



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

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT
CLASS II PERMISSIVE CHANGE**

FOR

PORTABLE COMPUTER

MODEL NUMBER: A1534

**FCC ID: BCGA1534
IC: 579C-A1534**

REPORT NUMBER: 16U22814-E2V1

ISSUE DATE: FEBRUARY 19, 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[®]

NVLAP LAB CODE 200065-0

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: PORTABLE COMPUTER

MODEL: A1534

SERIAL NUMBER: C02R4002H501 (CONDUCTED); C02R400FH4W8

DATE TESTED: FEBRUARY 09 – 15, 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.

Tested 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 v03r04, 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 checked="" 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, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Laptop Device with Bluetooth and WLAN Radios (AC 80 MHZ Beam-Forming).

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	6.74	4.72

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	2.24

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 7.21.94.152

The test utility software used during testing was 10.11.3 (15D2043)

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The EUT was investigated with and without AC Charger. And the worst was determined to be EUT with AC Charger. Therefore, all final radiated testing was performed with AC Charger.

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

Based on the baseline scan, the worst-case data rates were:

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/ DC Adapter	Apple Inc.	A1540	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	2	SMA	Un-Shielded	0.2	To Spectrum Analyzer
2	DC	1	Lightning	Un-Shielded	2	N/A

I/O CABLES (ABOVE 1G RADIATED TEST)

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

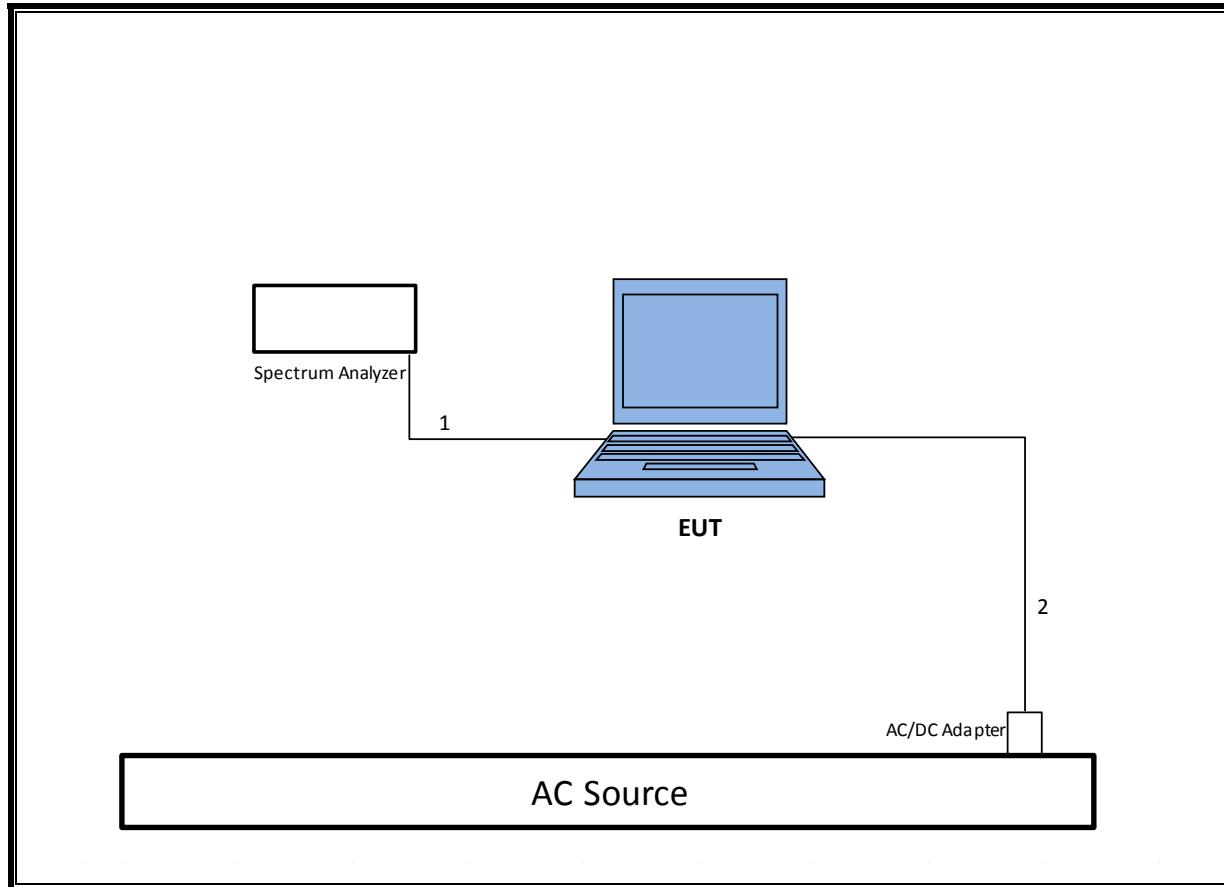
I/O CABLES (BELOW 1G RADIATED AND AC POWER CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
2	DC	1	Lightning	Un-Shielded	2	NA
3	Audio	1	Jack	Un-Shielded	0.5	NA

TEST SETUP- CONDUCTED PORT

The EUT was tested connected to spectrum analyzer via antenna port. Test software exercised the EUT.

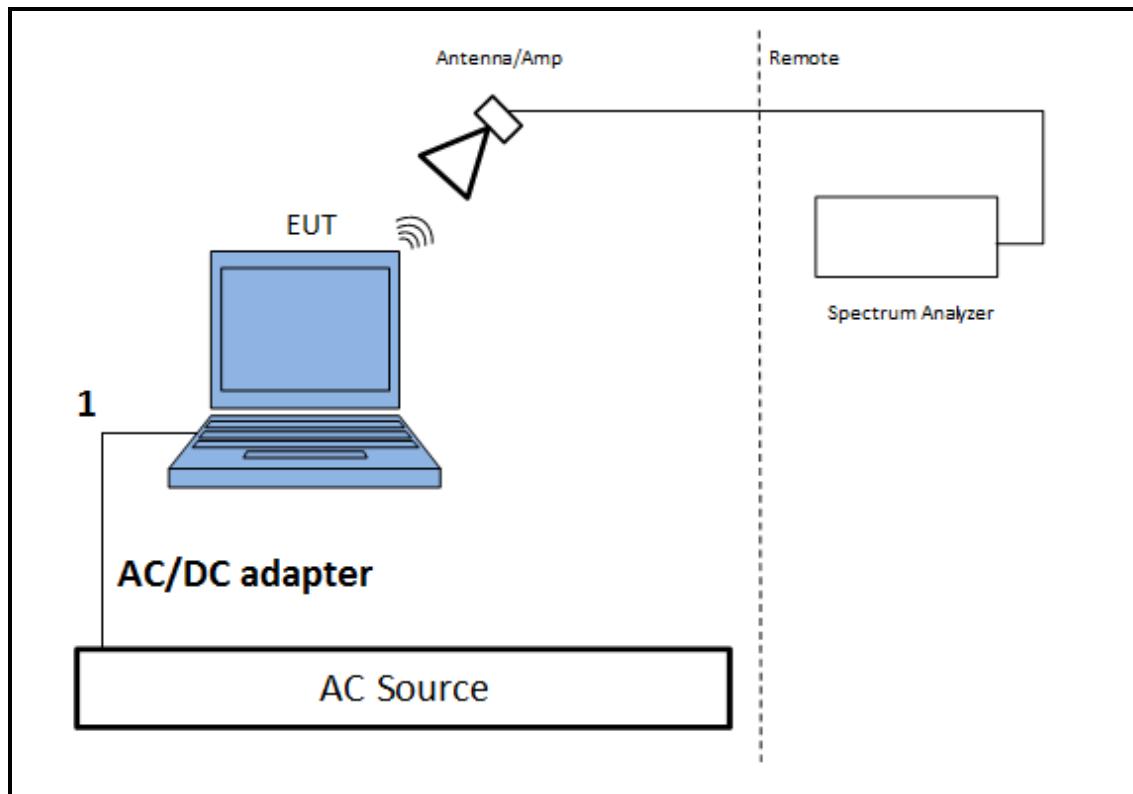
SETUP DIAGRAM



TEST SETUP- RADIATED- ABOVE 1 GHz

The EUT was powered by AC/DC adapter. Test software exercised the EUT.

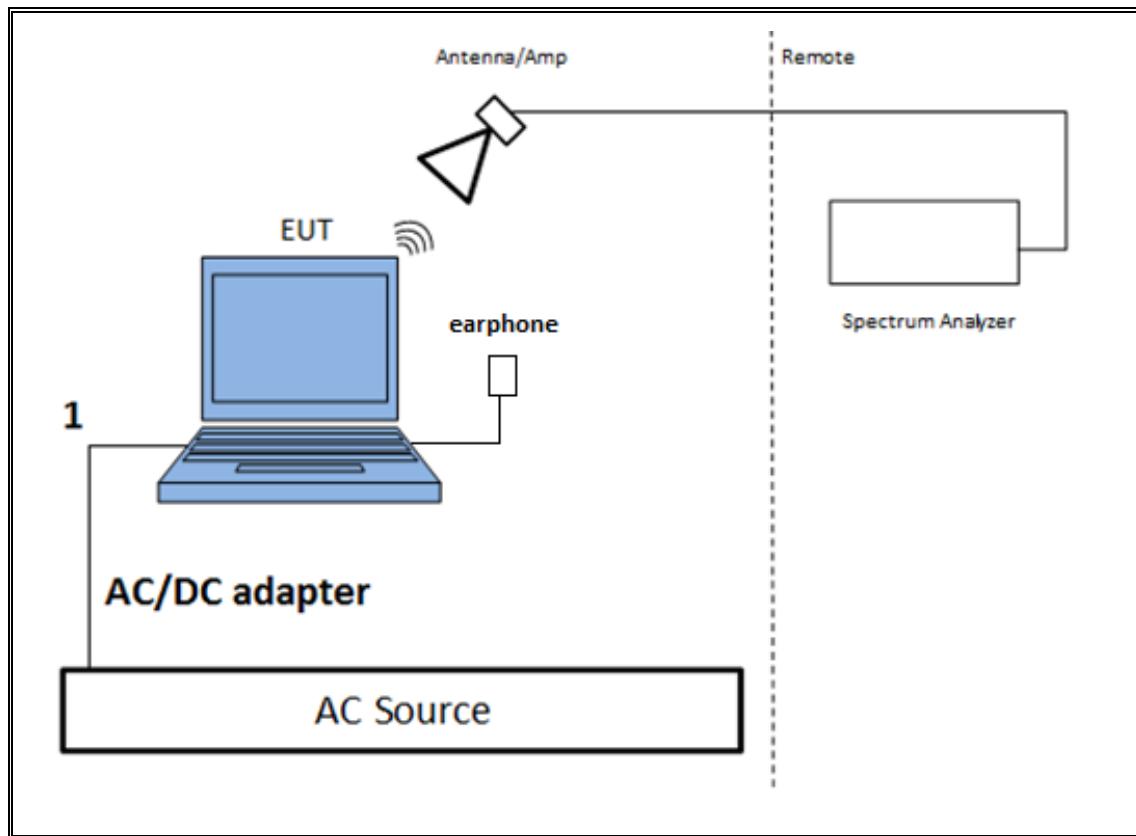
SETUP DIAGRAM



TEST SETUP- RADIATED- BELOW 1 GHz

The EUT was powered by AC/DC adapter and with earphone plugged in. Test software exercised the EUT.

