



# **CERTIFICATION TEST REPORT**

**Report Number. : 16U23300-E2V2**

**Applicant :** Insight Energy Ventures, LLC DBA Powerley  
333 W. Seventh St. #200  
Royal Oak, MI 48067, U.S.A.

**Model :** EB2.0

**FCC ID :** 2AHFD-N1O9A911

**IC ID :** 21573-482A2

**EUT Description :** Wireless Sensor Bridge for Home Energy Control

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 1  
INDUSTRY CANADA RSS-GEN Issue 4

**Date of Issue:**

Friday, July 08, 2016

**Prepared by:**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/14/2016	Initial Issue	D. Corona
V2	07/08/2016	Updated Section 5.3	J. WU

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Insight Energy Ventures, LLC DBA Powerley  
**EUT DESCRIPTION:** Wireless Sensor Bridge for Home Energy Control  
**MODEL:** EB2.0  
**SERIAL NUMBER:** Conducted: AMJ001532-0002, AMJ001532-0007,  
Radiated: AMJ001532-0008, AMJ001532-0010,  
**DATE TESTED:** MAY 25 – 31, 2016

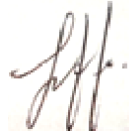
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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.

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, 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 Benicia Street, Fremont, California, USA.

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 checked="" 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 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, 9KHz to 30 MHz	2.14 dB
Radiated Disturbance, 30 to 1000 MHz	4.98 dB
Radiated Disturbance, 1000 to 6000 MHz	3.86 dB
Radiated Disturbance, 6000 to 18000 MHz	4.23 dB
Radiated Disturbance, 18000 to 26000 MHz	5.30 dB
Radiated Disturbance, 26000 to 40000 MHz	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 wireless sensor bridge for home energy control.

### 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	8.33	6.81

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB trace antenna, with a maximum gain of 6 dBi.

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 7.45.41.24 <r608913 WLTEST>

The EUT driver software installed during testing was 1.107 RC 5.0 W10: Apr 6, 2016.

The test utility software used during testing was Tera Term, Version 4.90(SVN# 6338).



## **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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	T430	PBB4M4Y	N/A
Laptop AC Adapter	Lenovo	ADLS90NLT2A	11S36200297ZZ30036RDM2	N/A
AC Adapter	ITE	YMC1801UW	N/A	N/A
TTL Converter	B&B electronics	232LPTTL33	N/A	N/A

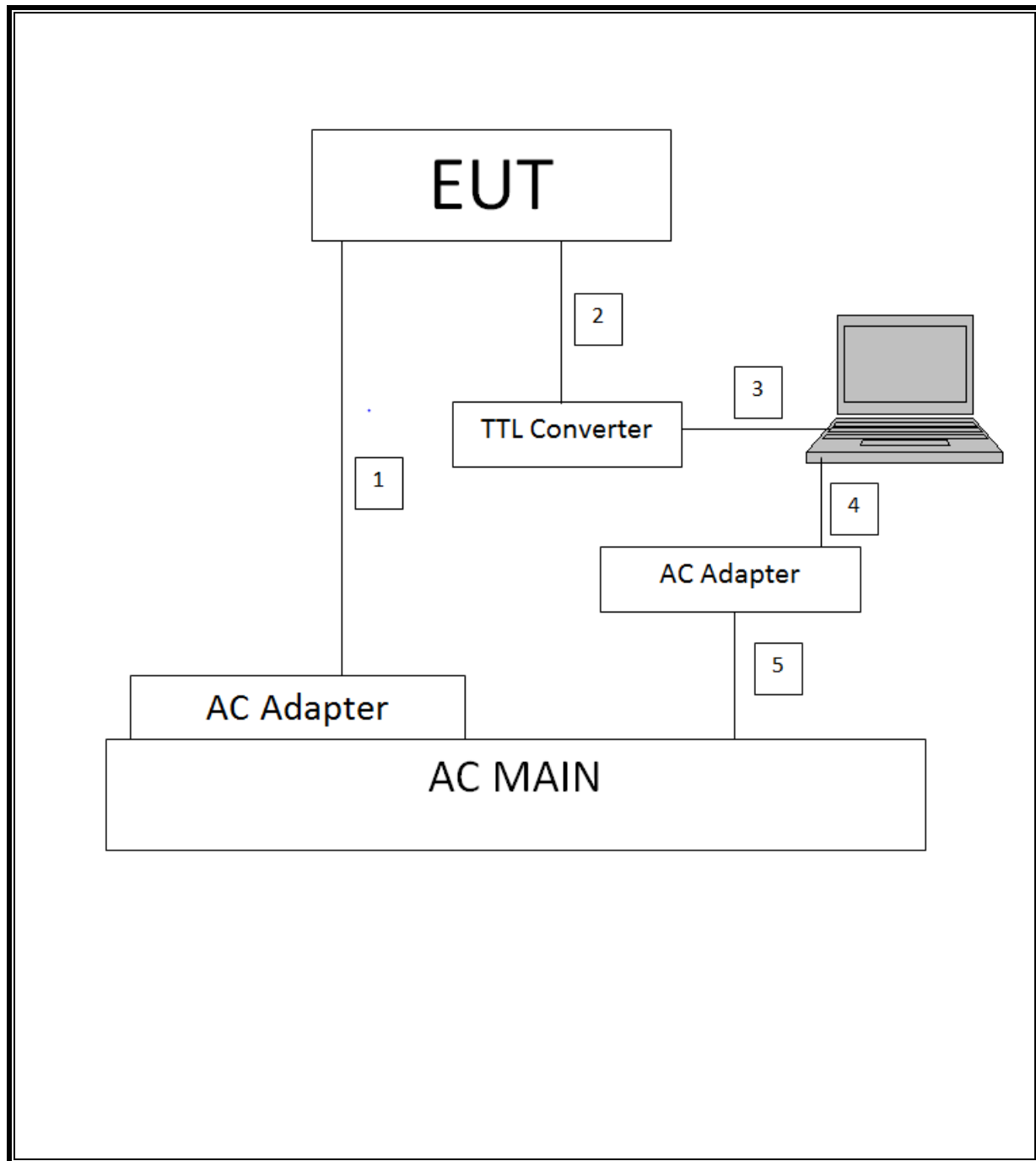
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	Micro-USB	Shielded	1.6	
2	Comm	1	Serial 9 Pins/3 Pins	Unshielded	0.8	
3	Comm	1	USB/Serial 9 Pins	Unshielded	0.4	
4	DC	1	20V DC	Unshielded	1.5	
5	AC	1	US115V	Unshielded	1	

### TEST SETUP

The EUT is a standalone unit, and the radio is exercised by software, Tera Term, via a USB/Serial cable.

## **SETUP DIAGRAM FOR TESTS**



## 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
Amplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	493	03/09/17
Amplifier, 1-8GHz, 35 dB	Miteq	AMF-4D-01000800-30-29P	1156	03/09/17
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	130	09/01/16
Antenna, Horn, 18GHz	ETS Lindgren	3117	345	02/22/17
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	447	05/31/16
ESR7 EMI Test Receiver 7GHz	Rohde & Schwarz	ESR	1436	12/19/16
High Pass Filter 3GHz	Micro-Tronics	HPS17543	485	03/09/17
High Pass Filter 3GHz	Micro-Tronics	HPS17543	486	07/20/16
High Pass Filter 6GHz	Micro-Tronics	HPS17542	483	03/09/17
High Pass Filter 6GHz	Micro-Tronics	HPS17542	484	07/20/16
LISN, 30 MHz	FCC	FCC-LISN-50/250-25-2	24	02/09/17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	482	03/09/17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	481	07/20/16
Power Meter	Keysight	N1911A	1262	07/01/16
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	404	06/29/16
RF Preamplifier, 26GHz - 40GHz	Miteq	NSP4000-SP2	88	04/07/17
Spectrum Analyzer, 40 GHz	Agilent / HP	8564E	106	08/14/16
Spectrum Analyzer, 44 GHz	Keysight	N9030A	907	01/06/17
Wideband Power Sensor	Keysight	N1921A	1225	04/07/17

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, Apr 12, 2016
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Conducted Port Software	UL	UL RF	Ver 4.7, Apr 28, 2016

## 7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 v03r05, Section 6.0

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

99% BW: ANSI C63.10-2013, Section 6.9.3.

Output Power: KDB 558074 D01 v03r05, Section 9.1.1.

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, 12.2

Band-edge: KDB 558074 D01 v03r05, Section 13.2.

AC Power Line Conducted Emissions: ANSI C63.10-2013 Section 6.2.

## 8. SUMMARY TABLE

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2.1	Occupied Bandwidth (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass
15.247	RSS-247 5.4.4	TX conducted output power	<30dBm		Pass
15.247	RSS-247 5.2.2	PSD	<8dBm		Pass
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass
15.205, 15.209, 15.247(d)	RSS-GEN 8.9/7	Radiated Spurious Emission	< 54dBuV/m		Pass

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

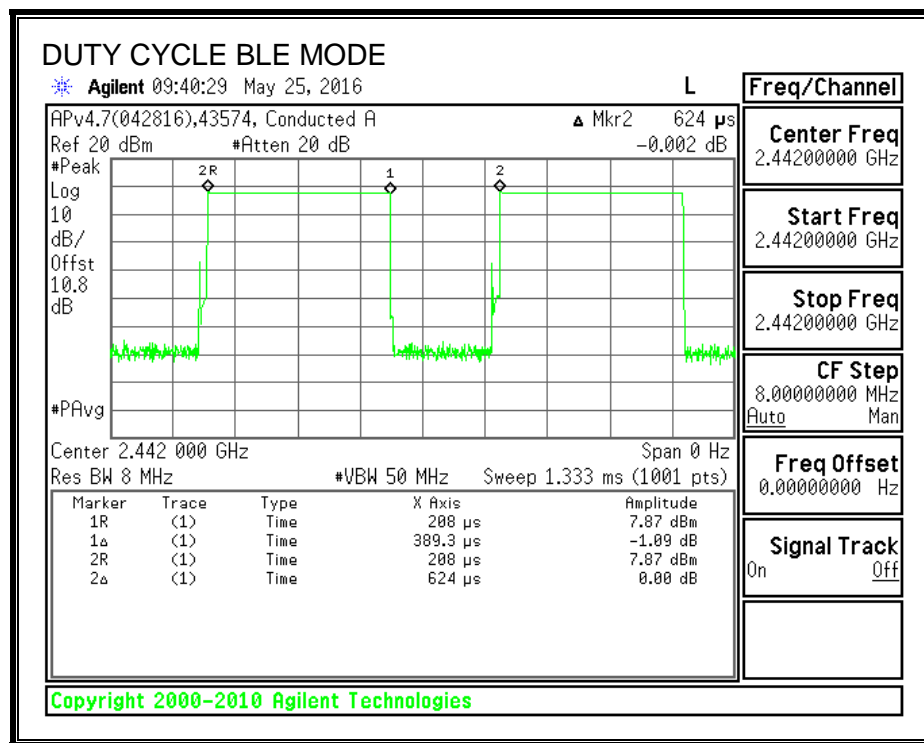
#### LIMITS

None; for reporting purposes only.

