



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

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL NUMBERS: A1723, A1724

**FCC ID: BCG-E3042A
IC: 579C-E3042A**

REPORT NUMBER: 15U21635-E3V2

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Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	01/22/2016	Initial Issue	M. Mekuria
V2	02/01/2016	Revised report to address TCB's questions	T. Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL: A1723, A1724

SERIAL NUMBER: C39Q4026GR20 (Radiated) C39QG04YGX9X (Conducted)

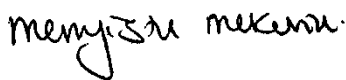
DATE TESTED: AUGUST 25, 2015 - DECEMBER 10, 2015

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.

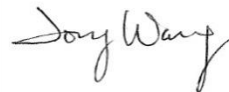
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. 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.

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UL Verification Services Inc. By:



MENGISTU MEKURIA
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:



TONY WANG
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
☐ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F
	☒ Chamber G
	☒ 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, Model A1723 and A1724 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/CDMA/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n/ac radio, Bluetooth radio and NFC. The rechargeable battery is not user accessible.

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	11.83	15.24

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	-0.90

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was BlueTool 1.8.8.6

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 fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.

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

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

BLE: 1 Mbps.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions

For simultaneous transmission of multiple channels from the same antenna in the 2.4GHz, 5GHz and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Apple	MacBook Pro	73043BDQAGU	N/A
Laptop AC/DC adapter	Apple	A1172	MV7211FJAX4XA	N/A
Earphone	Apple	NA	NA	N/A
EUT AC/DC adapter	Apple	A1357	W010A051	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	3	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	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	AC	1	AC	Un-shielded	3	N/A

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

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	AC	1	AC	Un-shielded	3	N/A

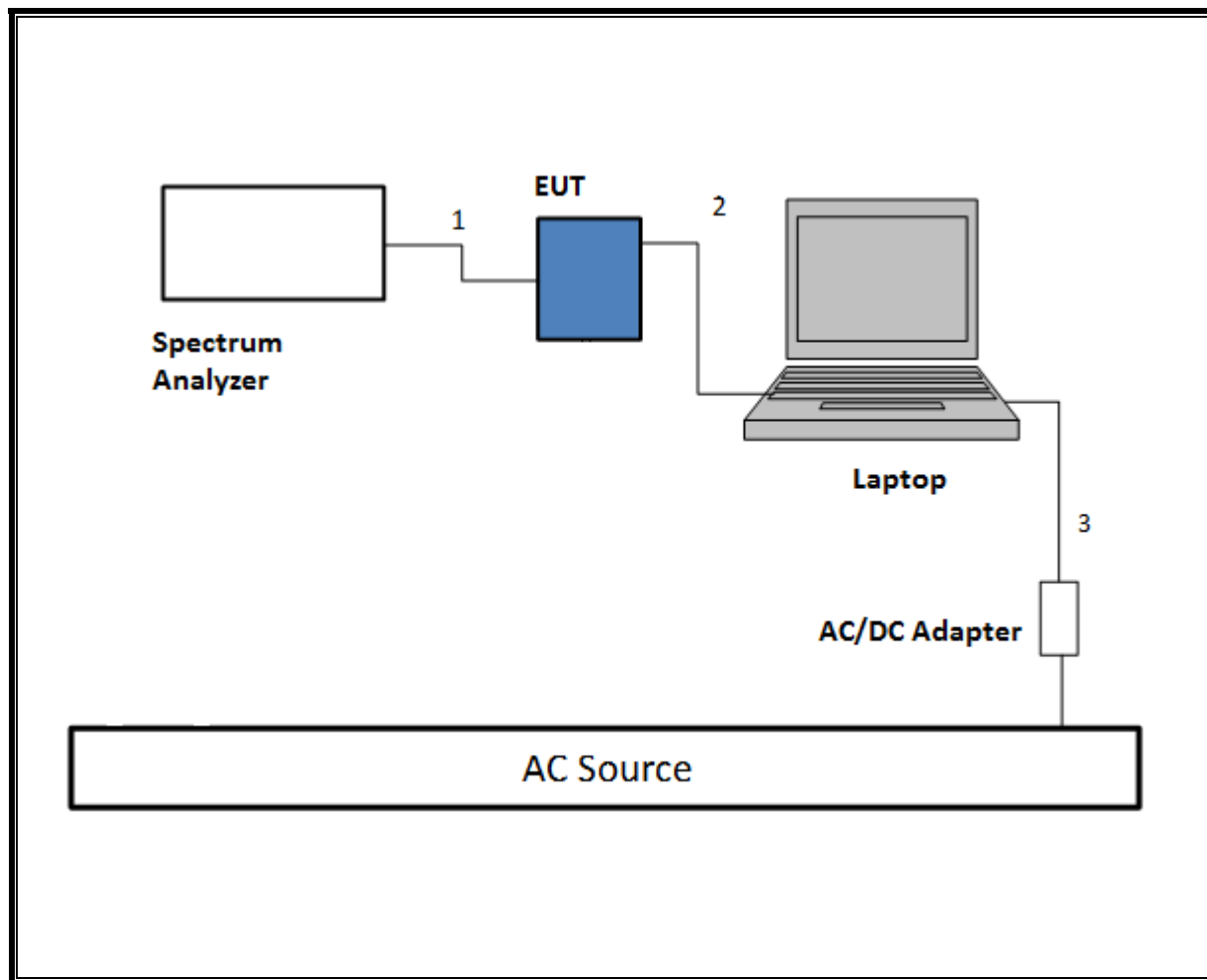
I/O CABLES (AC LINE CONDUCTED: LAPTOP CONFIGUARTION)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	3	N/A

TEST SETUP - CONDUCTED TESTS

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

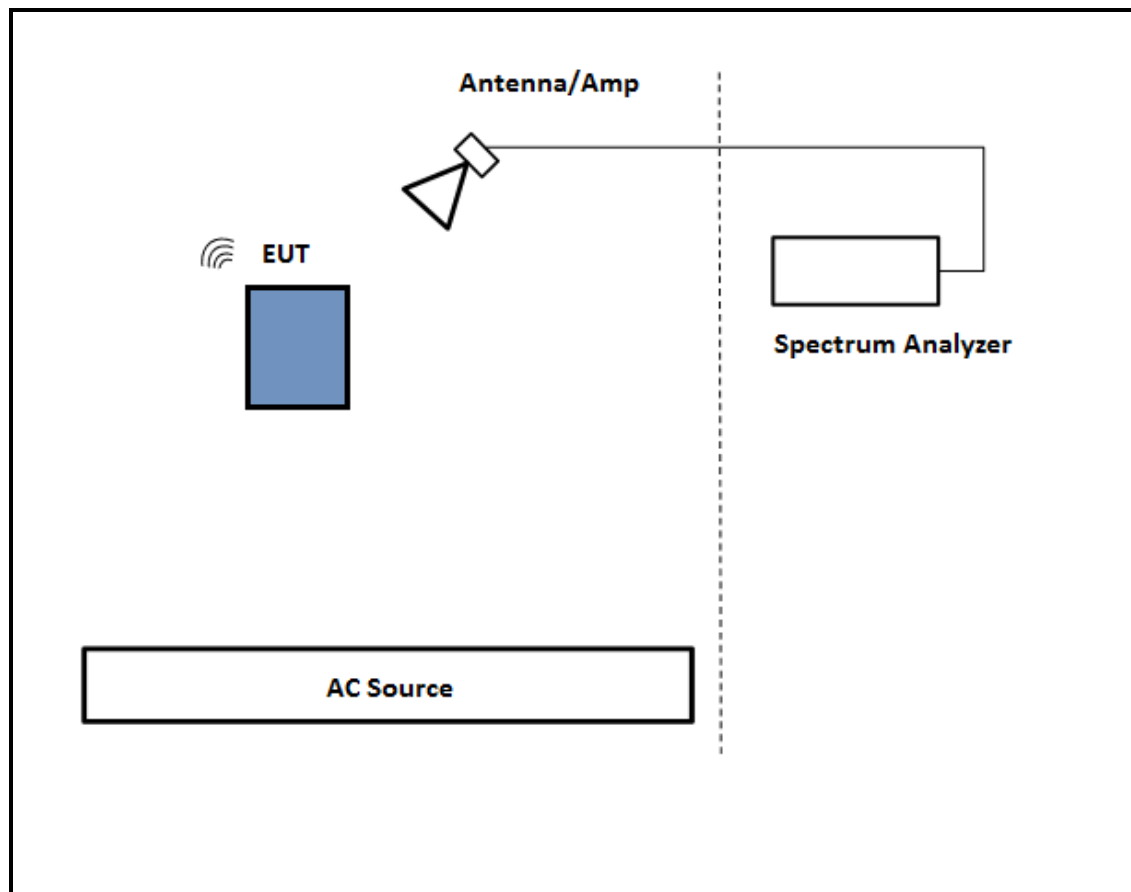
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

