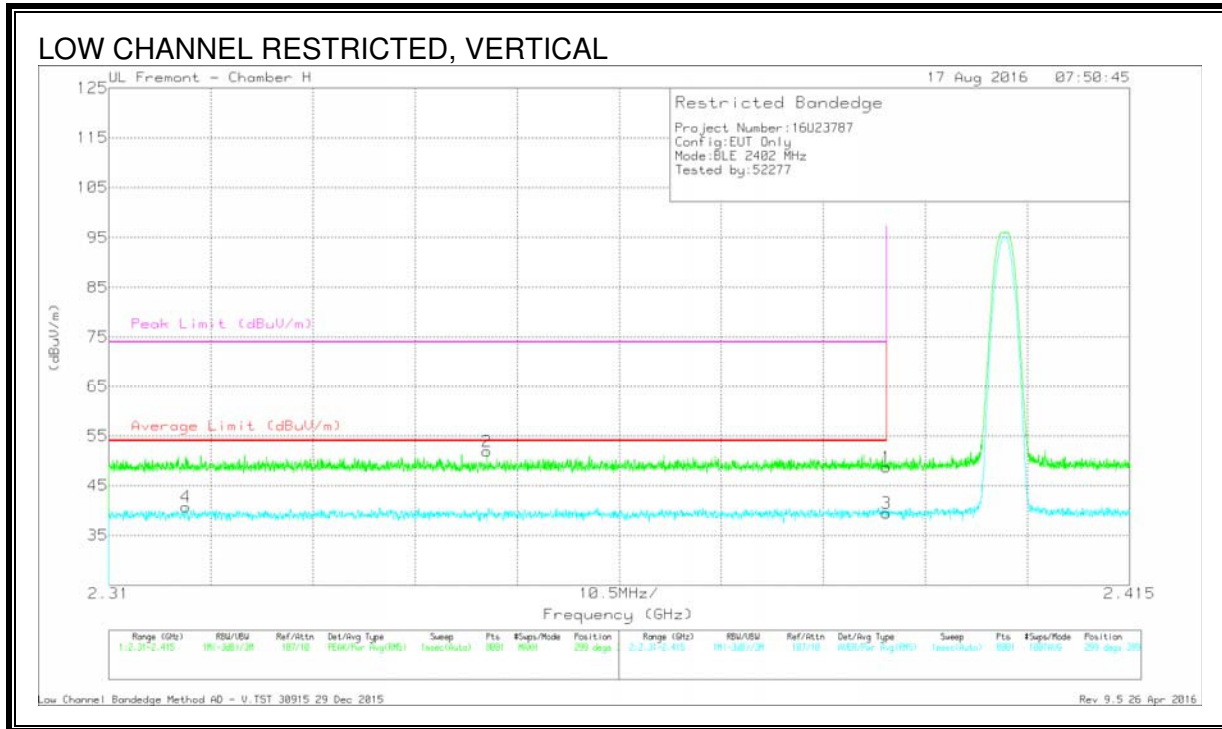
#### DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT120 (dB/m)	Amp/Cb/Ftr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.71	Pk	31.9	-27.8	48.81	-	-	74	-25.19	186	372	H
2	* 2.374	47.47	Pk	31.8	-27.8	51.47	-	-	74	-22.53	186	372	H
3	* 2.39	35.02	RMS	31.9	-27.8	39.12	54	-14.88	-	-	186	372	H
4	* 2.374	36.66	RMS	31.8	-27.8	40.66	54	-13.34	-	-	186	372	H

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

Pk - Peak detector

RMS - RMS detection



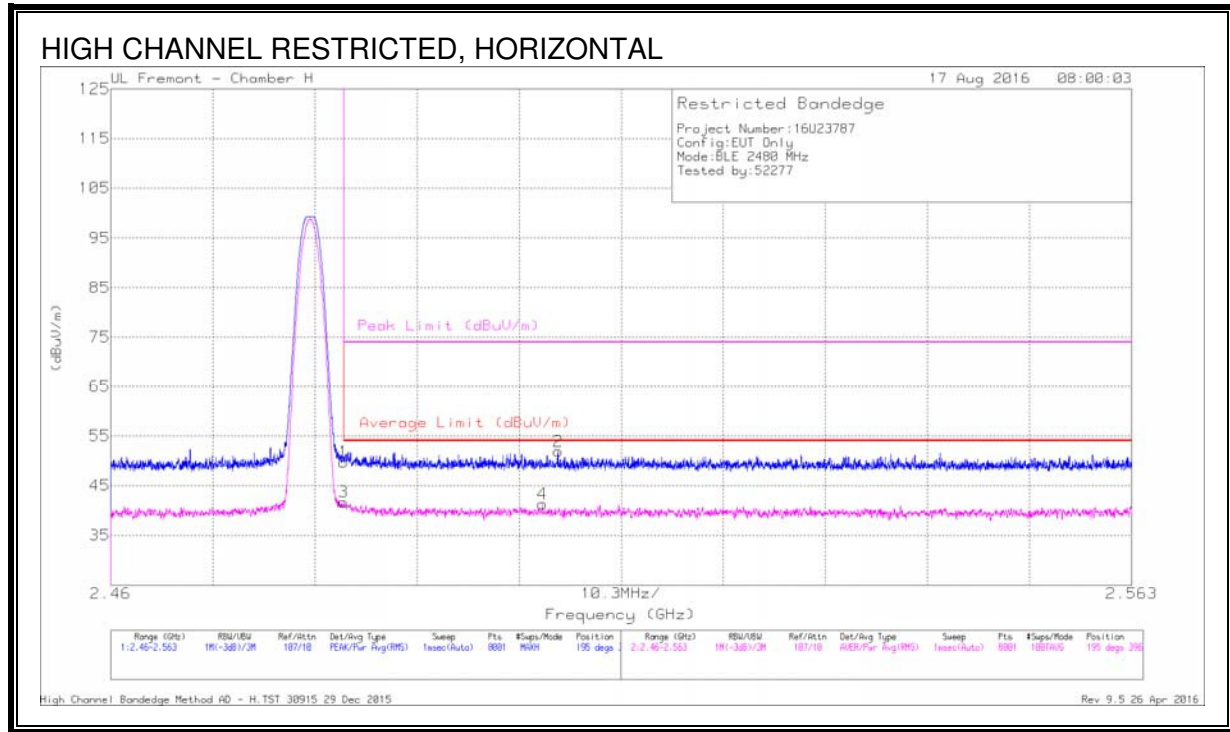
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT120 (dB/m)	Amp/Cb/Ftr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	44.62	Pk	31.9	-27.8	48.72	-	-	74	-25.28	299	389	V
2	* 2.349	47.9	Pk	31.7	-27.7	51.9	-	-	74	-22.1	299	389	V
3	* 2.39	35.38	RMS	31.9	-27.8	39.48	54	-14.52	-	-	299	389	V
4	* 2.318	36.71	RMS	31.6	-27.6	40.71	54	-13.29	-	-	299	389	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/Filtri/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	45.46	Pk	32.2	-27.9	49.76	-	-	74	-24.24	195	396	H
2	2.505	47.61	Pk	32.2	-27.9	51.91	-	-	74	-22.09	195	396	H
3	* 2.484	37.41	RMS	32.2	-27.9	41.71	54	-12.29	-	-	195	396	H
4	2.504	37	RMS	32.2	-27.9	41.3	54	-12.7	-	-	195	396	H