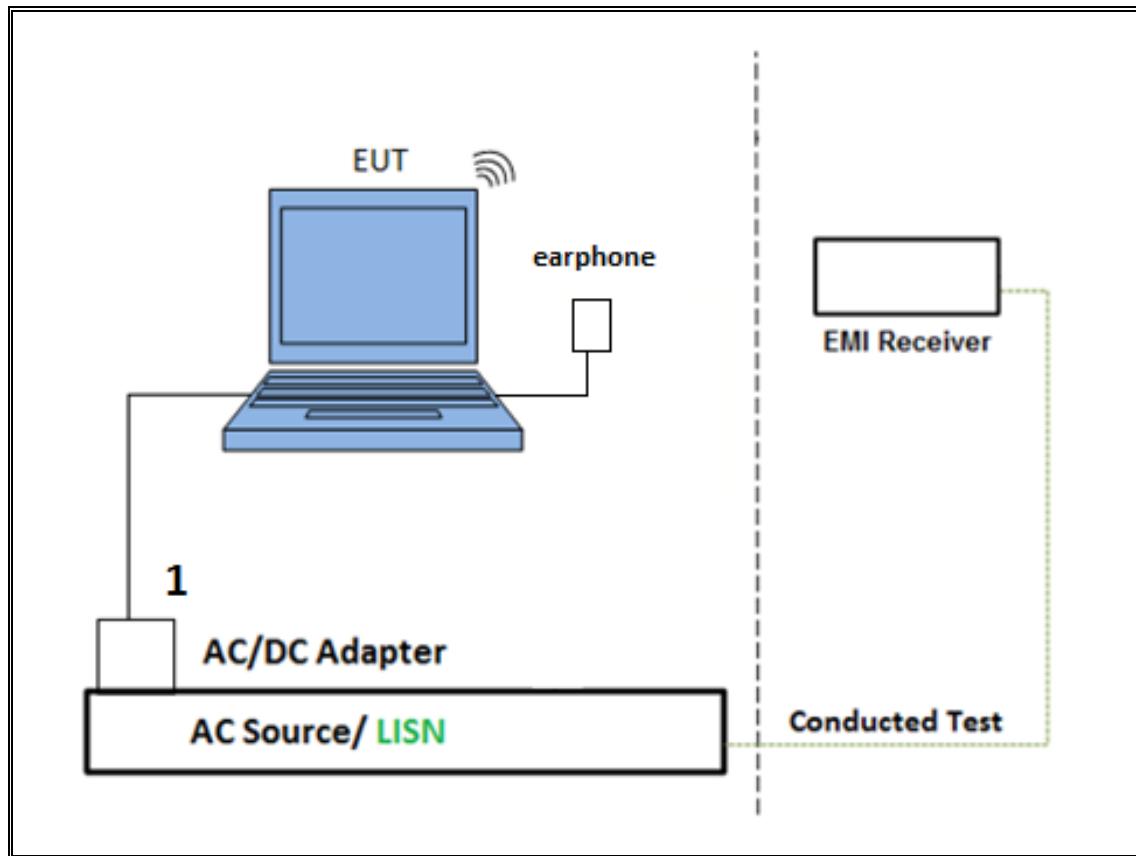
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED TESTS

The EUT was powered by AC/DC adapter and with earphone plugged in. 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	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	29310	3/26/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	10/28/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782153	6/2/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	6/8/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	US51350187	6/1/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	185623	6/9/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY51380911	10/15/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	9/25/2016
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	4/7/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	209336	5/12/2016
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/14/2016
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A04710	6/29/2016
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/16/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	161124	9/16/2016
Power Cable, Line Conducted Emissions	UL	PG1	N/A	7/28/2016
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 v03r04, Section 8.1.

Output Power: KDB 558074 D01 v03r04, Section 9.1.2.

Power Spectral Density: KDB 558074 D01 v03r04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r04, Section 12.1.

Band-edge: KDB 558074 D01 v03r04, Section 12.1.

7.2. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

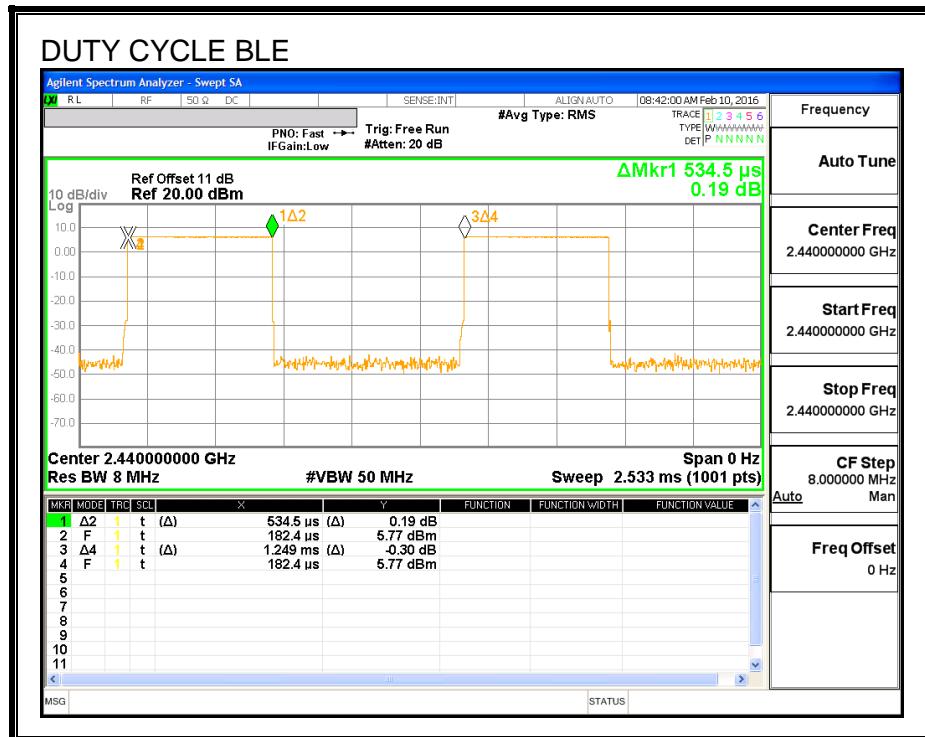
PROCEDURE

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	0.535	1.249	0.428	42.79%	3.69	1.871

DUTY CYCLE PLOTS



7.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

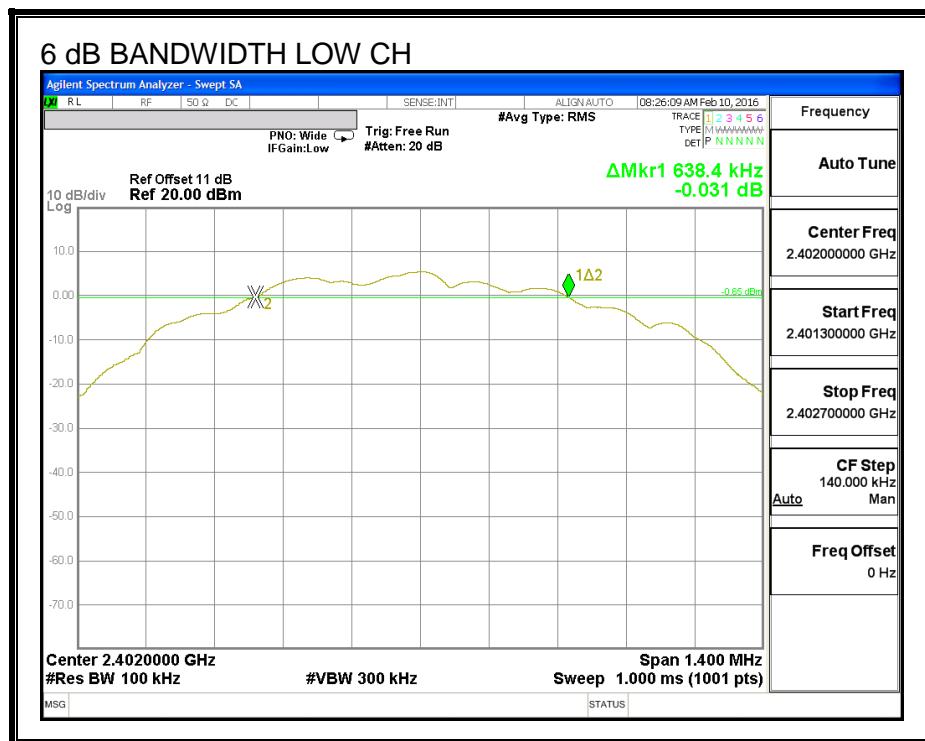
IC RSS-247 (5.2) (1)

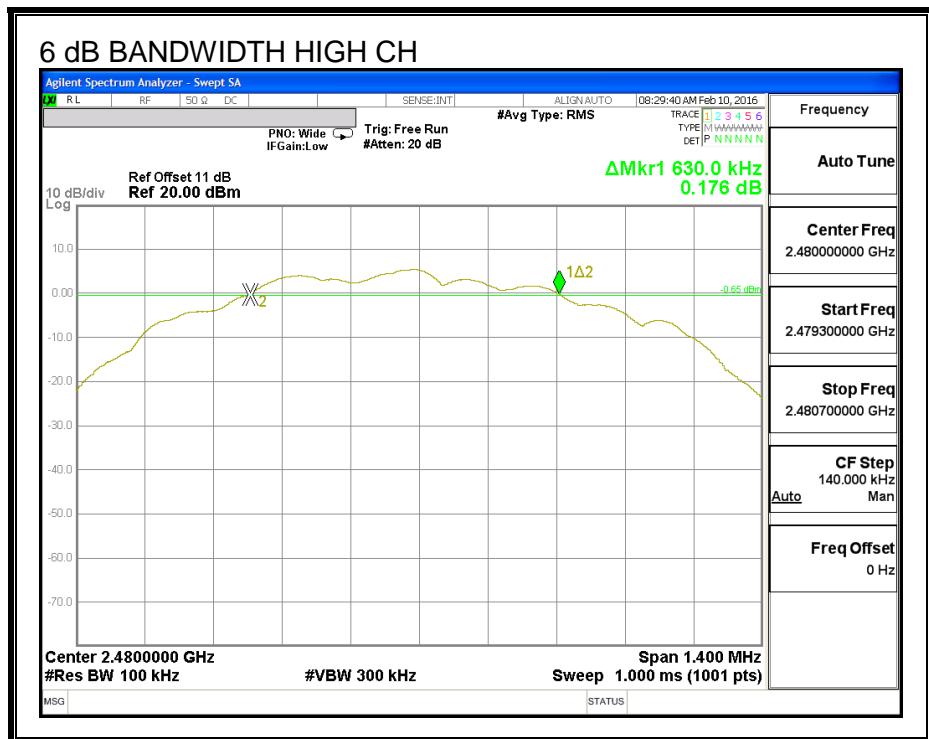
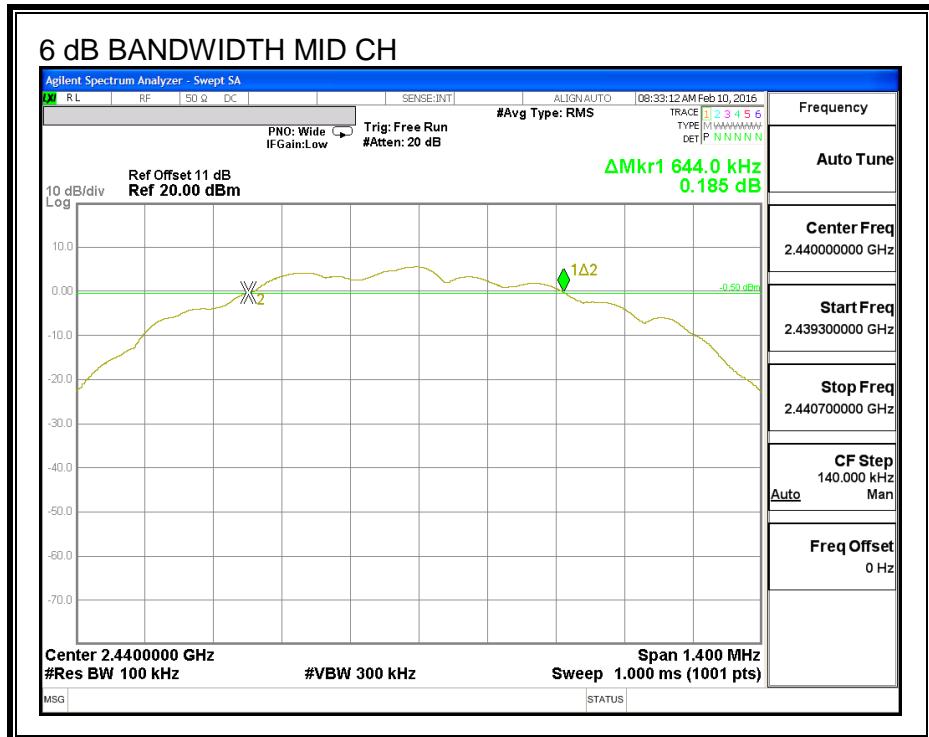
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6384	0.5
Middle	2440	0.6440	0.5
High	2480	0.6300	0.5

