FCC 47 CFR PART 15 SUBPART C
INDUSTRY (ISED) CANADA RSS-247 ISSUE 1

BLUETOOTH LOW ENERGY CERTIFICATION TEST REPORT

FOR

LED Light Bulb / Speaker with BLE and 802.11b/g/n

MODEL NUMBER: TWST-SPKR-001

FCC ID: 2AE49-TWSTSPK1
IC: 20364-TWSTSPK1

REPORT NUMBER: R11039922-E2

ISSUE DATE: 2016-11-23

Prepared for
ASTRO INC.
450 W 33RD ST.
NEW YORK
NEW YORK, 10001, USA

Prepared by
UL LLC
12 LABORATORY DR.
RESEARCH TRIANGLE PARK, NC 27709 USA
TEL: (919) 549-1400

NVLAP TESTING

NVLAP LAB CODE 200246-0

Revision History

Ver.	Issue Date	Revisions	Revised By
1	2016-11-11	Initial Issue	Richard Jankovics
2	2016-11-23	Updated test setup diagrams, added prescan note to radiated spurious plots, updated AC Power Line conducted RSS-Gen reference	Richard Jankovics
3	2016-11-23	Updated device antenna gains	Richard Jankovics

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ASTRO INC.
450 W 33RD ST.
NEW YORK, NEW YORK, 10001, USA

EUT DESCRIPTION: LED Light Bulb / Speaker with BLE and 802.11b/g/n

MODEL: TWST-SPKR-001

SERIAL NUMBER: FCC #1, FCC #2, FCC #3

DATE TESTED: 2016-10-06 – 2016-10-25

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	PASS
INDUSTRY (ISED) CANADA RSS-247 Issue 1	PASS
INDUSTRY (ISED) CANADA RSS-GEN Issue 4	PASS

UL LLC 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 LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 LLC By:

Jeff Moser
EMC Program Manager
UL – Consumer Technology Division

Prepared By:

Richard Jankovics
WiSE Engineer
UL – Consumer Technology Division

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, RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

12 Laboratory Dr., RTP, NC 27709
☐ Chamber A
☐ Chamber C

2800 Suite B Perimeter Park Dr., Morrisville, NC 27560
☐ Chamber NORTH
☒ Chamber SOUTH

The onsite chambers are covered under Industry (ISED) Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://www.nist.gov/nvlap/

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:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Total RF power, conducted	± 0.45 dB
RF power density, conducted	± 1.5 dB
Spurious emissions, conducted	± 2.94 dB
All emissions, radiated up to 40 GHz	± 5.36 dB
Temperature	± 0.07°C
Humidity	± 2.26% RH
DC and low frequency voltages	± 1.27%
Conducted Emissions (0.150-30MHz)	± 3.65dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an LED Light Bulb / Speaker with BLE and 802.11b/g/n.

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	1.69	1.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a trace antennas, with a maximum gain of -0.28 dBi.

5.1. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was FCC 1.0.

The test utility software used during testing was Ralink QA Test Program, version 1.0.1.0.

5.2. 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.

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

- BLE GFSK, Payload 37 bytes

5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T440	NA	NA
Power Brick	Lenovo	ADLX65NLC2A	NA	NA
Serial to USB	NA	NA	NA	NA

Note: Laptop, Power Brick, and Serial to USB are only used to configure sample and removed. Not present during measurements.

I/O CABLES

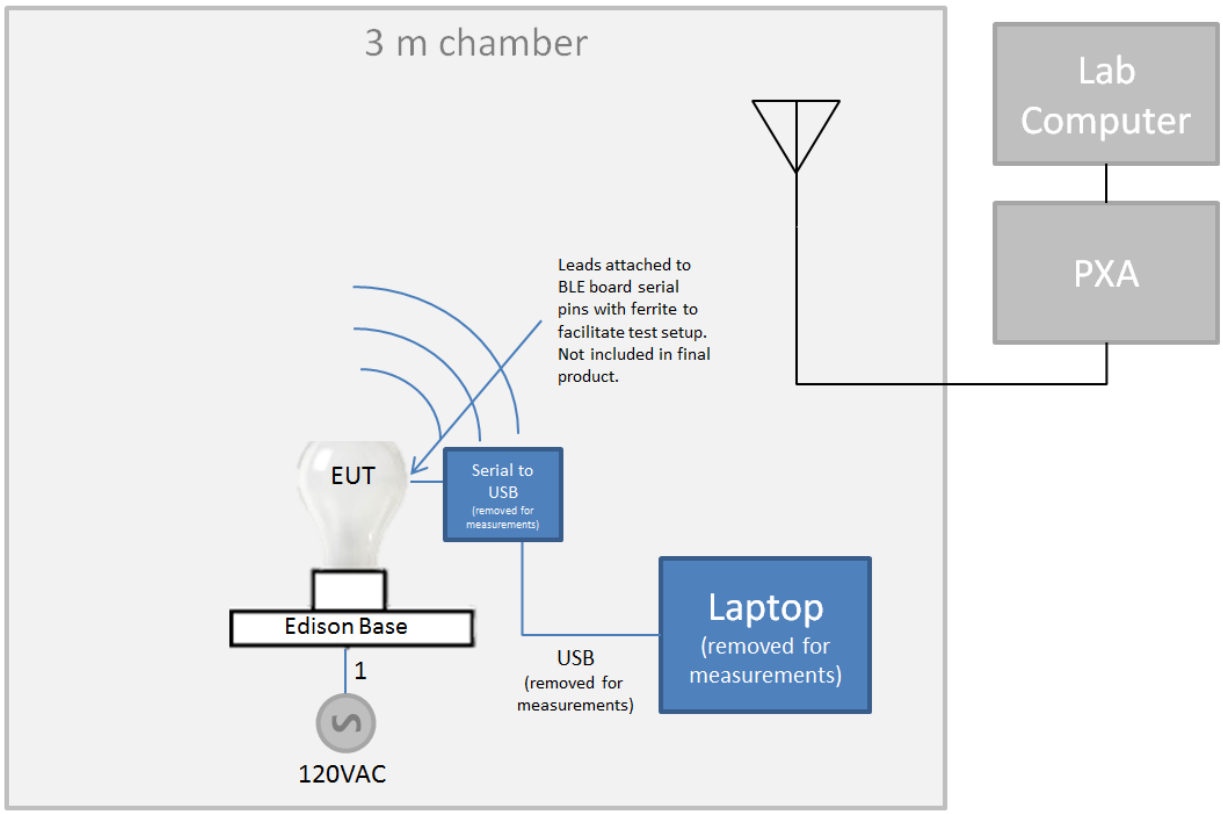
I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	Terminal	AC Inlet	2.95	18AWG line cord.
NA	Antenna	1	RF		0.3	
NA	NA	1	USB to Micro USB	USB cable	0.25	Configuration only. Not present during meas.

TEST SETUP

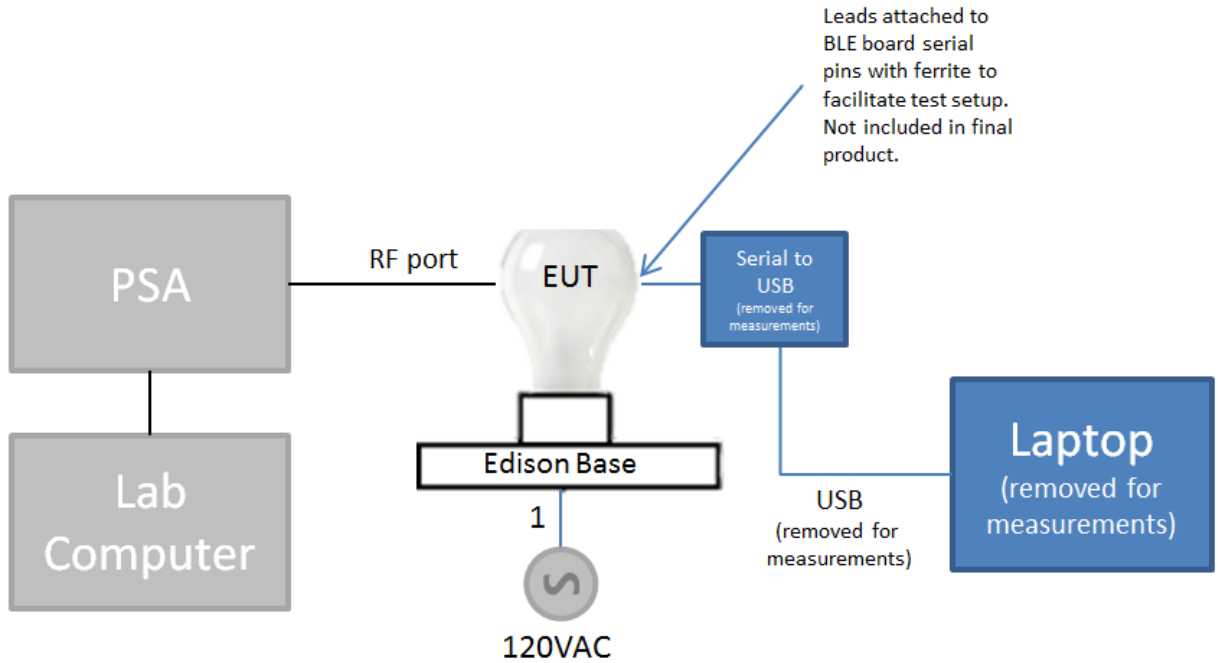
Different bulbs were provided. One unit was provided for radiated-emissions and line-conducted testing (an external serial port allowed for configuring the device) and one unit was provided for conducted-port testing. Units were modified with added serial port with serial to USB adapter to facilitate programming the RF output for testing. Once the device was running the test mode, the serial to USB adapter, USB cable and laptop were removed for measurements. Ports not present on finished product.

SETUP DIAGRAM FOR TESTS

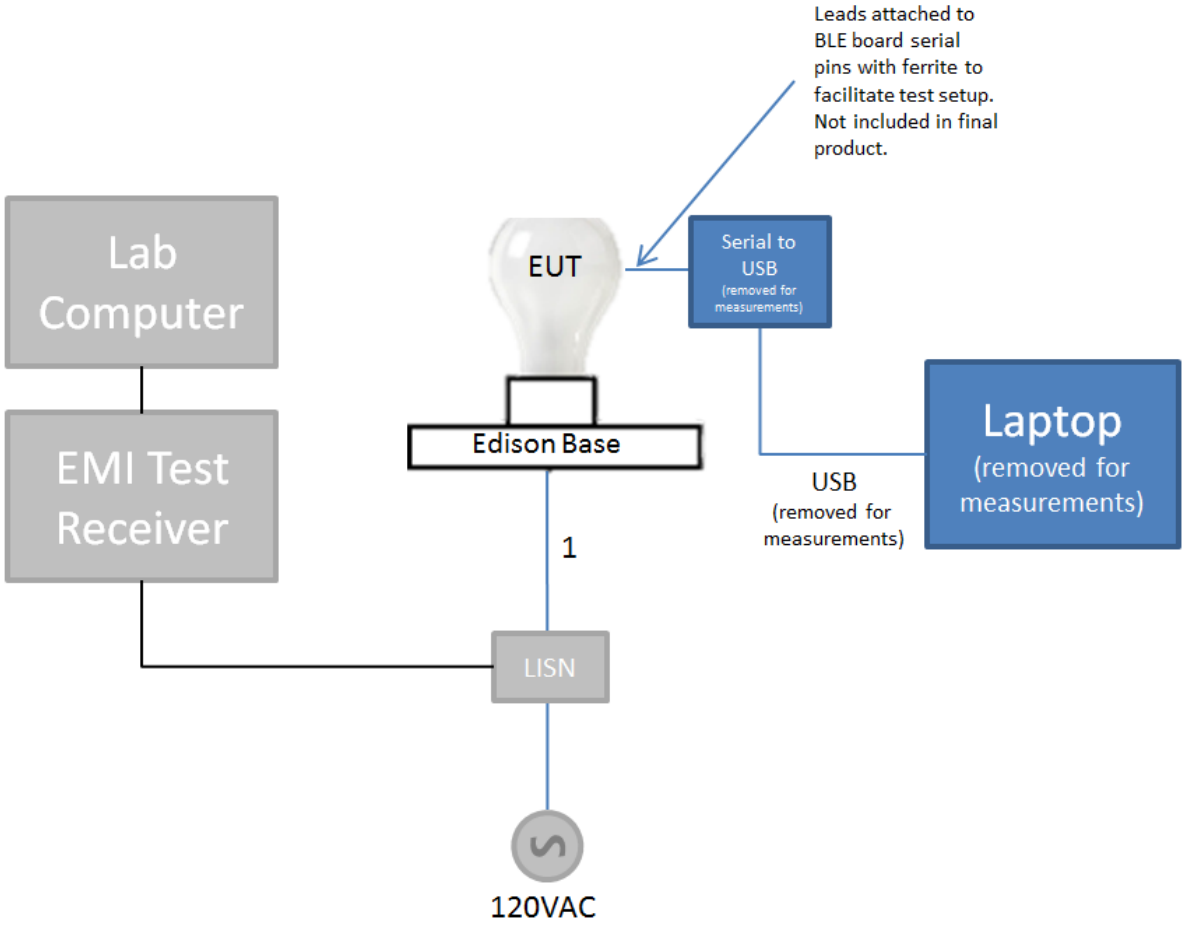
Radiated Setup



Antenna Port Conducted Setup



Line Conducted Setup



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz	**(Loop Ant.)**			
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2015-12-08	2016-12-31
	30-1000 MHz				
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2016-06-07	2017-06-30
	1-18 GHz				
AT0069	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2016-03-07	2017-03-31
	18-26 GHz				
AT0076	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2016-09-06	2017-09-30
	Gain-Loss Chains				
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2015-10-07	2016-10-31
S-SAC02	Gain-loss string: 30-1000MHz	Various	Various	2016-06-26	2017-06-30
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2016-08-28	2017-08-28
S-SAC04	Gain-loss string: 18-40GHz	Various	Various	2016-08-28	2017-08-28
	Receiver & Software				
SA0025	Spectrum Analyzer	Agilent	N9030A	2016-03-17	2017-03-31
SA0026 (18-40GHz RSE)	Spectrum Analyzer	Agilent	N9030A	2016-02-24	2017-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
HI0078	Temp/Humid/Pressure Meter	Springfield Precision	PreciseTemp	2016-06-13	2017-06-13