#### 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	0.389	0.624	0.624	62.39%	2.05	2.569

#### DUTY CYCLE PLOTS



## **9.2. 6 dB BANDWIDTH LIMITS**

FCC §15.247 (a) (2)

IC RSS-247 5.2 (1)

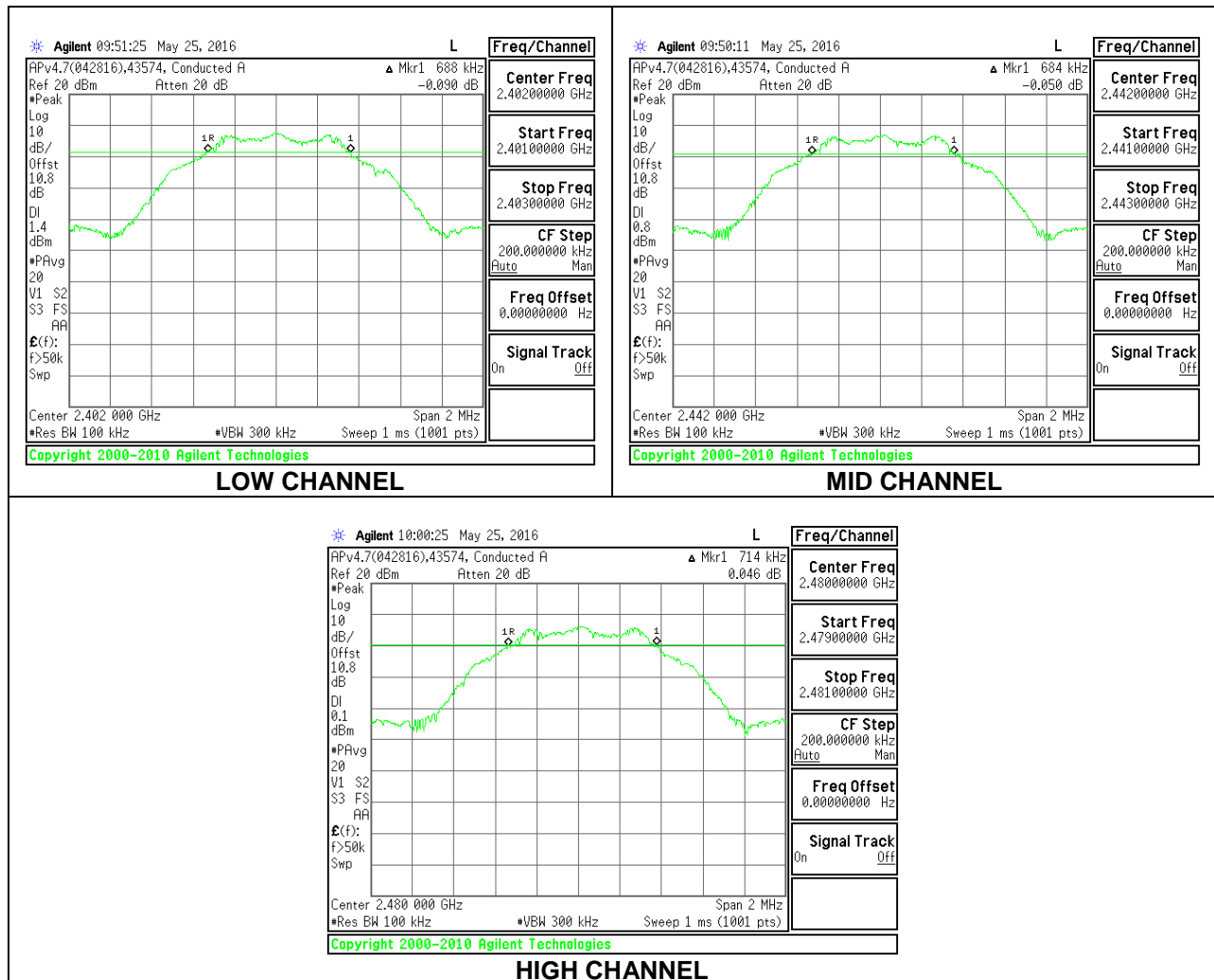
The minimum 6 dB bandwidth shall be at least 500 kHz.

## **RESULTS**



### 9.2.1. 6 dB BANDWIDTH

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6880	0.5
Middle	2442	0.6840	0.5
High	2480	0.7140	0.5



### **9.3. 99% BANDWIDTH**

#### **LIMITS**

None; for reporting purposes only.

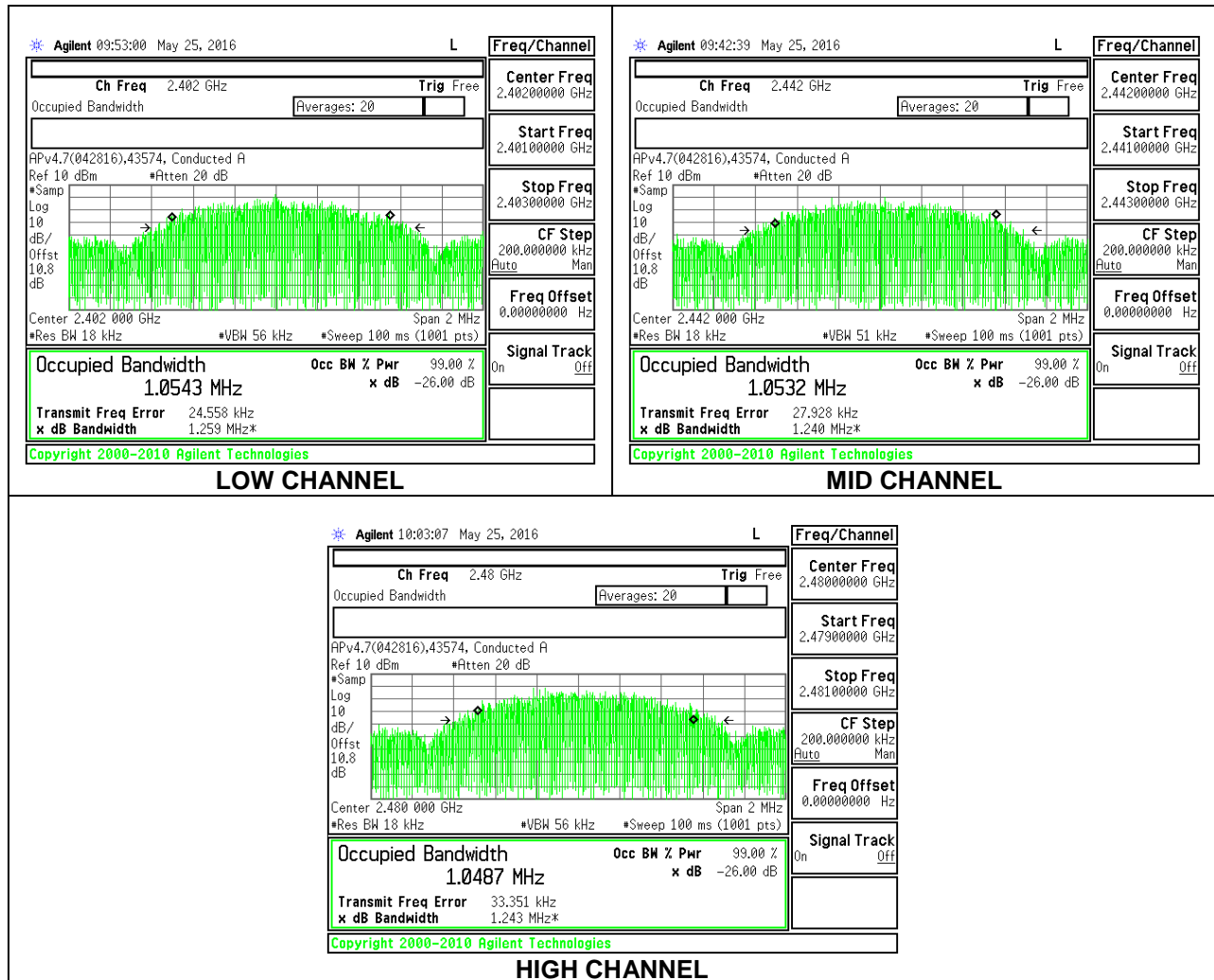
#### **TEST PROCEDURE**

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**

### 9.3.1. 99% BANDWIDTH

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0543
Middle	2442	1.0532
High	2480	1.0487



## **9.4. OUTPUT POWER**

### **LIMITS**

FCC §15.247 (b)