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

Pk - Peak detector

RMS - RMS detection

H



**DATA**

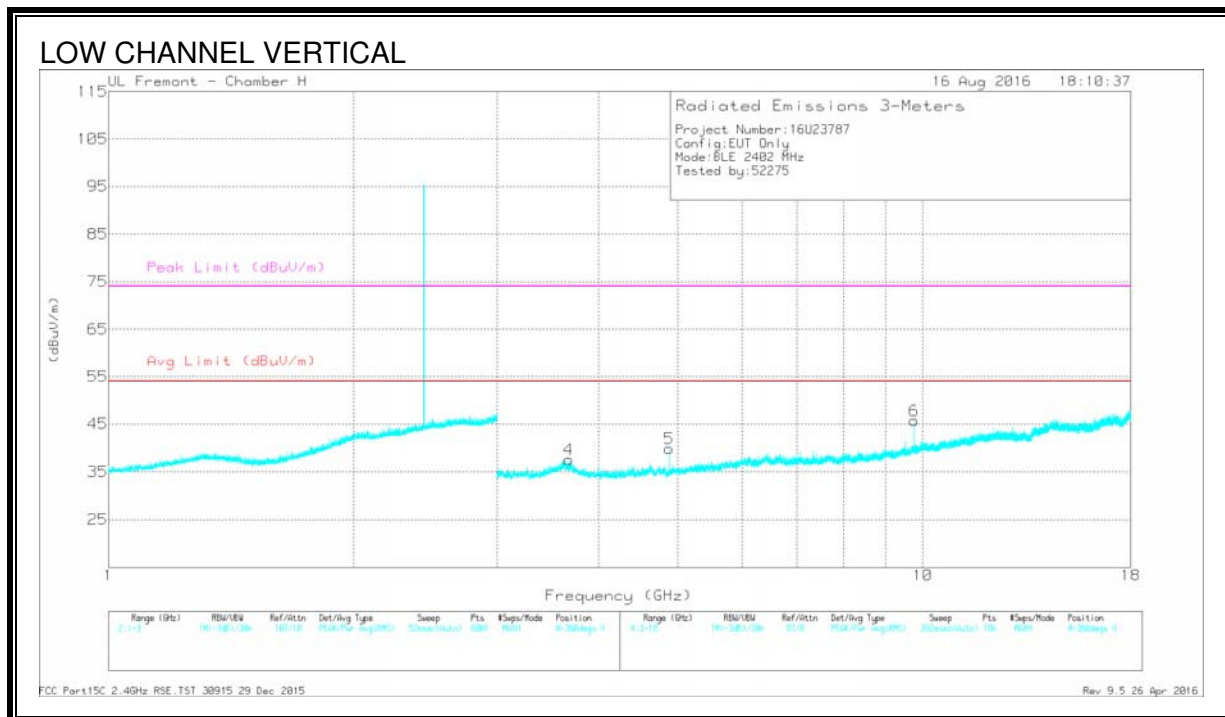
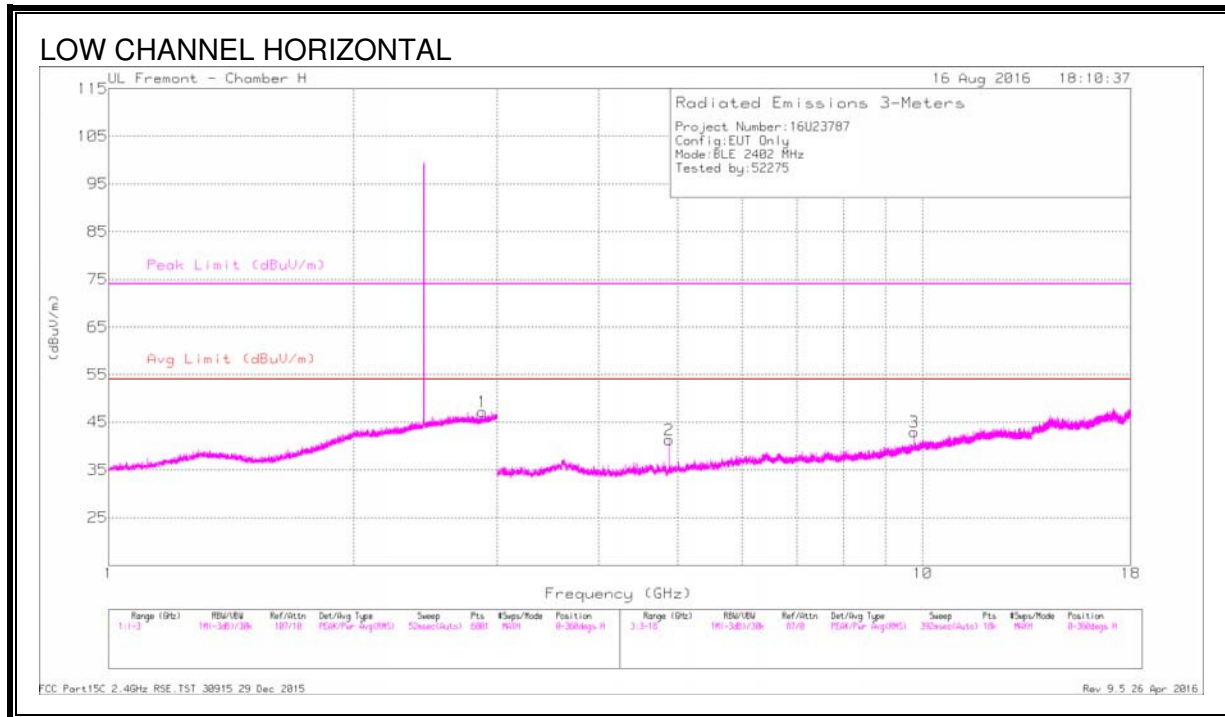
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/CbI/Filr/P ad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.15	Pk	32.2	-27.9	49.45	-	-	74	-24.55	10	164	V
2	* 2.49	47.72	Pk	32.2	-27.9	52.02	-	-	74	-21.98	10	164	V
3	* 2.484	36.96	RMS	32.2	-27.9	41.26	54	-12.74	-	-	10	164	V
4	* 2.484	37.1	RMS	32.2	-27.9	41.4	54	-12.6	-	-	10	164	V