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

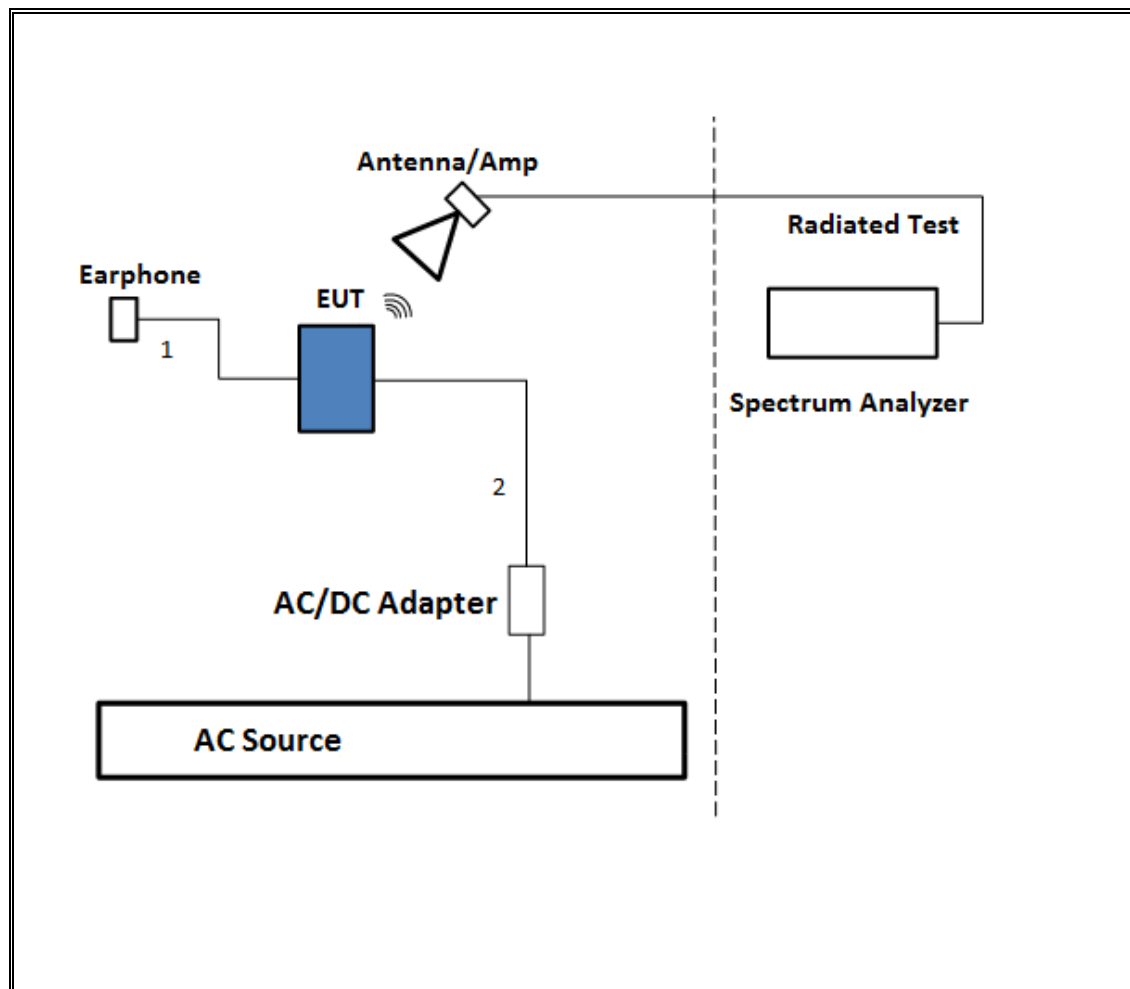
SETUP DIAGRAM



TEST SETUP- BELOW 1GHz

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

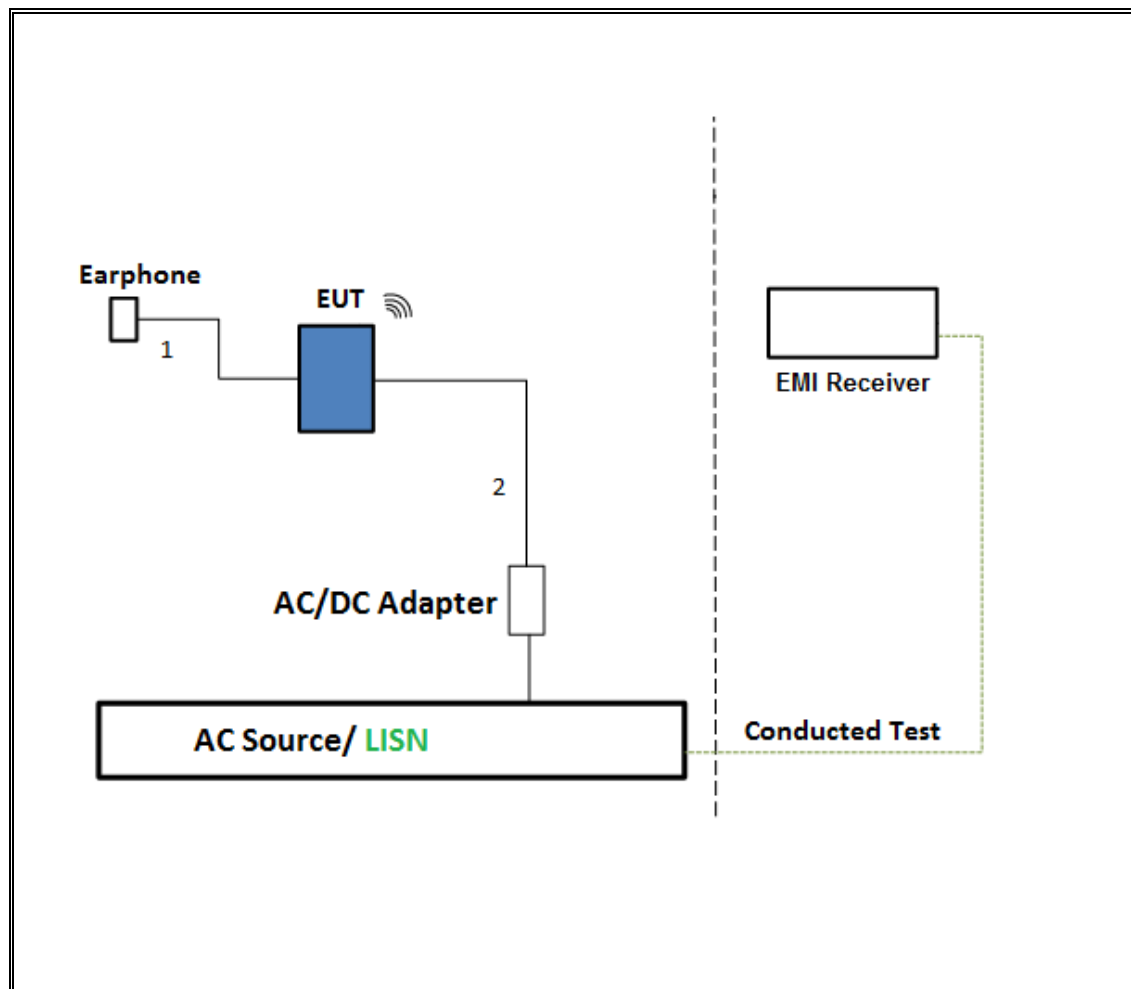
SETUP DIAGRAM



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.

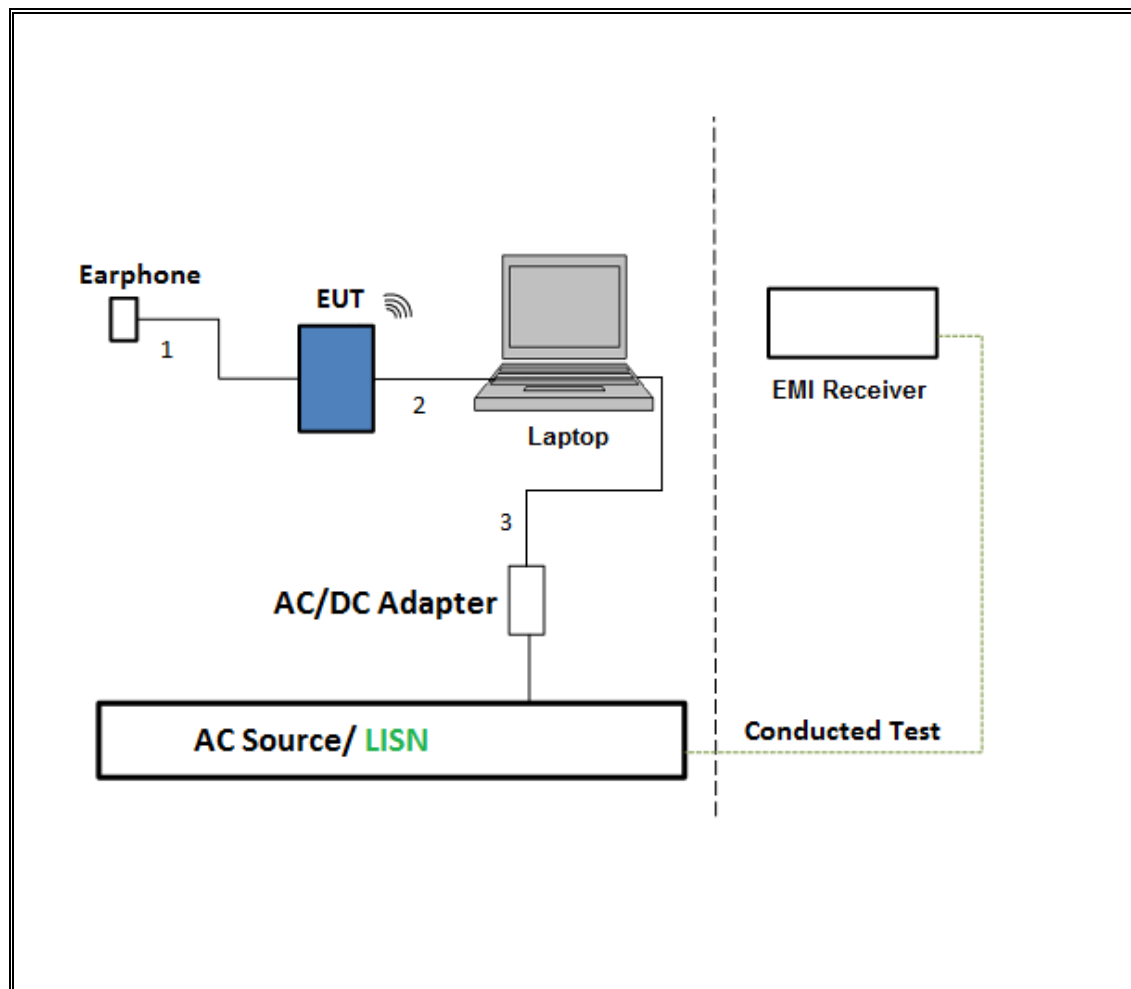
SETUP DIAGRAM



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	Cal Date	Cal Due
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	6/8/2015	6/8//2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	4/30/2015	4/30/2016
Antenna, Horn 1-18GHz	ETS Lindgren	3117	4/10/2015	4/10/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	6/11/2015	6/11/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	4/30/2015	4/30/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	5/22/2015	5/22/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1/31/2015	1/31/2016
Power Meter, P-series single channel	Agilent	N1911A	4/7/2015	4/7/2016
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	2/27/2015	2/27/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	12/17/2014	12/17/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	6/29/2015	6/29/2016
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ECSI7	09/10/15	09/10/16
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	01/16/15	01/16/16
Power Cable, Line Conducted Emissions ANSI 63.4	U L	PG1	7/28/2014	7/28/2016
UL SOFTWARE				
* Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
* Conducted Software	UL	UL EMC	Ver 2.2, March 31, 2015	
* AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 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

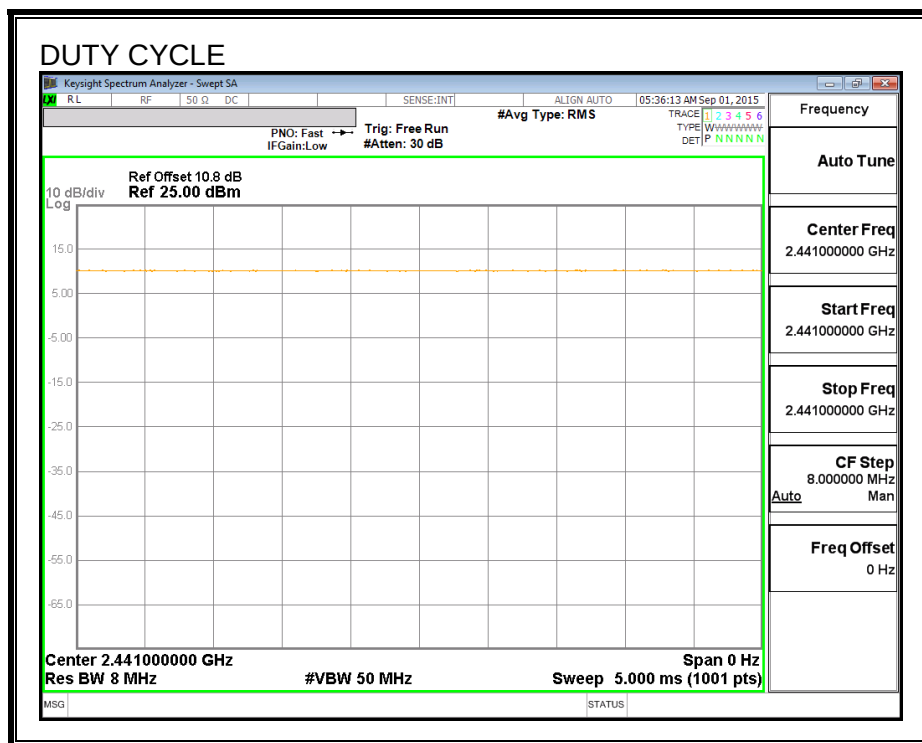
None; for reporting purposes only.

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	5.000	5.000	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)

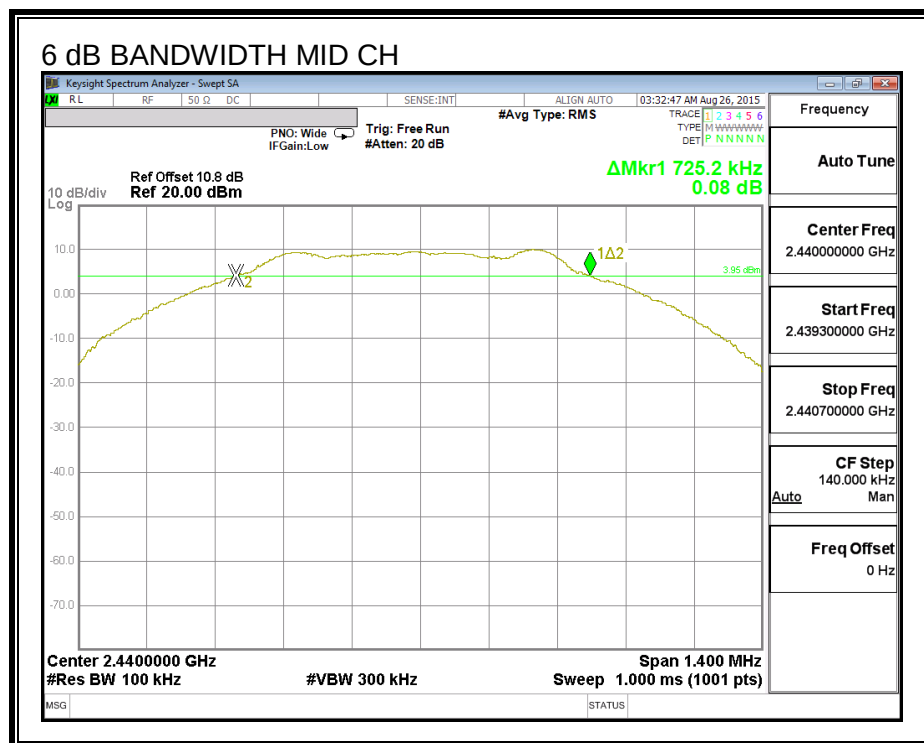
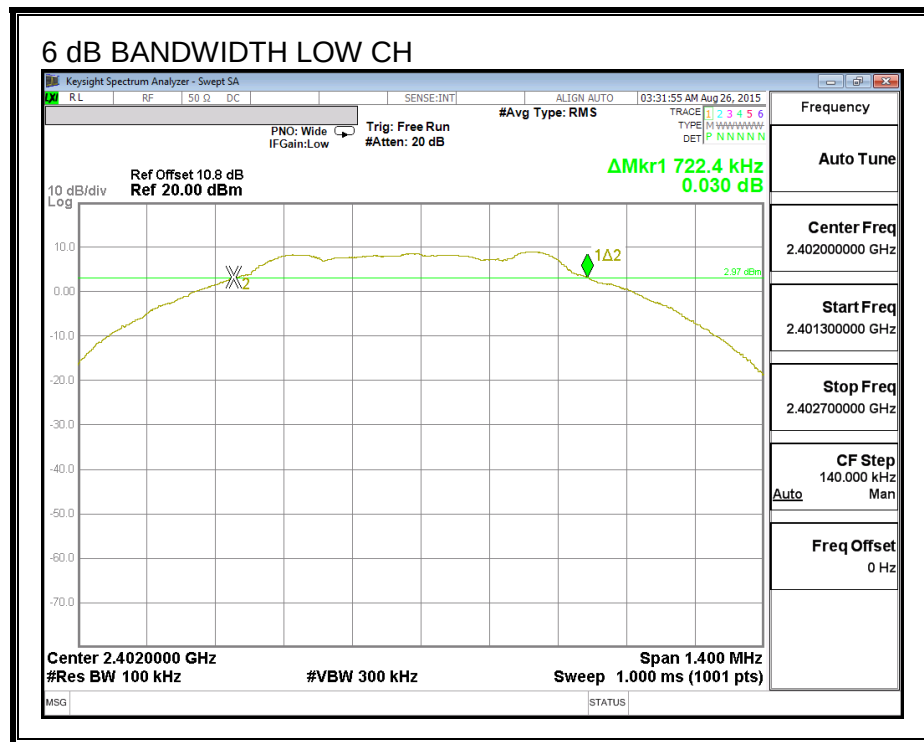
The minimum 6 dB bandwidth shall be at least 500 kHz.