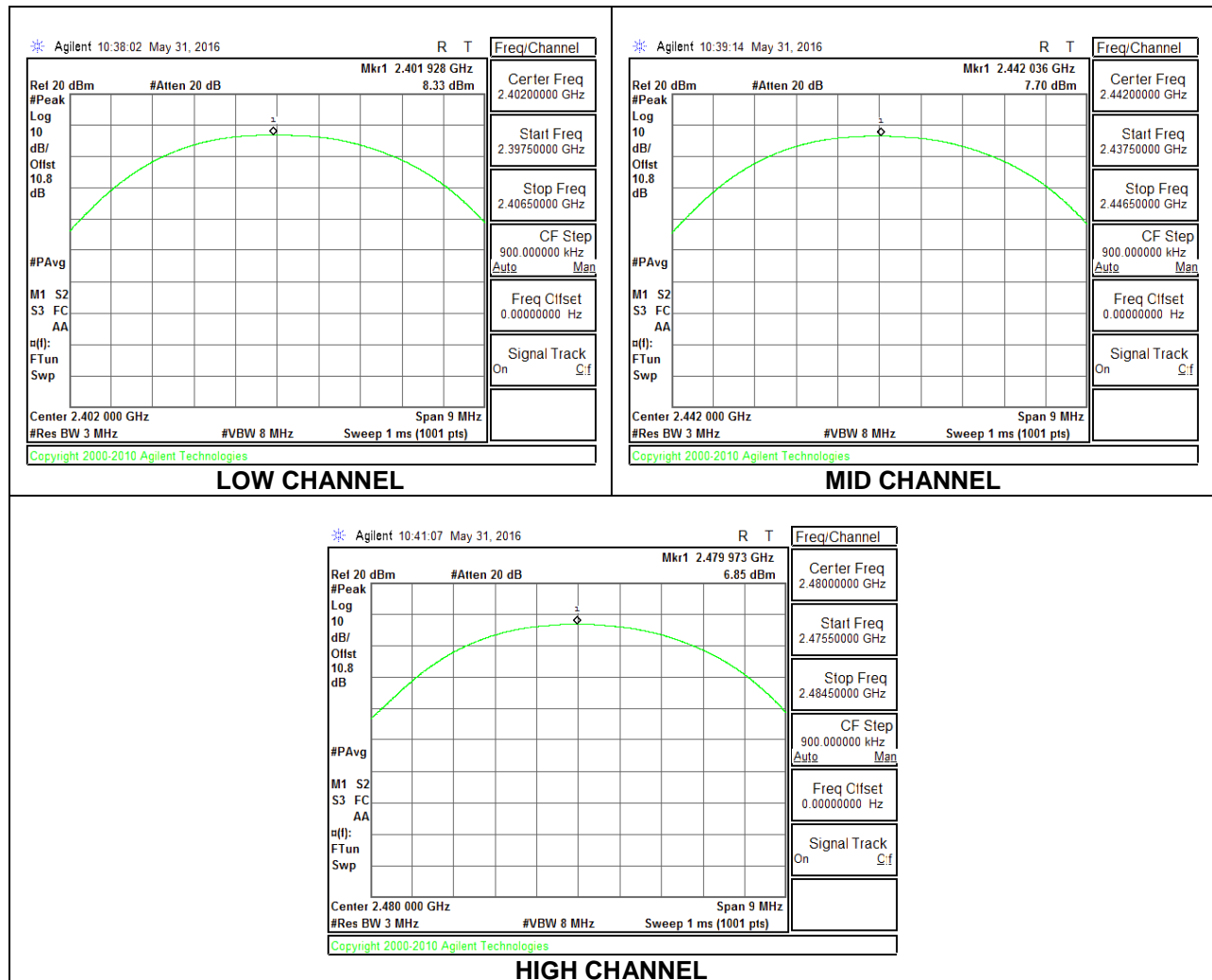
IC RSS-247 5.4 (4)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **RESULTS**

### 9.4.1. OUTPUT POWER

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.330	30	-21.670
Middle	2442	7.700	30	-22.300
High	2480	6.850	30	-23.150



## 9.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### RESULTS

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.63
Middle	2442	7.21
High	2480	6.51

## **9.6. POWER SPECTRAL DENSITY**

### **LIMITS**

FCC §15.247 (e)

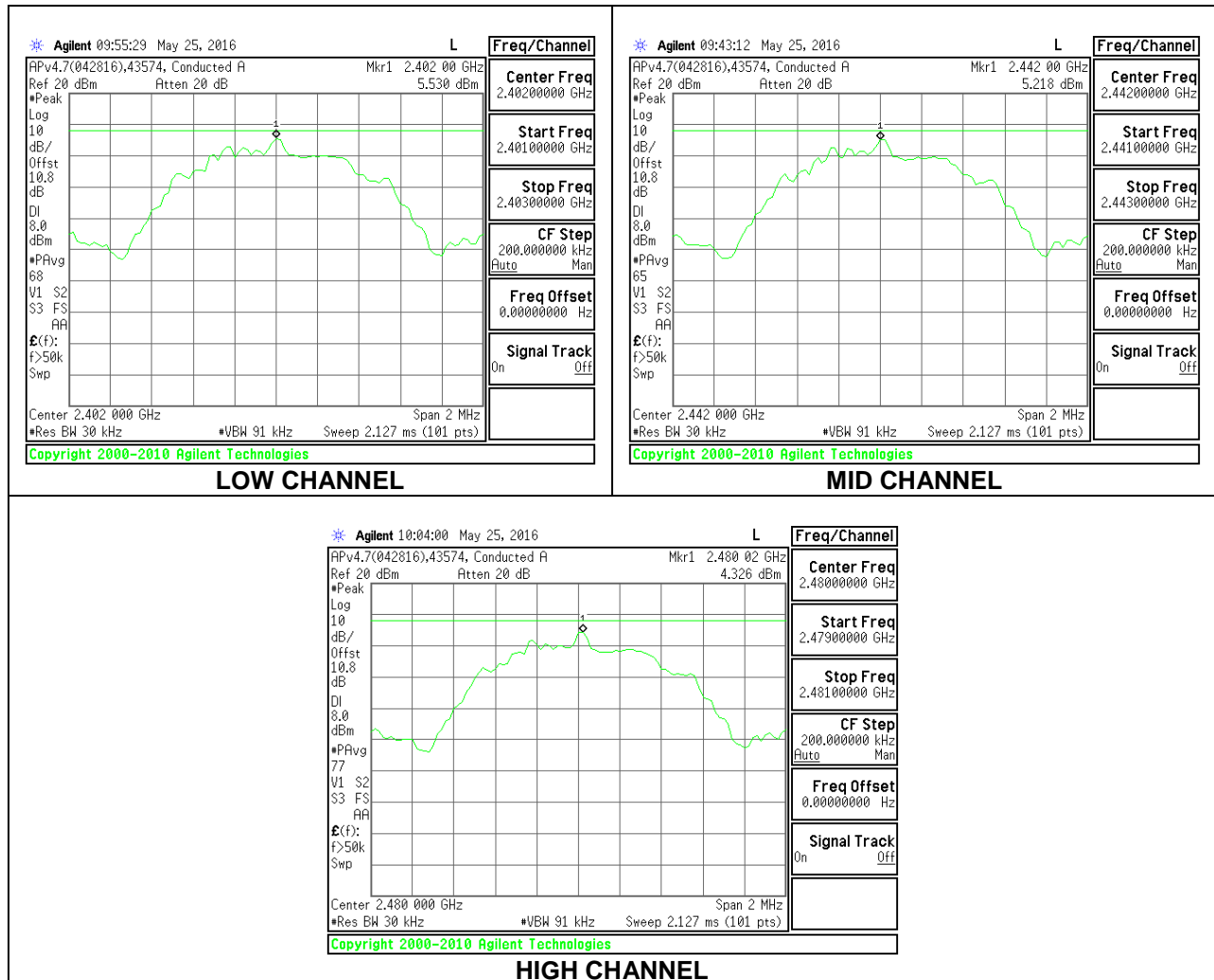
IC RSS-247 5.2 (2)

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**

### 9.6.1. POWER SPECTRAL DENSITY

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.53	8	-2.47
Middle	2442	5.22	8	-2.78
High	2480	4.33	8	-3.67





## **9.7. 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.

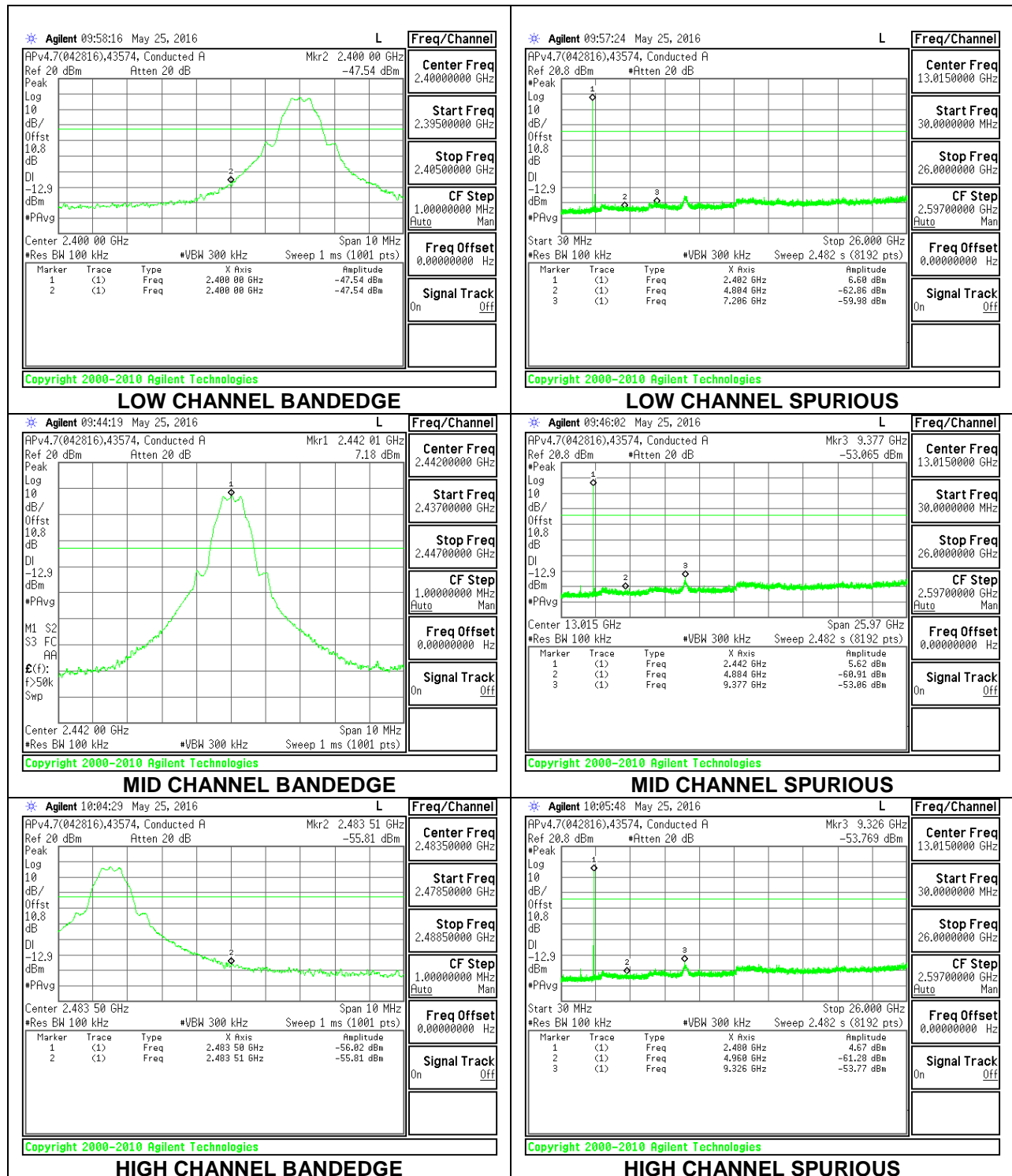
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

### **RESULTS**

## 9.7.1. SPURIOUS EMISSIONS, LOW CHANNEL



## 10. RADIATED TEST RESULTS

### 10.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

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 below 1GHz and 150cm for 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 add duty cycle factor for average measurements. Please refer to test report section 9.1 for duty cycle factor information.