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 2				
SA0020	Spectrum Analyzer	Agilent Technologies	E4446A	2016-03-22	2017-03-31
PWM003	RF Power Meter	Keysight Technologies	N1911A	2016-06-21	2017-06-21
PWS001	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	N1921A	2016-04-07	2017-04-31
UL139843	Temp/Humid/Pressure Meter	Fisher Scientific	14-650-118	2016-02-19	2017-02-19
MM0166	True RMS Multimeter	Agilent	U1232A	2016-03-15	2017-03-31

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL077	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3476-240	2016-06-15	2017-06-30
139843	Temp/Humid/Pressure Meter	Control Co./Fisher	14-650-118	2016-02-19	2017-02-19
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2016-08-24	2017-08-24
MM0170	Multi-meter	Fluke	83V	2016-03-15	2017-03-31
PRE0101521 (75141)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2016-08-23	2017-08-23
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2016-06-09	2017-06-30
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA

7. MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 v03r05 Section 6.0

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

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

Output Power: KDB 558074 D01 v03r05, Section 9.1.2

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

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

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

General Radiated Emissions: ANSI C63.10:2013 Sections 6.3-6.6

Line Conducted Emissions: ANSI C63.10:2013 Sections 6.2

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

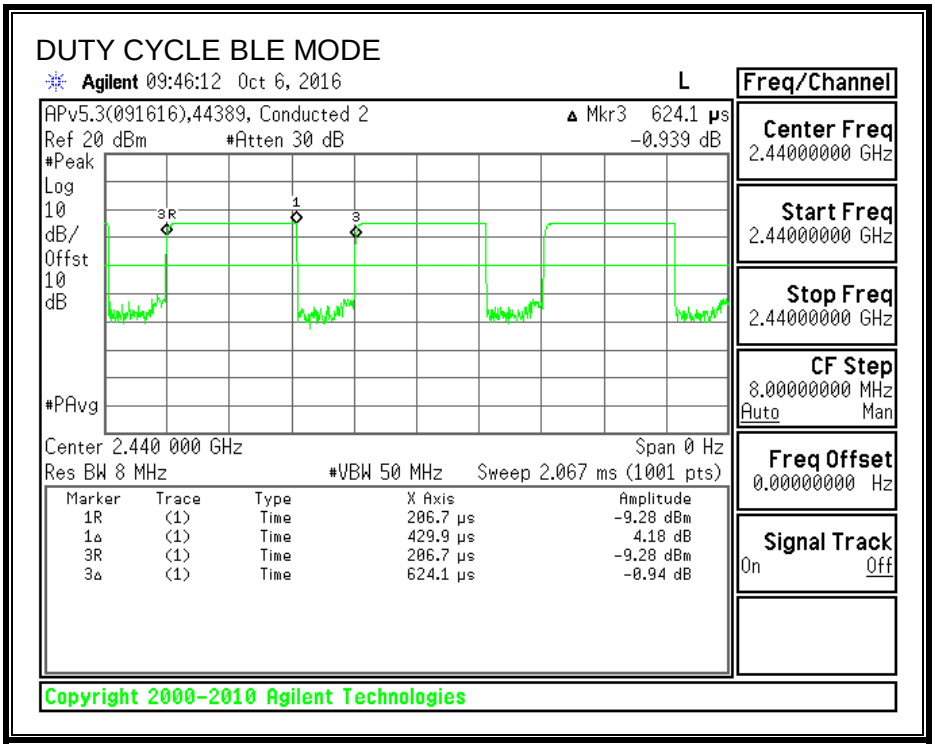
KDB 558074 Zero-Span Spectrum Analyzer Method.

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	0.430	0.624	0.689	68.88%	1.62	2.326

Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-06

DUTY CYCLE PLOTS



8.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-247 5.2 (1)

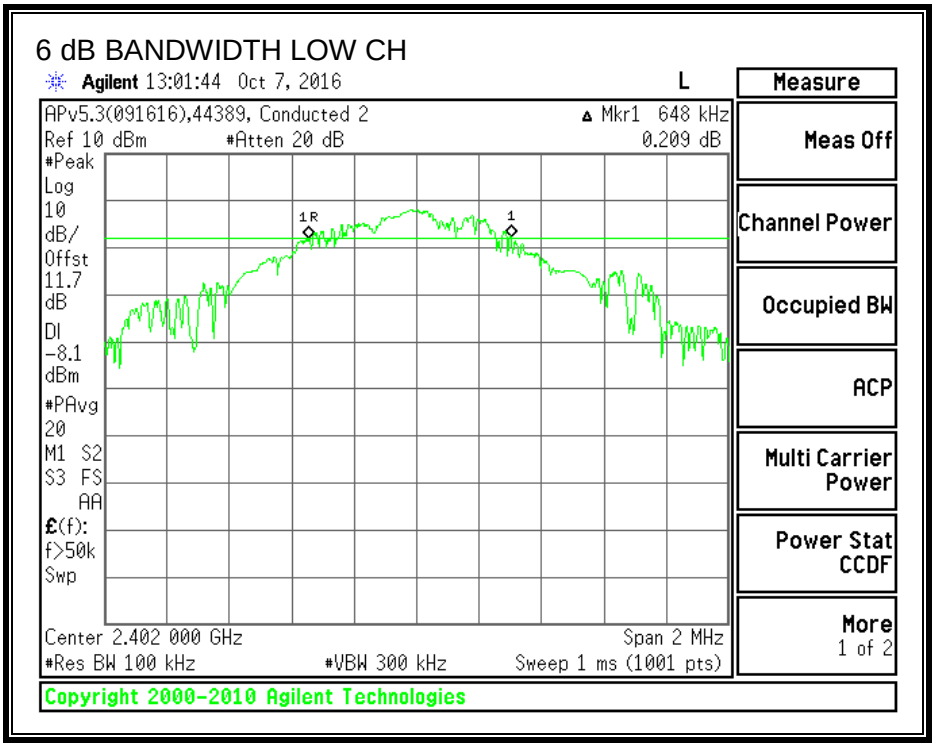
The minimum 6 dB bandwidth shall be at least 500 kHz.

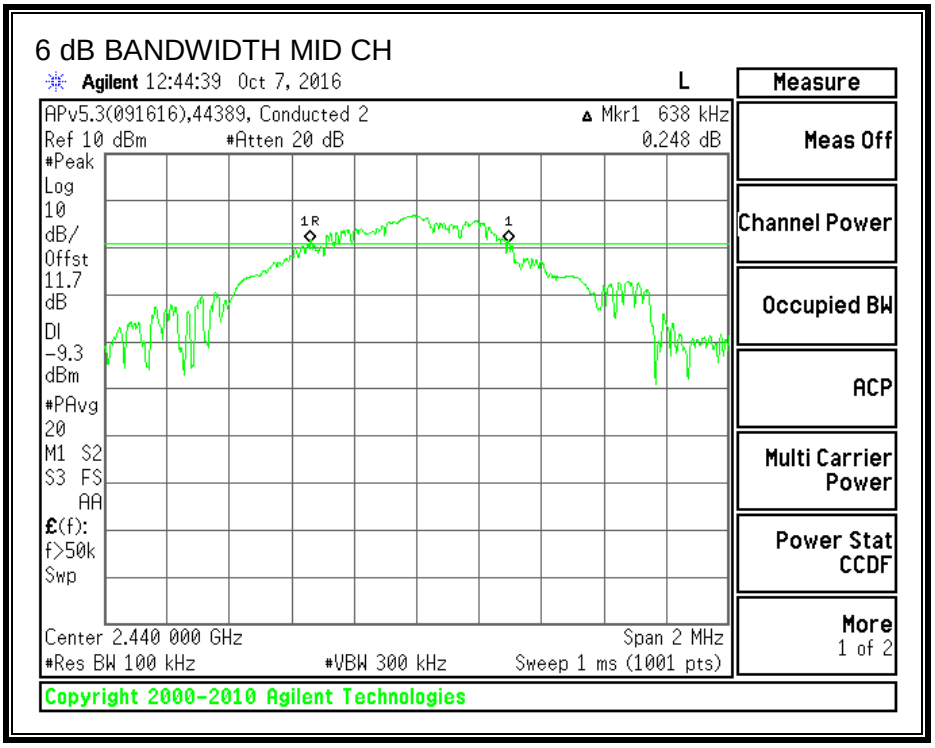
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6480	0.5
Middle	2440	0.6380	0.5
High	2480	0.6600	0.5

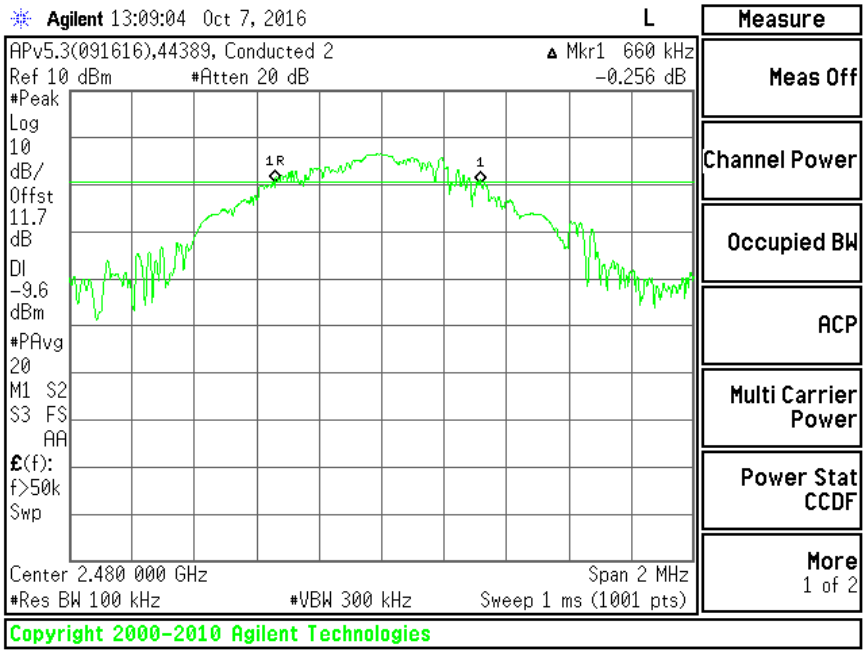
Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-07

6 dB BANDWIDTH





6 dB BANDWIDTH HIGH CH



8.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only. Testing per RSS-Gen Clause 6.6.