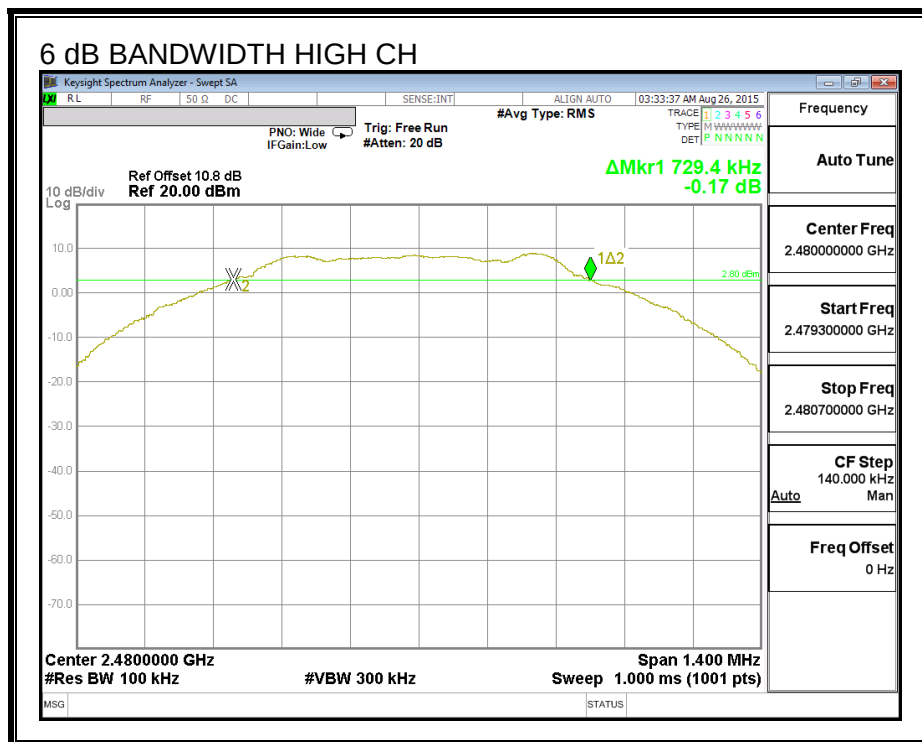
RESULTS

IPA

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.722	0.5
Middle	2440	0.725	0.5
High	2480	0.729	0.5

6 dB BANDWIDTH





7.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

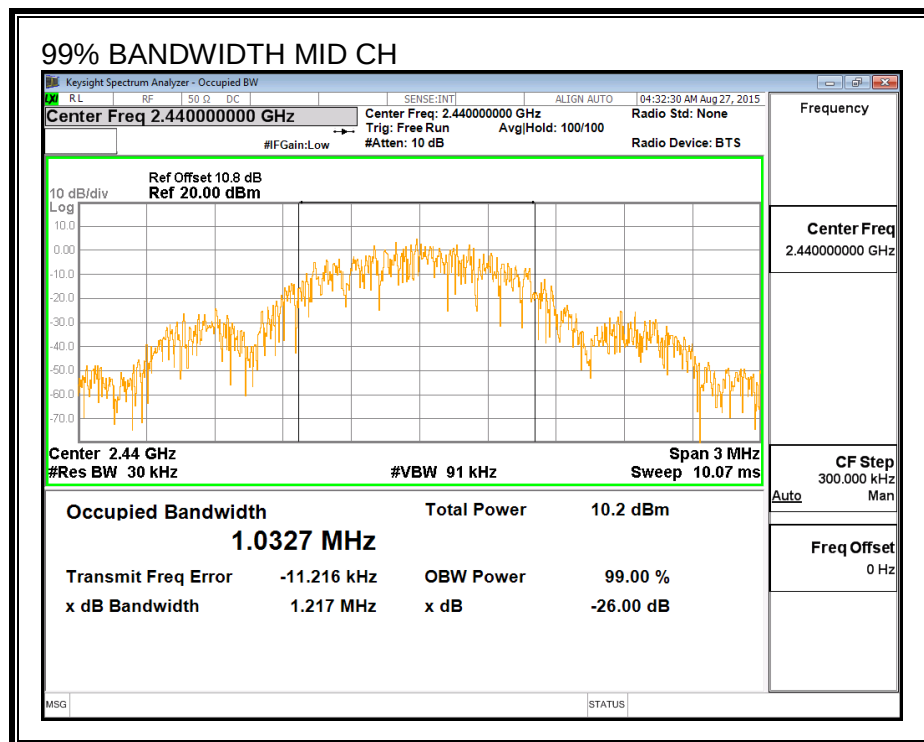
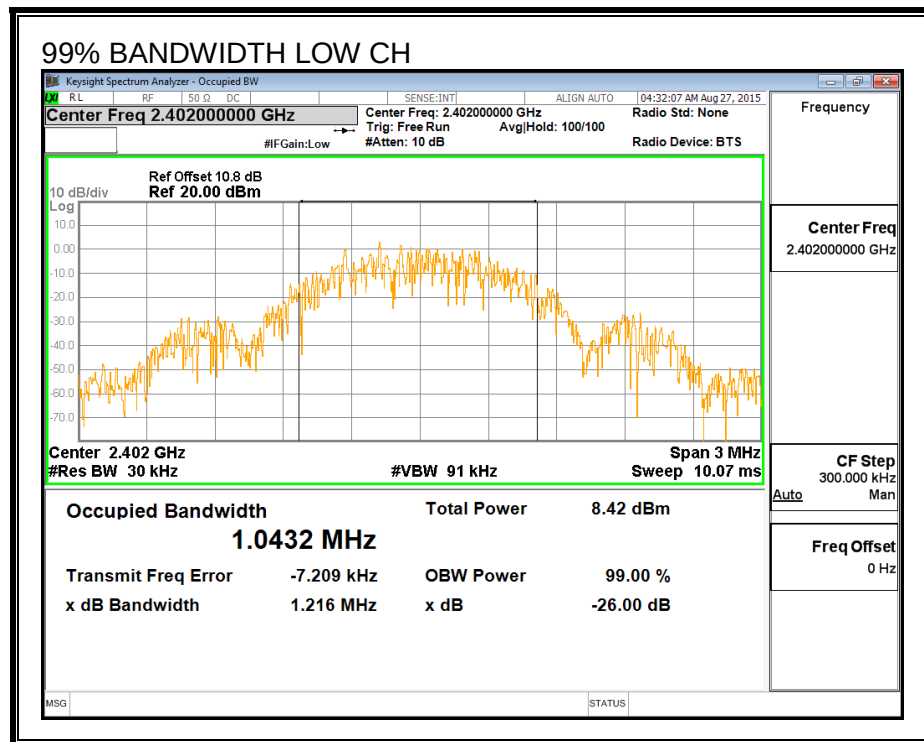
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

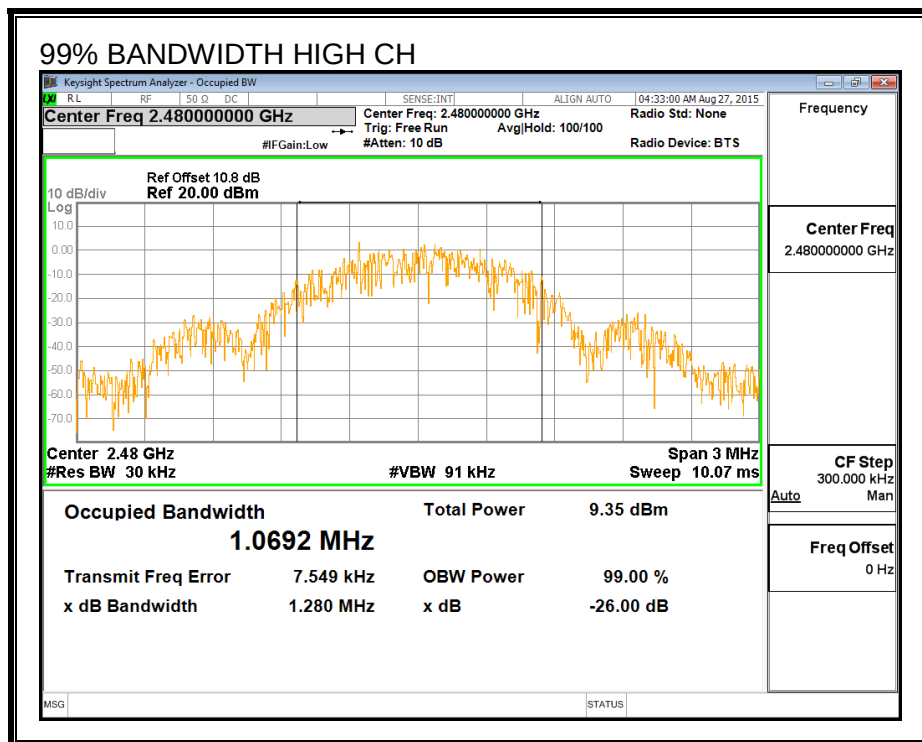
RESULTS

IPA

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0432
Middle	2440	1.0327
High	2480	1.0692

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 0.8 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	11.05
Middle	2440	11.50
High	2480	11.01

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	11.37	30	-18.630
Middle	2440	11.83	30	-18.170
High	2480	11.34	30	-18.660

7.7. POWER SPECTRAL DENSITY

LIMITS

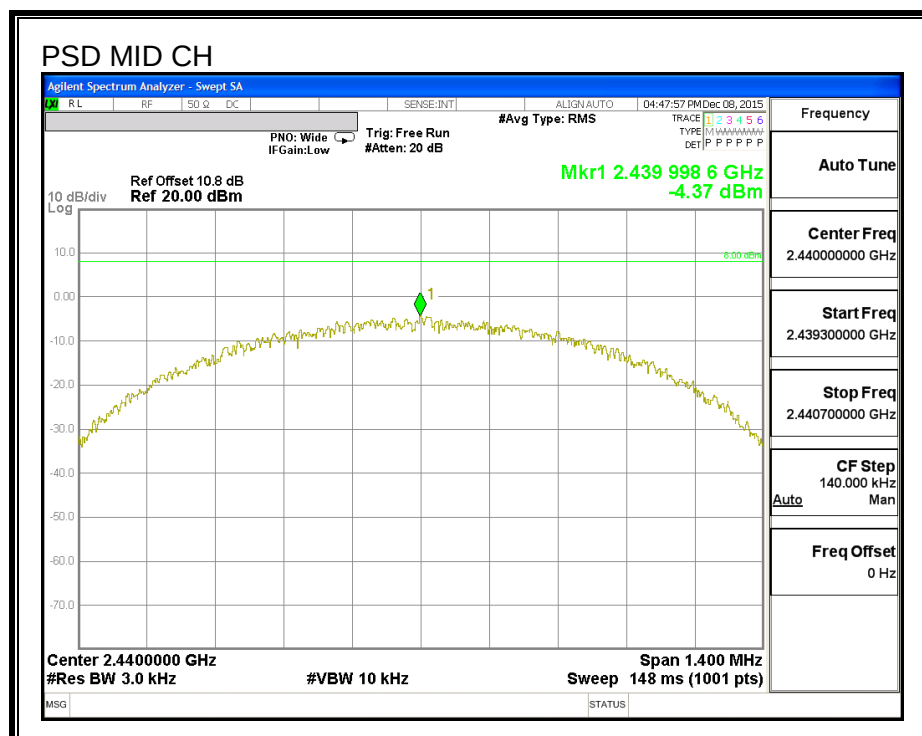
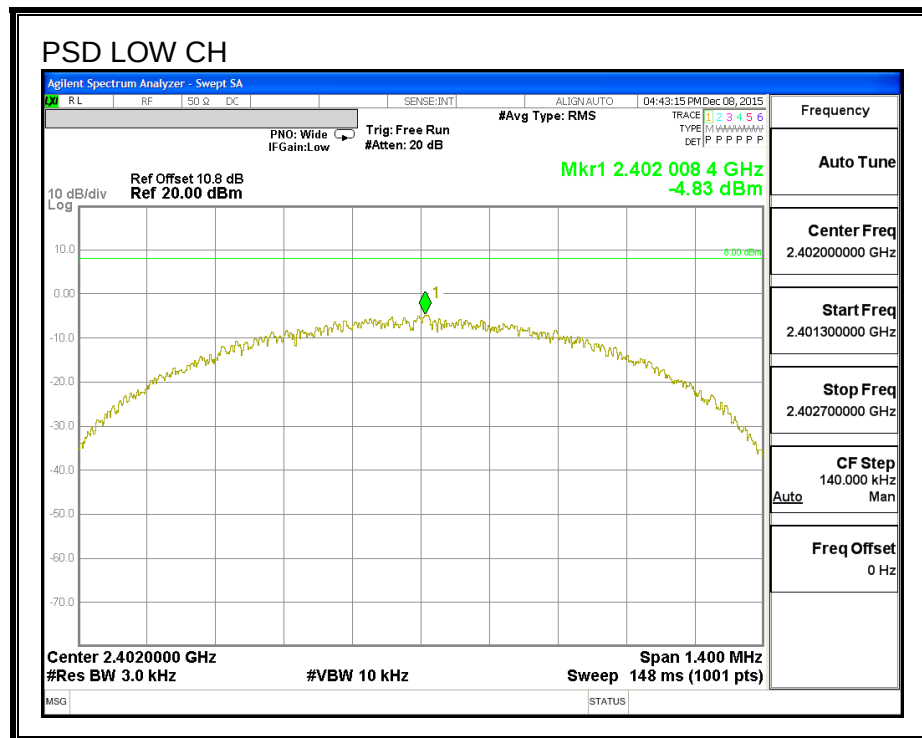
FCC §15.247 (e)