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.

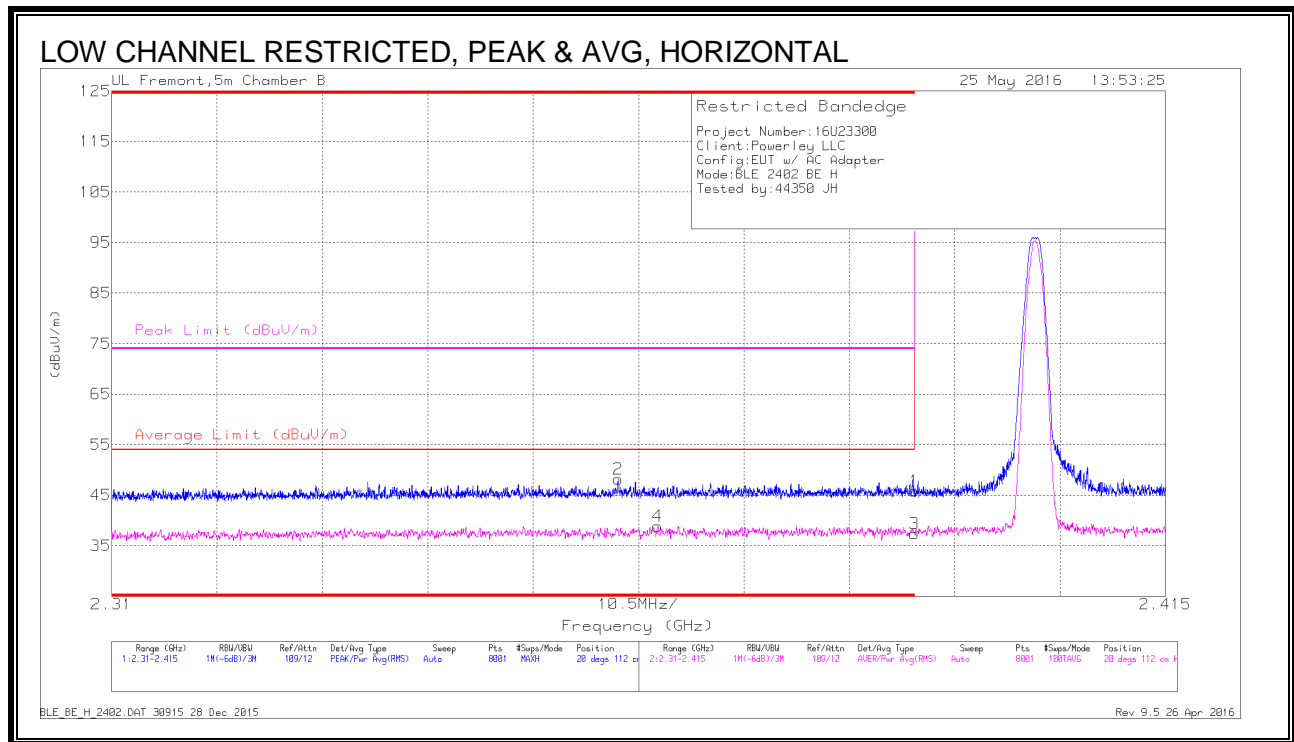
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

#### RESULTS

## 10.2. TX ABOVE 1 GHz FOR BLUETOOTH LOW ENERGY MODE IN THE 2.4 GHz BAND

### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



### Trace Markers

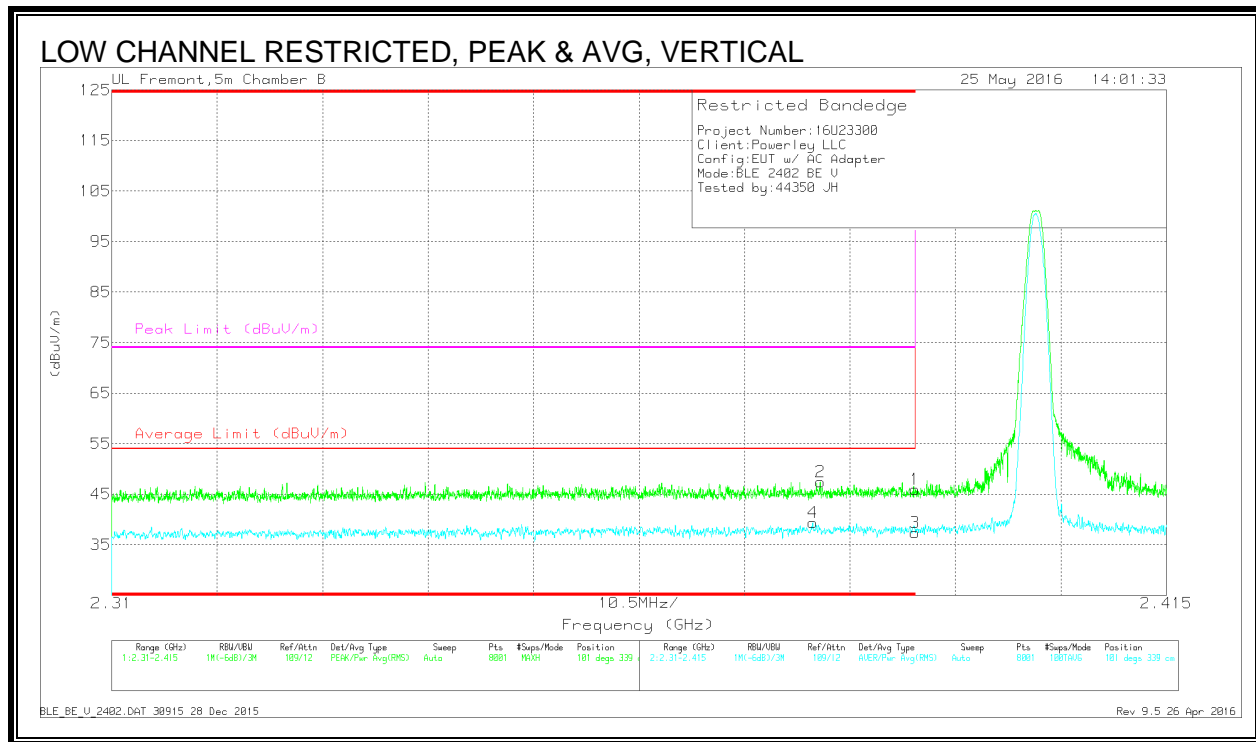
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Fit/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.07	Pk	32.1	-22.3	0	45.87	-	-	74	-28.13	20	112	H
2	* 2.36	38.44	Pk	31.9	-22.2	0	48.14	-	-	74	-25.86	20	112	H
3	* 2.39	25.52	RMS	32.1	-22.3	2.05	37.37	54	-16.63	-	-	20	112	H
4	* 2.364	27.23	RMS	31.9	-22.3	2.05	38.88	54	-15.12	-	-	20	112	H

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

Pk - Peak detector

RMS - RMS detection

**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



**Trace Markers**

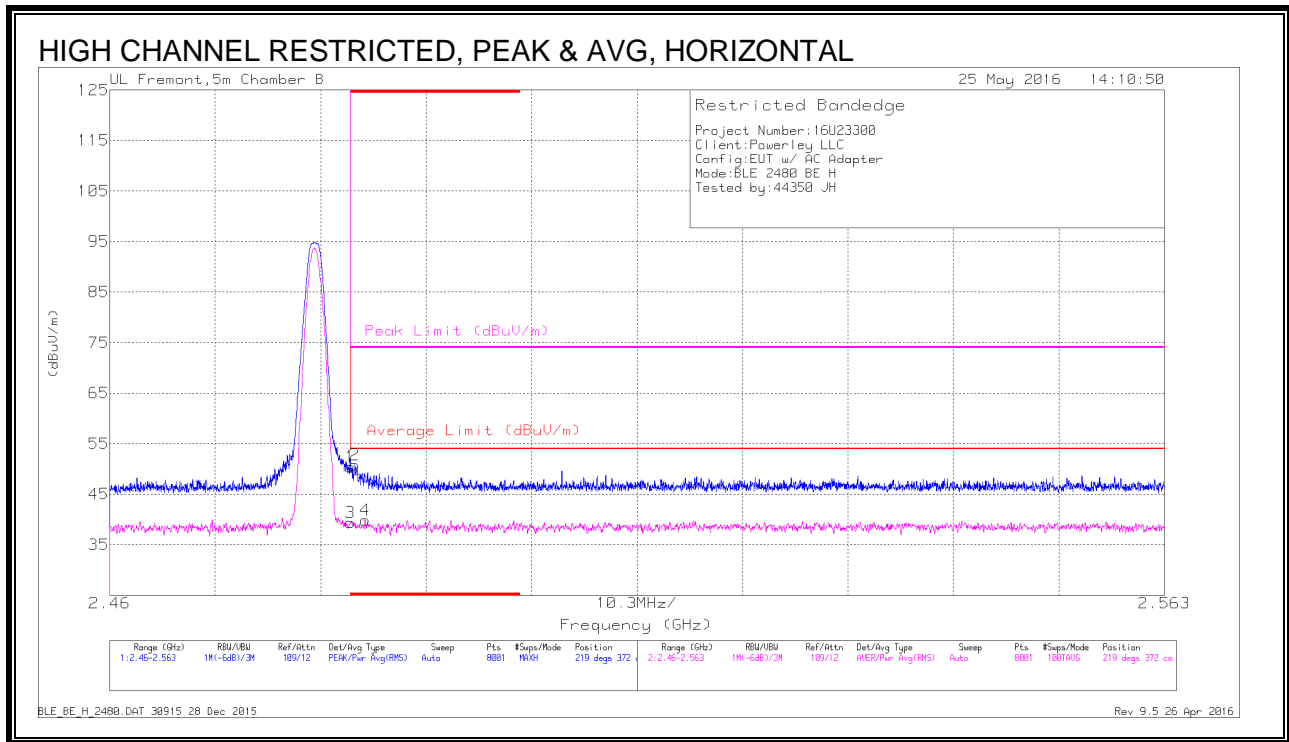
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
4	* 2.38	27.49	RMS	32.1	-22.3	2.05	39.34	54	-14.66	-	-	101	339	V
2	* 2.381	37.6	Pk	32.1	-22.3	0	47.4	-	-	74	-26.6	101	339	V
1	* 2.39	36.12	Pk	32.1	-22.3	0	45.92	-	-	74	-28.08	101	339	V
3	* 2.39	25.55	RMS	32.1	-22.3	2.05	37.40	54	-16.6	-	-	101	339	V