TEST PROCEDURE

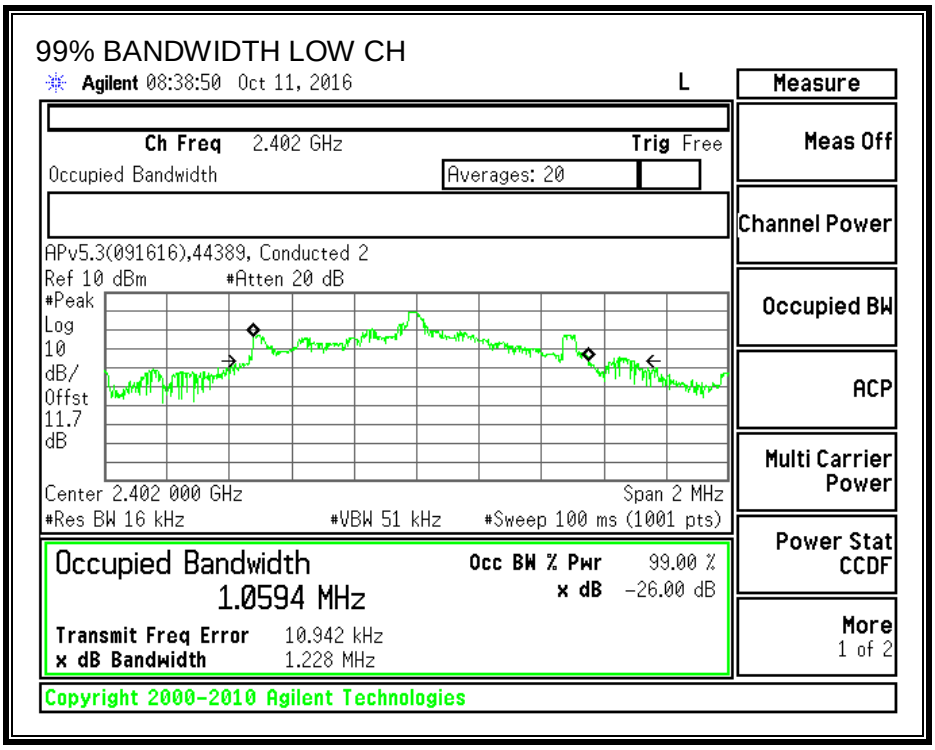
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

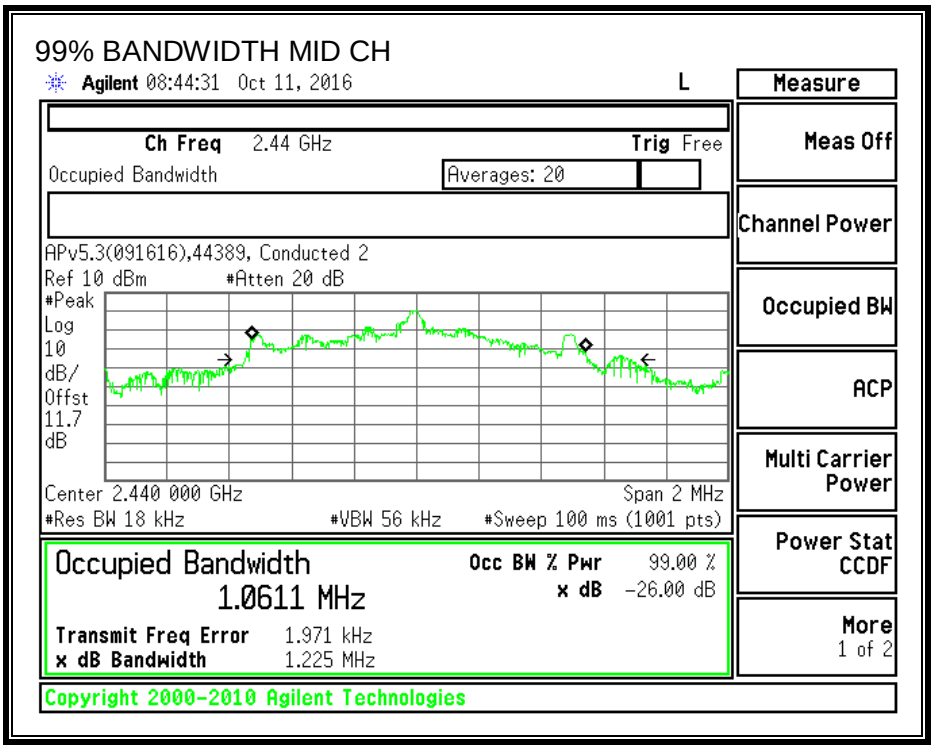
RESULTS

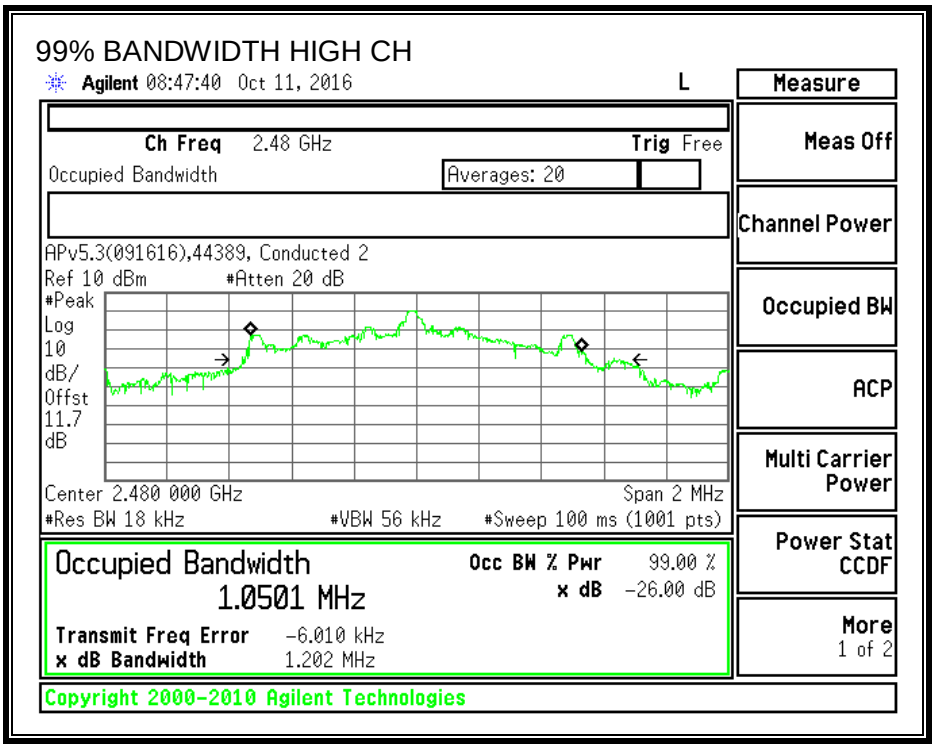
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0594
Middle	2440	1.0611
High	2480	1.0501

Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-11

99% BANDWIDTH







8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

IC RSS-247 5.4 (4)

FCC - 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.

RSS - For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.240	30	-28.760
Middle	2440	1.690	30	-28.310
High	2480	1.630	30	-28.370

Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-06

8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 11.7 dB (including 10 dB pad and 1.7 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	1.15
Middle	2440	1.61
High	2480	1.55

NOTE: Gated Measurements

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-247 5.2 (2)

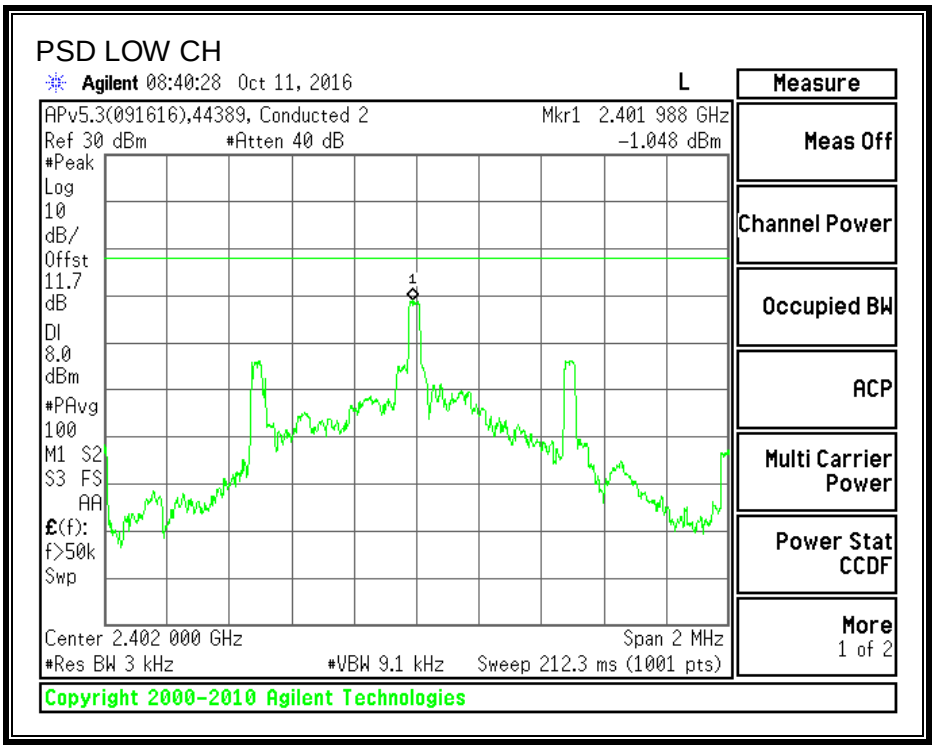
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz to 100 kHz band during any time interval of continuous transmission.

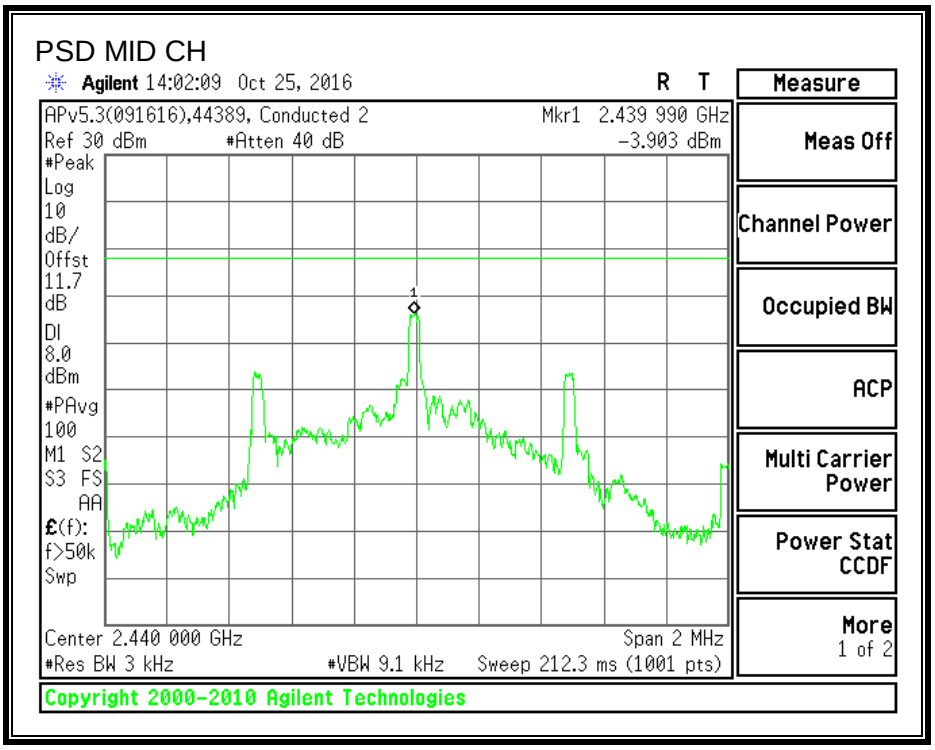
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-1.05	8	-9.05
Middle	2440	-3.90	8	-11.90
High	2480	-1.65	8	-9.65