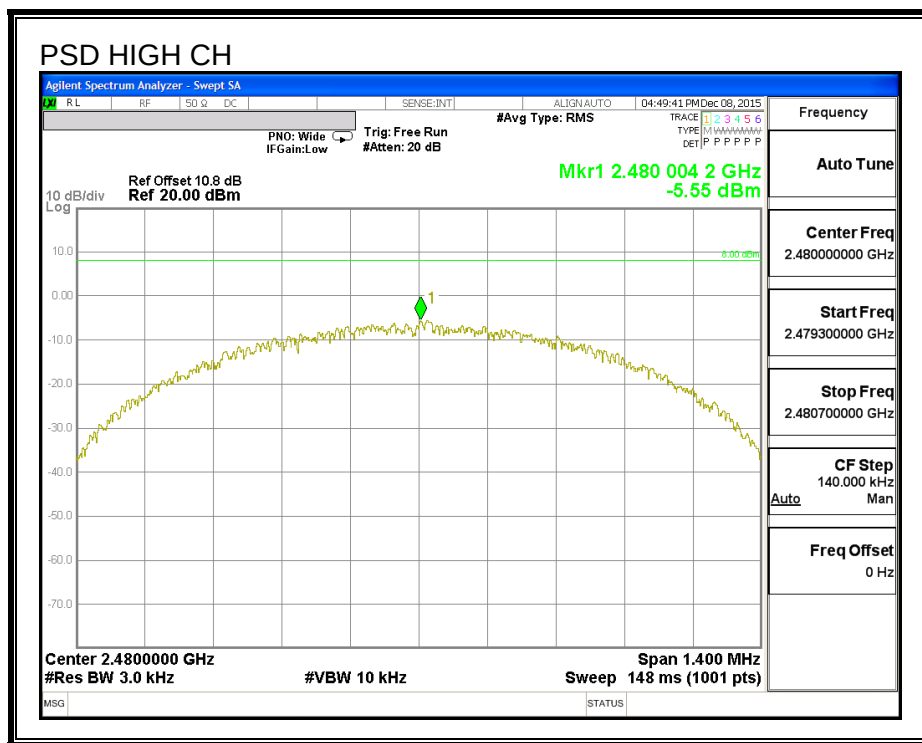
IC RSS-247 (5.2) (2)

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	-4.83	8	-12.83
Middle	2440	-4.37	8	-12.37
High	2480	-5.55	8	-13.55

POWER SPECTRAL DENSITY



7.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

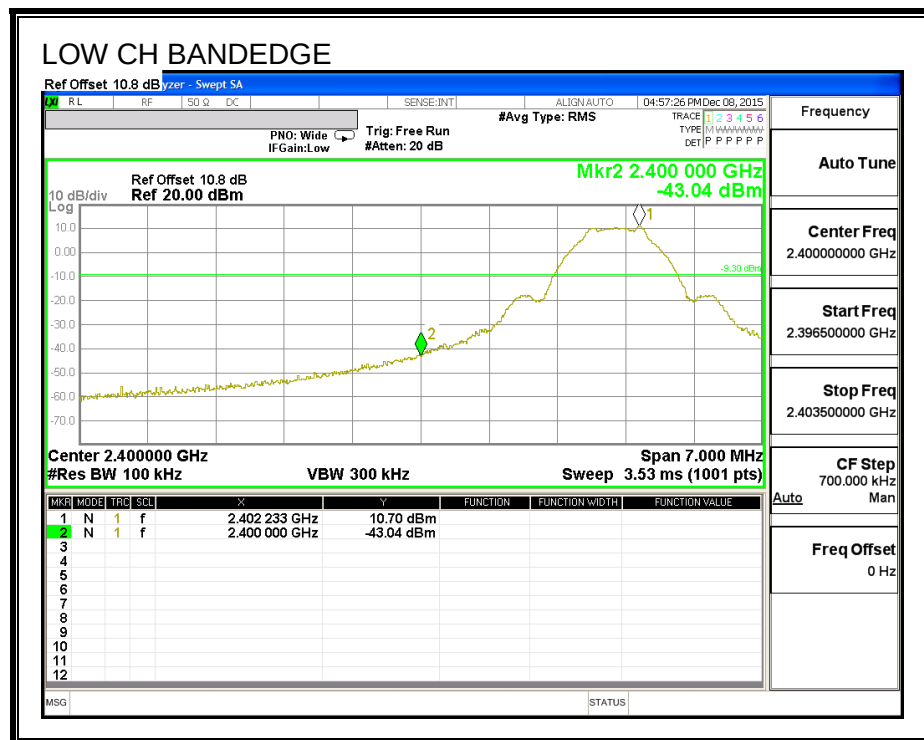
FCC §15.247 (d)

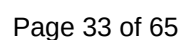
IC RSS-247 (5.5)

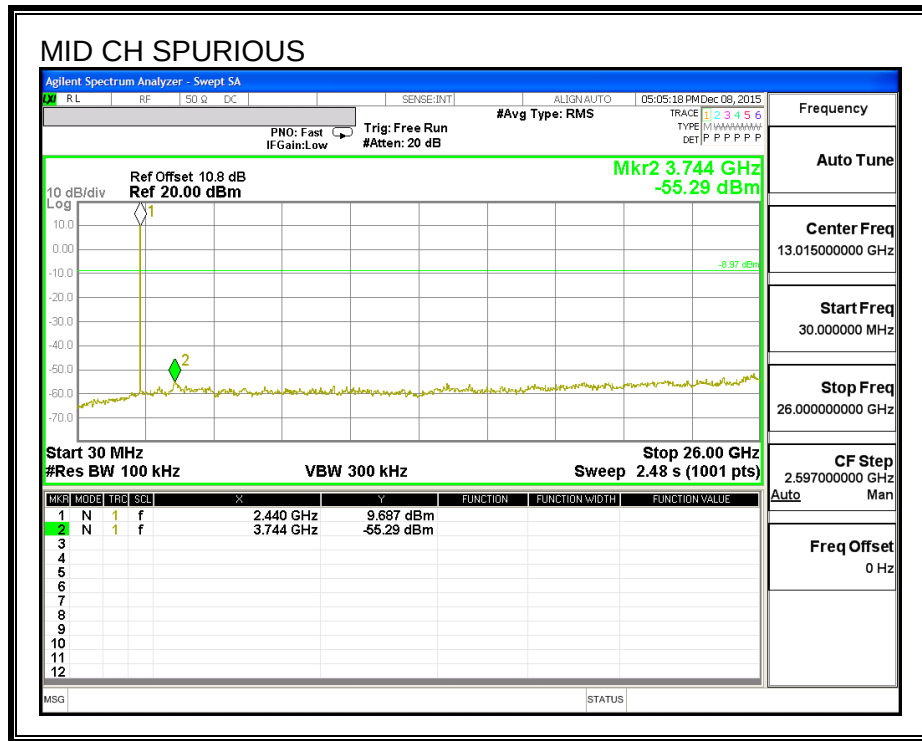
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

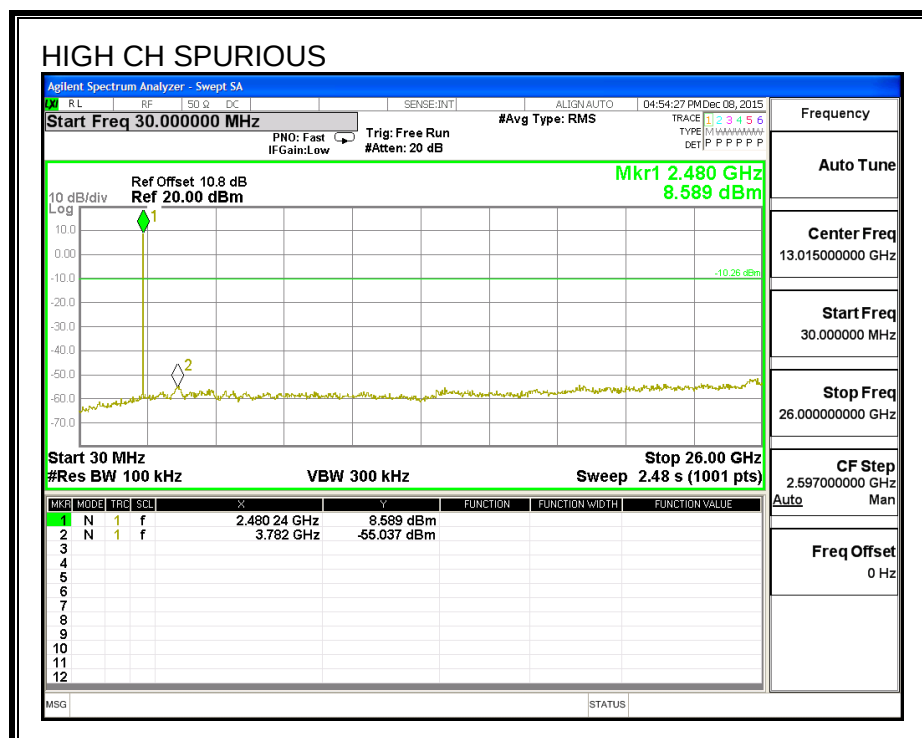
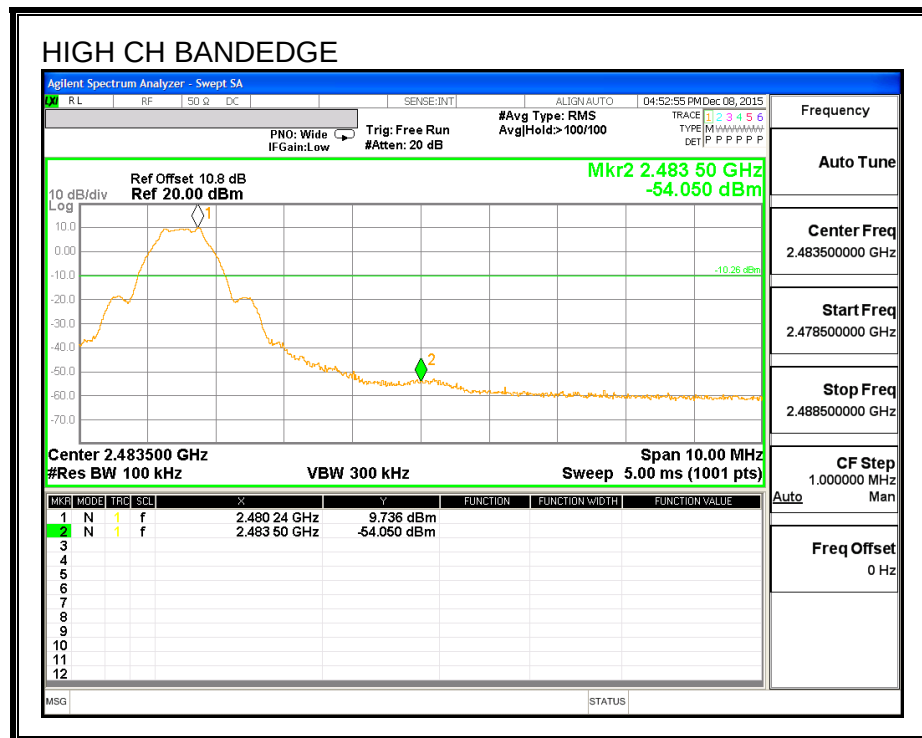
RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL







SPURIOUS EMISSIONS, 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.

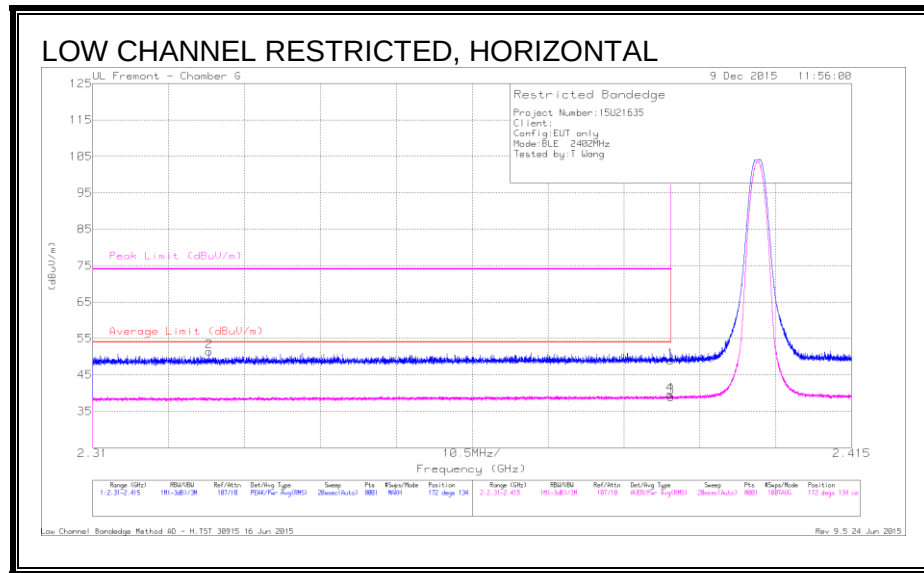
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 3MHz video bandwidth with average detector for average measurements.