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

Pk - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Trace Markers

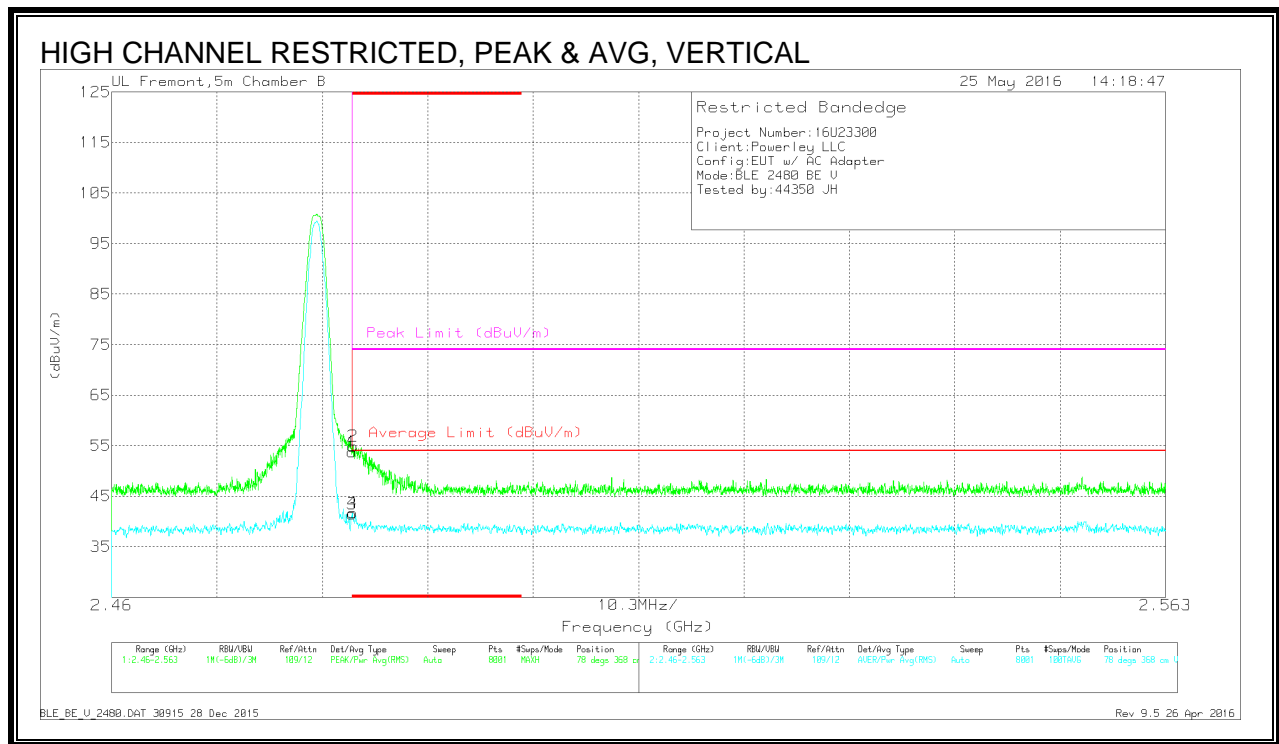
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	40.36	Pk	32.3	-22.3	0	50.36	-	-	74	-23.64	219	372	H
2	* 2.484	40.76	Pk	32.3	-22.3	0	50.76	-	-	74	-23.24	219	372	H
3	* 2.484	27.25	RMS	32.3	-22.3	2.05	39.30	54	-14.70	-	-	219	372	H
4	* 2.485	27.73	RMS	32.3	-22.2	2.05	39.88	54	-14.12	-	-	219	372	H

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

Pk - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Trace Markers

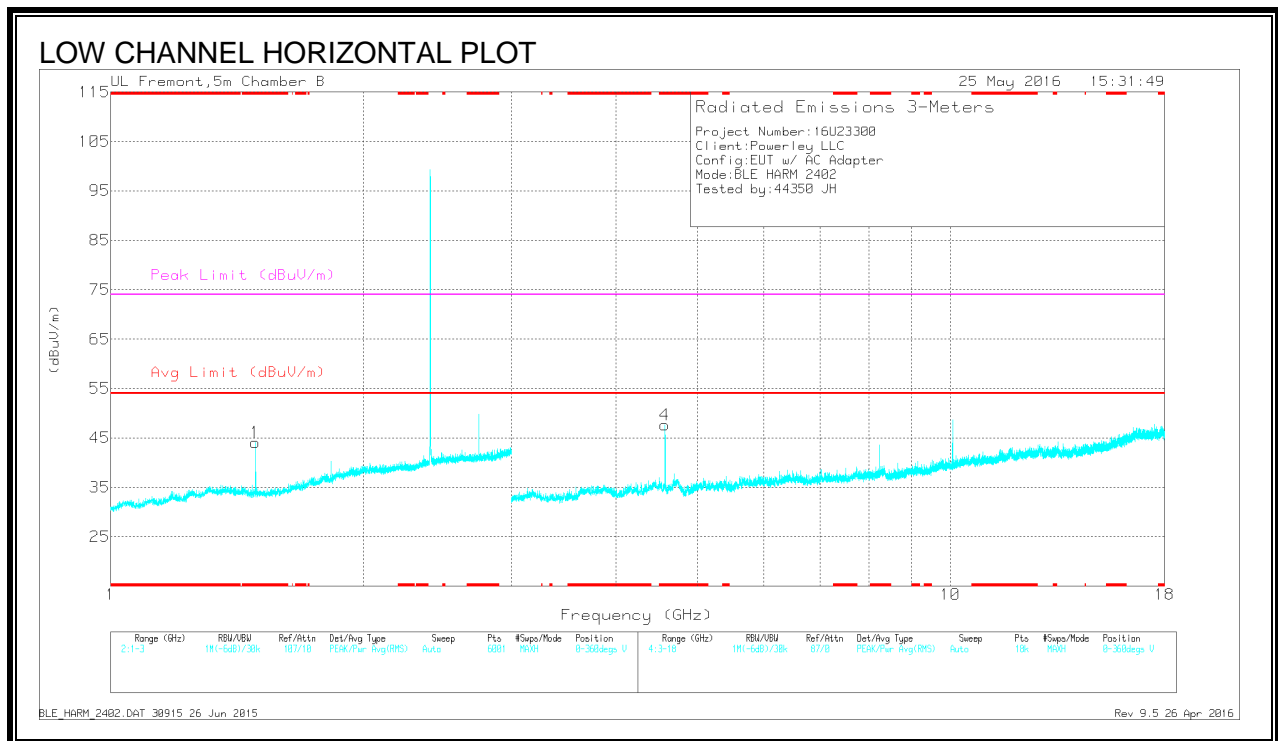
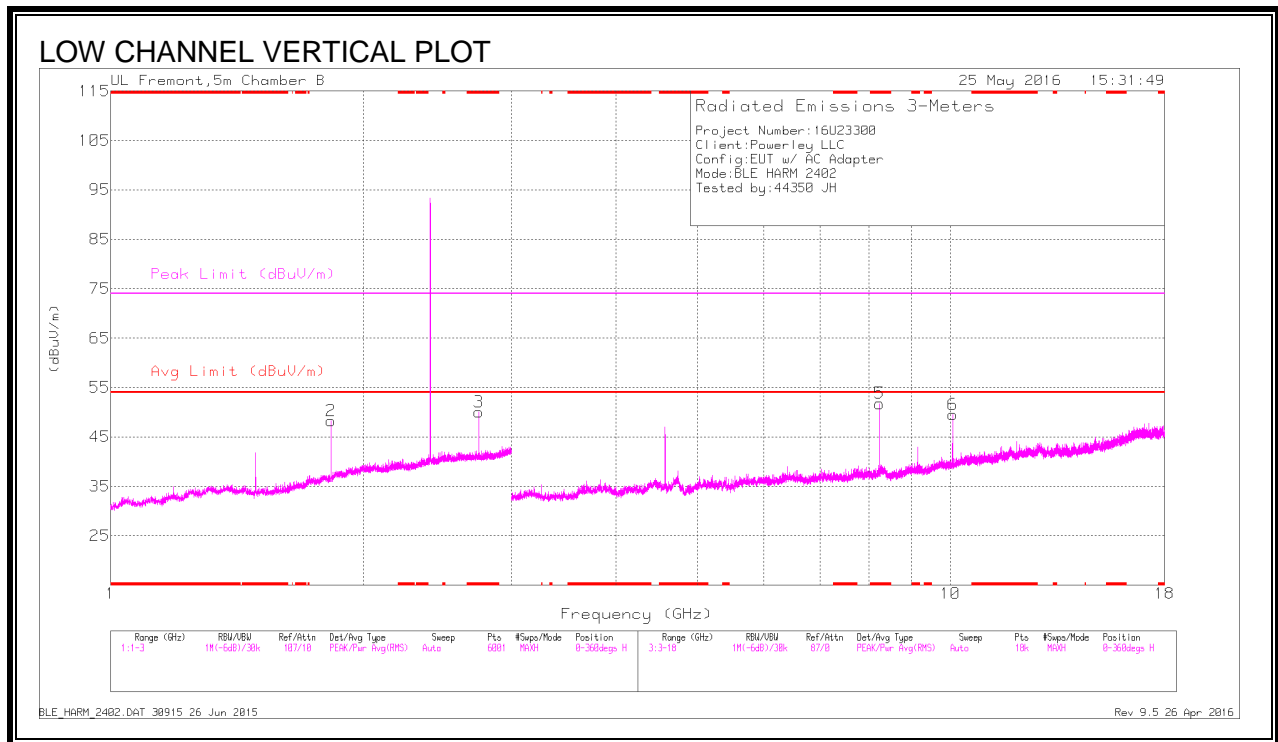
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	43.72	Pk	32.3	-22.3	0	53.72	-	-	74	-20.28	78	368	V
2	* 2.484	44.92	Pk	32.3	-22.3	0	54.92	-	-	74	-19.08	78	368	V
3	* 2.484	29.39	RMS	32.3	-22.3	2.05	41.44	54	-12.56	-	-	78	368	V
4	* 2.484	29.69	RMS	32.3	-22.3	2.05	41.74	54	-12.26	-	-	78	368	V