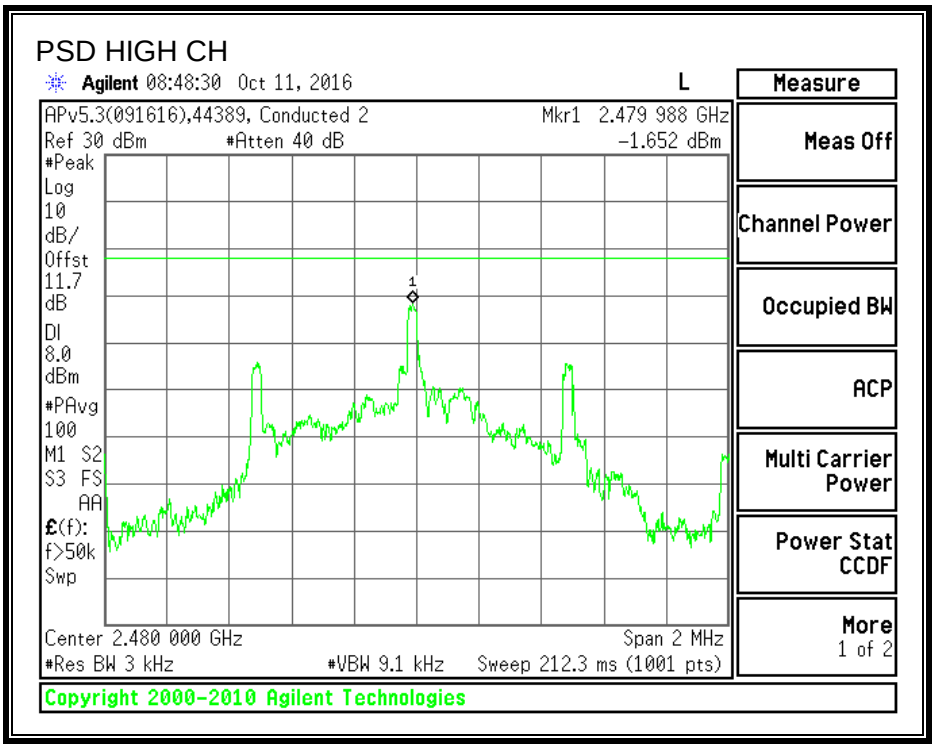
Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-11, 2016-10-25

POWER SPECTRAL DENSITY





PSD HIGH CH



8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

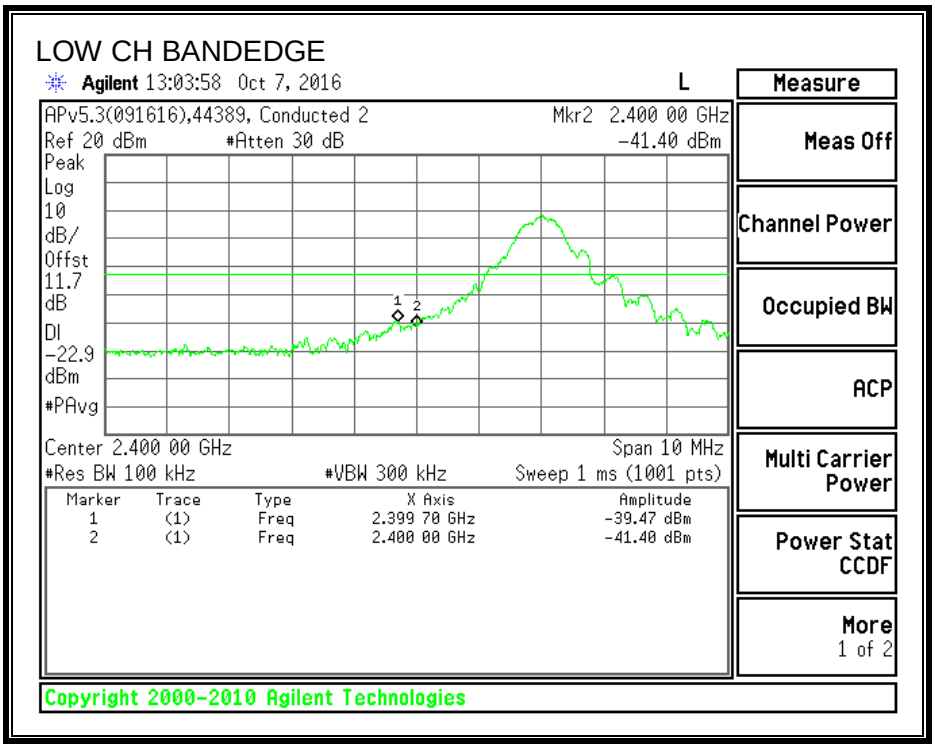
IC RSS-247 5.5

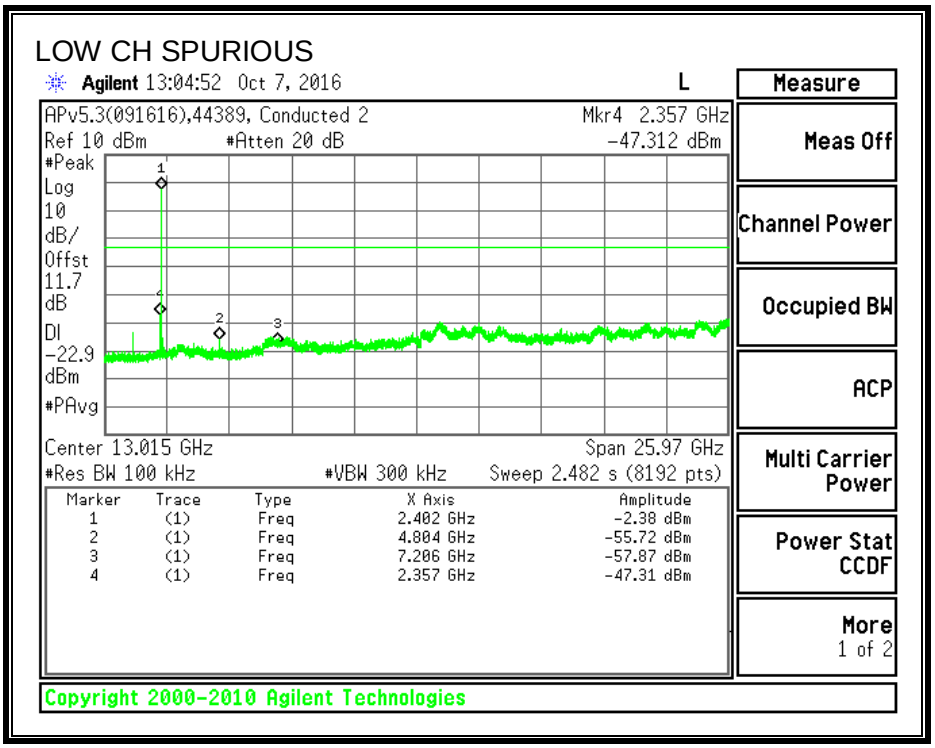
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