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 BANDEGE



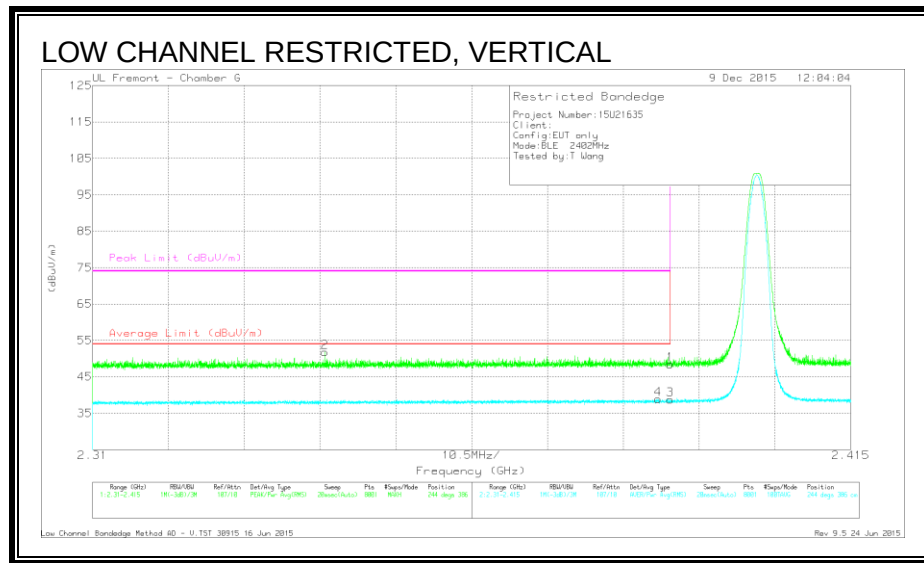
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl /Ftr/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	41.53	Pk	31.9	-24.5	48.93	-	-	74	-25.07	172	134	H
2	* 2.326	44.42	Pk	31.6	-24.6	51.42	-	-	74	-22.58	172	134	H
3	* 2.39	31.53	RMS	31.9	-24.5	38.93	54	-15.07	-	-	172	134	H
4	* 2.39	32.07	RMS	31.9	-24.5	39.47	54	-14.53	-	-	172	134	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection



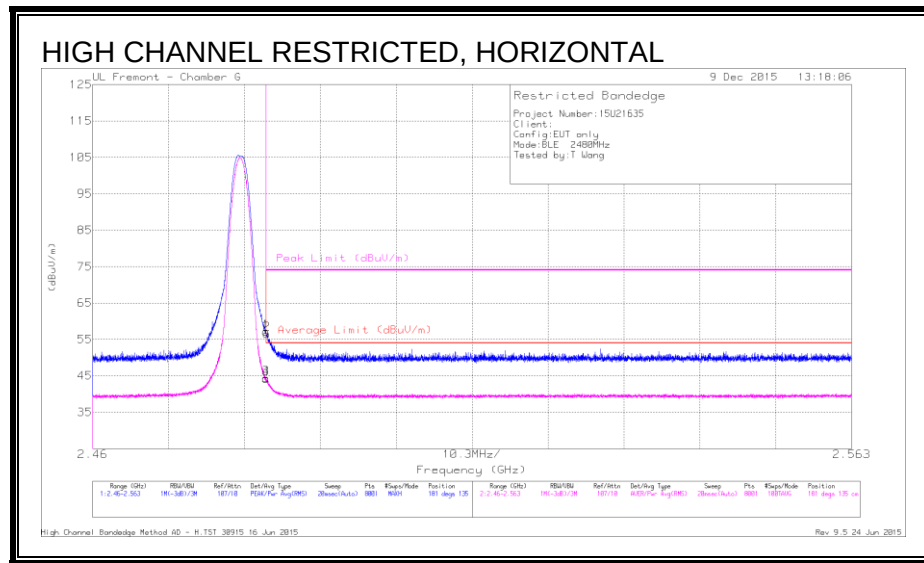
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/ Ftr/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	41.04	Pk	31.9	-24.5	48.44	-	-	74	-25.56	244	386	V
2	* 2.342	44.72	Pk	31.7	-24.6	51.82	-	-	74	-22.18	244	386	V
3	* 2.39	31.32	RMS	31.9	-24.5	38.72	54	-15.28	-	-	244	386	V
4	* 2.388	31.62	RMS	31.8	-24.5	38.92	54	-15.08	-	-	244	386	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection



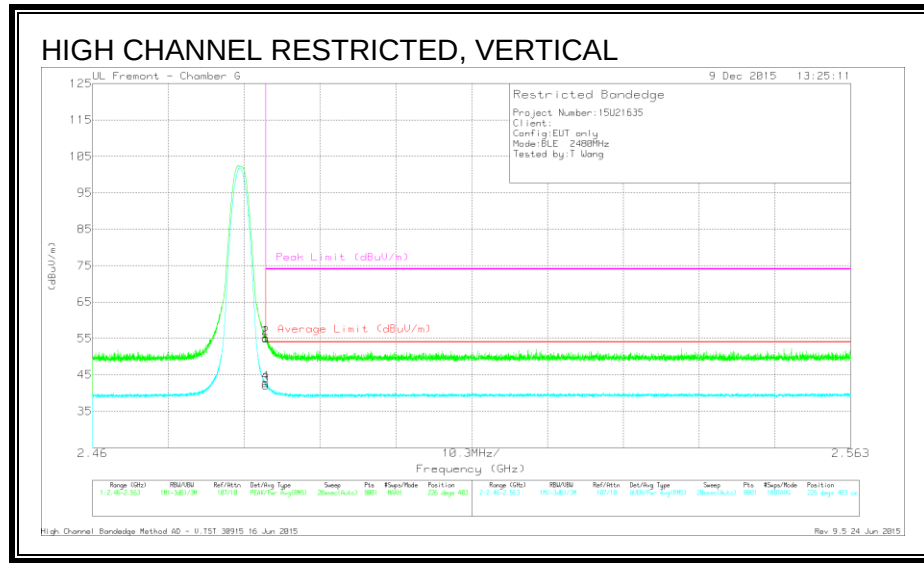
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/ Ftr/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	49.3	Pk	32.3	-24.5	57.1	-	-	74	-16.9	181	135	H
2	* 2.484	48.73	Pk	32.3	-24.5	56.53	-	-	74	-17.47	181	135	H
3	* 2.484	36.53	RMS	32.3	-24.5	44.33	54	-9.67	-	-	181	135	H
4	* 2.484	36.46	RMS	32.3	-24.5	44.26	54	-9.74	-	-	181	135	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection



DATA

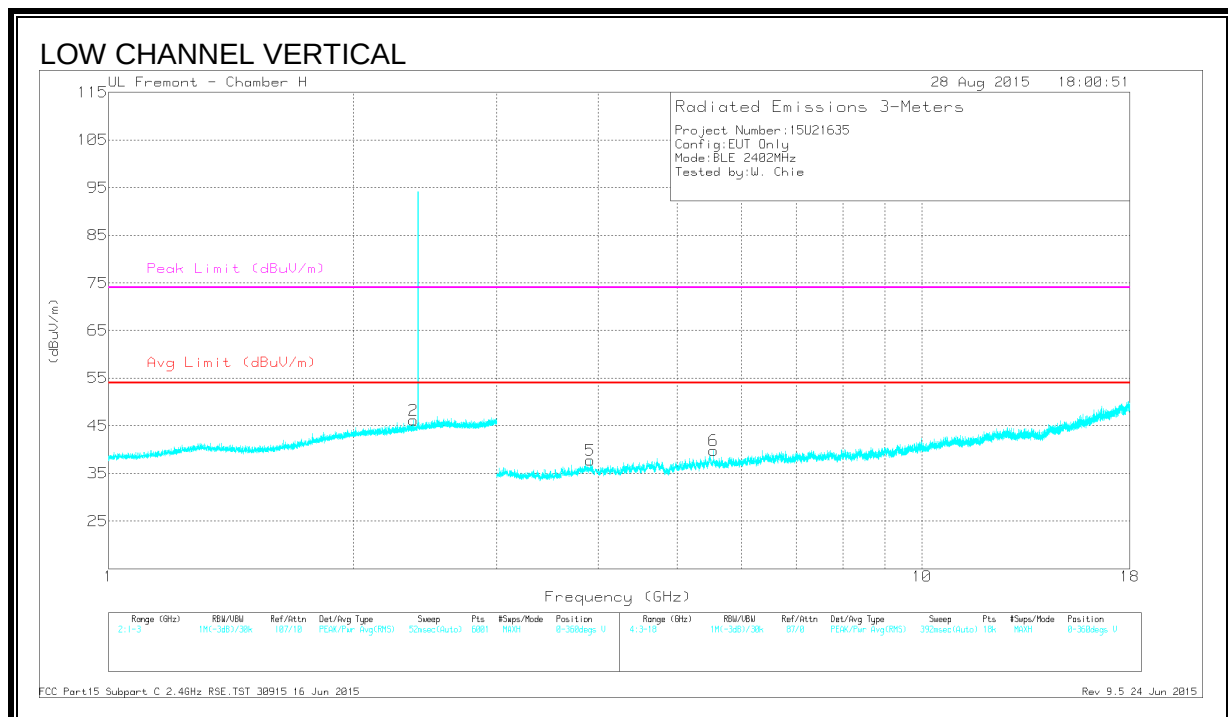
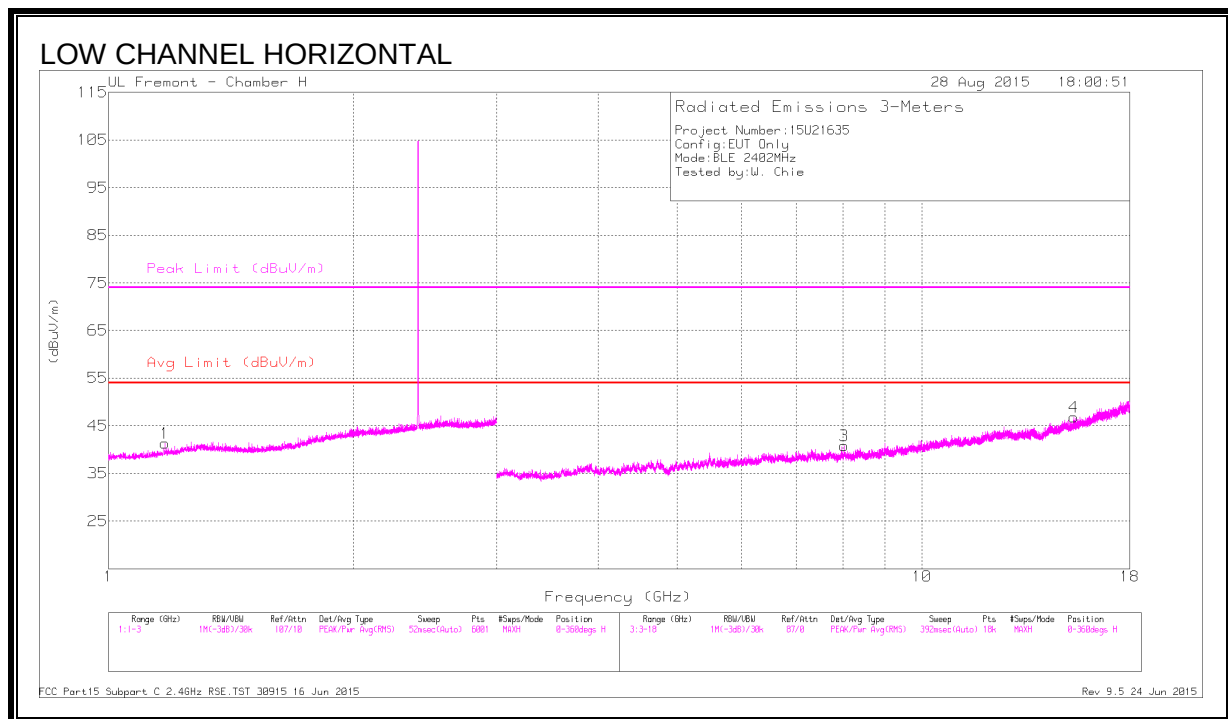
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.3	Pk	32.3	-24.5	55.1	-	-	74	-18.9	226	403	V
2	* 2.484	47.23	Pk	32.3	-24.5	55.03	-	-	74	-18.97	226	403	V
3	* 2.484	34.35	RMS	32.3	-24.5	42.15	54	-11.85	-	-	226	403	V
4	* 2.484	34.95	RMS	32.3	-24.5	42.75	54	-11.25	-	-	226	403	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