6 dB BANDWIDTH





7.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

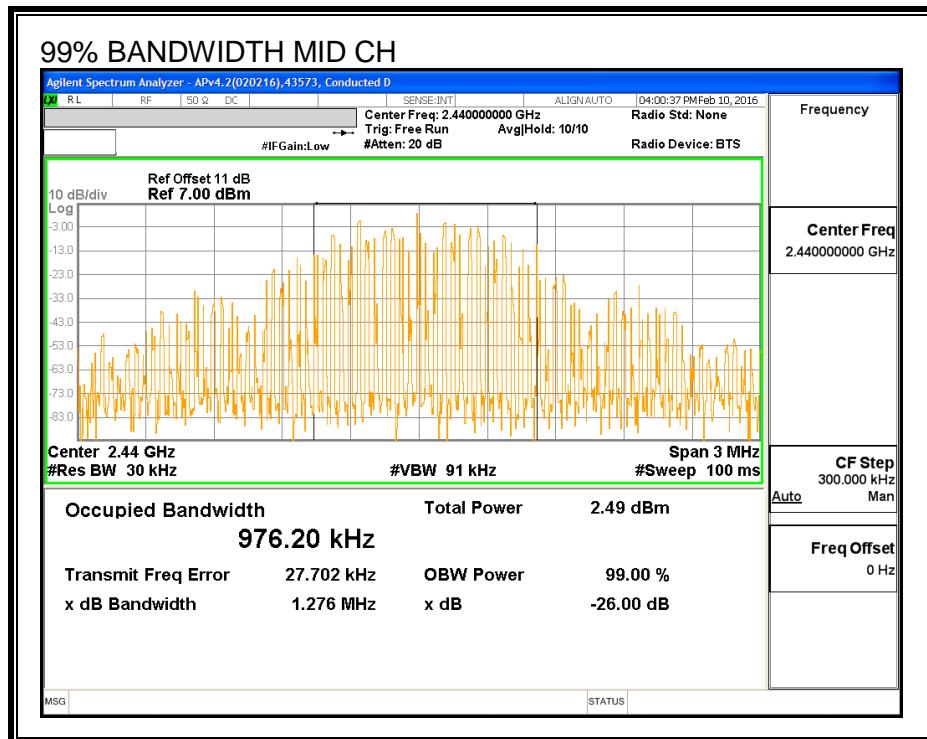
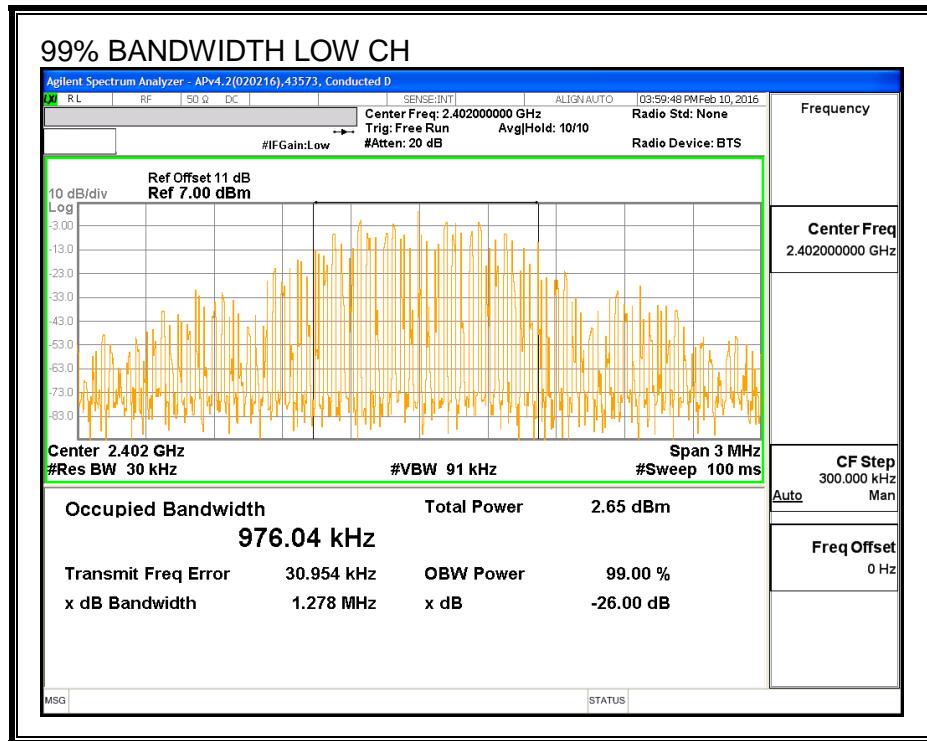
TEST PROCEDURE

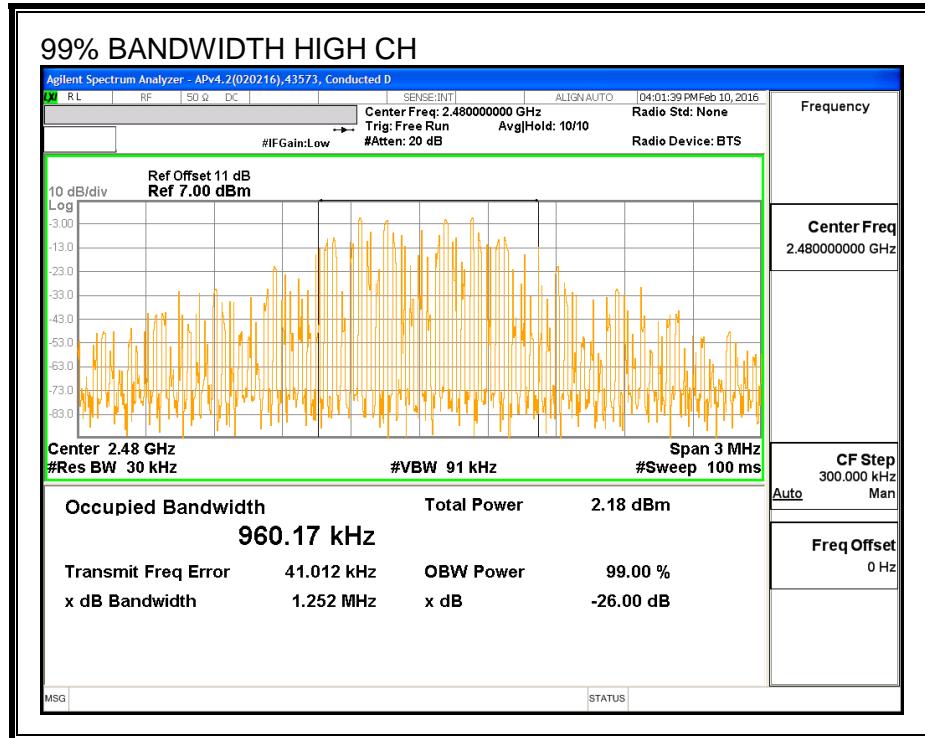
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.97604
Middle	2440	0.97620
High	2480	0.96017

99% BANDWIDTH





7.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

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.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	6.35
Middle	2440	6.56
High	2480	6.40

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.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	6.54	30	-23.460
Middle	2440	6.74	30	-23.260
High	2480	6.58	30	-23.420

7.7. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

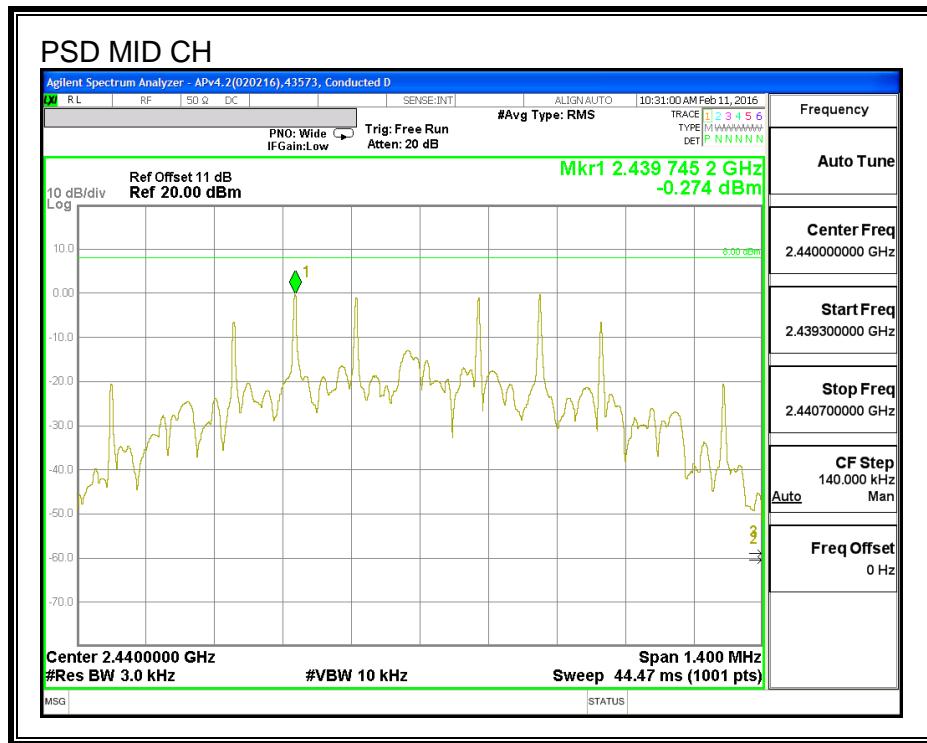
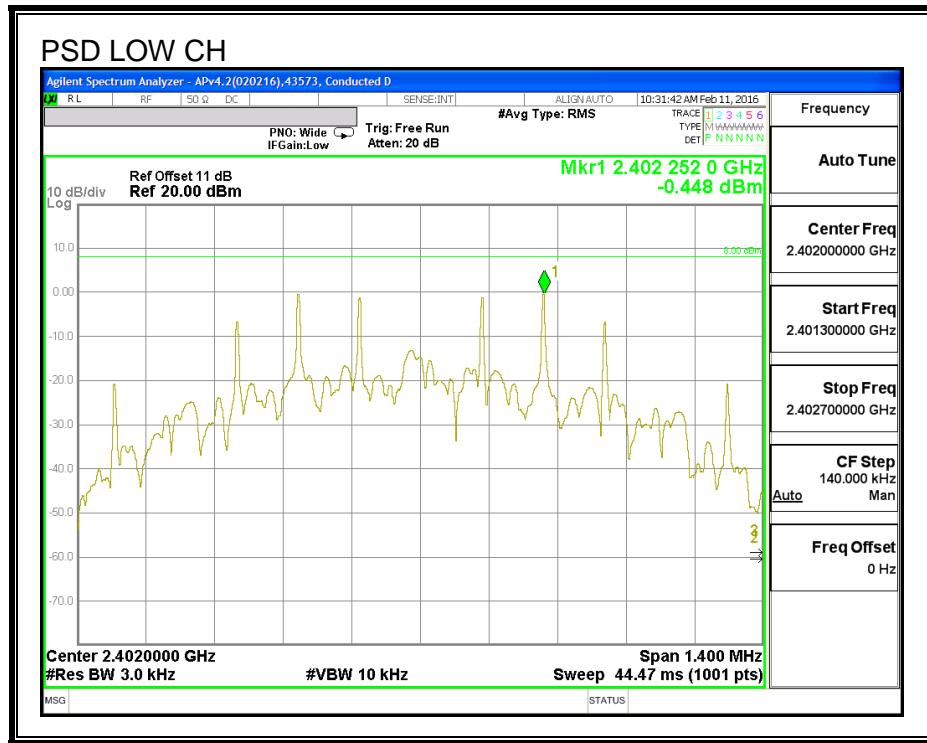
IC RSS-247 (5.2) (2)

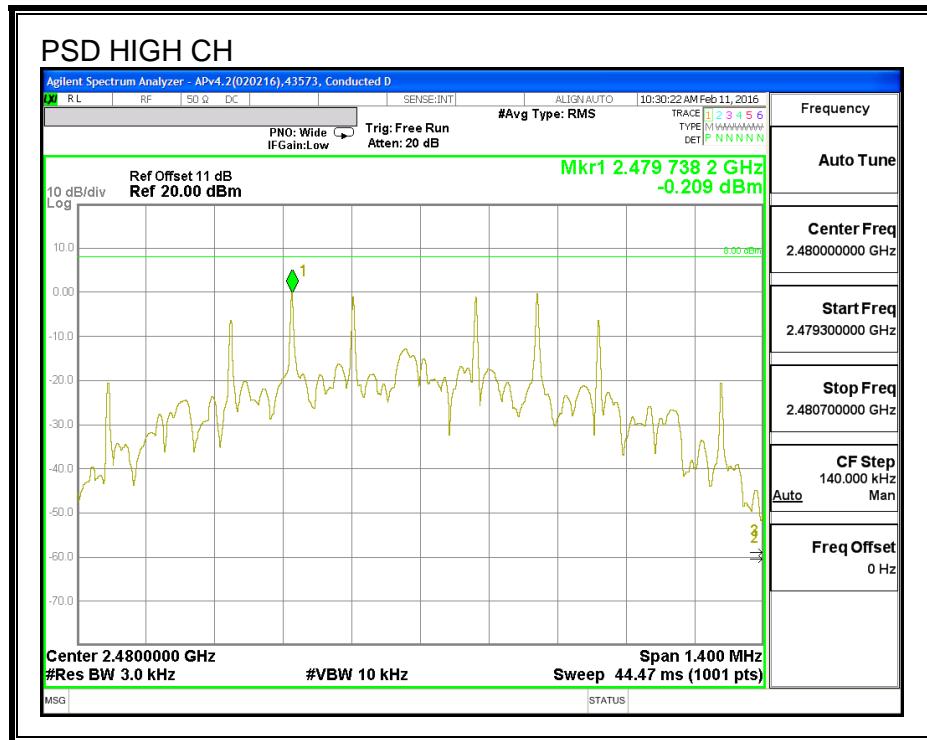
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-0.448	8	-8.45
Middle	2440	-0.274	8	-8.27
High	2480	-0.209	8	-8.21