Test Performed: Niklas Haydon / Jeff Cabrera
Test Date: 2016-10-07

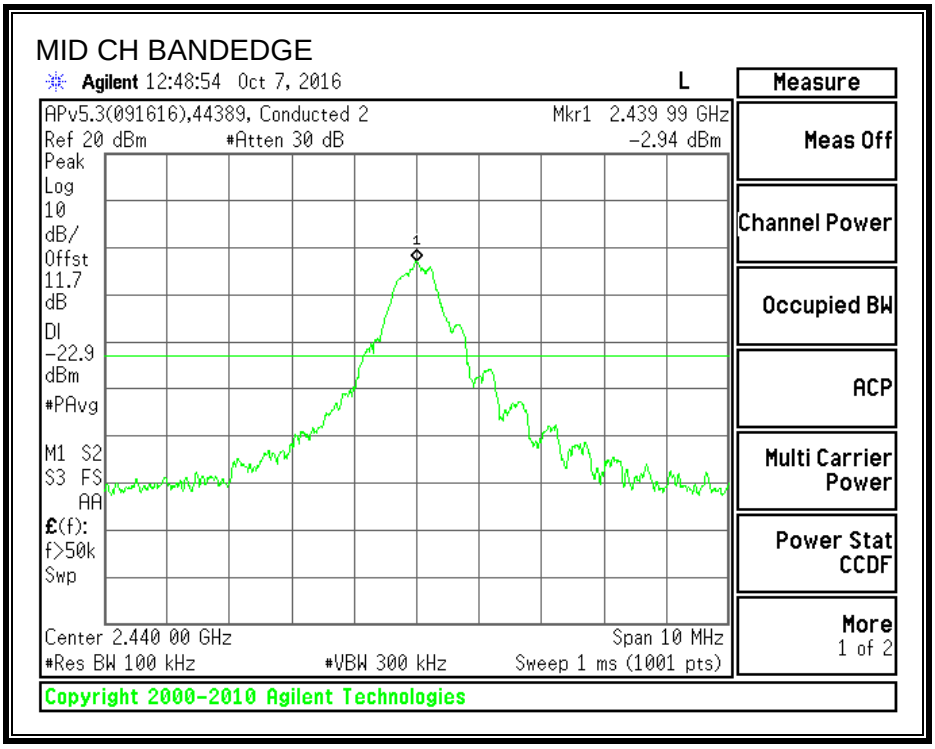
RESULTS

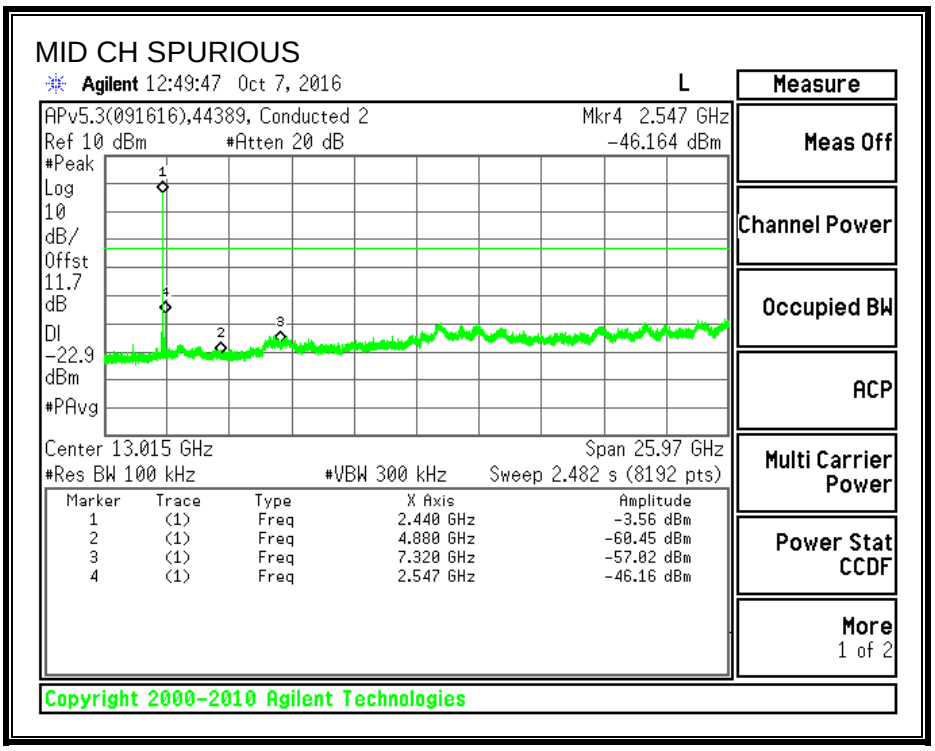
SPURIOUS EMISSIONS, LOW CHANNEL



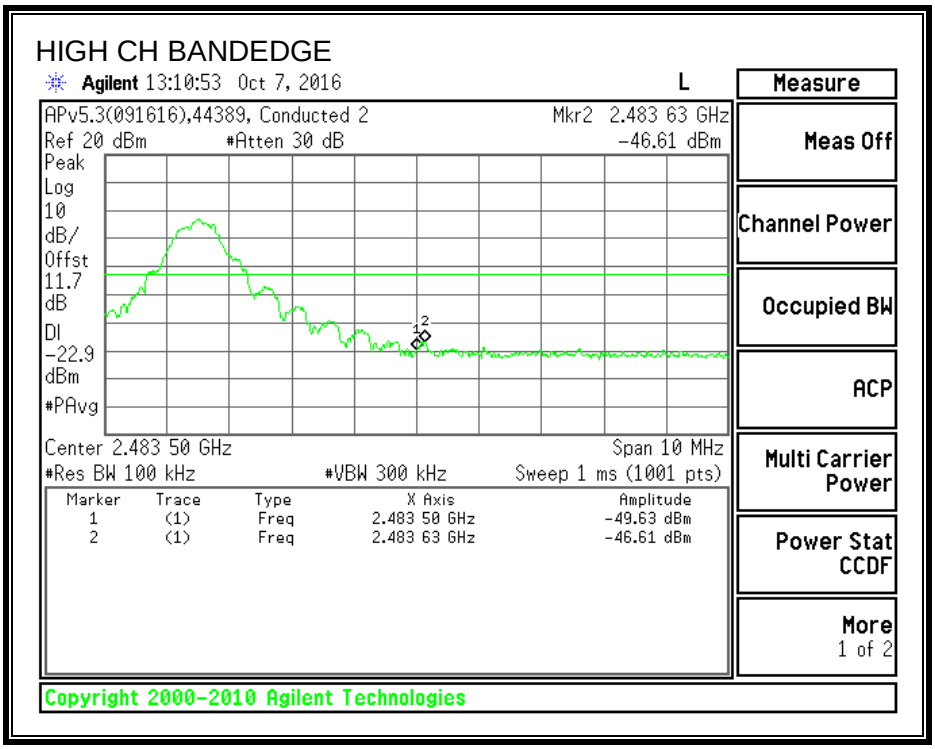


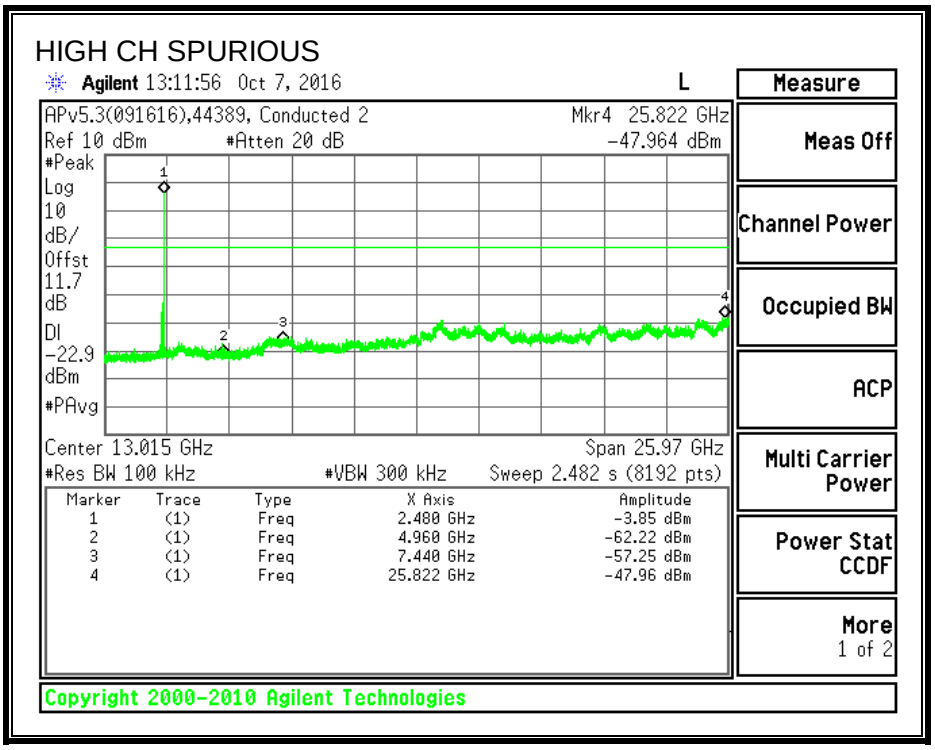
SPURIOUS EMISSIONS, MID CHANNEL





SPURIOUS EMISSIONS, HIGH CHANNEL





9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205, §15.209, §15.247 (d)

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
0.009-0.490	2400/f(kHz) (at 300 m)	-
0.490-1.705	24000/f(kHz) (at 30 m)	-
1.705-30.0	30 (at 30 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 measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. For this evaluation, RMS Power Averaging was used and the resolution/video bandwidth settings were 1MHz/3MHz.

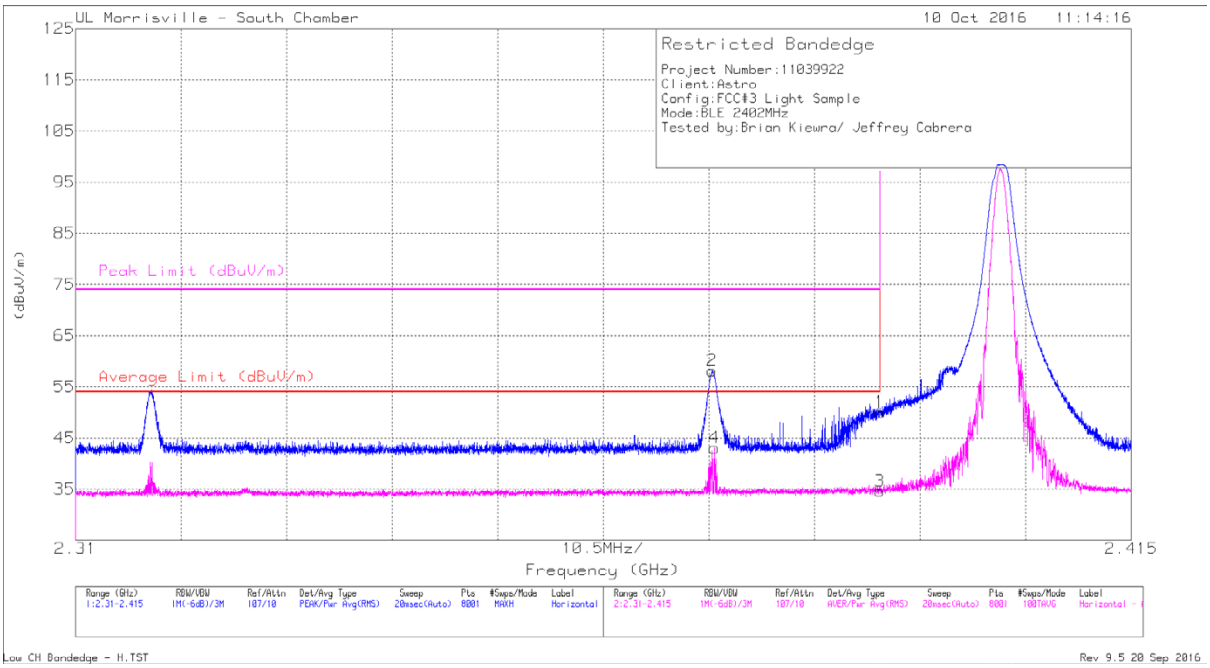
The spectrum from 9 kHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. TX ABOVE 1 GHz FOR BLE MODE IN THE 2.4 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

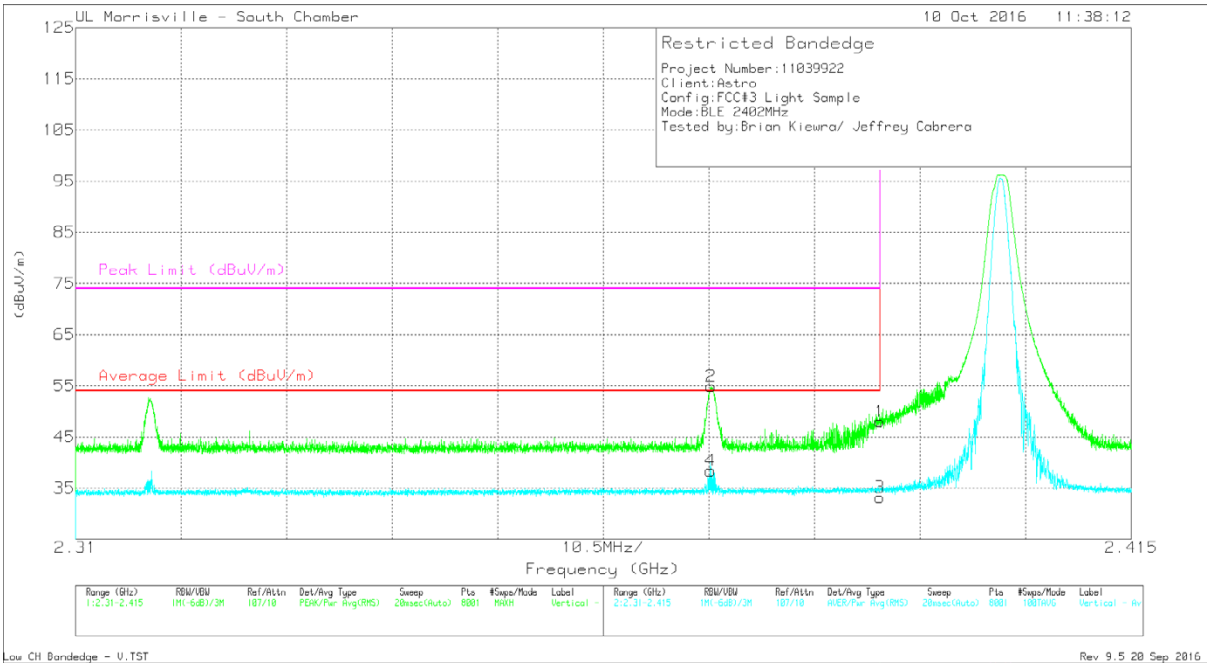


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/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	41.93	Pk	32.2	-24.1	0	50.03	-	-	74	-23.97	135	205	H
2	* 2.373	50.15	Pk	32	-24	0	58.15	-	-	74	-15.85	135	205	H
3	* 2.39	24.91	RMS	32.2	-24.1	1.62	34.63	54	-19.37	-	-	135	205	H
4	* 2.374	33.42	RMS	32	-24	1.62	43.04	54	-10.96	-	-	135	205	H

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

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

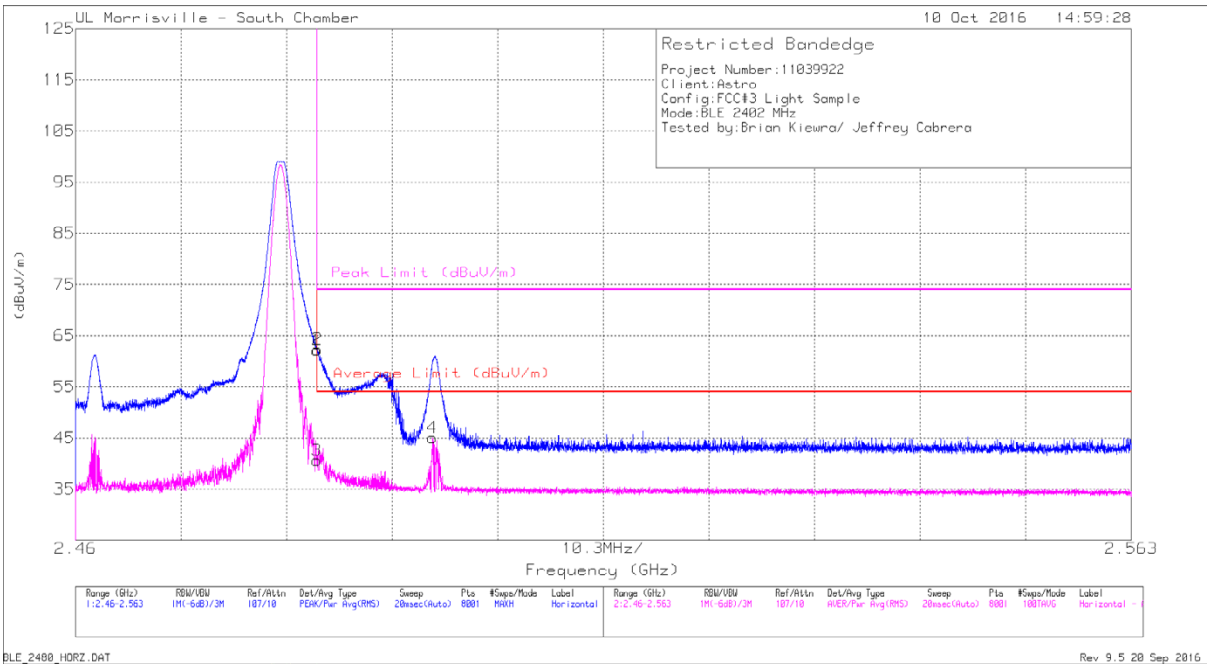


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/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	39.89	Pk	32.2	-24.1	0	47.99	-	-	74	-26.01	176	228	V
2	* 2.373	46.92	Pk	32	-24	0	54.92	-	-	74	-19.08	176	228	V
3	* 2.39	25.07	RMS	32.2	-24.1	1.62	34.79	54	-19.21	-	-	176	228	V
4	* 2.373	30.37	RMS	32	-24	1.62	39.99	54	-14.01	-	-	176	228	V