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

Pk - Peak detector

RMS - RMS detection

### 8.2.2. HARMONICS AND SPURIOUS EMISSIONS



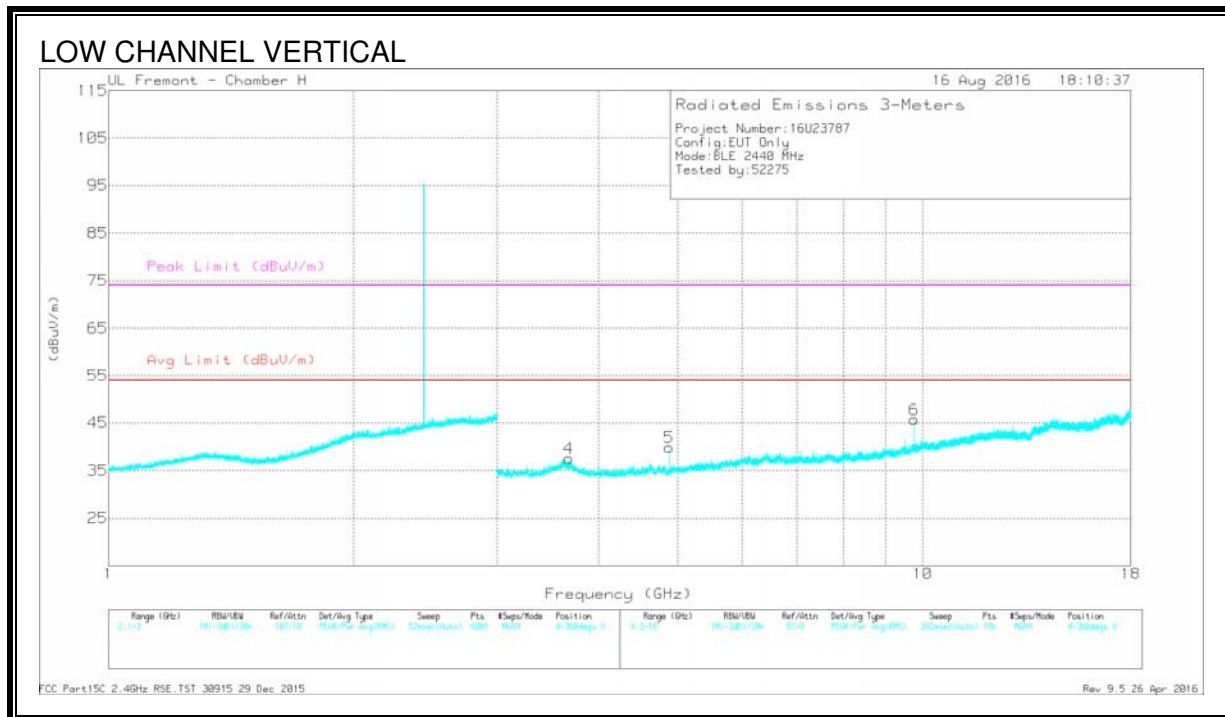
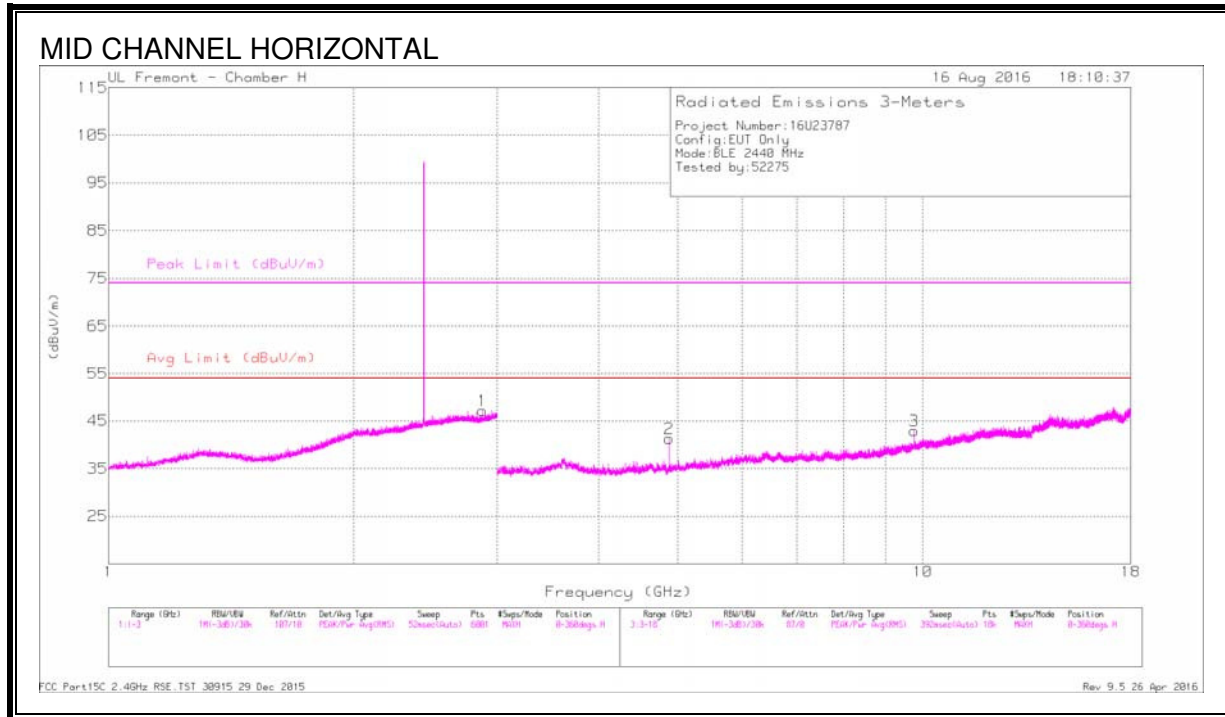
**DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/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	* 2.881	38.55	PK2	32.8	-19.2	52.15	-	-	74	-21.85	353	221	H
	* 2.878	27.36	MAv1	32.8	-19.2	40.96	54	-13.04	-	-	353	221	H
2	* 4.88	43.57	PK2	34	-34.8	42.77	-	-	74	-31.23	48	170	H
	* 4.88	31.96	MAv1	34	-34.8	31.16	54	-22.84	-	-	48	170	H
4	* 3.674	43.96	PK2	34.9	-36	42.86	-	-	74	-31.14	221	294	V
	* 3.678	33.59	MAv1	34.9	-36	32.49	54	-21.51	-	-	221	294	V
5	* 4.881	42.67	PK2	34	-34.7	41.97	-	-	74	-32.03	74	372	V
	* 4.88	32.06	MAv1	34	-34.8	31.26	54	-22.74	-	-	74	372	V
3	9.76	39.61	PK2	37.3	-29.1	47.81	-	-	-	-	75	198	H
6	9.76	39.36	PK2	37.2	-29.1	47.46	-	-	-	-	273	191	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average