POWER SPECTRAL DENSITY





7.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

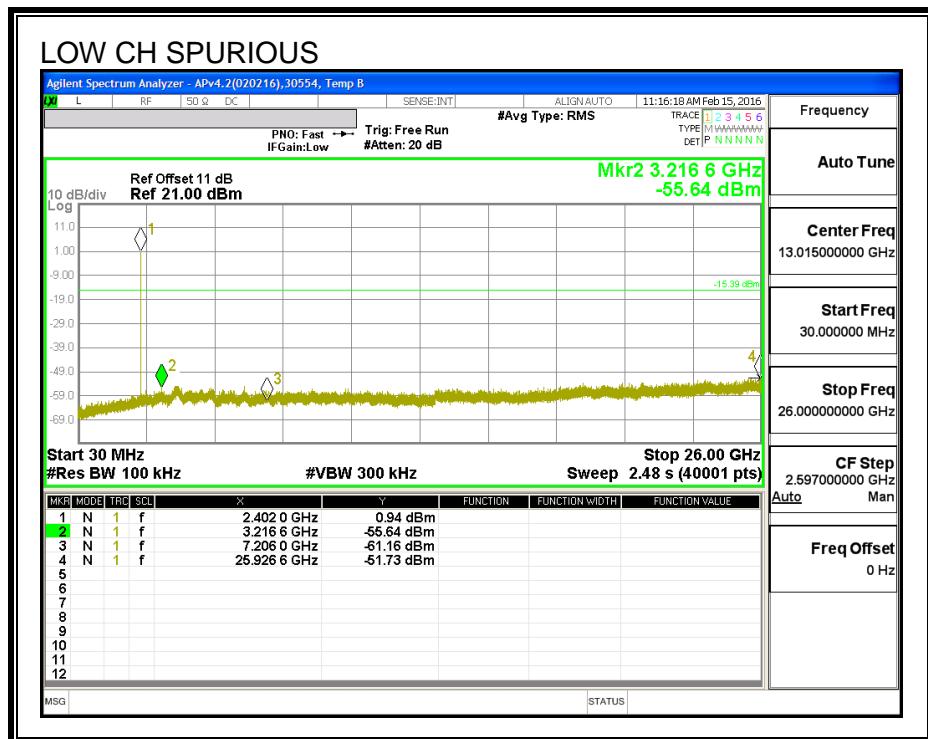
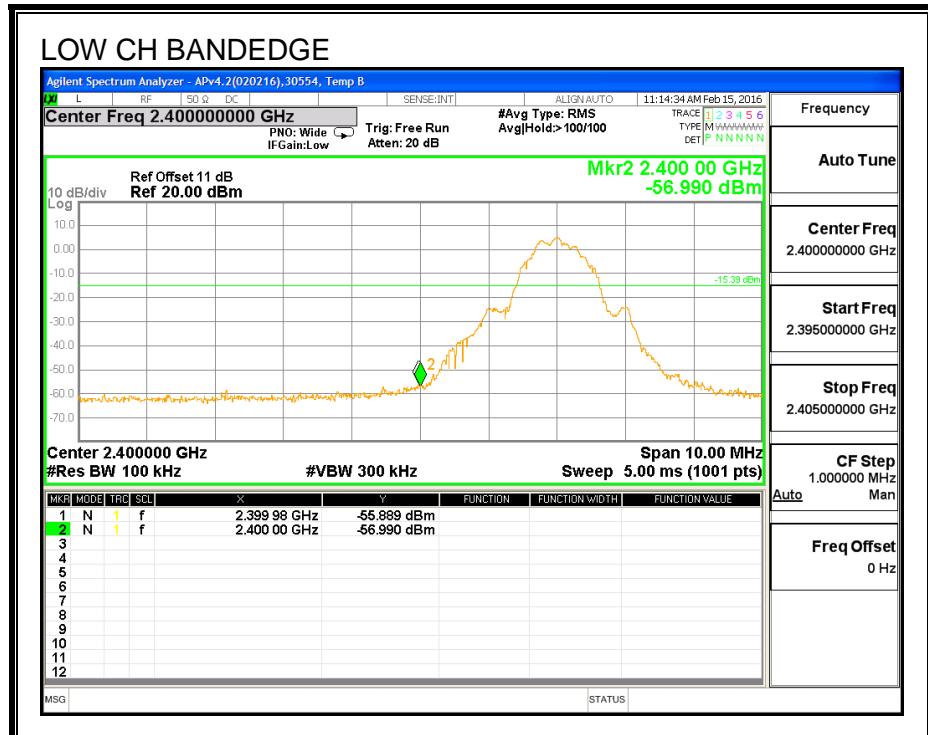
FCC §15.247 (d)

IC RSS-247 (5.5)

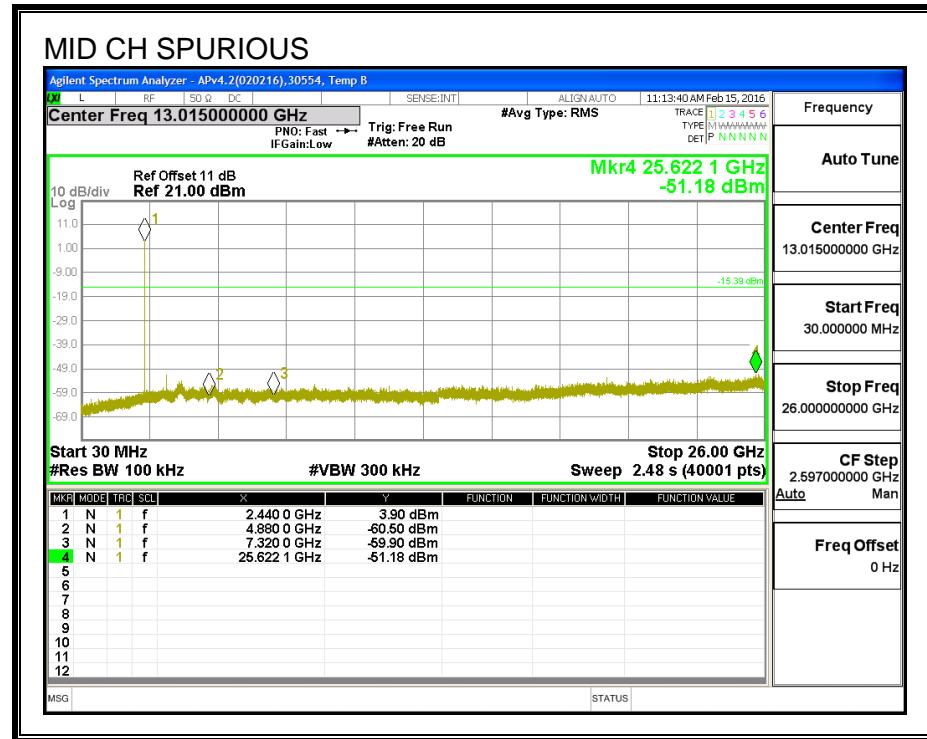
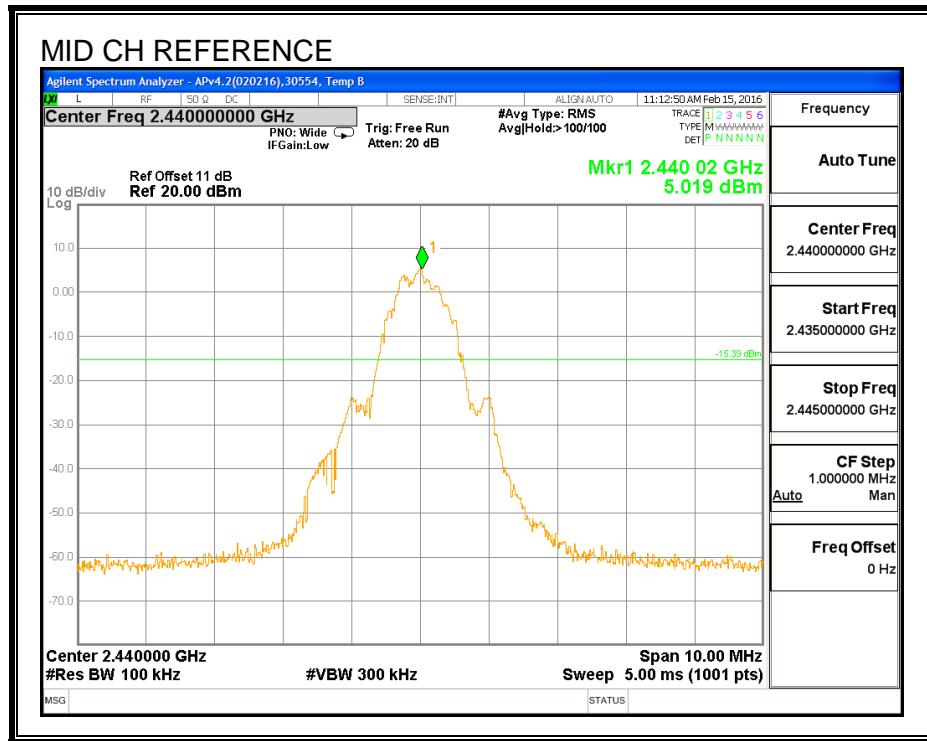
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

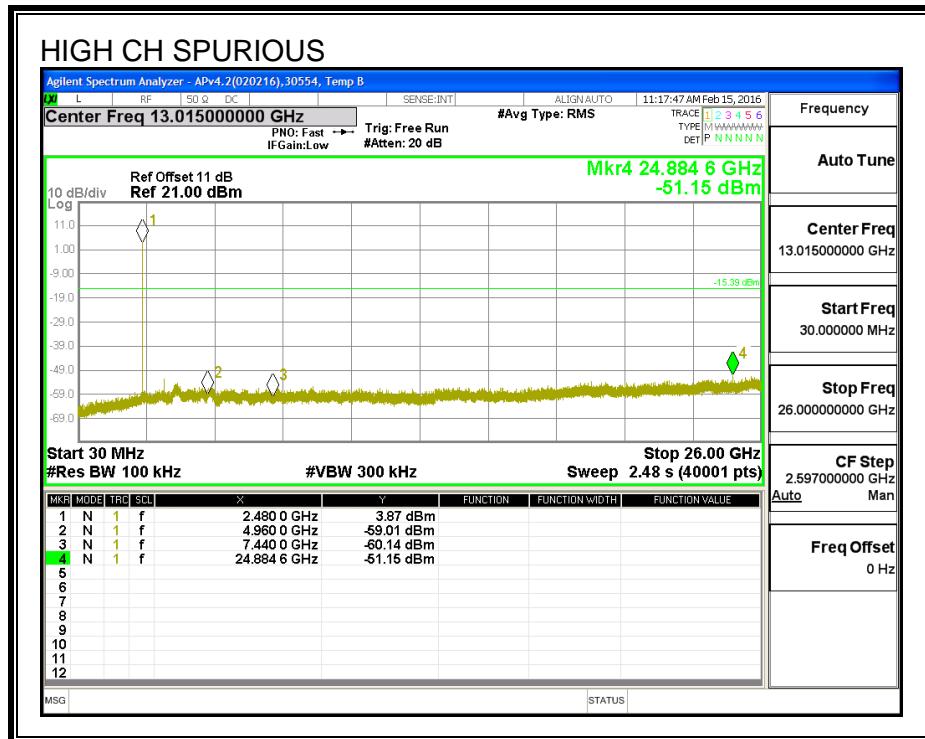
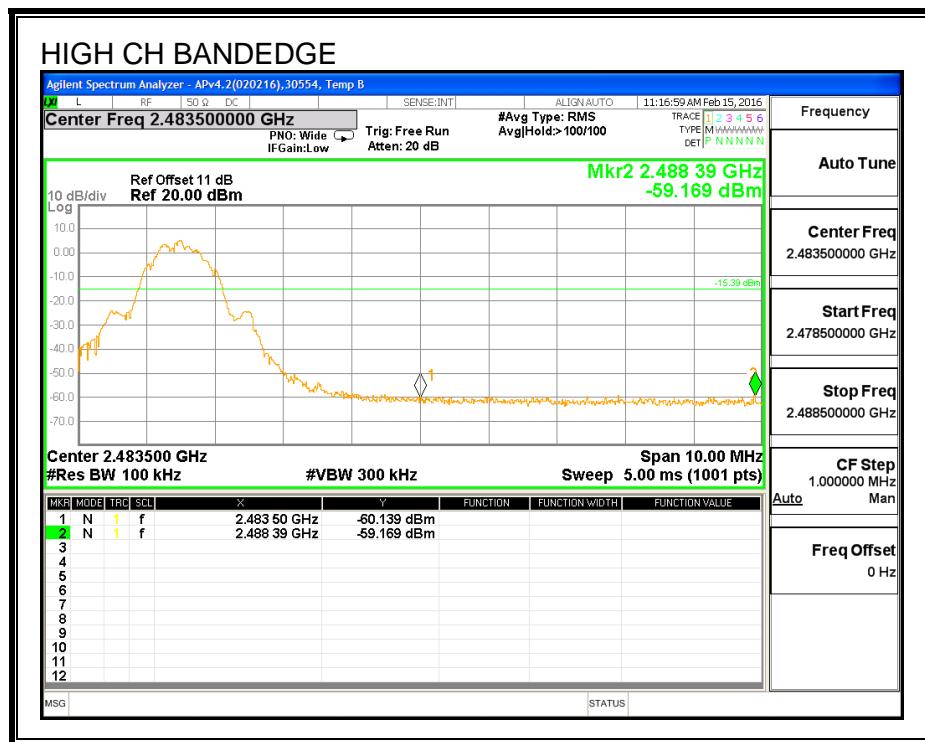
SPURIOUS EMISSIONS, LOW CHANNEL



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 (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
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.