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

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

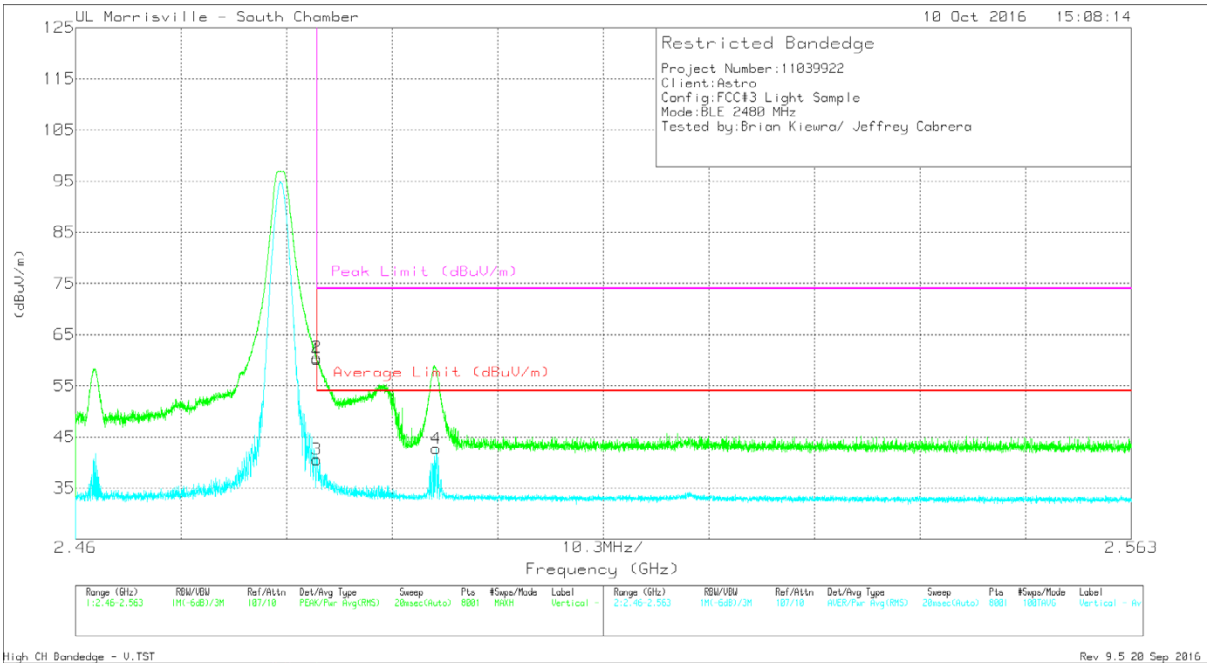


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/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	54.35	Pk	32.4	-24.6	0	62.15	-	-	74	-11.85	132	195	H
2	* 2.484	54.52	Pk	32.4	-24.6	0	62.32	-	-	74	-11.68	132	195	H
3	* 2.484	31.22	RMS	32.4	-24.6	1.62	40.64	54	-13.36	-	-	132	195	H
4	* 2.495	35.62	RMS	32.4	-24.6	1.62	45.04	54	-8.96	-	-	132	195	H

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

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



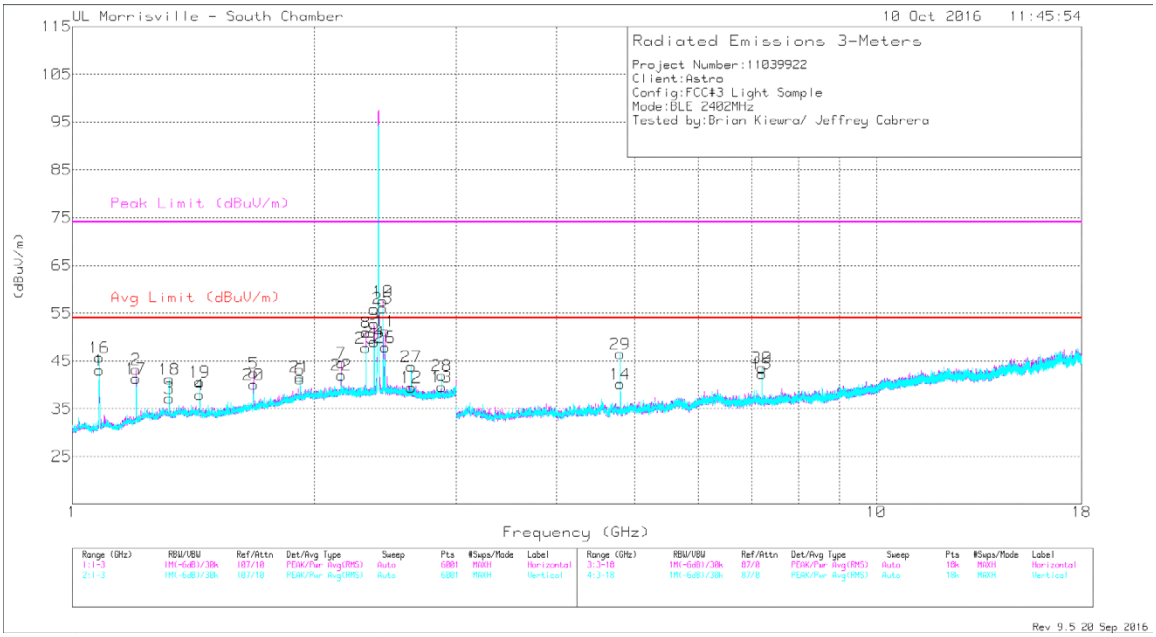
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/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	52.4	Pk	32.4	-24.6	0	60.2	-	-	74	-13.8	175	302	V
2	* 2.484	52.69	Pk	32.4	-24.6	0	60.49	-	-	74	-13.51	175	302	V
3	* 2.484	32.78	RMS	32.4	-24.6	1.62	42.20	54	-11.80	-	-	175	302	V
4	* 2.495	34.82	RMS	32.5	-24.6	1.62	44.34	54	-9.66	-	-	175	302	V

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

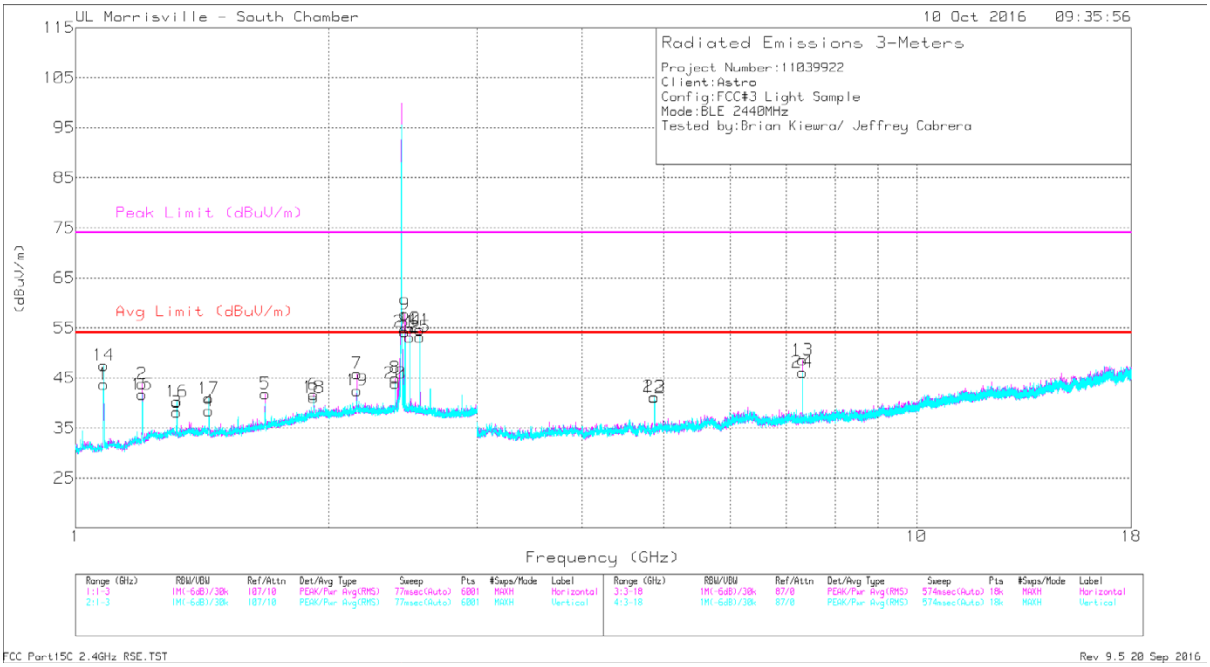


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	* 1.08	43.82	PK2	27.5	-24.4	0	46.92	-	-	74	-27.08	12	125	H
	* 1.08	39.1	MAv1	27.5	-24.4	1.62	43.82	54	-10.18	-	-	12	125	H
2	* 1.2	42.23	PK2	28.3	-23.8	0	46.73	-	-	74	-27.27	357	194	H
	* 1.2	37.03	MAv1	28.3	-23.8	1.62	43.15	54	-10.85	-	-	357	194	H
3	* 1.32	38.16	PK2	28.8	-23.1	0	43.86	-	-	74	-30.14	130	112	H
	* 1.32	29.71	MAv1	28.8	-23.1	1.62	37.03	54	-16.97	-	-	130	112	H
4	* 1.44	38.04	PK2	28.4	-22.7	0	43.74	-	-	74	-30.26	168	238	H
	* 1.44	28.53	MAv1	28.4	-22.7	1.62	35.85	54	-18.15	-	-	168	238	H
5	* 1.68	41.66	PK2	28.9	-22.1	0	48.46	-	-	74	-25.54	107	286	H
	* 1.68	35.34	MAv1	28.9	-22.1	1.62	43.76	54	-10.24	-	-	107	286	H
8	* 2.317	46.88	PK2	31.7	-23.7	0	54.88	-	-	74	-19.12	139	199	H
	* 2.317	30.97	MAv1	31.7	-23.7	1.62	40.59	54	-13.41	-	-	139	199	H
9	* 2.373	49.96	PK2	32	-24	0	57.96	-	-	74	-16.04	131	183	H
	* 2.373	30.46	MAv1	32	-24	1.62	40.08	54	-13.92	-	-	131	183	H
13	* 2.88	39.93	PK2	32.7	-26.1	0	46.53	-	-	74	-27.47	139	144	H
	* 2.88	29.93	MAv1	32.7	-26.1	1.62	38.15	54	-15.85	-	-	139	144	H
16	* 1.08	45.45	PK2	27.5	-24.4	0	48.55	-	-	74	-25.45	329	213	V
	* 1.08	41.69	MAv1	27.5	-24.4	1.62	46.41	54	-7.59	-	-	329	213	V
17	* 1.2	41.32	PK2	28.3	-23.8	0	45.82	-	-	74	-28.18	316	124	V
	* 1.2	35.86	MAv1	28.3	-23.8	1.62	41.98	54	-12.02	-	-	316	124	V
18	* 1.32	39.87	PK2	28.8	-23.1	0	45.57	-	-	74	-28.43	92	112	V
	* 1.32	32.94	MAv1	28.8	-23.1	1.62	40.26	54	-13.74	-	-	92	112	V
19	* 1.44	40.12	PK2	28.4	-22.7	0	45.82	-	-	74	-28.18	139	105	V
	* 1.44	32.85	MAv1	28.4	-22.7	1.62	40.17	54	-13.83	-	-	139	105	V
20	* 1.68	39.22	PK2	28.9	-22.1	0	46.02	-	-	74	-27.98	286	107	V
	* 1.68	31.27	MAv1	28.9	-22.1	1.62	39.69	54	-14.31	-	-	286	107	V
23	* 2.317	45.8	PK2	31.7	-23.7	0	53.8	-	-	74	-20.2	197	279	V
	* 2.317	30.42	MAv1	31.7	-23.7	1.62	40.04	54	-13.96	-	-	197	279	V
24	* 2.373	47.46	PK2	32	-24	0	55.46	-	-	74	-18.54	165	372	V
	* 2.373	28.13	MAv1	32	-24	1.62	37.75	54	-16.25	-	-	165	372	V
28	* 2.88	40.94	PK2	32.7	-26.1	0	47.54	-	-	74	-26.46	244	112	V
	* 2.88	32.01	MAv1	32.7	-26.1	1.62	40.23	54	-13.77	-	-	244	112	V
14	* 4.803	45.52	PK2	34	-31.1	0	48.42	-	-	74	-25.58	147	198	H
	* 4.804	30.31	MAv1	34	-31.1	1.62	34.83	54	-19.17	-	-	147	198	H
29	* 4.803	48.59	PK2	34	-31.1	0	51.49	-	-	74	-22.51	310	200	V
	* 4.804	33	MAv1	34	-31.1	1.62	37.52	54	-16.48	-	-	310	200	V
6	1.92	32.71	Pk	30.9	-22.4	0	41.21	-	-	-	-	0-360	101	H
21	1.92	33.18	Pk	30.9	-22.4	0	41.68	-	-	-	-	0-360	199	V
7	2.16	36.01	Pk	31.7	-23.1	0	44.61	-	-	-	-	0-360	199	H
22	2.16	33.41	Pk	31.7	-23.1	0	42.01	-	-	-	-	0-360	101	V
10	2.434	49.48	Pk	32.3	-24.3	0	57.48	-	-	-	-	0-360	199	H
25	2.434	48.03	Pk	32.3	-24.3	0	56.03	-	-	-	-	0-360	199	V
11	2.448	43.3	Pk	32.3	-24.4	0	51.2	-	-	-	-	0-360	199	H
26	2.448	39.98	Pk	32.3	-24.4	0	47.88	-	-	-	-	0-360	199	V
12	2.64	32.47	Pk	32.5	-25.5	0	39.47	-	-	-	-	0-360	101	H
27	2.64	36.85	Pk	32.5	-25.5	0	43.85	-	-	-	-	0-360	199	V
15	7.206	35.01	Pk	35.6	-28.3	0	42.31	-	-	-	-	0-360	101	H
30	7.206	36.23	Pk	35.6	-28.3	0	43.53	-	-	-	-	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
MAv1 - Maximum RMS Average
Note: Plot above represents a prescan. All final measurements were made at RBW/VBW = 1MHz/3MHz.