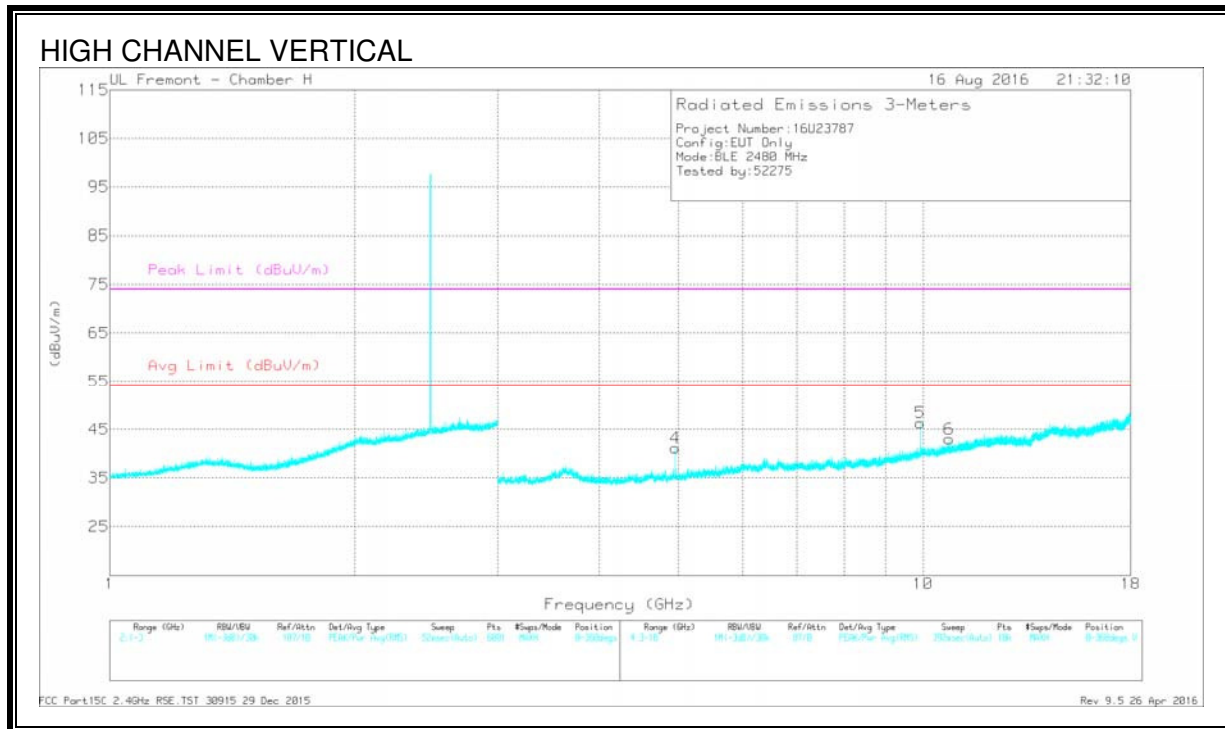
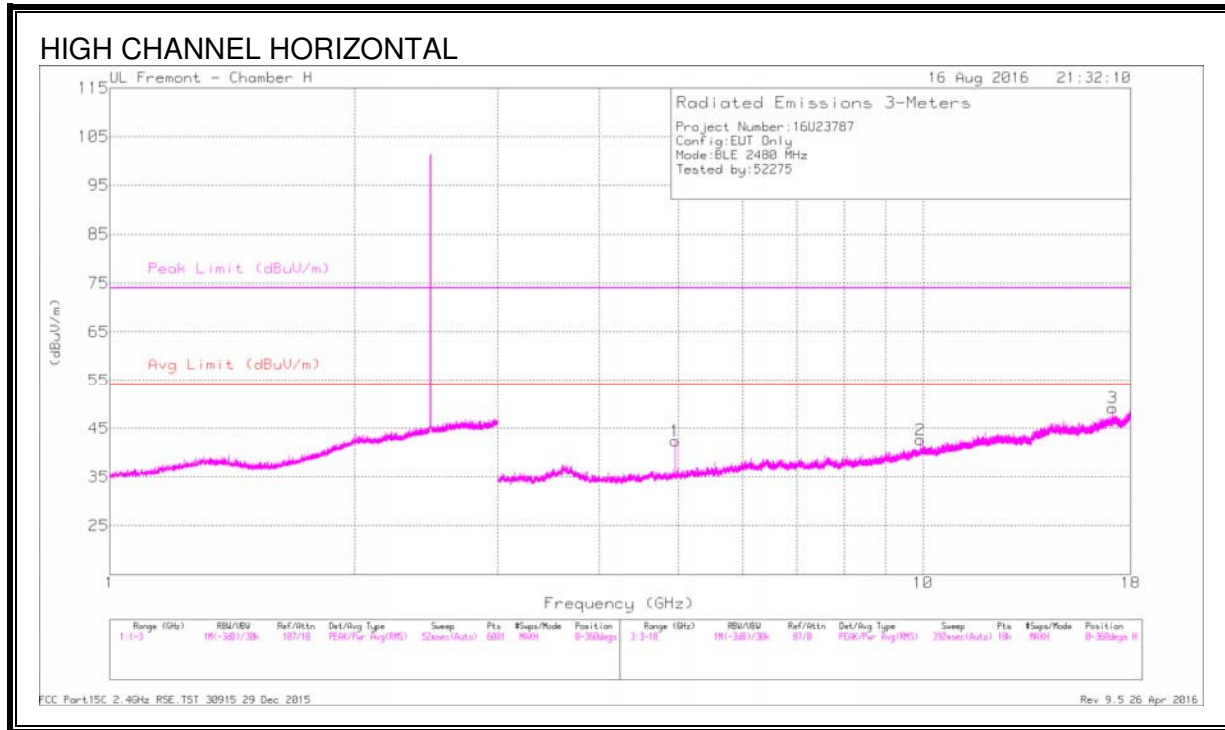
**DATA**