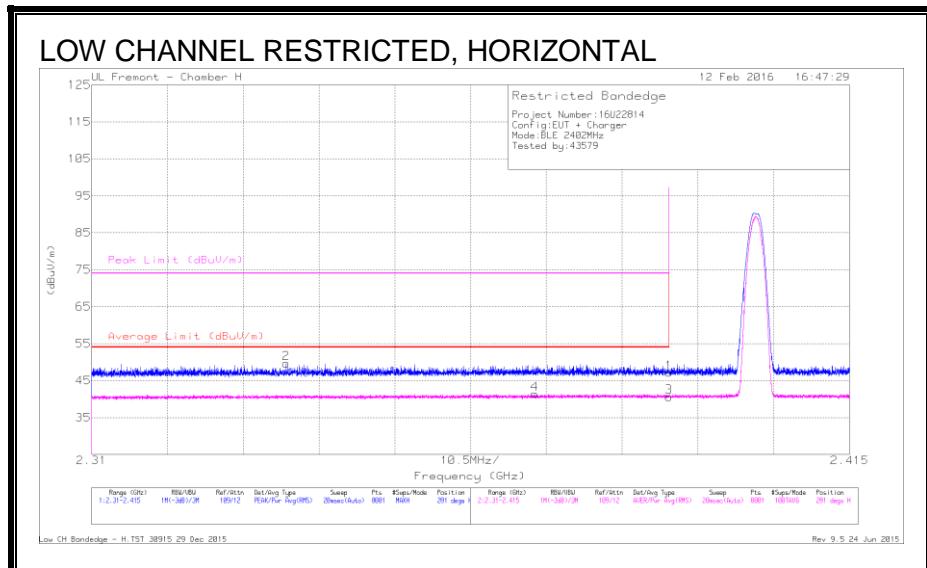
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

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 BANDEDGE



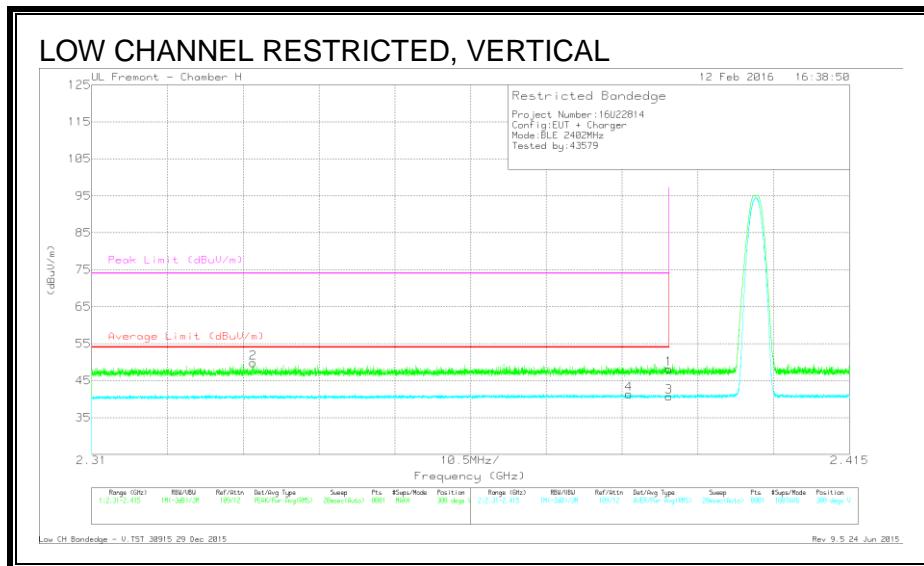
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbf/Flt r/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	37.56	Pk	32	-22.4	0	47.16	-	-	74	-26.84	281	319	H
2	* 2.337	40.16	Pk	31.9	-22.4	0	49.66	-	-	74	-24.34	281	319	H
3	* 2.39	27.28	RMS	32	-22.4	3.69	40.57	54	-13.43	-	-	281	319	H
4	* 2.371	28.09	RMS	32	-22.4	3.69	41.38	54	-12.62	-	-	281	319	H

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection



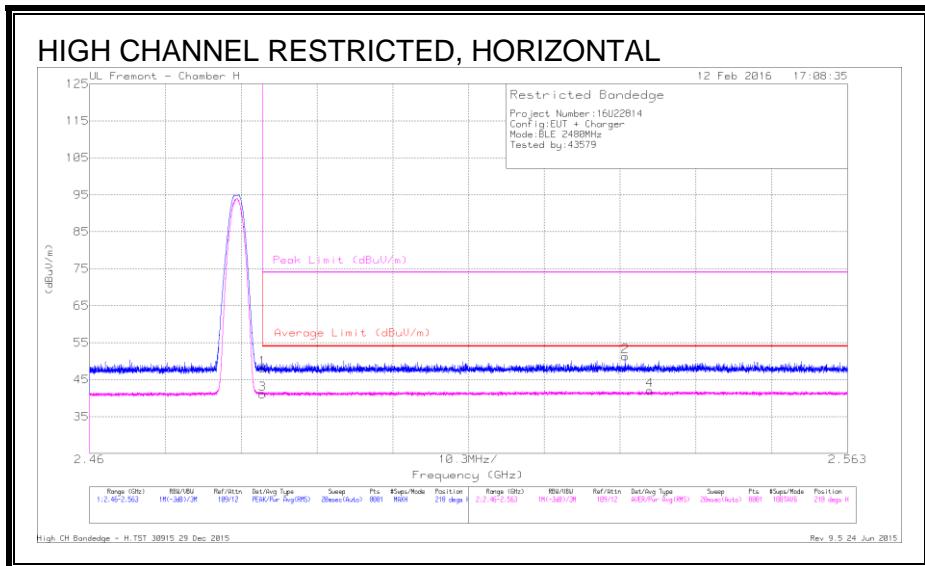
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fit r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.57	Pk	32	-22.4	0	48.17	-	-	74	-25.83	308	315	V
2	* 2.332	40.3	Pk	31.9	-22.4	0	49.8	-	-	74	-24.2	308	315	V
3	* 2.39	27.36	RMS	32	-22.4	3.69	40.65	54	-13.35	-	-	308	315	V
4	* 2.384	28.07	RMS	32	-22.4	3.69	41.36	54	-12.64	-	-	308	315	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection



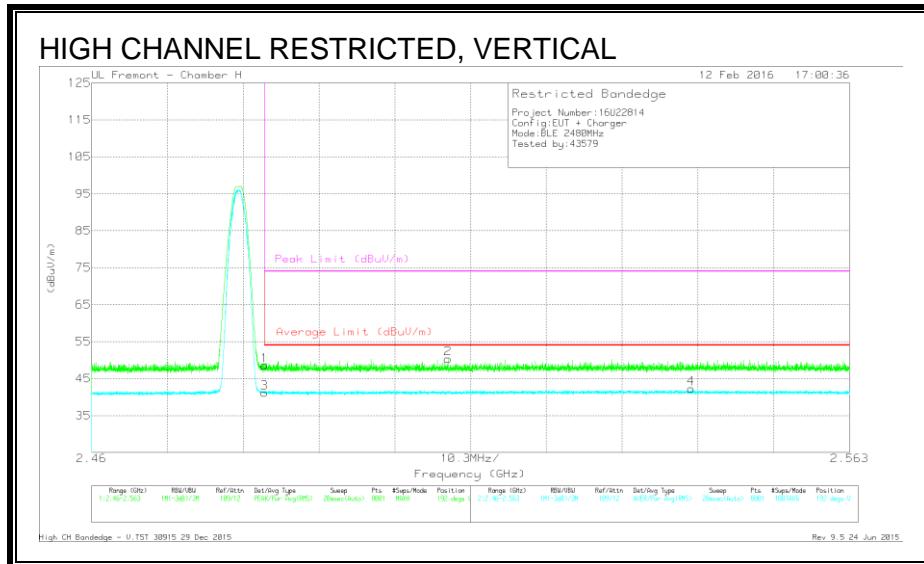
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.15	Pk	32.4	-22.5	0	48.05	-	-	74	-25.95	218	355	H
3	* 2.484	27.52	RMS	32.4	-22.5	3.69	41.11	54	-12.89	-	-	218	355	H
2	2.533	41.22	Pk	32.5	-22.4	0	51.32	-	-	74	-22.68	218	355	H
4	2.536	28.29	RMS	32.5	-22.4	3.69	42.08	54	-11.92	-	-	218	355	H