MID CHANNEL

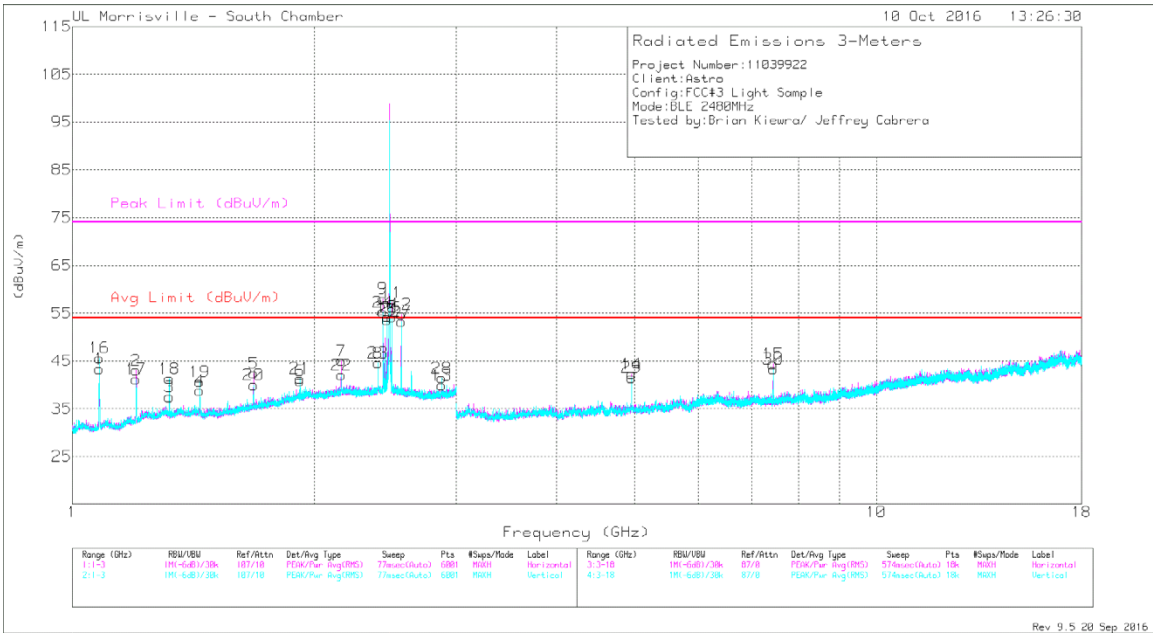


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (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	* 1.08	45.18	PK2	27.5	-24.4	0	48.28	-	-	74	-25.72	360	133	H
	* 1.08	40.89	MAv1	27.5	-24.4	1.62	45.61	54	-8.39	-	-	360	133	H
2	* 1.2	43	PK2	28.3	-23.8	0	47.5	-	-	74	-26.5	360	240	H
	* 1.2	37.82	MAv1	28.3	-23.8	1.62	43.94	54	-10.06	-	-	360	240	H
3	* 1.32	38.24	PK2	28.8	-23.1	0	43.94	-	-	74	-30.06	136	111	H
	* 1.32	29.94	MAv1	28.8	-23.1	1.62	37.26	54	-16.74	-	-	136	111	H
4	* 1.44	38.17	PK2	28.4	-22.7	0	43.87	-	-	74	-30.13	131	101	H
	* 1.44	29.05	MAv1	28.4	-22.7	1.62	36.37	54	-17.63	-	-	131	101	H
5	* 2.496	49.17	PK2	32.5	-24.6	0	57.07	-	-	74	-16.93	168	103	H
	* 2.496	32.87	MAv1	32.5	-24.6	1.62	42.39	54	-11.61	-	-	168	103	H
10	* 1.08	46.86	PK2	27.5	-24.4	0	49.96	-	-	74	-24.04	326	200	V
	* 1.08	43.3	MAv1	27.5	-24.4	1.62	48.02	54	-5.98	-	-	326	200	V
14	* 1.2	41.85	PK2	28.3	-23.8	0	46.35	-	-	74	-27.65	309	102	V
	* 1.2	35.99	MAv1	28.3	-23.8	1.62	42.11	54	-11.89	-	-	309	102	V
15	* 1.32	40.08	PK2	28.8	-23.1	0	45.78	-	-	74	-28.22	164	147	V
	* 1.32	32.91	MAv1	28.8	-23.1	1.62	40.23	54	-13.77	-	-	164	147	V
16	* 1.44	40.16	PK2	28.4	-22.7	0	45.86	-	-	74	-28.14	123	106	V
	* 1.44	32.98	MAv1	28.4	-22.7	1.62	40.3	54	-13.7	-	-	123	106	V
17	* 2.496	51.88	PK2	32.5	-24.6	0	59.78	-	-	74	-14.22	182	298	V
	* 2.496	34.19	MAv1	32.5	-24.6	1.62	43.71	54	-10.29	-	-	182	298	V
22	* 4.879	43.38	PK2	34.1	-31	0	46.48	-	-	74	-27.52	306	106	H
	* 4.88	28.98	MAv1	34.1	-31	1.62	33.7	54	-20.3	-	-	306	106	H
12	* 7.32	43.55	PK2	35.5	-27.9	0	51.15	-	-	74	-22.85	154	102	H
	* 7.32	35.89	MAv1	35.5	-27.9	1.62	45.11	54	-8.89	-	-	154	102	H
13	* 4.879	47.15	PK2	34.1	-31	0	50.25	-	-	74	-23.75	287	212	V
	* 4.88	32.16	MAv1	34.1	-31	1.62	36.88	54	-17.12	-	-	287	212	V
23	* 7.32	43.41	PK2	35.5	-27.9	0	51.01	-	-	74	-22.99	120	197	V
	* 7.32	35.98	MAv1	35.5	-27.9	1.62	45.2	54	-8.8	-	-	120	197	V
24	* 1.08	45.18	PK2	27.5	-24.4	0	48.28	-	-	74	-25.72	360	133	H
	* 1.08	40.89	MAv1	27.5	-24.4	1.62	45.61	54	-8.39	-	-	360	133	H
6	1.92	33.16	Pk	30.9	-22.4	0	41.66	-	-	-	-	0-360	101	H
18	1.92	32.61	Pk	30.9	-22.4	0	41.11	-	-	-	-	0-360	199	V
7	2.16	37.3	Pk	31.7	-23.1	0	45.9	-	-	-	-	0-360	199	H
19	2.16	33.91	Pk	31.7	-23.1	0	42.51	-	-	-	-	0-360	199	V
8	2.4	36.82	Pk	32.3	-24.1	0	45.02	-	-	-	-	0-360	199	H
20	2.4	35.71	Pk	32.3	-24.1	0	43.91	-	-	-	-	0-360	101	V
9	2.464	49.93	Pk	32.3	-24.5	0	57.73	-	-	-	-	0-360	199	H
21	2.464	46.44	Pk	32.3	-24.5	0	54.24	-	-	-	-	0-360	101	V
11	2.567	47.31	Pk	32.4	-25.1	0	54.61	-	-	-	-	0-360	199	H
25	2.567	45.9	Pk	32.4	-25.1	0	53.2	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
MAv1 - Maximum RMS Average
Note: Plot above represents a prescan. All final measurements were made at RBW/VBW = 1MHz/3MHz.

HIGH CHANNEL



Trace Markers

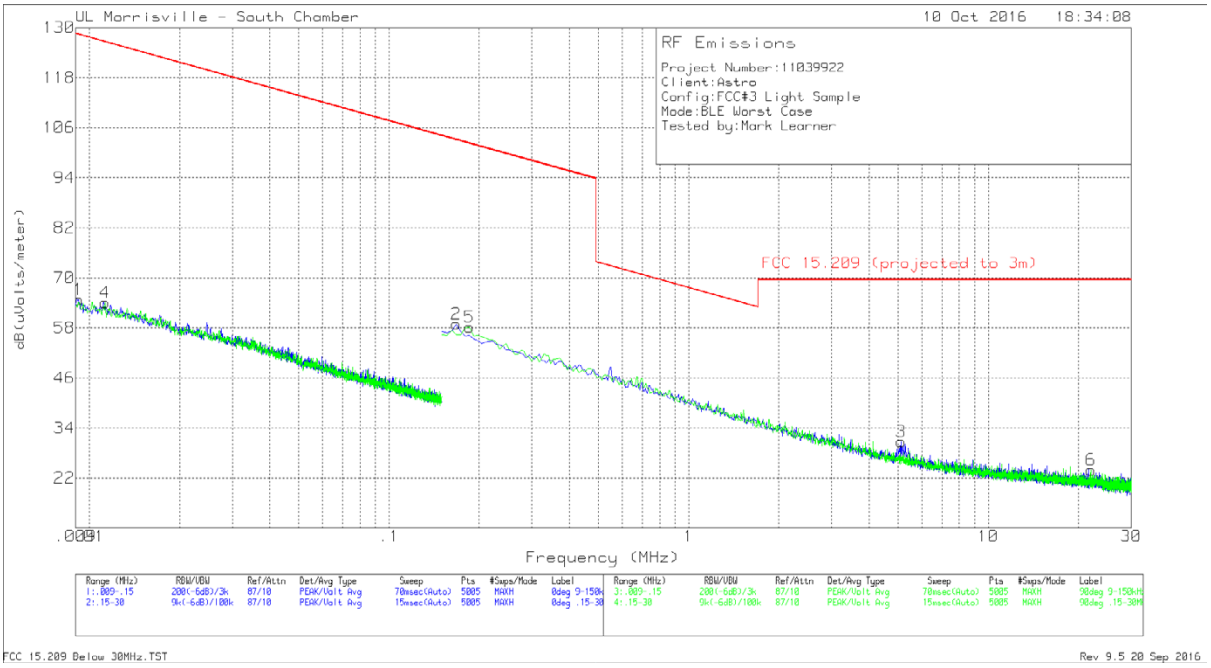
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0069 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.08	43.88	PK2	27.5	-24.4	0	46.98	-	-	74	-27.02	216	277	H
	* 1.08	39.64	MAv1	27.5	-24.4	1.62	44.36	54	-9.64	-	-	216	277	H
2	* 1.2	42.38	PK2	28.3	-23.8	0	46.88	-	-	74	-27.12	357	200	H
	* 1.2	37.31	MAv1	28.3	-23.8	1.62	43.43	54	-10.57	-	-	357	200	H
3	* 1.32	37.91	PK2	28.8	-23.1	0	43.61	-	-	74	-30.39	117	112	H
	* 1.32	29.69	MAv1	28.8	-23.1	1.62	37.01	54	-16.99	-	-	117	112	H
4	* 1.44	39.23	PK2	28.4	-22.7	0	44.93	-	-	74	-29.07	160	139	H
	* 1.44	31.27	MAv1	28.4	-22.7	1.62	38.59	54	-15.41	-	-	160	139	H
5	* 1.68	41.7	PK2	28.9	-22.1	0	48.5	-	-	74	-25.5	106	289	H
	* 1.68	35.37	MAv1	28.9	-22.1	1.62	43.79	54	-10.21	-	-	106	289	H
11	* 2.495	51.95	PK2	32.5	-24.6	0	59.85	-	-	74	-14.15	144	182	H
	* 2.495	33.8	MAv1	32.5	-24.6	1.62	43.32	54	-10.68	-	-	144	182	H
13	* 2.88	39.62	PK2	32.7	-26.1	0	46.22	-	-	74	-27.78	127	140	H
	* 2.88	29.75	MAv1	32.7	-26.1	1.62	37.97	54	-16.03	-	-	127	140	H
16	* 1.08	45.68	PK2	27.5	-24.4	0	48.78	-	-	74	-25.22	325	171	V
	* 1.08	41.92	MAv1	27.5	-24.4	1.62	46.64	54	-7.36	-	-	325	171	V
17	* 1.2	41.62	PK2	28.3	-23.8	0	46.12	-	-	74	-27.88	321	123	V
	* 1.2	35.81	MAv1	28.3	-23.8	1.62	41.93	54	-12.07	-	-	321	123	V
18	* 1.32	40.22	PK2	28.8	-23.1	0	45.92	-	-	74	-28.08	89	102	V
	* 1.32	33.01	MAv1	28.8	-23.1	1.62	40.33	54	-13.67	-	-	89	102	V
19	* 1.44	40.05	PK2	28.4	-22.7	0	45.75	-	-	74	-28.25	136	104	V
	* 1.44	32.84	MAv1	28.4	-22.7	1.62	40.16	54	-13.84	-	-	136	104	V
20	* 1.68	39.15	PK2	28.9	-22.1	0	45.95	-	-	74	-28.05	291	109	V
	* 1.68	31.38	MAv1	28.9	-22.1	1.62	39.8	54	-14.2	-	-	291	109	V
26	* 2.495	51.37	PK2	32.5	-24.6	0	59.27	-	-	74	-14.73	173	337	V
	* 2.495	34.78	MAv1	32.5	-24.6	1.62	44.3	54	-9.7	-	-	173	337	V
28	* 2.88	41.05	PK2	32.7	-26.1	0	47.65	-	-	74	-26.35	239	115	V
	* 2.88	32.31	MAv1	32.7	-26.1	1.62	40.53	54	-13.47	-	-	239	115	V
14	* 4.959	45.27	PK2	34.1	-31.3	0	48.07	-	-	74	-25.93	146	166	H
	* 4.96	32.07	MAv1	34.1	-31.3	1.62	36.49	54	-17.51	-	-	146	166	H
15	* 7.44	41.82	PK2	35.5	-28.2	0	49.12	-	-	74	-24.88	157	105	H
	* 7.44	33	MAv1	35.5	-28.1	1.62	42.02	54	-11.98	-	-	157	105	H
29	* 4.959	48.52	PK2	34.1	-31.3	0	51.32	-	-	74	-22.68	307	223	V
	* 4.96	35.63	MAv1	34.1	-31.3	1.62	40.05	54	-13.95	-	-	307	223	V
30	* 7.441	41.1	PK2	35.5	-28.2	0	48.4	-	-	74	-25.6	331	166	V
	* 7.44	32.22	MAv1	35.5	-28.1	1.62	41.24	54	-12.76	-	-	331	166	V
6	1.919	32.39	Pk	30.9	-22.4	0	40.89	-	-	-	-	0-360	199	H
21	1.92	32.86	Pk	30.9	-22.4	0	41.36	-	-	-	-	0-360	199	V
7	2.159	36.48	Pk	31.7	-23.1	0	45.08	-	-	-	-	0-360	199	H
22	2.16	33.43	Pk	31.7	-23.1	0	42.03	-	-	-	-	0-360	199	V
8	2.4	36.35	Pk	32.3	-24.1	0	44.55	-	-	-	-	0-360	199	H
23	2.4	36.42	Pk	32.3	-24.1	0	44.62	-	-	-	-	0-360	101	V
9	2.434	50.08	Pk	32.3	-24.3	0	58.08	-	-	-	-	0-360	199	H
24	2.434	47.29	Pk	32.3	-24.3	0	55.29	-	-	-	-	0-360	101	V
10	2.462	46.5	Pk	32.3	-24.5	0	54.3	-	-	-	-	0-360	199	H
25	2.462	45.8	Pk	32.3	-24.5	0	53.6	-	-	-	-	0-360	199	V
12	2.565	47.5	Pk	32.4	-25.1	0	54.8	-	-	-	-	0-360	199	H
27	2.565	46.01	Pk	32.4	-25.1	0	53.31	-	-	-	-	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - Maximum Peak
MAv1 - Maximum RMS Average
Note: Plot above represents a prescan. All final measurements were made at RBW/VBW = 1MHz/3MHz.