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

Pk - Peak detector

RMS - RMS detection

## HARMONICS AND SPURIOUS EMISSIONS





## DATA

### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Ch/Filt/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
3	* 2.745	39.49	Pk	32.3	-21.8	0	49.99	-	-	74	-24.01	0-360	102	H
1	* 1.487	38.65	Pk	27.9	-22.5	0	44.05	-	-	74	-29.95	0-360	199	V
5	* 8.235	44.76	Pk	35.8	-28.8	0	51.76	-	-	74	-22.24	0-360	199	H
4	* 4.575	46.29	Pk	34.1	-32.7	0	47.69	-	-	74	-26.31	0-360	199	V
2	1.83	40.02	Pk	30.3	-22.1	0	48.22	-	-	-	-	0-360	102	H
6	10.065	38.52	Pk	37.4	-26.4	0	49.52	-	-	-	-	0-360	199	H

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

Pk - Peak detector

### Radiated Emissions

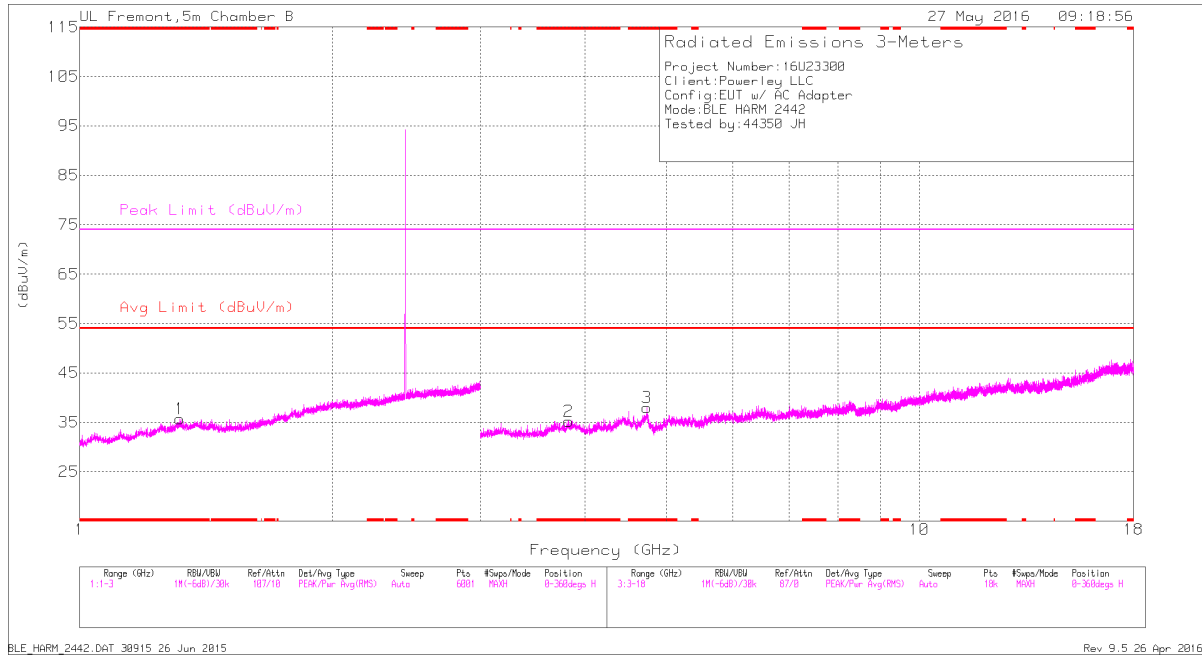
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Ch/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.745	42.68	PK2	32.3	-21.8	0	53.18	-	-	74	-20.82	37	108	H
* 2.745	38.54	MAV1	32.3	-21.8	2.05	51.09	54	-2.91	-	-	37	108	H
* 1.487	42.4	PK2	27.9	-22.5	0	47.80	-	-	74	-26.20	151	130	V
* 1.487	35.68	MAV1	27.9	-22.5	2.05	43.13	54	-10.87	-	-	151	130	V
* 8.235	47.1	PK2	35.8	-28.8	0	54.10	-	-	74	-19.90	342	183	H
* 8.235	43.93	MAV1	35.8	-28.8	2.05	52.98	54	-1.02	-	-	342	183	H
* 4.575	48.81	PK2	34.1	-32.7	0	50.21	-	-	74	-23.79	28	162	V
* 4.575	46.15	MAV1	34.1	-32.7	2.05	49.60	54	-4.40	-	-	28	162	V
1.83	42.65	PK2	30.3	-22.1	0	50.85	-	-	74	-23.15	355	109	H
10.065	41.9	PK2	37.4	-26.4	0	52.90	-	-	74	-21.10	327	188	H

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

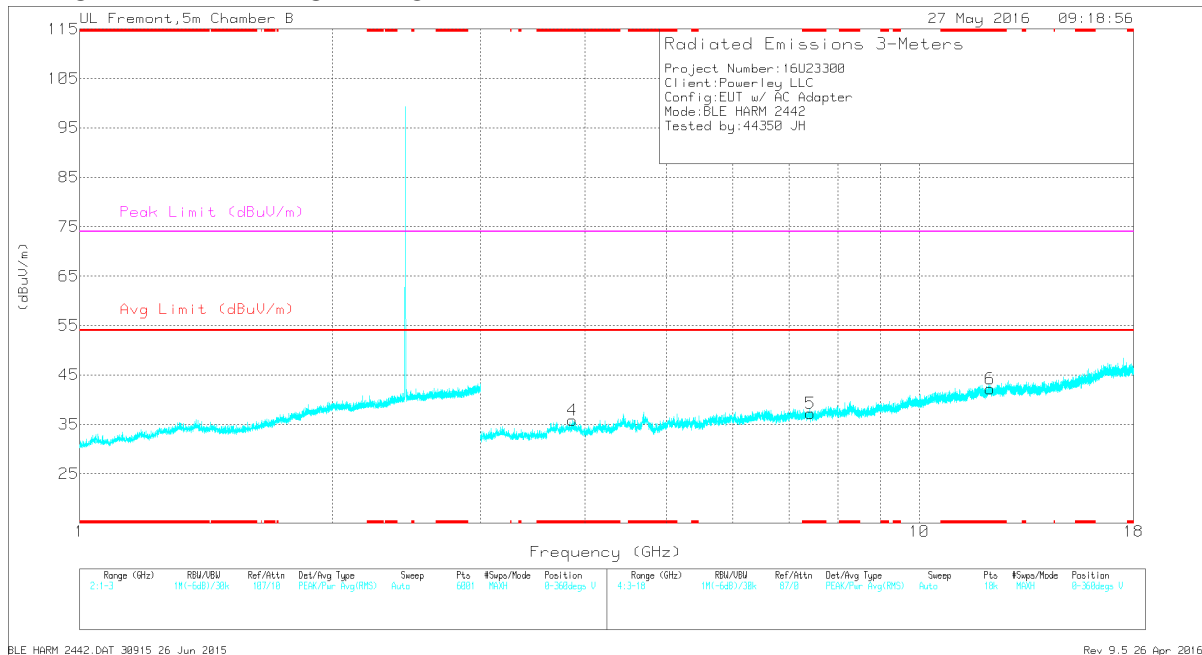
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

### MID CHANNEL HORIZONTAL PLOT



### MID CHANNEL VERTICAL PLOT



## DATA

### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/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	* 1.315	29.63	Pk	29	-22.9	0	35.73	-	-	74	-38.27	0-360	199	H
2	* 3.823	34.05	Pk	33.4	-32.3	0	35.15	-	-	74	-38.85	0-360	199	H
3	* 4.739	34.83	Pk	34	-30.9	0	37.93	-	-	74	-36.07	0-360	199	H
4	* 3.866	34.33	Pk	33.4	-31.9	0	35.83	-	-	74	-38.17	0-360	199	V
5	* 7.42	31.16	Pk	35.6	-29.5	0	37.26	-	-	74	-36.74	0-360	101	V
6	* 12.136	28.21	Pk	39	-25	0	42.21	-	-	74	-31.79	0-360	199	V