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection



DATA

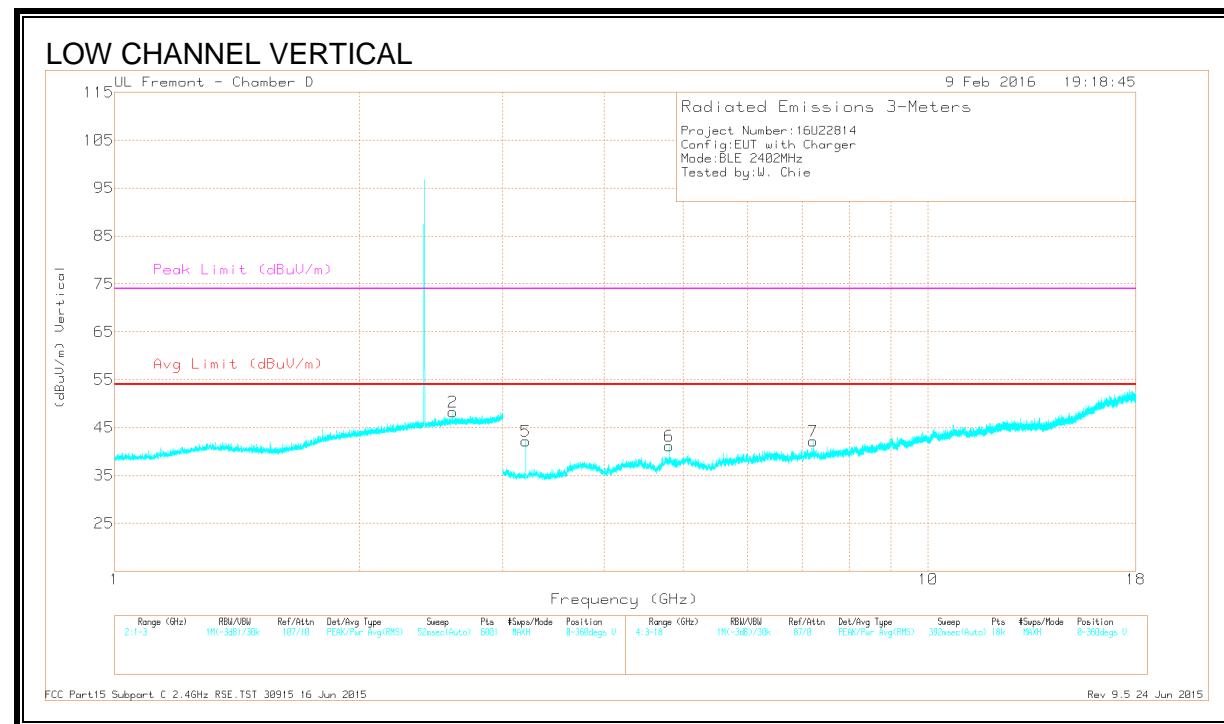
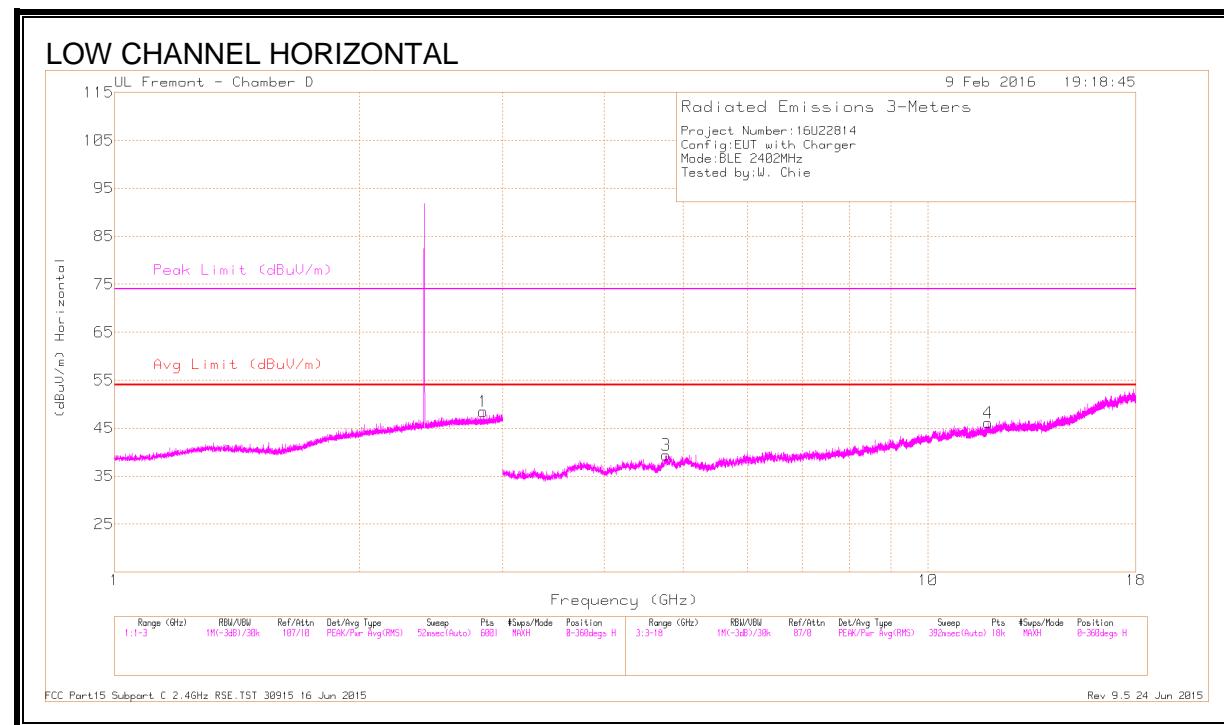
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbf/Flt r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.68	Pk	32.4	-22.5	0	48.58	-	-	74	-25.42	192	353	V
3	* 2.484	27.59	RMS	32.4	-22.5	3.69	41.18	54	-12.82	-	-	192	353	V
2	2.508	40.38	Pk	32.5	-22.5	0	50.38	-	-	74	-23.62	192	353	V
4	2.541	28.52	RMS	32.5	-22.4	3.69	42.31	54	-11.69	-	-	192	353	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

8.2.2. HARMONICS AND SPURIOUS EMISSIONS



DATA

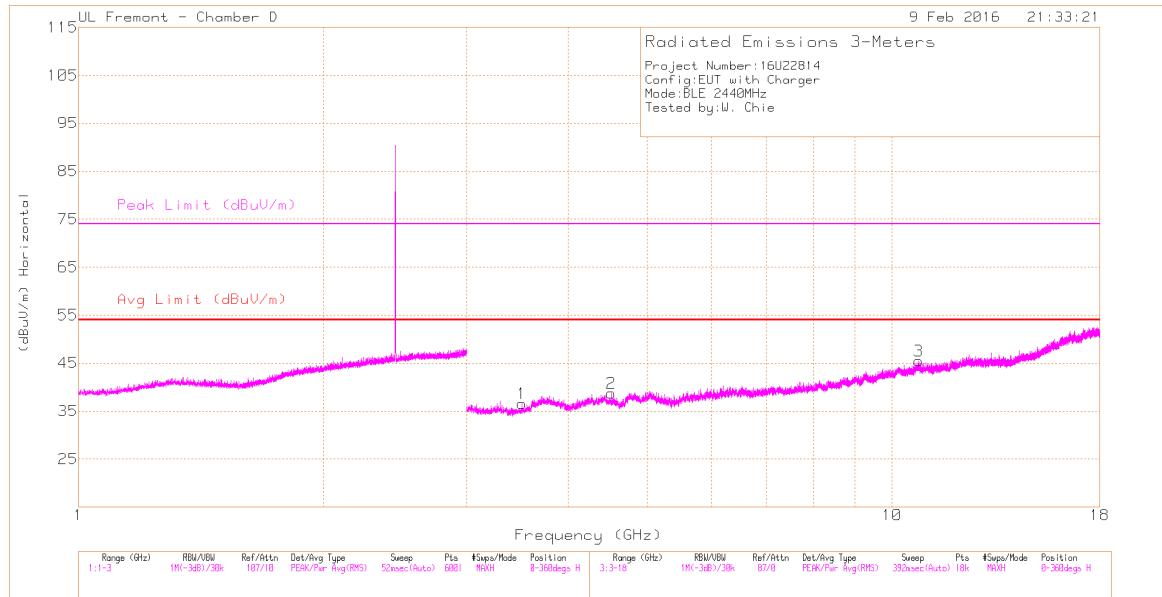
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.84	41.59	PK2	32.5	-20.1	0	53.99	-	-	74	-20.01	305	221	H
	* 2.84	29.55	MAv1	32.5	-20.1	3.69	45.63	54	-8.37	-	-	305	221	H
3	* 4.758	38.21	PK2	34.1	-26.4	0	45.91	-	-	74	-28.09	82	361	H
	* 4.759	26.24	MAv1	34.1	-26.4	3.69	37.62	54	-16.38	-	-	82	361	H
4	* 11.844	34.29	PK2	38.3	-20.2	0	52.39	-	-	74	-21.61	141	314	H
	* 11.845	22.65	MAv1	38.3	-20.2	3.69	44.43	54	-9.57	-	-	141	314	H
6	* 4.805	39.89	PK2	34.1	-26.7	0	47.29	-	-	74	-26.71	97	185	V
	* 4.804	28.88	MAv1	34.1	-26.7	3.69	39.96	54	-14.04	-	-	97	185	V
2	2.605	41.65	PK2	32.4	-20.4	0	53.65	-	-	-	-	279	225	V
5	3.203	39.43	PK2	32.6	-28.8	0	43.23	-	-	-	-	160	216	V
7	7.226	36.35	PK2	35.5	-24.3	0	47.55	-	-	-	-	133	226	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

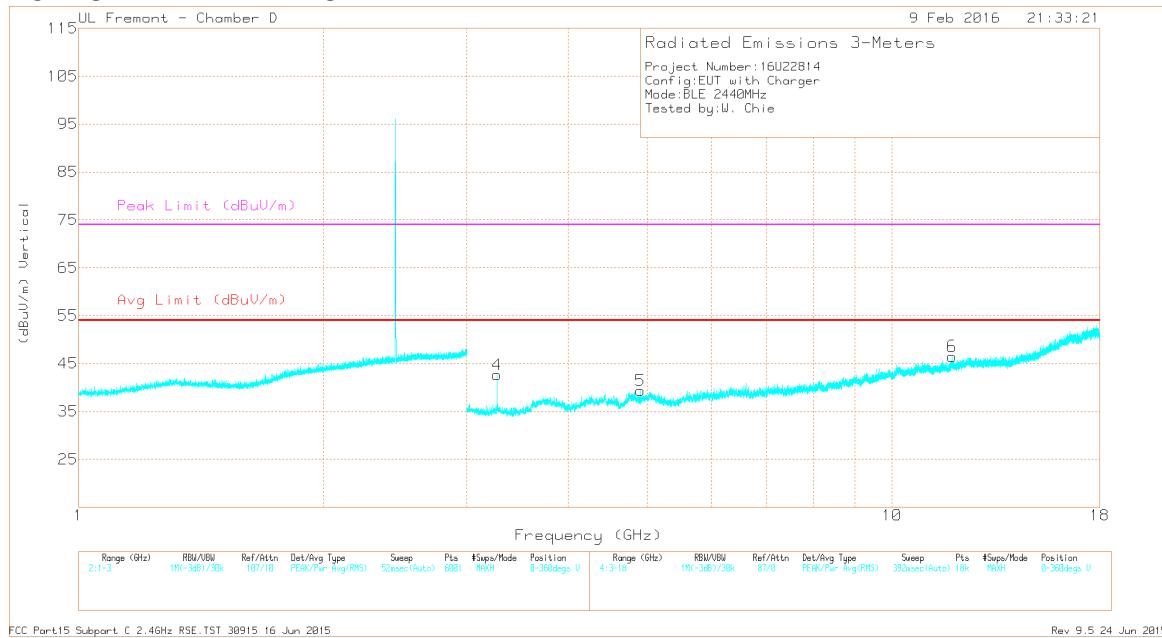
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



DATA

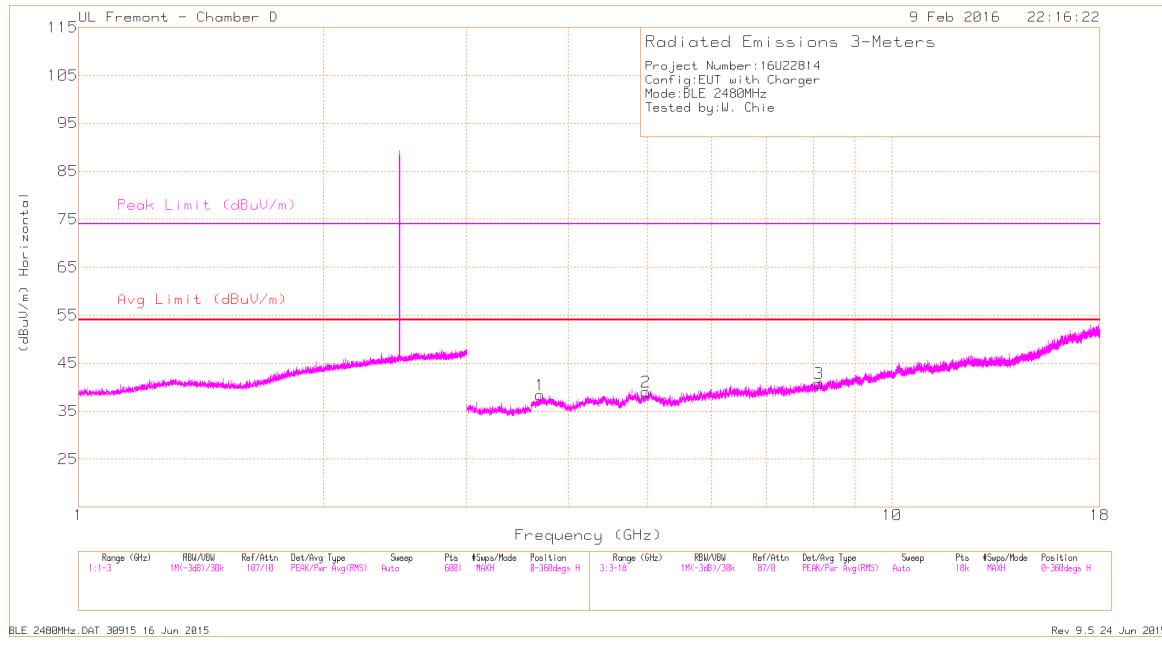
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.507	38.73	PK2	32.8	-28.4	0	43.13	-	-	74	-30.87	114	288	H
	* 3.505	26.94	MAv1	32.8	-28.4	3.69	35.02	54	-18.98	-	-	114	288	H
2	* 4.516	37.92	PK2	34	-27.8	0	44.12	-	-	74	-29.88	60	327	H
	* 4.52	26.18	MAv1	34	-27.8	3.69	36.06	54	-17.94	-	-	60	327	H
3	* 10.775	33.53	PK2	37.9	-19.9	0	51.53	-	-	74	-22.47	101	119	H
	* 10.774	22.09	MAv1	37.9	-19.9	3.69	43.77	54	-10.23	-	-	101	119	H
5	* 4.905	40.17	PK2	34.1	-28	0	46.27	-	-	74	-27.73	101	211	V
	* 4.904	29.36	MAv1	34.1	-28	3.69	39.14	54	-14.86	-	-	101	211	V
6	* 11.86	34.21	PK2	38.4	-20.1	0	52.51	-	-	74	-21.49	16	219	V
	* 11.859	22.68	MAv1	38.4	-20.1	3.69	44.66	54	-9.34	-	-	16	219	V
4	3.268	39.88	PK2	32.7	-27.9	0	44.68	-	-	-	-	131	224	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