RMS - RMS detection

8.2.2. HARMONICS AND SPURIOUS EMISSIONS



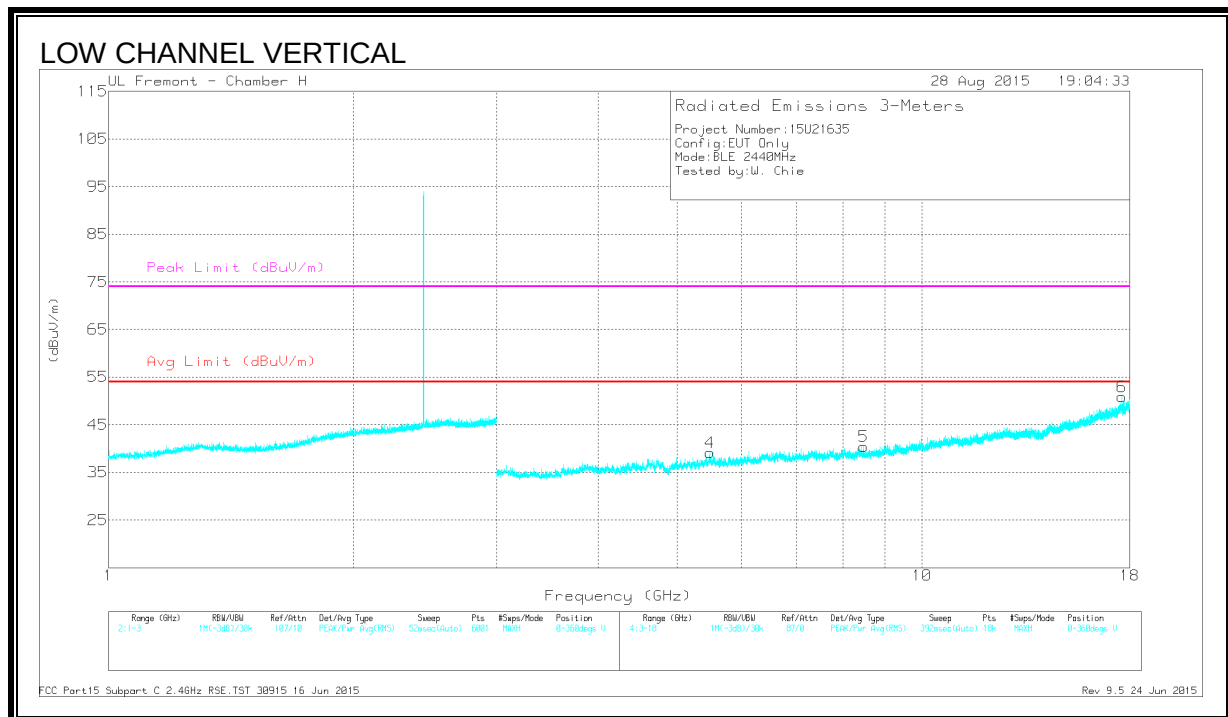
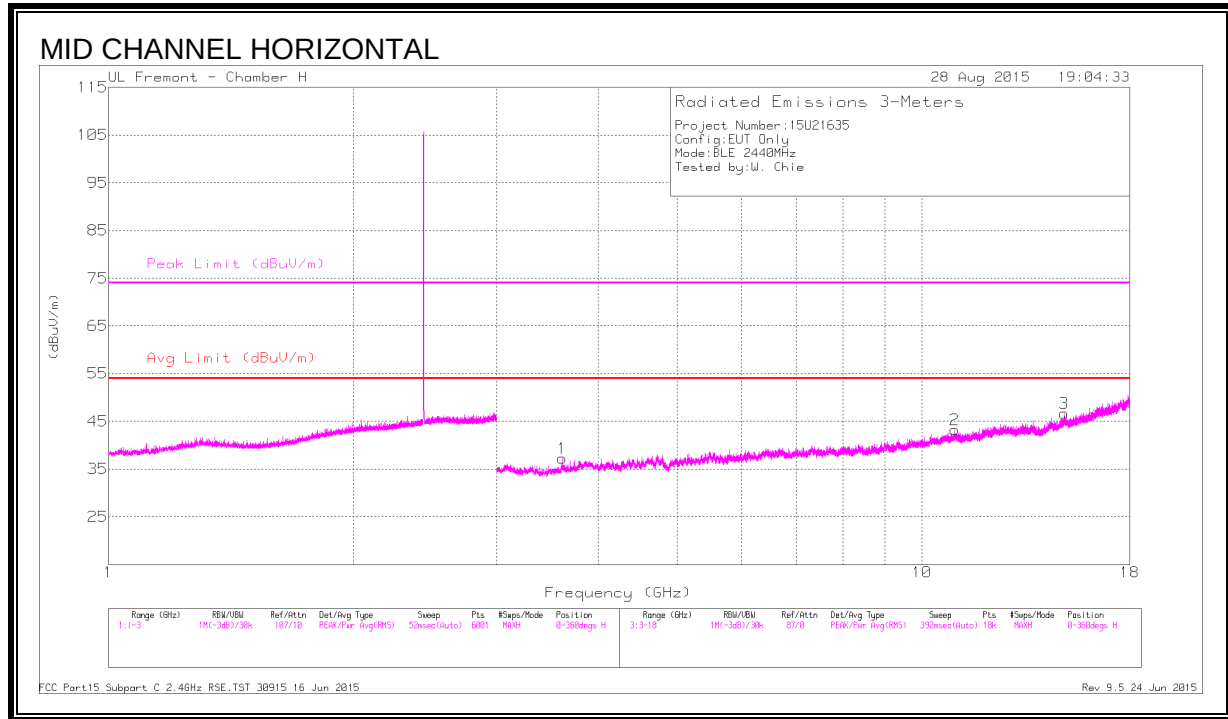
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fitr/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	* 1.174	44.56	PK2	27.8	-24.9	47.46	-	-	74	-26.54	254	373	H
	* 1.176	32.18	MAv1	27.9	-24.9	35.18	54	-18.82	-	-	254	373	H
2	* 2.368	43.36	PK2	32	-23.5	51.86	-	-	74	-22.14	11	184	V
	* 2.369	31.49	MAv1	32	-23.5	39.99	54	-14.01	-	-	11	184	V
4	* 15.36	36.51	PK2	40.7	-24.3	52.91	-	-	74	-21.09	353	171	H
	* 15.358	24.9	MAv1	40.7	-24.3	41.3	54	-12.7	-	-	353	171	H
5	* 3.911	42.82	PK2	33.6	-31.8	44.62	-	-	74	-29.38	121	343	V
	* 3.912	30.85	MAv1	33.6	-31.8	32.65	54	-21.35	-	-	121	343	V
6	5.546	41.46	PK2	35.2	-30.5	46.16	-	-	-	-	132	209	V
3	8.022	38.31	PK2	35.9	-27.4	46.81	-	-	-	-	198	149	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



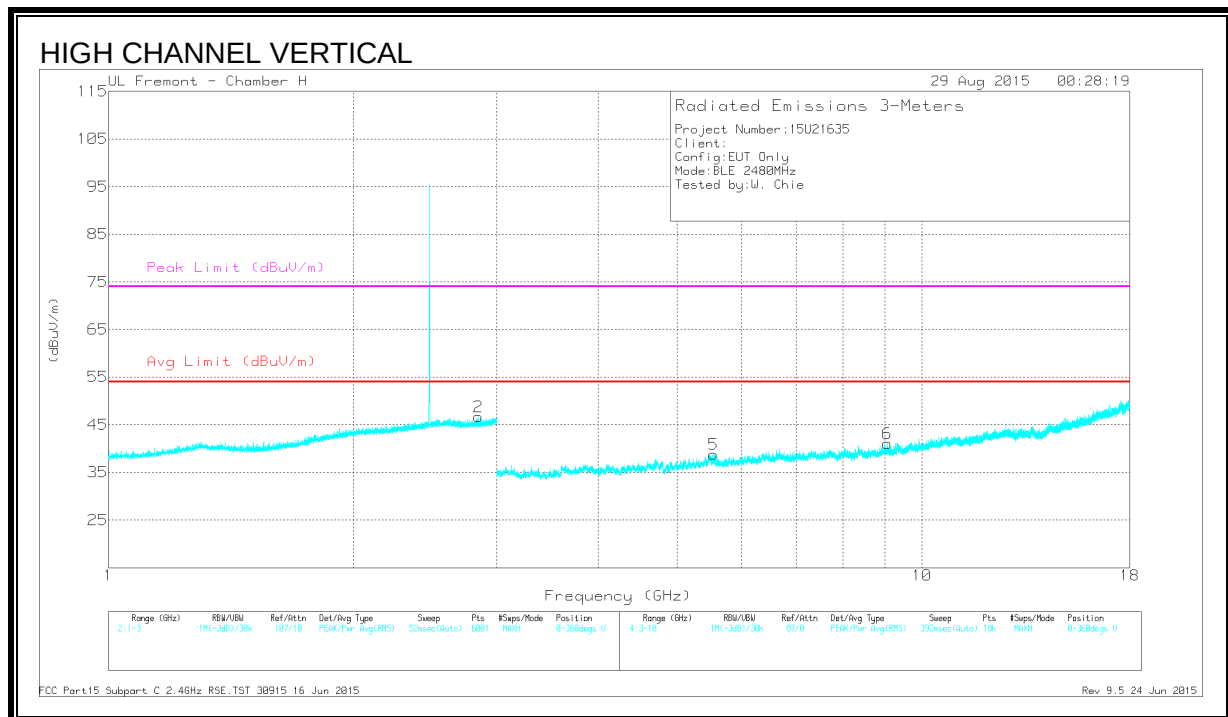
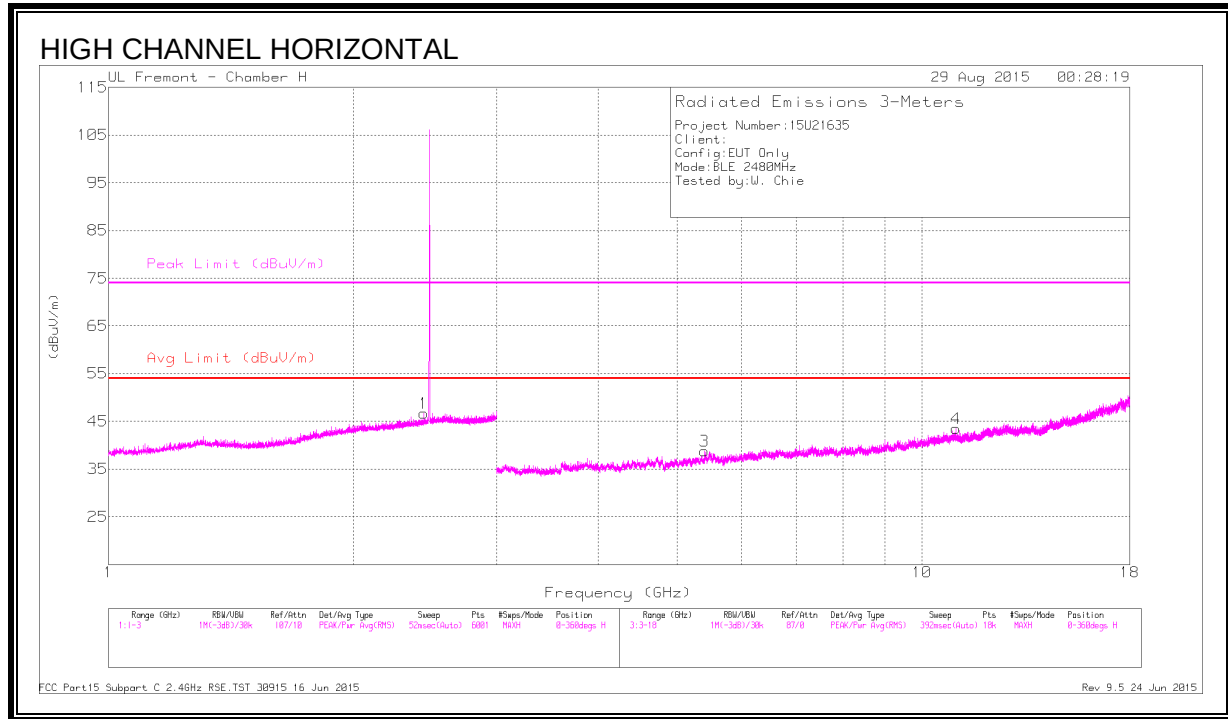
DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Filt/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	* 3.614	42.56	PK2	33.1	-31.8	43.86	-	-	74	-30.14	18	140	H
	* 3.614	30.47	MAv1	33.1	-31.8	31.77	54	-22.23	-	-	18	140	H
2	* 10.969	36.97	PK2	37.8	-24.4	50.37	-	-	74	-23.63	33	295	H
	* 10.97	24.46	MAv1	37.8	-24.4	37.86	54	-16.14	-	-	33	295	H
5	* 8.471	38.3	PK2	35.9	-27.9	46.3	-	-	74	-27.7	347	159	V
	* 8.469	26.81	MAv1	35.9	-27.9	34.81	54	-19.19	-	-	347	159	V
4	5.484	40.81	PK2	35.5	-30.2	46.11	-	-	-	-	73	209	V
3	14.945	36.33	PK2	40.6	-24	52.93	-	-	-	-	57	130	H
6	17.604	34.06	PK2	42	-19.9	56.16	-	-	-	-	335	117	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/ Fitr/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	* 2.849	43.3	PK2	32.4	-23.2	52.5	-	-	74	-21.5	273	100	V
	* 2.85	31.46	MAv1	32.4	-23.2	40.66	54	-13.34	-	-	273	100	V
3	* 5.405	40.25	PK2	35.3	-30.8	44.75	-	-	74	-29.25	26	281	H
	* 5.405	28.71	MAv1	35.3	-30.8	33.21	54	-20.79	-	-	26	281	H
4	* 11.011	36.1	PK2	37.8	-24.5	49.4	-	-	74	-24.6	11	175	H
	* 11.011	24.67	MAv1	37.8	-24.5	37.97	54	-16.03	-	-	11	175	H
6	* 9.068	37.81	PK2	36.2	-25.9	48.11	-	-	74	-25.89	53	351	V
	* 9.068	25.72	MAv1	36.2	-25.9	36.02	54	-17.98	-	-	53	351	V
1	2.443	43.78	PK2	32.2	-23.5	52.48	-	-	-	-	343	114	H
5	5.541	40.69	PK2	35.3	-30.5	45.49	-	-	-	-	79	138	V