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	* 2.881	38.92	PK2	32.8	-19.2	52.52	-	-	74	-21.48	238	333	H
	* 2.878	27.38	MAv1	32.8	-19.2	40.98	54	-13.02	-	-	238	333	H
2	* 4.881	42.57	PK2	34	-34.8	41.77	-	-	74	-32.23	6	304	H
	* 4.88	32.05	MAv1	34	-34.8	31.25	54	-22.75	-	-	6	304	H
4	* 3.674	44.52	PK2	34.9	-36	43.42	-	-	74	-30.58	302	102	V
	* 3.678	33.55	MAv1	34.9	-36	32.45	54	-21.55	-	-	302	102	V
5	* 4.879	42.76	PK2	34	-34.8	41.96	-	-	74	-32.04	27	345	V
3	9.759	38.89	PK2	37.2	-29.1	46.99	-	-	-	-	354	371	H
6	9.761	38.96	PK2	37.3	-29.1	47.16	-	-	-	-	44	365	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/Cb/Filtr/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	* 4.96	46.93	PK2	34	-34.3	46.63	-	-	74	-27.37	268	100	H
	* 4.96	39.77	MAv1	34	-34.3	39.47	54	-14.53	-	-	268	100	H
4	* 4.96	46.41	PK2	34	-34.3	46.11	-	-	74	-27.89	345	255	V
	* 4.96	39.52	MAv1	34	-34.3	39.22	54	-14.78	-	-	345	255	V
6	* 10.766	38.2	PK2	38.1	-28.5	47.8	-	-	74	-26.2	196	386	V
	* 10.767	27.56	MAv1	38.1	-28.5	37.16	54	-16.84	-	-	196	386	V
5	9.919	43.69	PK2	37.5	-29.3	51.89	-	-	-	-	266	116	V
2	9.92	41.54	PK2	37.5	-29.3	49.74	-	-	-	-	267	100	H
3	17.105	37.42	PK2	41.1	-24.4	54.12	-	-	-	-	256	282	H