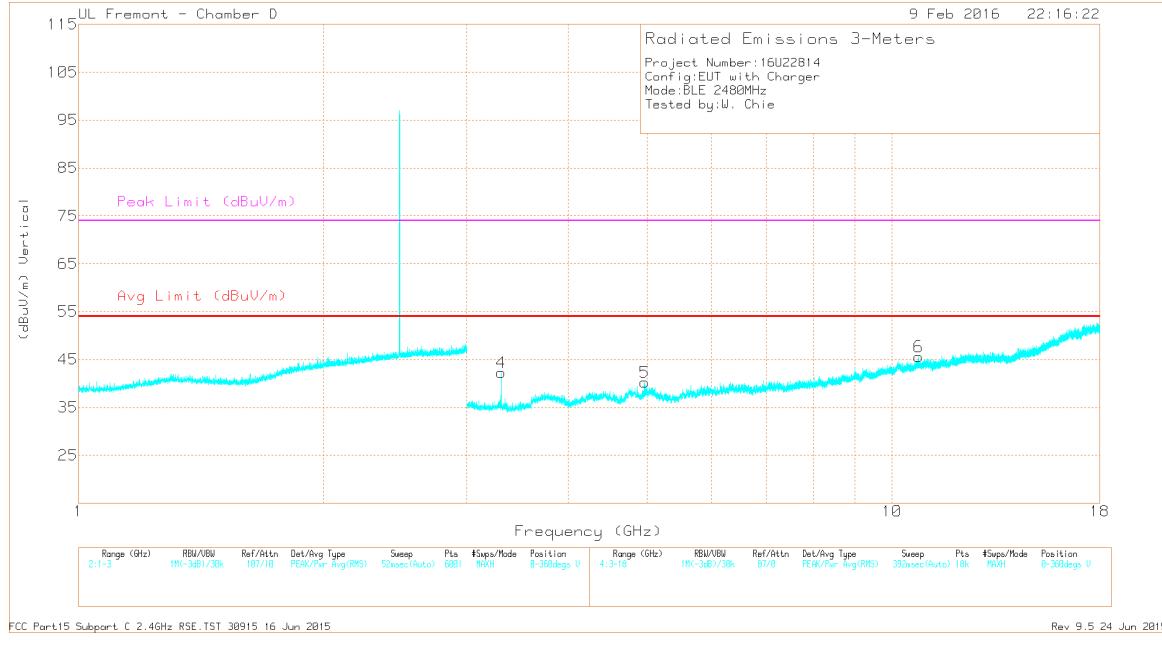
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (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	* 3.694	39.26	PK2	33.2	-28.9	0	43.56	-	-	74	-30.44	340	242	H
	* 3.693	27.17	MAv1	33.2	-28.9	3.69	35.15	54	-18.85	-	-	340	242	H
2	* 4.977	31.95	Pk2	34.2	-27.1	0	39.05	-	-	74	-34.95	125	200	H
	* 4.977	25.90	MAv1	34.2	-27.1	3.69	36.69	54	-17.31	-	-	125	145	H
3	* 8.128	27.93	Pk2	35.6	-22.7	0	40.83	-	-	74	-33.17	147	101	H
	* 8.128	22.70	MAv1	35.6	-22.7	3.69	39.29	54	-14.71	-	-	147	267	H
5	* 4.96	40.41	PK2	34.2	-27.5	0	47.11	-	-	74	-26.89	103	209	V
	* 4.96	29.26	MAv1	34.2	-27.5	3.69	39.64	54	-14.36	-	-	103	209	V
6	* 10.778	34.35	PK2	37.9	-19.9	0	52.35	-	-	74	-21.65	177	255	V
	* 10.779	22.16	MAv1	37.9	-19.9	3.69	43.84	54	-10.16	-	-	177	255	V
4	3.308	39.10	PK2	32.7	-27.9	0	43.9	-	-	-	-	169	213	V

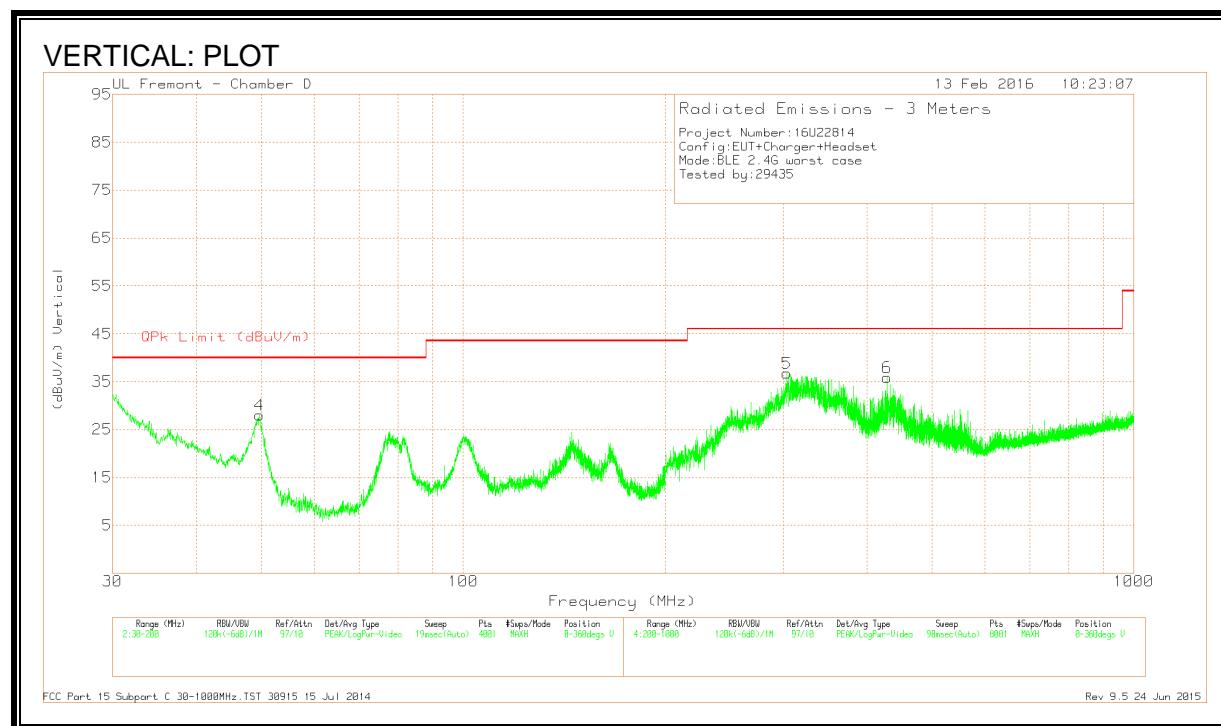
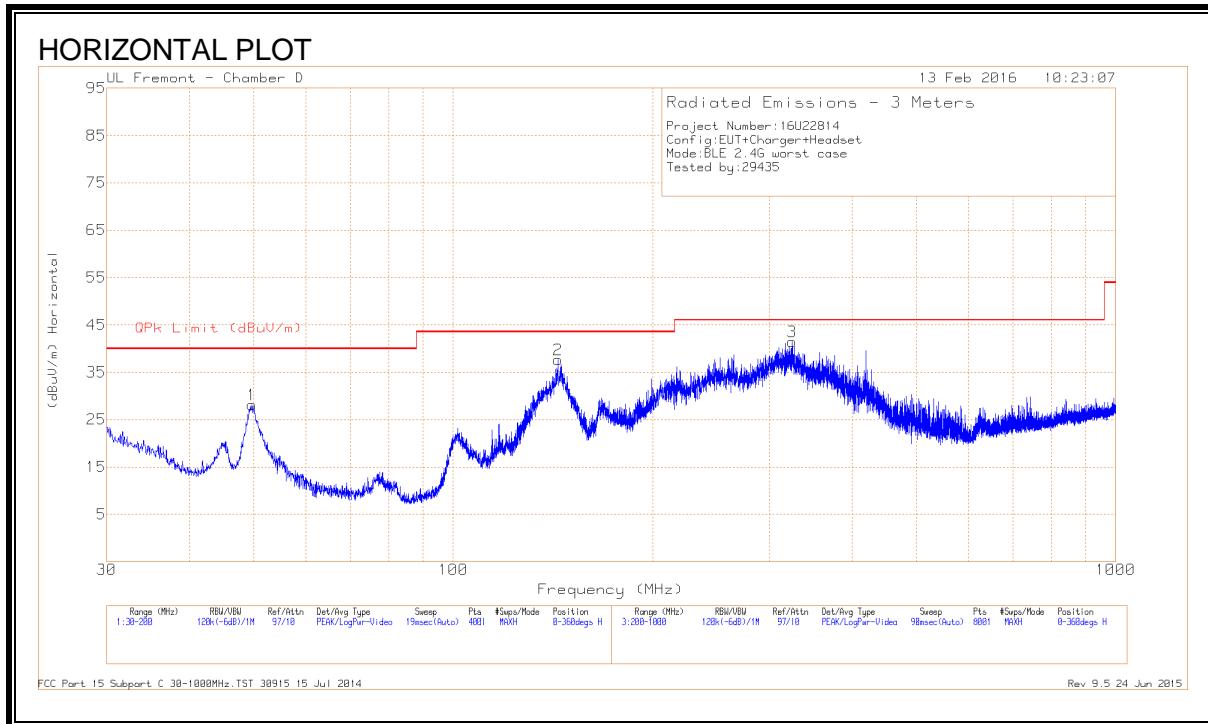
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

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

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 324.5713	45.61	Qp	17.9	-30.3	33.21	46.02	-12.81	47	269	H
4	49.6775	47.77	Pk	12	-31.7	28.07	40	-11.93	0-360	100	V
1	49.6988	47.8	Pk	12	-31.7	28.1	40	-11.9	0-360	401	H
2	143.9046	45.19	Qp	16.7	-31.1	30.79	43.52	-12.73	134	178	H
5	303.7	49.63	Pk	17.4	-30.3	36.73	46.02	-9.29	0-360	301	V
6	428.5	45.36	Pk	20.4	-29.9	35.86	46.02	-10.16	0-360	100	V