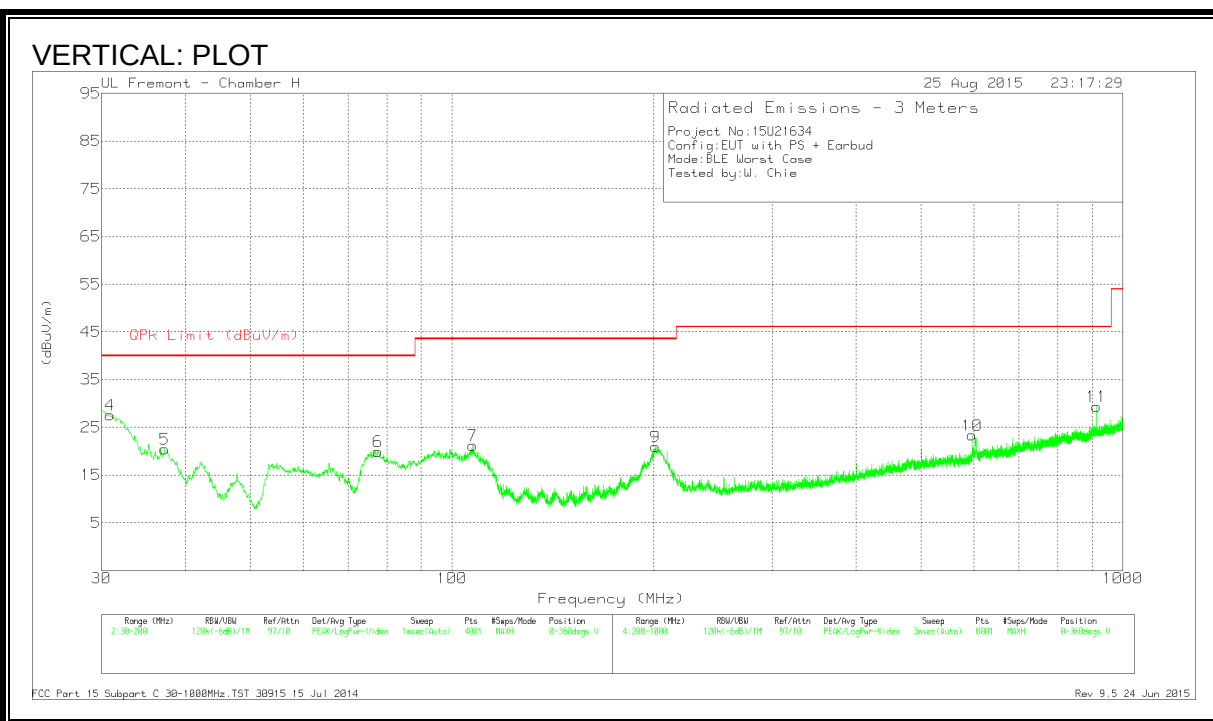
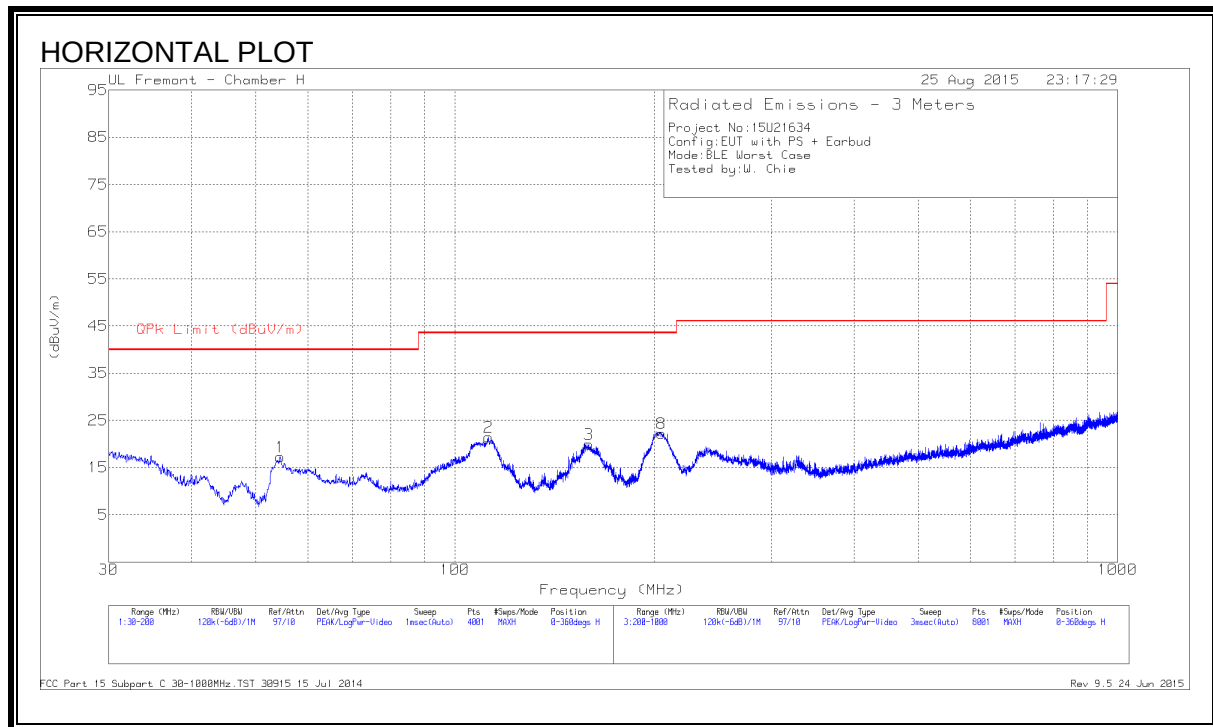
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

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

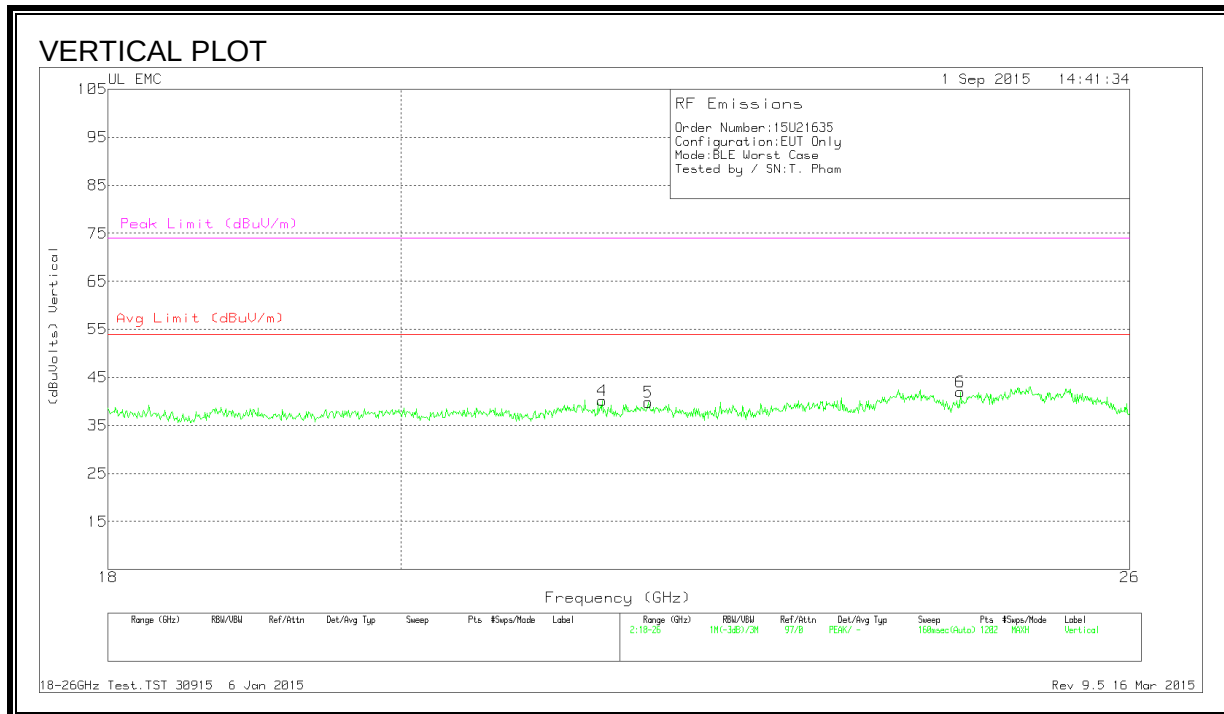
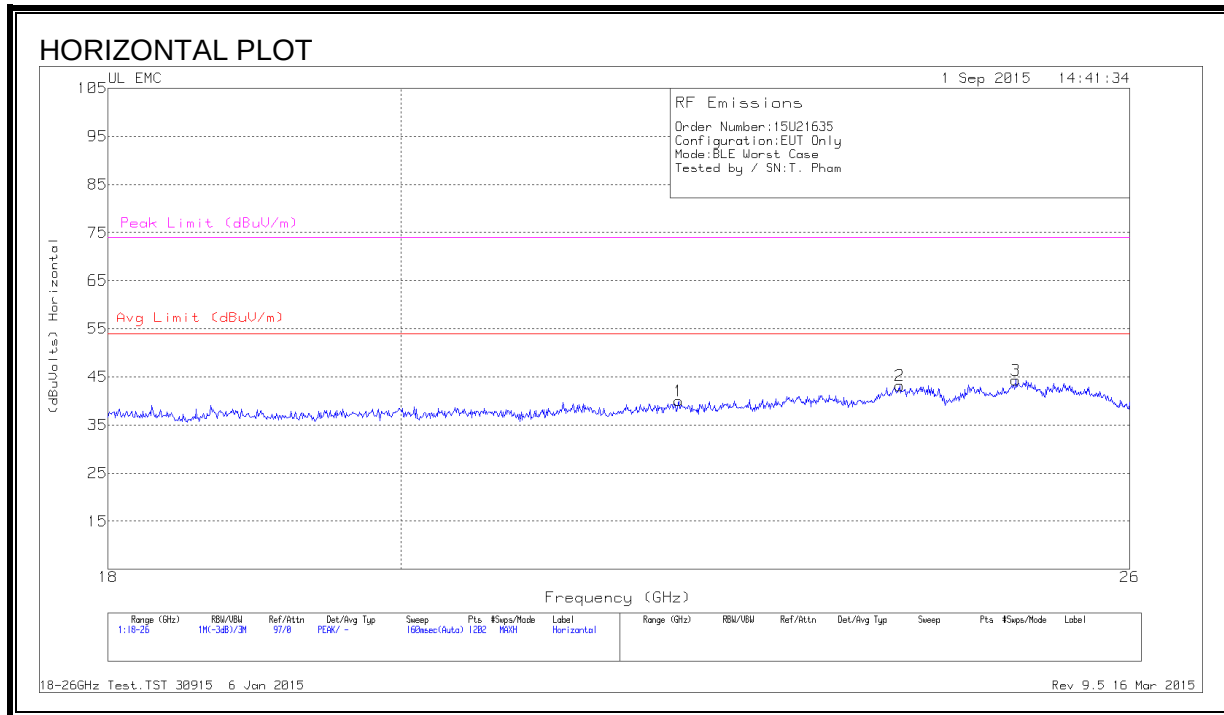
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT900 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 112.3225	38.97	Pk	12.9	-30.4	21.47	43.52	-22.05	0-360	301	H
4	30.8925	37.8	Pk	21.1	-31.3	27.6	40	-12.4	0-360	100	V
5	37.2675	34.73	Pk	16.9	-31.2	20.43	40	-19.57	0-360	100	V
1	54.4588	41.1	Pk	7.2	-31	17.3	40	-22.7	0-360	401	H
6	77.6	42.66	Pk	8	-30.7	19.96	40	-20.04	0-360	100	V
7	107.435	39.88	Pk	11.9	-30.5	21.28	43.52	-22.24	0-360	100	V
3	159.115	38	Pk	12	-30	20	43.52	-23.52	0-360	201	H
9	200.9	38.61	Pk	12.1	-29.8	20.91	43.52	-22.61	0-360	100	V
8	204.9	41.05	Pk	10.9	-29.7	22.25	43.52	-21.27	0-360	201	H
10	596.3	32.83	Pk	18.6	-28.1	23.33	46.02	-22.69	0-360	100	V
11	914.6	33.29	Pk	22.5	-26.4	29.39	46.02	-16.63	0-360	301	V

* - indicates frequency in CFR15.205/IC7.2.2 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	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	22.103	41.4	Pk	33	-24.9	-9.5	40	54	-14	74	-34
2	23.935	43.37	Pk	33.4	-24.1	-9.5	43.17	54	-10.83	74	-30.83
3	24.954	44.13	Pk	34.1	-24.4	-9.5	44.33	54	-9.67	74	-29.67
4	21.504	42.07	Pk	33	-25.4	-9.5	40.167	54	-13.83	74	-33.83
5	21.863	40.63	Pk	33.3	-24.6	-9.5	39.83	54	-14.17	74	-34.17
6	24.461	41.9	Pk	33.9	-24.3	-9.5	42	54	-12	74	-32

Pk - Peak detector

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

C63.10.