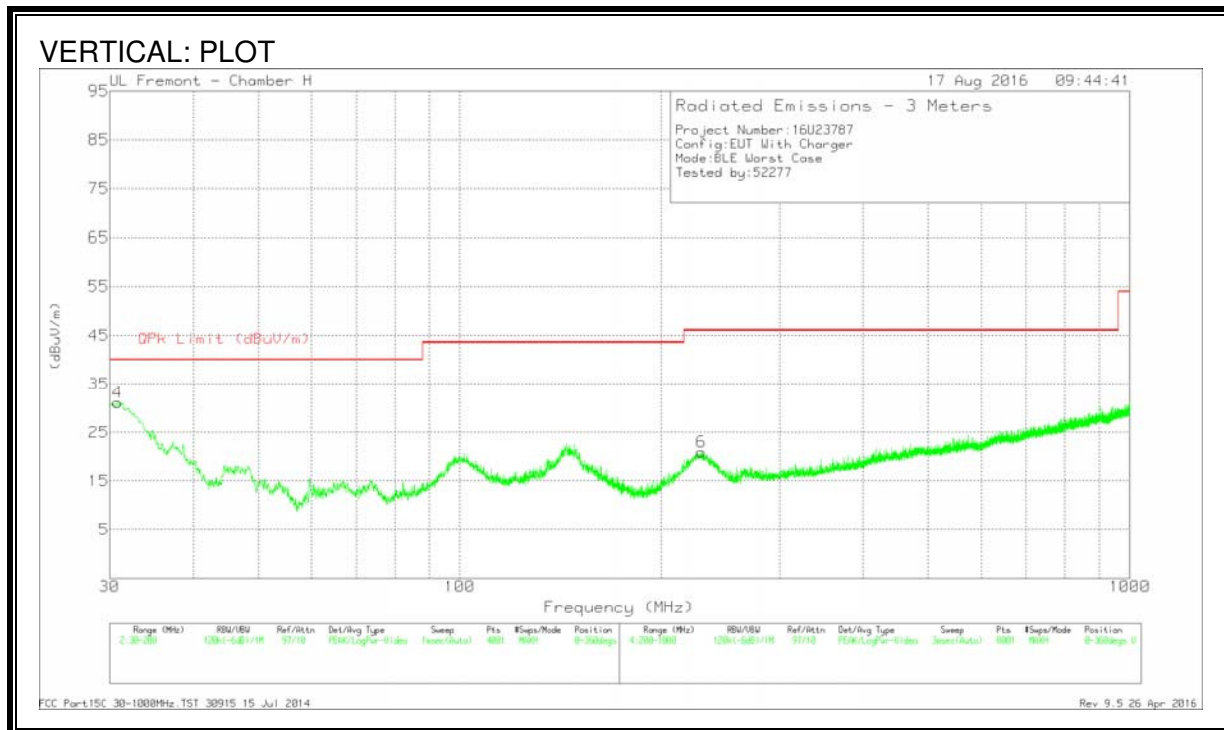
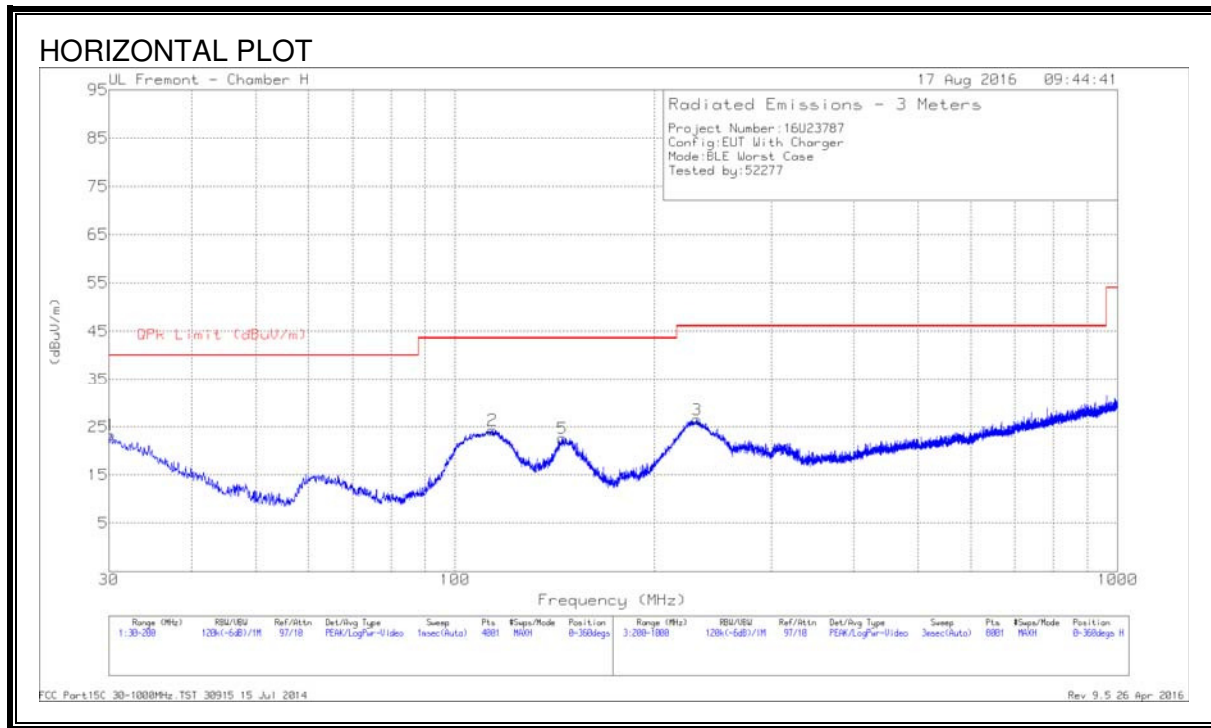
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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)