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

Pk - Peak detector

### Radiated Emissions

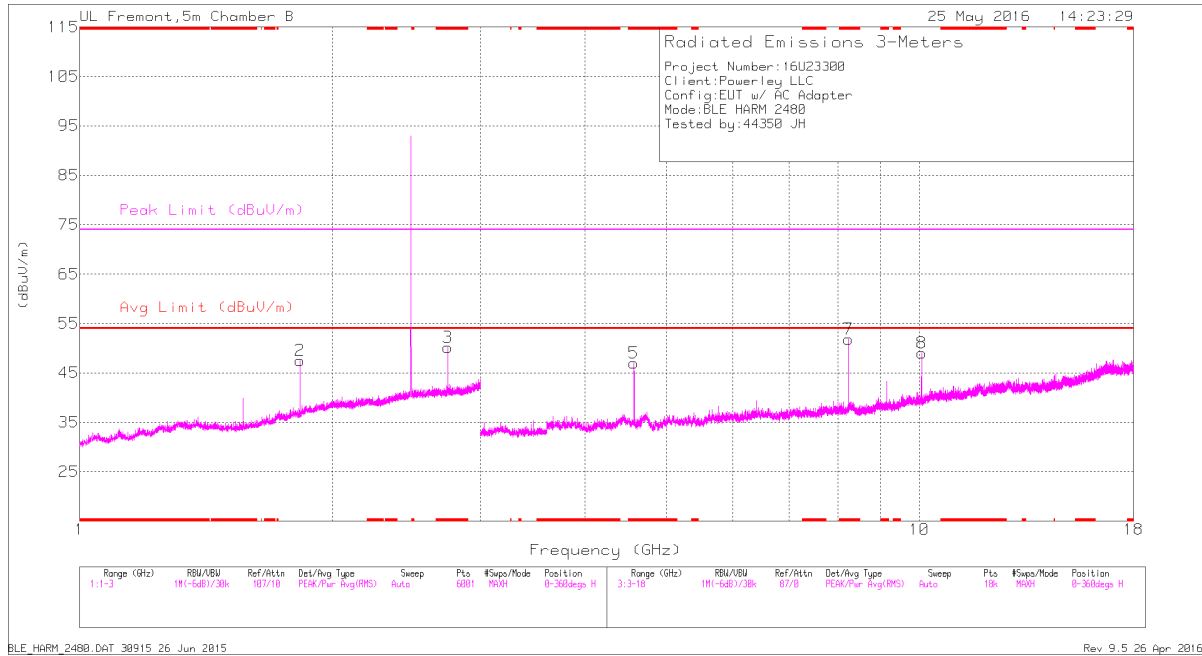
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.316	35.3	PK2	29	-22.9	0	41.4	-	-	74	-32.6	1	100	H
* 1.314	24.59	MAv1	29	-23	2.05	32.64	54	-21.36	-	-	1	100	H
* 3.822	39.29	PK2	33.4	-32.3	0	40.39	-	-	74	-33.61	1	100	H
* 3.824	29.8	MAv1	33.4	-32.3	2.05	32.95	54	-21.05	-	-	1	100	H
* 4.739	39.52	PK2	34	-31	0	42.52	-	-	74	-31.48	1	100	H
* 4.739	29.65	MAv1	34	-31	2.05	34.7	54	-19.3	-	-	1	100	H
* 3.867	39.65	PK2	33.3	-31.9	0	41.05	-	-	74	-32.95	1	100	V
* 3.868	29.69	MAv1	33.3	-31.9	2.05	33.14	54	-20.86	-	-	1	100	V
* 7.418	36.36	PK2	35.6	-29.4	0	42.56	-	-	74	-31.44	1	100	V
* 7.422	26.7	MAv1	35.6	-29.5	2.05	34.85	54	-19.15	-	-	1	100	V
* 12.134	34.13	PK2	39	-25	0	48.13	-	-	74	-25.87	1	100	V
* 12.136	24.22	MAv1	39	-25	2.05	40.27	54	-13.73	-	-	1	100	V

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

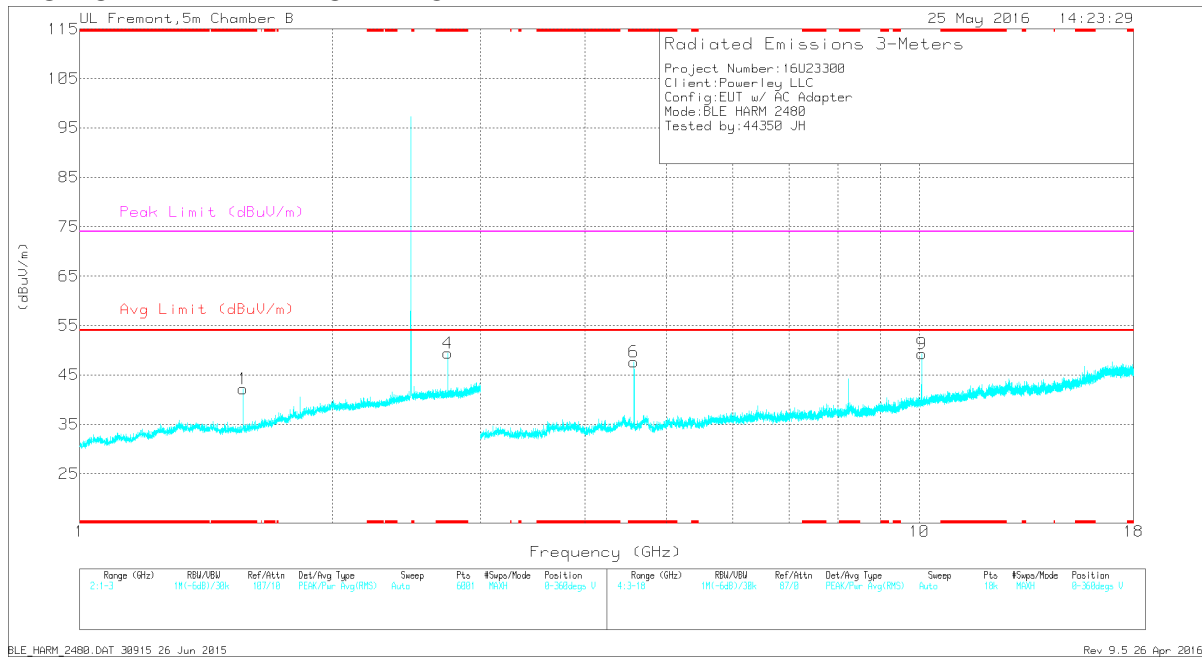
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

## HIGH CHANNEL HORIZONTAL PLOT



## HIGH CHANNEL VERTICAL PLOT



## DATA

### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filt/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
3	* 2.745	39.63	Pk	32.3	-21.8	0	50.13	-	-	74	-23.87	0-360	101	H
1	* 1.565	36.61	Pk	28	-22.4	0	42.21	-	-	74	-31.79	0-360	201	V
4	* 2.745	38.95	Pk	32.3	-21.8	0	49.45	-	-	74	-24.55	0-360	201	V
5	* 4.575	45.62	Pk	34.1	-32.7	0	47.02	-	-	74	-26.98	0-360	101	H
7	* 8.235	44.78	Pk	35.8	-28.8	0	51.78	-	-	74	-22.22	0-360	199	H
6	* 4.575	46.19	Pk	34.1	-32.7	0	47.59	-	-	74	-26.41	0-360	199	V
2	1.83	39.32	Pk	30.3	-22.1	0	47.52	-	-	-	-	0-360	101	H
8	10.065	38.05	Pk	37.4	-26.4	0	49.05	-	-	-	-	0-360	199	H
9	10.065	38.29	Pk	37.4	-26.4	0	49.29	-	-	-	-	0-360	101	V

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

Pk - Peak detector

### Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filt/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
* 2.745	42.46	PK2	32.3	-21.8	0	52.96	-	-	74	-21.04	13	231	H
* 2.745	38.04	MAv1	32.3	-21.8	2.05	50.59	54	-3.41	-	-	13	231	H
* 1.565	40.86	PK2	28	-22.4	0	46.46	-	-	74	-27.54	160	137	V
* 1.565	33.12	MAv1	28	-22.4	2.05	40.77	54	-13.23	-	-	160	137	V
* 2.745	41.53	PK2	32.3	-21.8	0	52.03	-	-	74	-21.97	55	193	V
* 2.745	37.35	MAv1	32.3	-21.8	2.05	49.9	54	-4.1	-	-	55	193	V
* 4.575	48.43	PK2	34.1	-32.7	0	49.83	-	-	74	-24.17	45	101	H
* 4.575	45.06	MAv1	34.1	-32.7	2.05	48.51	54	-5.49	-	-	45	101	H
* 8.235	46.84	PK2	35.8	-28.8	0	53.84	-	-	74	-20.16	343	185	H
* 8.235	43.7	MAv1	35.8	-28.8	2.05	52.75	54	-1.25	-	-	343	185	H
* 4.575	48.78	PK2	34.1	-32.7	0	50.18	-	-	74	-23.82	22	157	V
* 4.575	46.15	MAv1	34.1	-32.7	2.05	49.6	54	-4.4	-	-	22	157	V
1.83	42.18	PK2	30.3	-22.1	0	50.38	-	-	74	-23.62	357	107	H
10.065	42.33	PK2	37.4	-26.4	0	53.33	-	-	74	-20.67	326	188	H
10.065	41.52	PK2	37.4	-26.4	0	52.52	-	-	74	-21.48	342	110	V

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

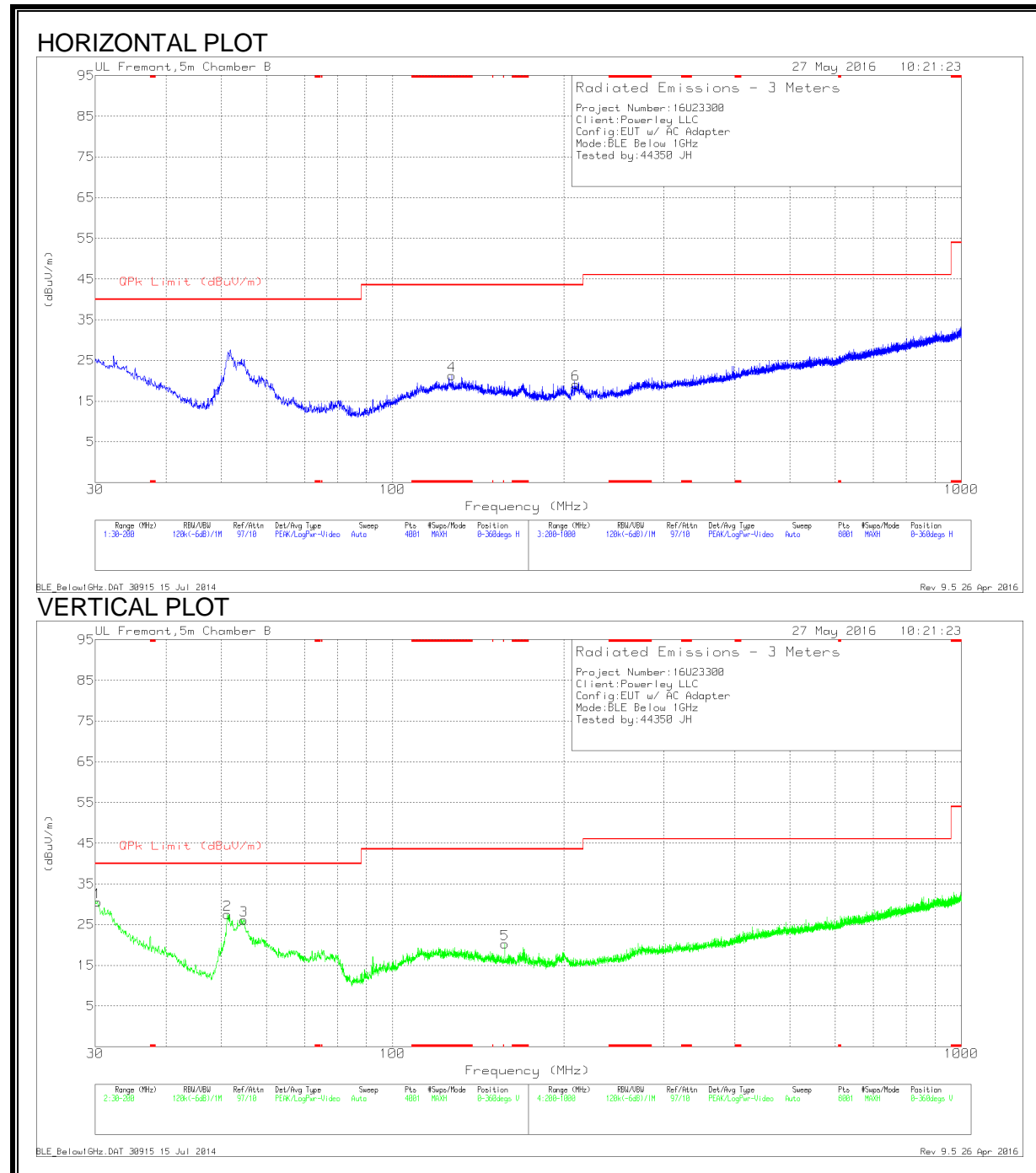
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