RESULTS

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

Line-L1 .15 - 30MHz

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.168	44.74	Pk	1.2	0	45.94	65.06	-19.12		
2	.168	23.43	Av	1.2	0	24.63	-	-	55.06	-30.43
3	.8115	43.06	Pk	.3	0	43.36	56	-12.64		
4	.8115	26.04	Av	.3	0	26.34	-	-	46	-19.66
5	4.281	28.4	Pk	.2	.1	28.7	56	-27.3		
6	4.245	18.34	Av	.2	.1	18.64	-	-	46	-27.36
7	23.9955	22.38	Pk	.3	.2	22.88	60	-37.12		
8	23.9955	15.56	Av	.3	.2	16.06	-	-	50	-33.94
9	26.646	22.66	Pk	.3	.3	23.26	60	-36.74		
10	26.898	10.55	Av	.3	.3	11.15	-	-	50	-38.85

Line-L2 .15 - 30MHz

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
11	.1635	44.3	Pk	1.3	0	45.6	65.28	-19.68		
12	.168	24.53	Av	1.3	0	25.83	-	-	55.06	-29.23
13	.8115	43.13	Pk	.3	0	43.43	56	-12.57		
14	.816	29.07	Av	.3	0	29.37	-	-	46	-16.63
15	4.2135	28.3	Pk	.2	.1	28.6	56	-27.4		
16	4.227	18.38	Av	.2	.1	18.68	-	-	46	-27.32
17	23.9955	19.79	Pk	.3	.2	20.29	60	-39.71		
18	23.9955	13.15	Av	.3	.2	13.65	-	-	50	-36.35
19	26.529	18.13	Pk	.3	.3	18.73	60	-41.27		
20	26.151	8.01	Av	.3	.3	8.61	-	-	50	-41.39

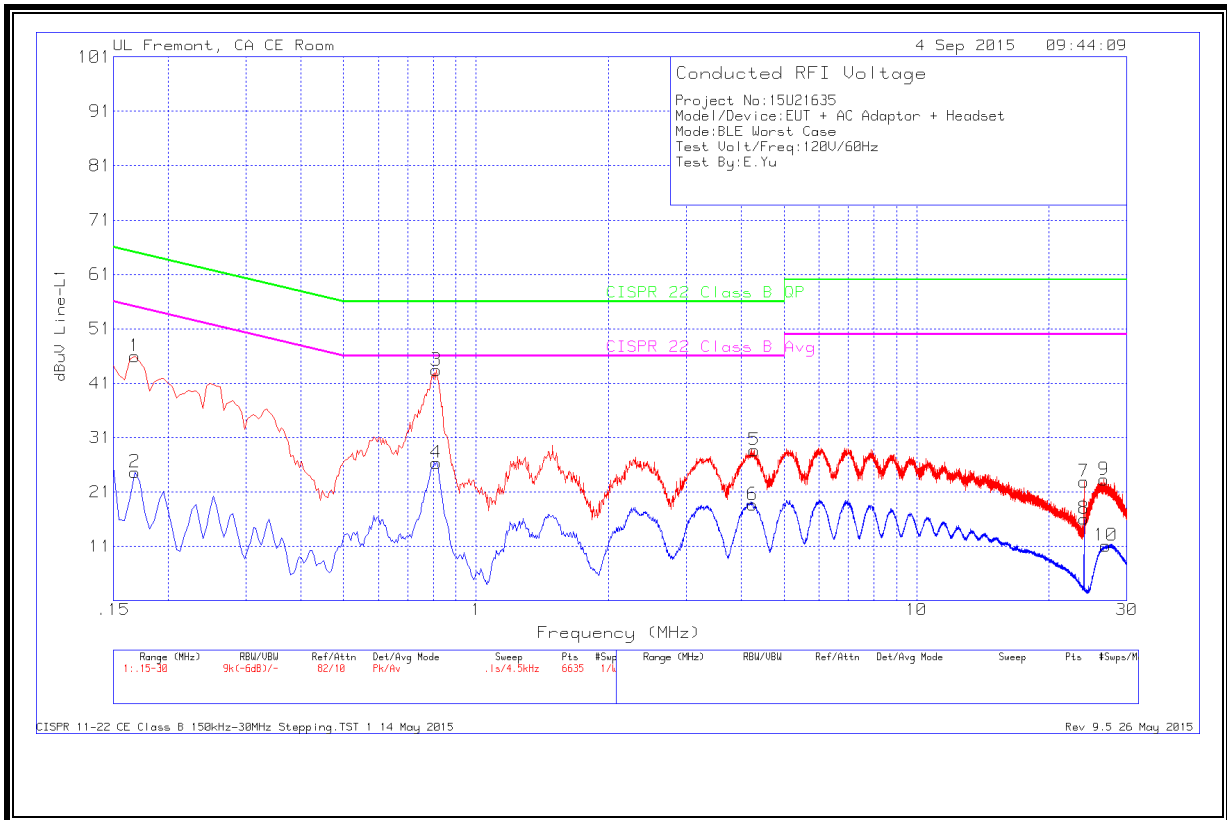
Pk - Peak detector

Av - Average detection

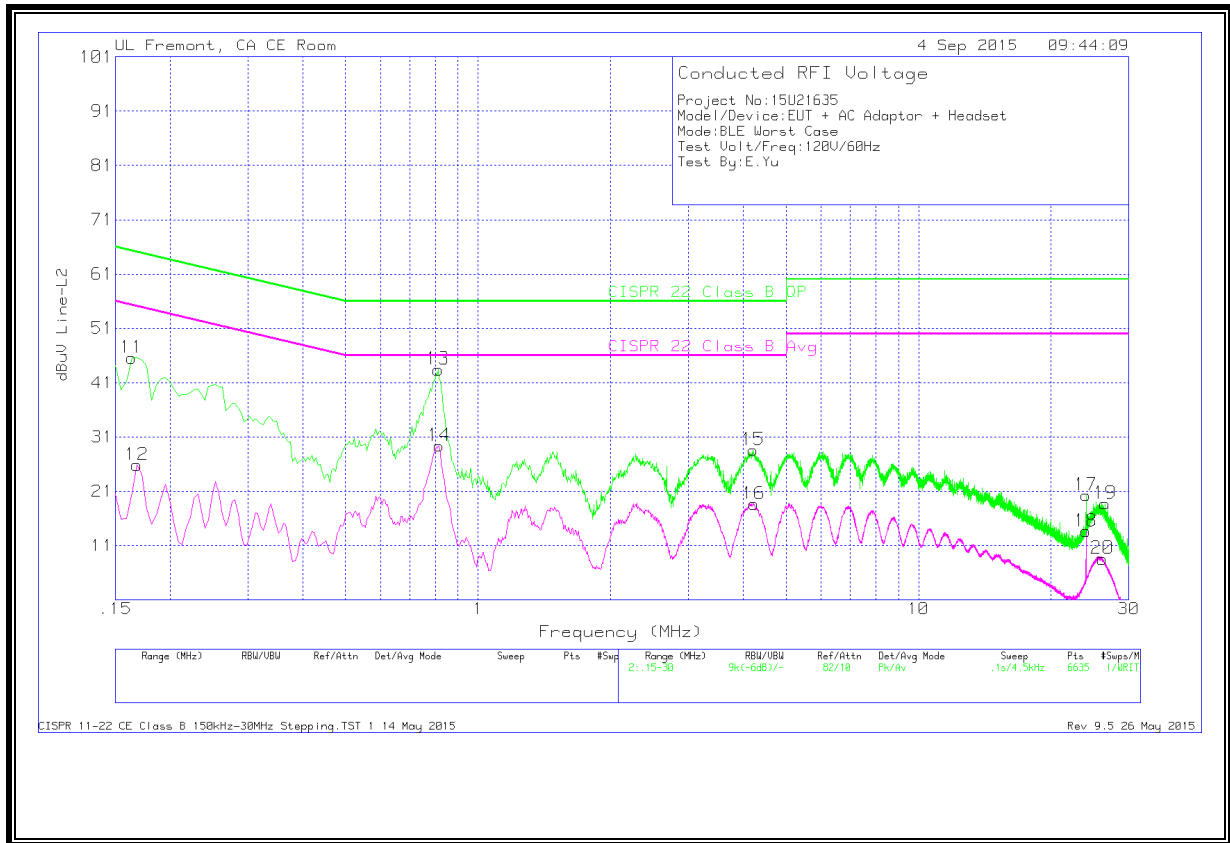
CISPR 11-22 CE Class B 150kHz-30MHz Stepping.TST 1 14 May 2015

Rev 9.5 26 May 2015

LINE 1 RESULTS



LINE 2 RESULTS



9.2. EUT POWERED BY HOST PC VIA USB CABLE

Line-L1 .15 - 30MHz

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.1509	47.28	Qp	1.4	0	48.68	65.95	-17.27		
2	.15	20.15	Av	1.4	0	21.55	-	-	56	-34.45
3	.16778	52.08	Qp	1.2	0	53.28	65.07	-11.79		
4	.168	40.15	Av	1.2	0	41.35	-	-	55.06	-13.71
5	.19163	46.83	Qp	1	0	47.83	63.97	-16.14		
6	.195	35	Av	1	0	36	-	-	53.82	-17.82

Pk - Peak detector

Qp - Quasi-Peak detector

Av - Average detection

Ca - CISPR average detection

Line-L2 .15 - 30MHz

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
7	.16688	51.77	Qp	1.3	0	53.07	65.11	-12.04		
8	.168	39.23	Av	1.3	0	40.53	-	-	55.06	-14.53
9	.19388	46.64	Qp	1.1	0	47.74	63.87	-16.13		
10	.195	34.84	Av	1	0	35.84	-	-	53.82	-17.98
11	.21863	40.69	Qp	.9	0	41.59	62.87	-21.28		
12	.222	30.1	Av	.9	0	31	-	-	52.74	-21.74

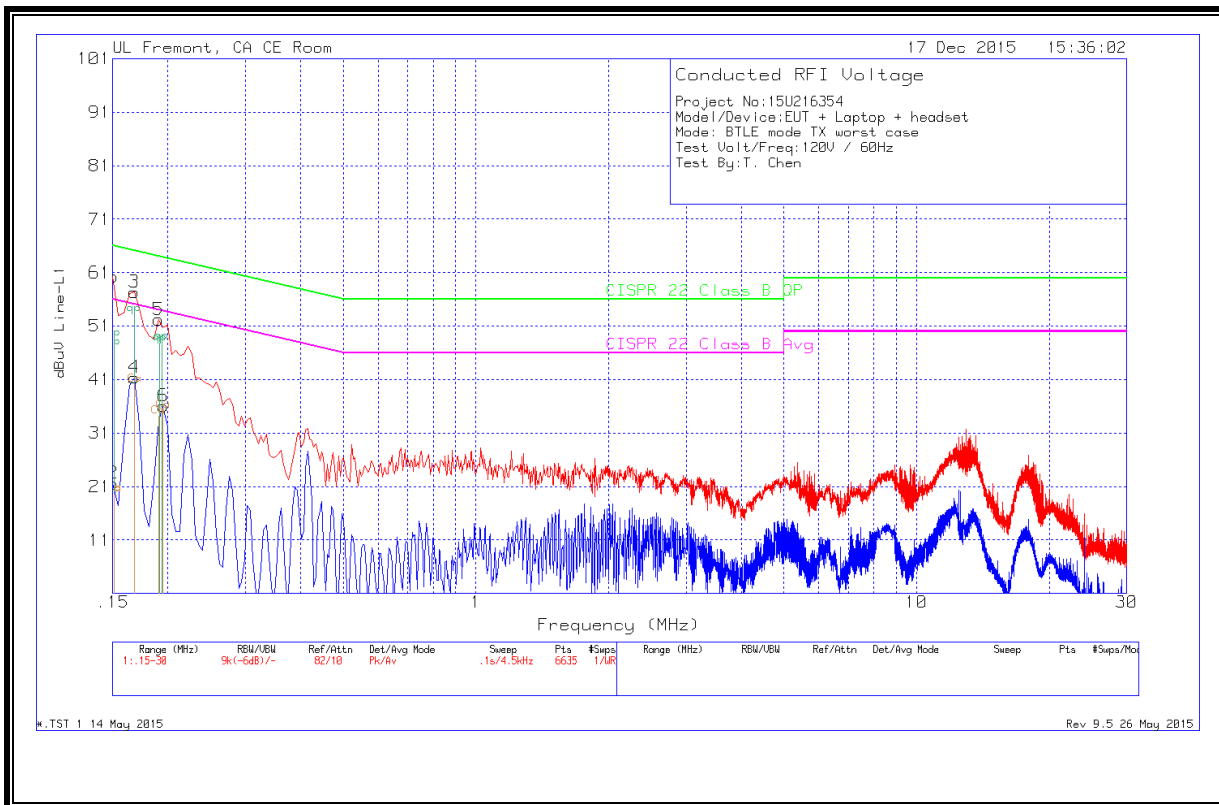
Pk - Peak detector

Qp - Quasi-Peak detector

Av - Average detection

Ca - CISPR average detection

LINE 1 RESULTS



LINE 2 RESULTS