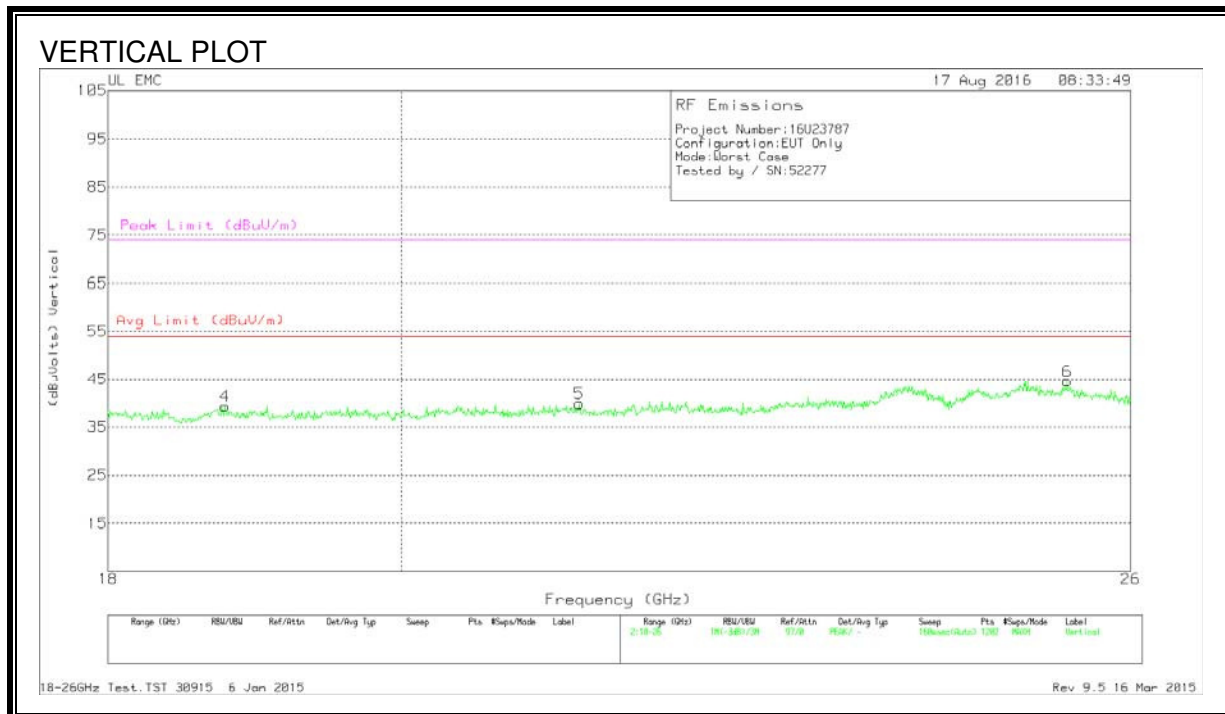
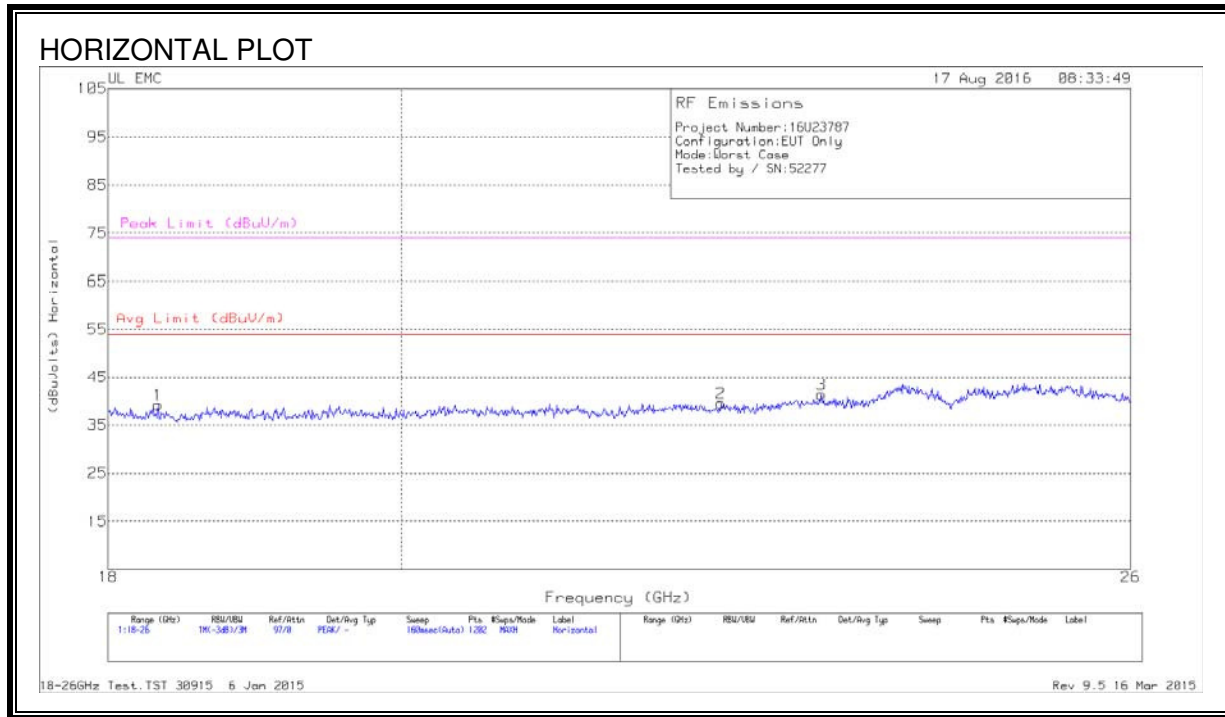
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.2125	29.72	Pk	24.9	-31.3	23.32	40	-16.68	0-360	98	H
2	* 113.8525	37.62	Pk	17.1	-30.4	24.32	43.52	-19.2	0-360	299	H
3	231.7	40.92	Pk	15.1	-29.5	26.52	46.02	-19.5	0-360	199	H
4	30.85	37.81	Pk	24.7	-31.3	31.21	40	-8.79	0-360	100	V
5	145.3025	36.34	Pk	16.5	-30.2	22.64	43.52	-20.88	0-360	199	H
6	229.4	35.56	Pk	15	-29.6	20.96	46.02	-25.06	0-360	201	V

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

### 8.4. WORST-CASE 18 to 26 GHz

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



**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	18.326	41.57	Pk	32.4	-25.3	-9.5	39.17	54	-14.83	74	-34.83
2	22.436	40.2	Pk	33.5	-24.7	-9.5	39.5	54	-14.5	74	-34.5
3	23.262	42.23	Pk	33.5	-24.9	-9.5	41.33	54	-12.67	74	-32.67
4	18.773	41.53	Pk	32.4	-25.1	-9.5	39.33	54	-14.67	74	-34.67
5	21.324	41.33	Pk	33.1	-25.1	-9.5	39.83	54	-14.17	74	-34.17
6	25.414	44.17	Pk	34.3	-24.3	-9.5	44.67	54	-9.33	74	-29.33