**Note:** There are no other emissions found above system noise floor from 18GHz to 26GHz.

### 10.3. WORST-CASE BELOW 1 GHz

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



## DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 127.07	31.32	Pk	17.8	-27.8	21.32	43.52	-22.2	0-360	200	H
1	30.2763	34.32	Pk	25	-28.8	30.52	40	-9.48	0-360	100	V
2	51.2075	44.75	Pk	11.3	-28.6	27.45	40	-12.55	0-360	100	V
3	54.735	43.44	Pk	11.1	-28.4	26.14	40	-13.86	0-360	100	V
5	157.5	31.5	Pk	16.2	-27.4	20.3	43.52	-23.22	0-360	100	V
6	210	31.83	Pk	14.3	-27	19.13	43.52	-24.39	0-360	100	H

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

Pk - Peak detector

## 11. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 <sup>*</sup>	56 to 46 <sup>*</sup>
0.5-5	56	46
5-30	60	50

<sup>\*</sup> Decreases with the logarithm of the frequency.

### TEST PROCEDURE

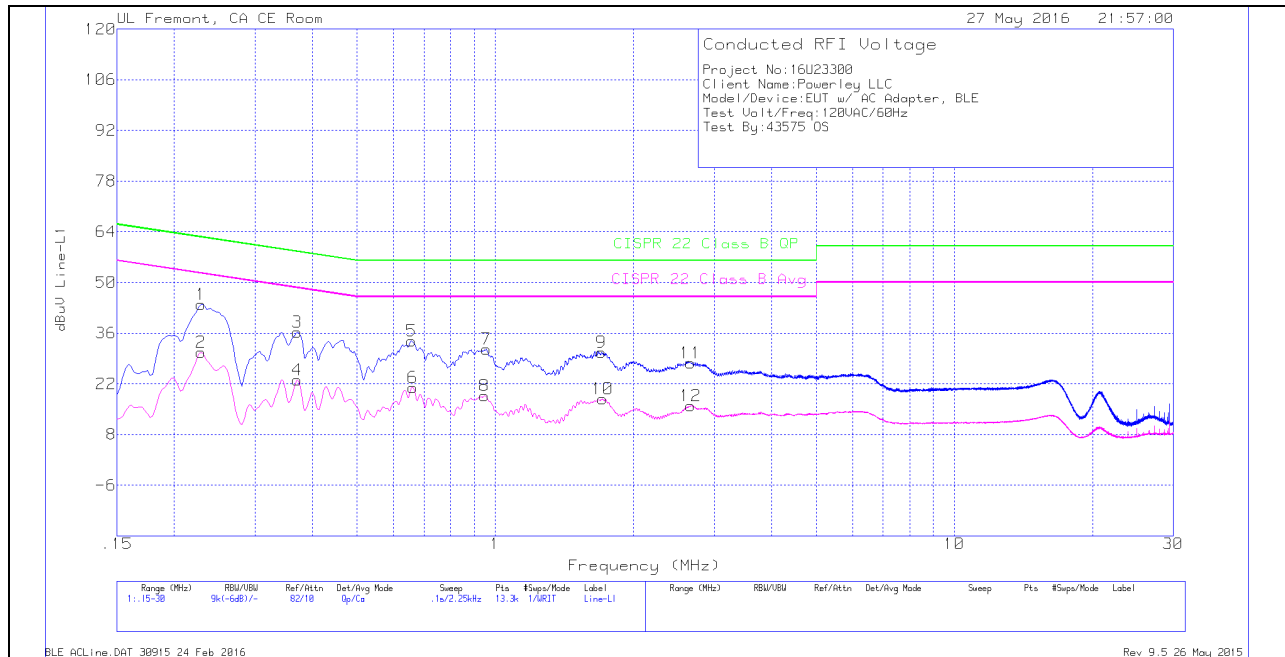
ANSI C63.4

### RESULTS



## 6 WORST EMISSIONS

### LINE 1 PLOT



### LINE 1 RESULT

#### Trace Markers

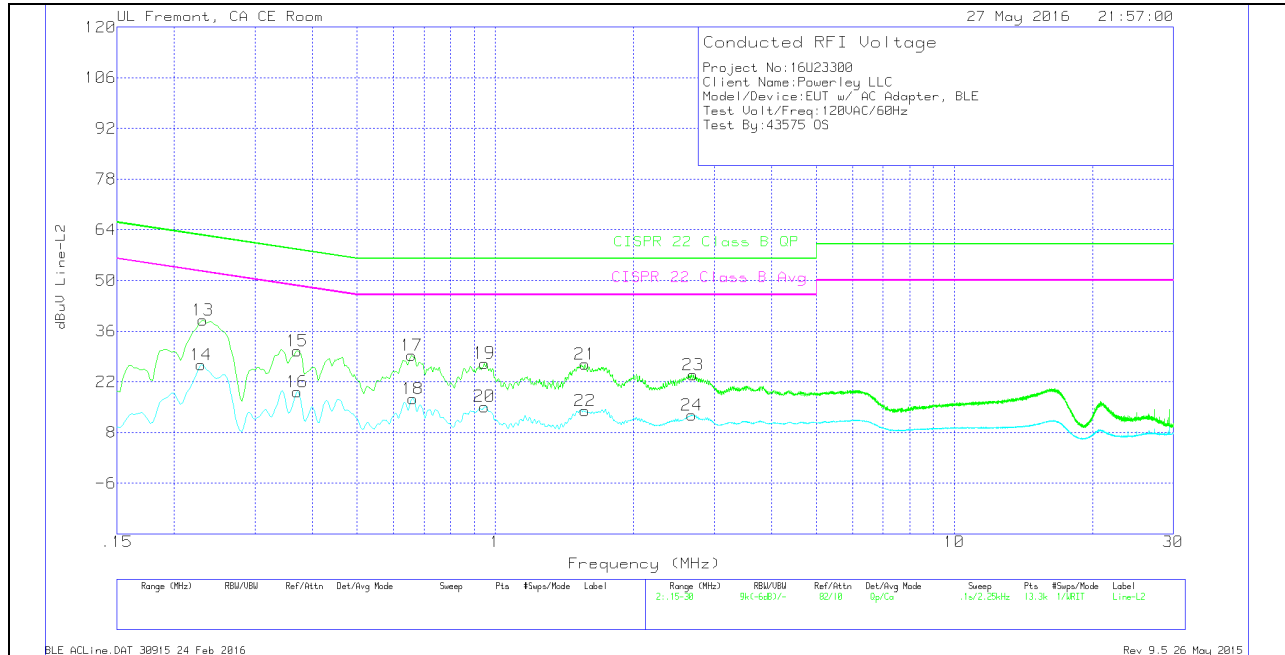
#### Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
1	.22875	33.03	Qp	.8	0	10.1	43.93	62.49	-18.56	-	-
2	.22875	19.83	Ca	.8	0	10.1	30.73	-	-	52.49	-21.76
3	.3705	25.73	Qp	.4	0	10.1	36.23	58.49	-22.26	-	-
4	.3705	12.54	Ca	.4	0	10.1	23.04	-	-	48.49	-25.45
5	.6585	23.42	Qp	.3	0	10.1	33.82	56	-22.18	-	-
6	.66075	10.56	Ca	.3	0	10.1	20.96	-	-	46	-25.04
7	.9555	21.02	Qp	.3	.1	10.1	31.52	56	-24.48	-	-
8	.94875	8.3	Ca	.3	0	10.1	18.7	-	-	46	-27.3
9	1.70475	20.27	Qp	.2	.1	10.1	30.67	56	-25.33	-	-
10	1.71375	7.38	Ca	.2	.1	10.1	17.78	-	-	46	-28.22
11	2.661	17.38	Qp	.2	.1	10.1	27.78	56	-28.22	-	-
12	2.66775	5.51	Ca	.2	.1	10.1	15.91	-	-	46	-30.09

Qp - Quasi-Peak detector

Ca - CISPR average detection

## LINE 2 PLOT



## LINE 2 RESULT

### Trace Markers

#### Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Limiter (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
13	.231	28.12	Qp	.8	0	10.1	39.02	62.41	-23.39	-	-
14	.22875	15.74	Ca	.8	0	10.1	26.64	-	-	52.49	-25.85
15	.3705	19.93	Qp	.5	0	10.1	30.53	58.49	-27.96	-	-
16	.3705	8.67	Ca	.5	0	10.1	19.27	-	-	48.49	-29.22
17	.6585	18.93	Qp	.3	0	10.1	29.33	56	-26.67	-	-
18	.66075	6.94	Ca	.3	0	10.1	17.34	-	-	46	-28.66
19	.9465	16.74	Qp	.3	0	10.1	27.14	56	-28.86	-	-
20	.94875	4.75	Ca	.3	0	10.1	15.15	-	-	46	-30.85
21	1.5675	16.53	Qp	.2	.1	10.1	26.93	56	-29.07	-	-
22	1.5675	3.57	Ca	.2	.1	10.1	13.97	-	-	46	-32.03
23	2.69925	13.56	Qp	.2	.1	10.1	23.96	56	-32.04	-	-
24	2.6835	2.35	Ca	.2	.1	10.1	12.75	-	-	46	-33.25

Qp - Quasi-Peak detector

Ca - CISPR average detection