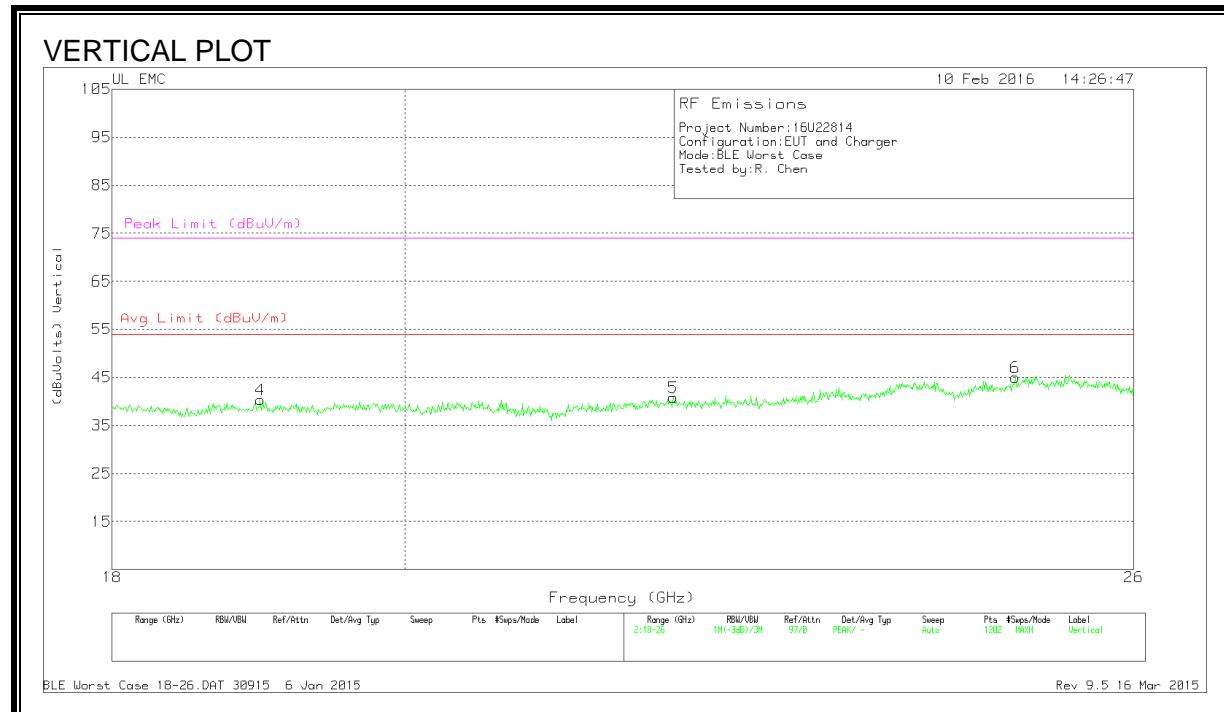
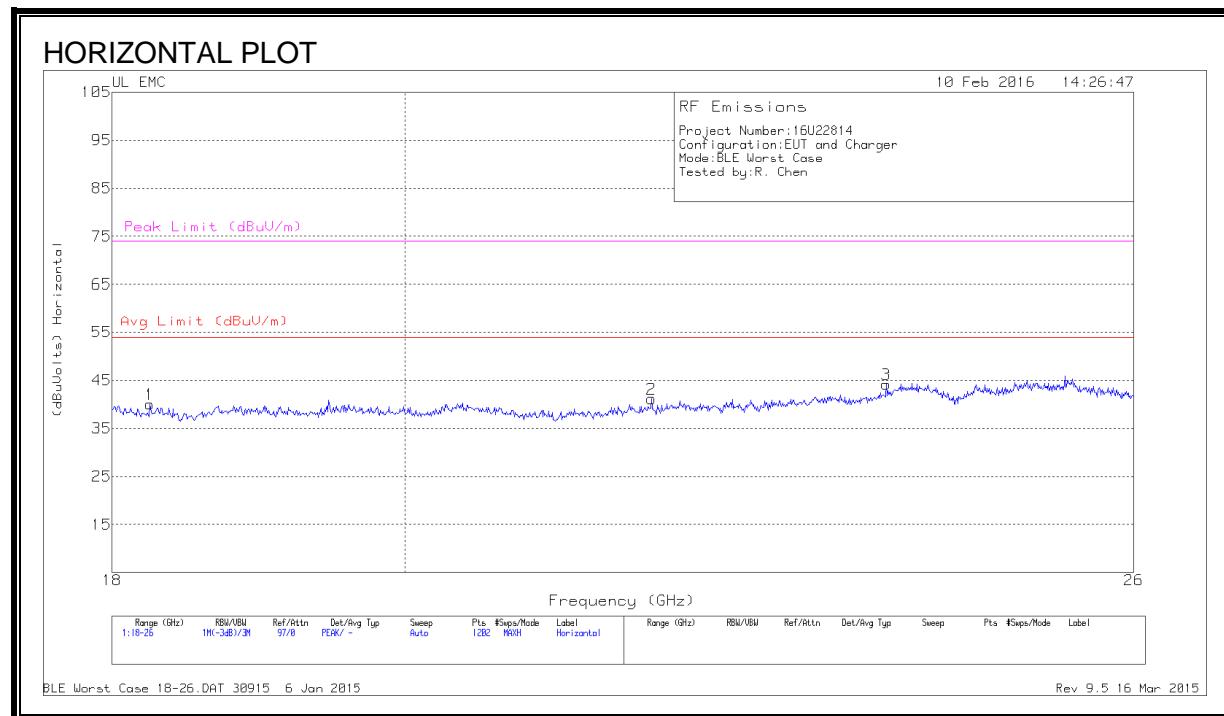
* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

Qp - Quasi-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	T477 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.246	42.7	Pk	32.3	-25.5	-9.5	40	54	-14	74	-34
2	21.857	42.27	Pk	33	-24.6	-9.5	41.17	54	-12.83	74	-32.83
3	23.782	44.07	Pk	33.8	-24.2	-9.5	44.17	54	-9.83	74	-29.83
4	18.986	42.43	Pk	32.5	-25.1	-9.5	40.33	54	-13.67	74	-33.67
5	22.03	42.13	Pk	33.2	-25	-9.5	40.83	54	-13.17	74	-33.17
6	24.914	44.7	Pk	34	-24.2	-9.5	45	54	-9	74	-29

Pk - Peak detector

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

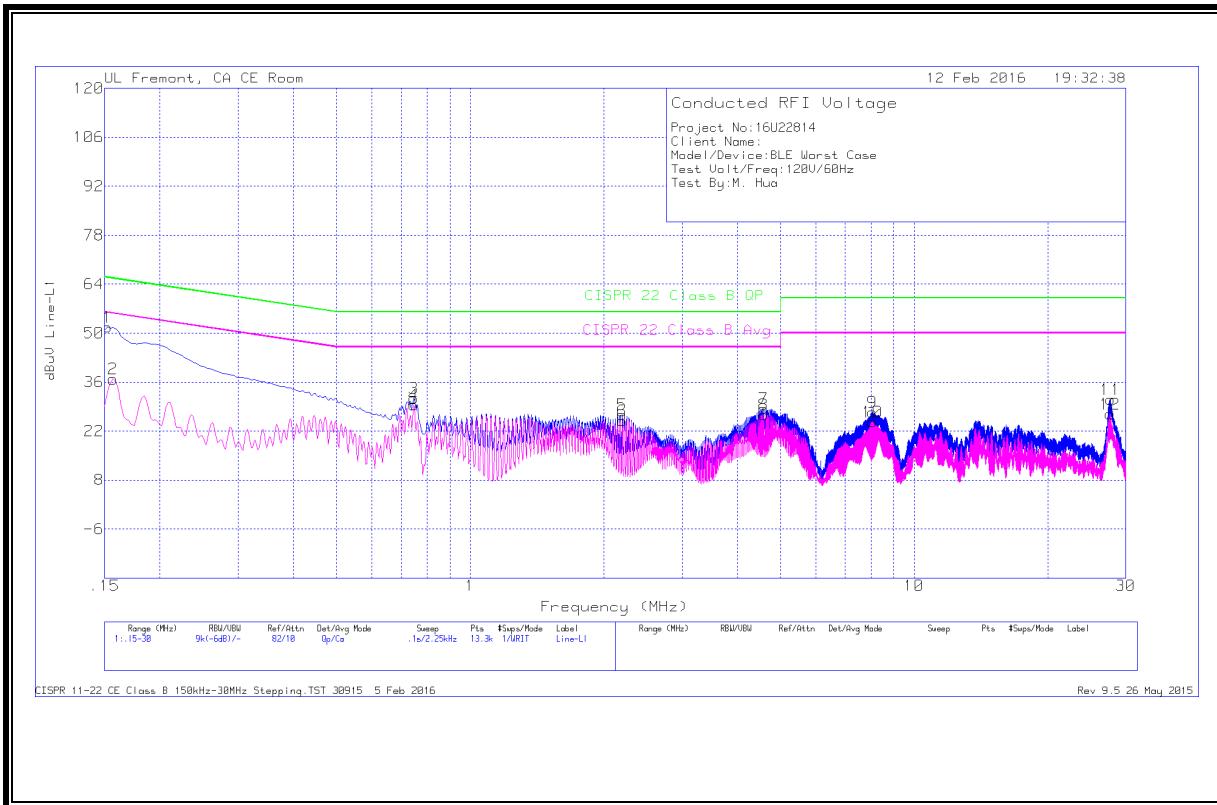
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

LINE 1 RESULTS



WORST EMISSIONS

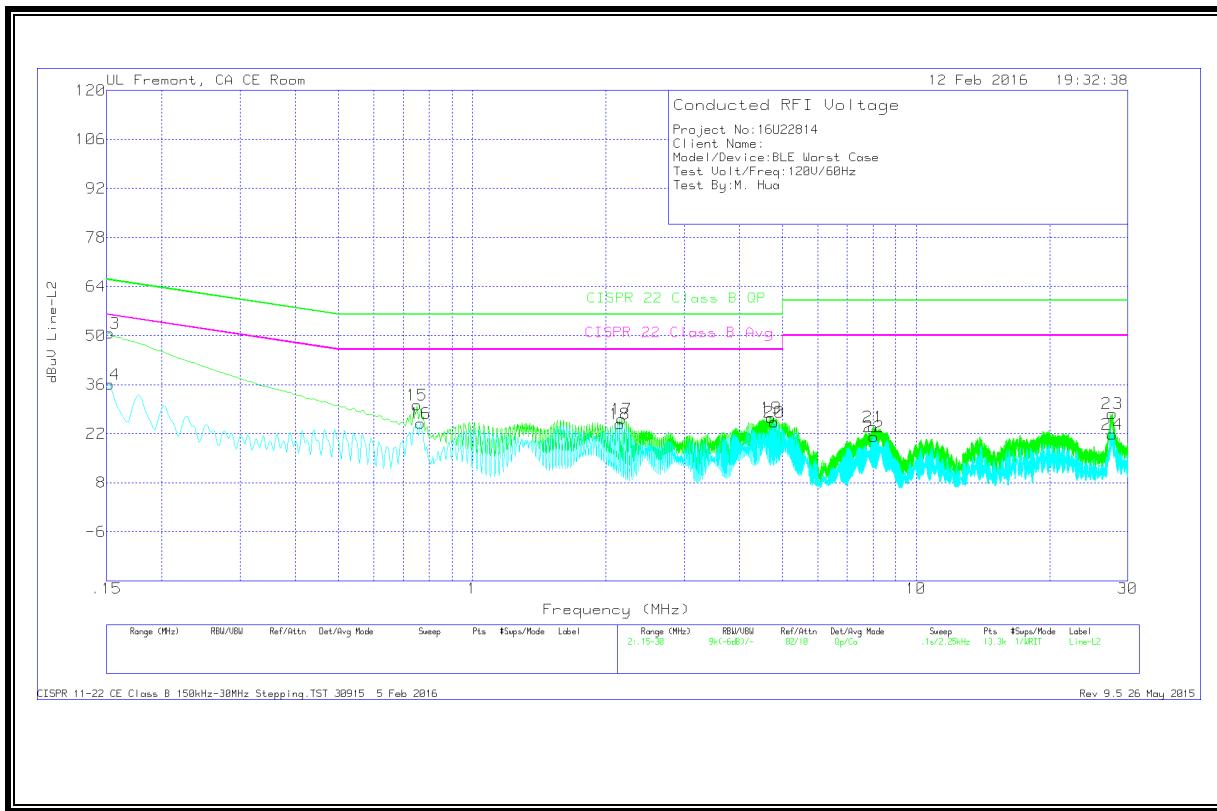
Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L1	LC Cables 1&3	10dB Pad	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.15225	41.64	Qp	.1	0	10	51.74	65.88	-14.14	-	-
2	.15675	26.88	Ca	0	0	10	36.88	-	-	55.63	-18.75
3	.74625	21.37	Qp	0	0	10	31.37	56	-24.63	-	-
4	.74625	19.47	Ca	0	0	10	29.47	-	-	46	-16.53
5	2.19975	16.54	Qp	0	.1	10	26.64	56	-29.36	-	-
6	2.19975	14.94	Ca	0	.1	10	25.04	-	-	46	-20.96
7	4.58475	18.3	Qp	0	.1	10	28.4	56	-27.6	-	-
8	4.58475	16.66	Ca	0	.1	10	26.76	-	-	46	-19.24
9	8.05425	17.33	Qp	0	.1	10	27.43	60	-32.57	-	-
10	8.05425	14.51	Ca	0	.1	10	24.61	-	-	50	-25.39
11	27.71475	20.75	Qp	0	.3	10	31.05	60	-28.95	-	-
12	27.66075	16.53	Ca	0	.3	10	26.83	-	-	50	-23.17

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	T1310 IL L2	LC Cables 2&3	10dB Pad	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
13	.15225	40.67	Qp	0	0	10	50.67	65.88	-15.21	-	-
14	.15225	26.11	Ca	0	0	10	36.11	-	-	55.88	-19.77
15	.75075	20.13	Qp	0	0	10	30.13	56	-25.87	-	-
16	.76425	14.92	Ca	0	0	10	24.92	-	-	46	-21.08
17	2.17275	16.03	Qp	0	.1	10	26.13	56	-29.87	-	-
18	2.148	14.67	Ca	0	.1	10	24.77	-	-	46	-21.23
19	4.71975	16.47	Qp	0	.1	10	26.57	56	-29.43	-	-
20	4.794	15.21	Ca	0	.1	10	25.31	-	-	46	-20.69
21	8.0025	13.83	Qp	0	.1	10	23.93	60	-36.07	-	-
22	8.0295	10.99	Ca	0	.1	10	21.09	-	-	50	-28.91
23	27.66975	17.38	Qp	.1	.3	10	27.78	60	-32.22	-	-
24	27.66975	11.42	Ca	.1	.3	10	21.82	-	-	50	-28.18

Qp - Quasi-Peak detector

Ca - CISPR average detection