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 $\mu$ 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-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	.17025	35.69	Qp	0	0	10.1	45.79	64.95	-19.16	-	-
2	.17025	18.39	Ca	0	0	10.1	28.49	-	-	54.95	-26.46
3	.25575	32.68	Qp	0	0	10.1	42.78	61.57	-18.79	-	-
4	.258	15.33	Ca	0	0	10.1	25.43	-	-	51.5	-26.07
5	.34125	29.28	Qp	0	0	10.1	39.38	59.17	-19.79	-	-
6	.3435	12.43	Ca	0	0	10.1	22.53	-	-	49.12	-26.59
7	.78	24.16	Qp	0	0	10.1	34.26	56	-21.74	-	-
8	.78	15.13	Ca	0	0	10.1	25.23	-	-	46	-20.77
9	3.381	13.42	Qp	0	.1	10.1	23.62	56	-32.38	-	-
10	3.381	8.68	Ca	0	.1	10.1	18.88	-	-	46	-27.12
11	18.29175	11.18	Qp	0	.2	10.3	21.68	60	-38.32	-	-
12	18.29175	2.58	Ca	0	.2	10.3	13.08	-	-	50	-36.92

Qp - Quasi-Peak detector

Ca - CISPR average detection

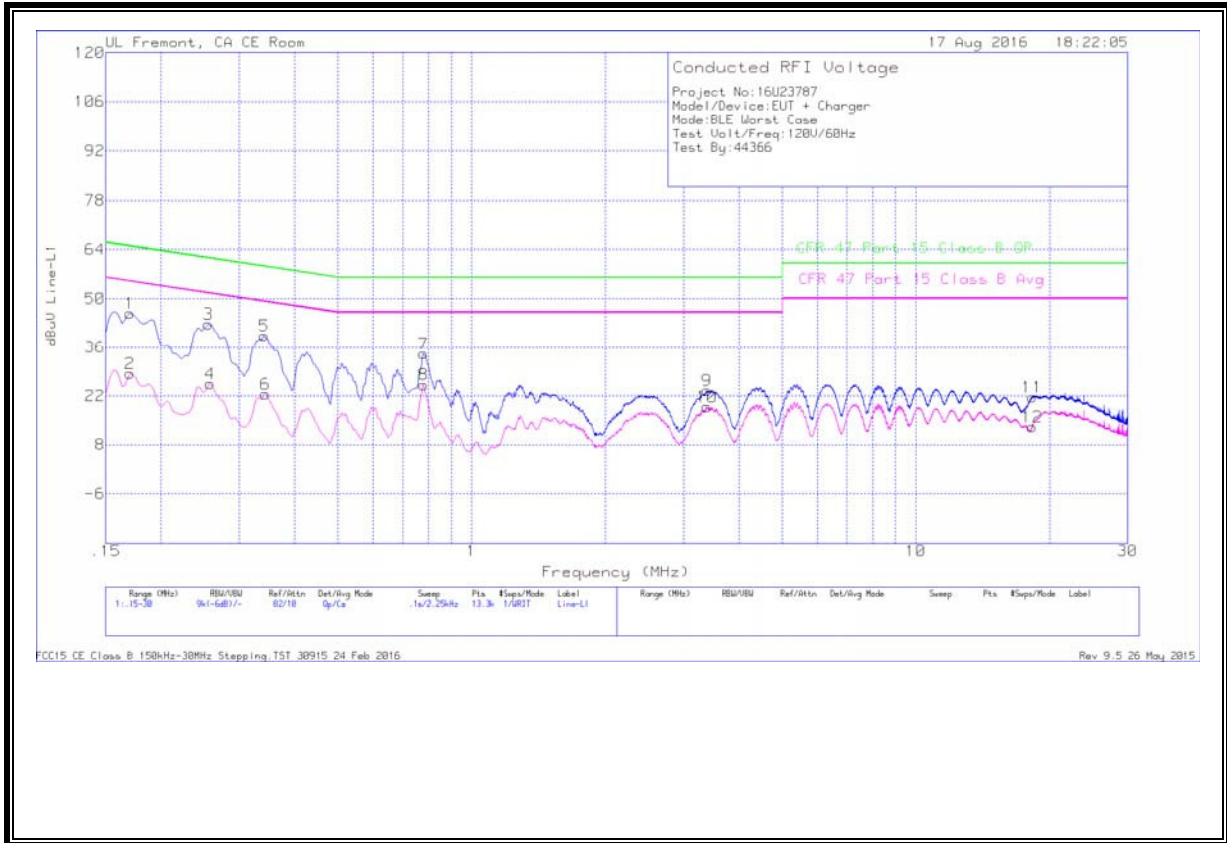
**Line-L2 .15 - 30MHz**

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	36.6	Qp	0	0	10.1	46.7	64.95	-18.25	-	-
14	.17025	19.59	Ca	0	0	10.1	29.69	-	-	54.95	-25.26
15	.25575	33.06	Qp	0	0	10.1	43.16	61.57	-18.41	-	-
16	.258	17.11	Ca	0	0	10.1	27.21	-	-	51.5	-24.29
17	.34125	28.52	Qp	0	0	10.1	38.62	59.17	-20.55	-	-
18	.3435	14.01	Ca	0	0	10.1	24.11	-	-	49.12	-25.01
19	.78	24.14	Qp	0	0	10.1	34.24	56	-21.76	-	-
20	.77775	19.44	Ca	0	0	10.1	29.54	-	-	46	-16.46
21	3.40125	14.9	Qp	0	.1	10.1	25.1	56	-30.9	-	-
22	3.4035	9.9	Ca	0	.1	10.1	20.1	-	-	46	-25.9
23	18.28725	14.12	Qp	0	.2	10.3	24.62	60	-35.38	-	-
24	18.28613	8.97	Ca	0	.2	10.3	19.47	-	-	50	-30.53

Qp - Quasi-Peak detector

Ca - CISPR average detection

**LINE 1 RESULTS**



**LINE 2 RESULTS**