9.3. WORST-CASE BELOW 1 GHz

Note: All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (specification distance / test distance). Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

SPURIOUS EMISSIONS 9KHz TO 30 MHz (WORST-CASE CONFIGURATION)

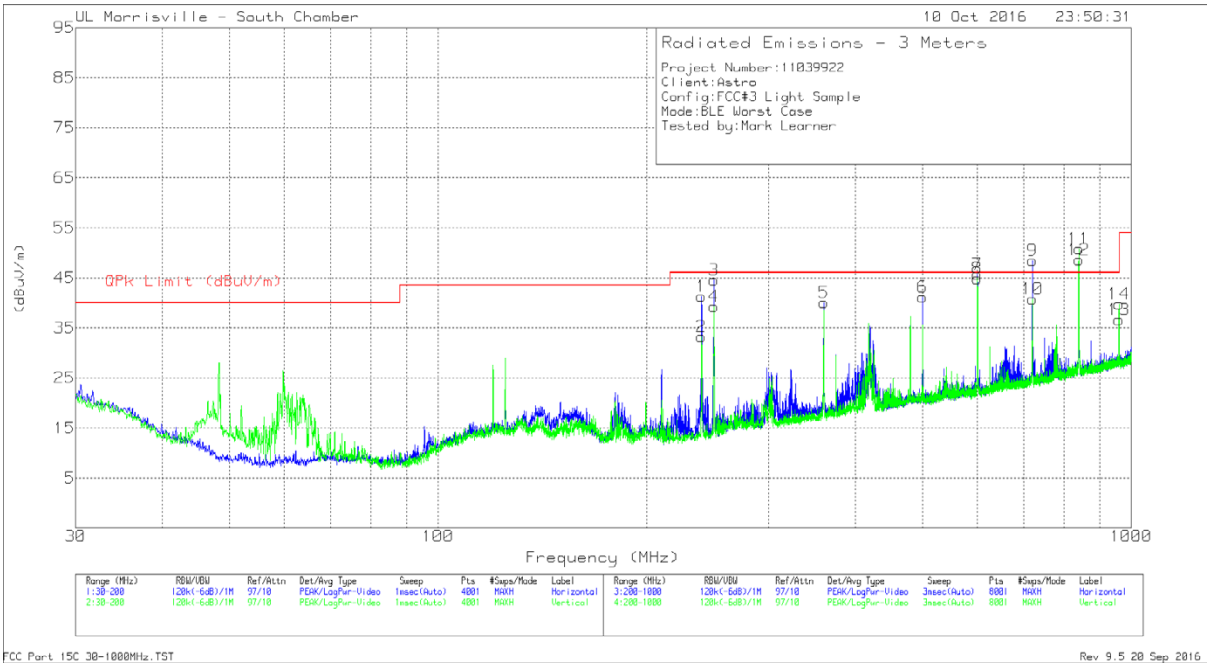


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 (projected to 3m)	Margin (dB)	Azimuth (Degs)
1	.0092	45.07	Pk	19.6	.1	64.77	128.33	-63.56	0-360
4	.0113	45.41	Pk	18.5	.1	64.01	126.55	-62.54	0-360
2	.1679	46.87	Pk	11.9	.1	58.87	103.1	-44.23	0-360
5	.18579	46.13	Pk	11.9	.1	58.13	102.22	-44.09	0-360
3	5.12481	18.98	Pk	11.3	.4	30.68	69.54	-38.86	0-360
6	22.04155	13.53	Pk	9.6	.8	23.93	69.54	-45.61	0-360

Pk - Peak detector

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



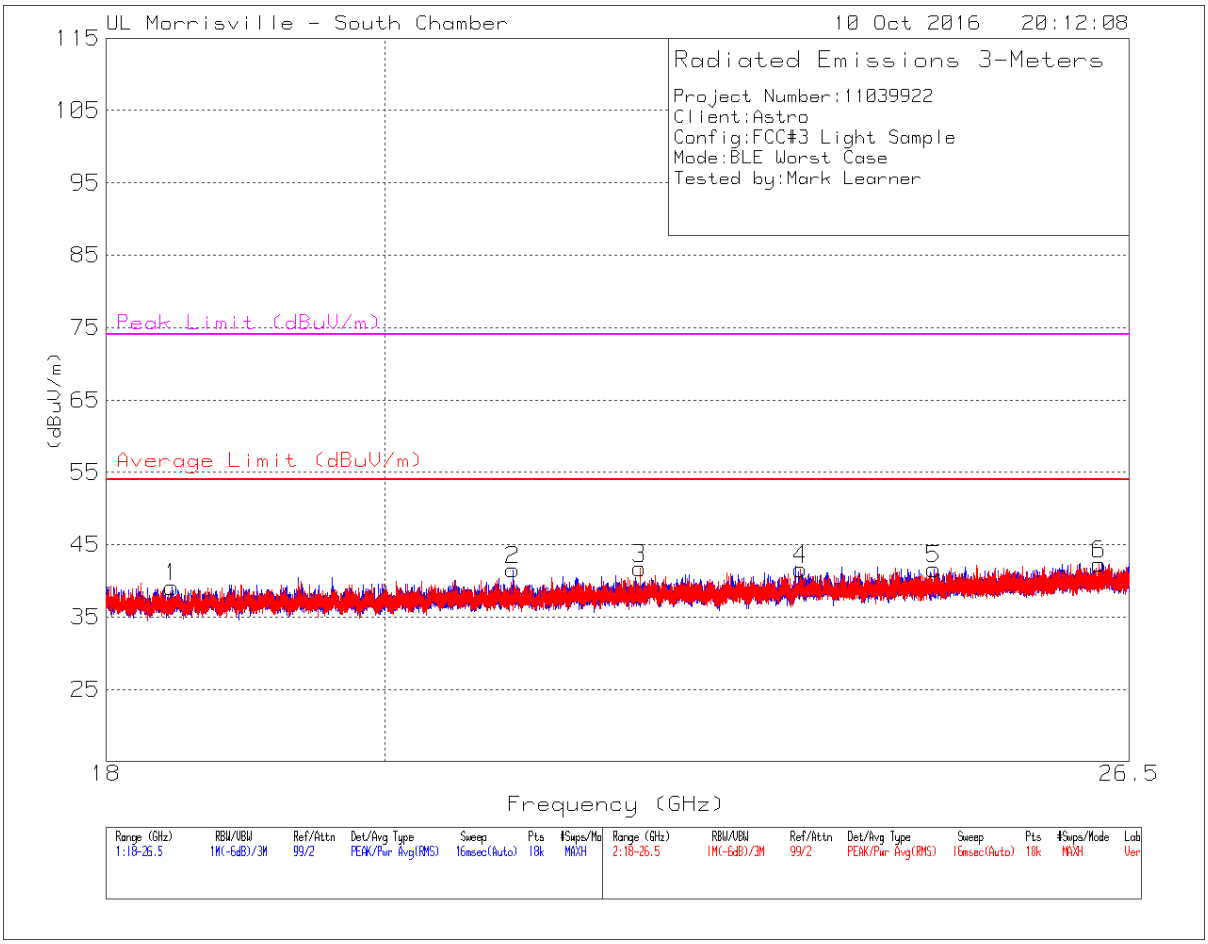
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 249.9908	56.73	Qp	16.1	-29.9	42.93	46.02	-3.09	197	116	H
4	* 250	53.05	Pk	16.1	-29.9	39.25	46.02	-6.77	0-360	202	V
1	* 240.0084	55.12	Qp	16.2	-29.9	41.42	46.02	-4.6	211	119	H
2	240	46.97	Pk	16.2	-29.9	33.27	-	-	0-360	202	V
5	360	49.82	Pk	19.6	-29.4	40.02	-	-	0-360	102	H
6	500	47.83	Pk	22.1	-28.8	41.13	-	-	0-360	198	H
7	600	51.02	Pk	23.3	-28.6	45.72	-	-	0-360	298	H
8	600	50.19	Pk	23.3	-28.6	44.89	-	-	0-360	202	V
9	720	51.58	Pk	25.2	-28.3	48.48	-	-	0-360	102	H
10	720	43.91	Pk	25.2	-28.3	40.81	-	-	0-360	202	V
12	840	49.84	Pk	26.4	-27.7	48.54	-	-	0-360	102	H
11	840	52.12	Pk	26.4	-27.7	50.82	-	-	0-360	202	V
13	959.8	35.46	Pk	27.5	-26.3	36.66	-	-	0-360	398	H
14	960	38.55	Pk	27.5	-26.3	39.75	-	-	0-360	202	V

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

9.4. WORST-CASE ABOVE 18 GHz

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



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF AT0076 (dB/m)	Amp/Cbl (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 18.453	47.04	PK2	32.7	-40.9	0	38.84	54	-15.16	74	-35.16	360	269	H
2	* 20.991	46.76	PK2	33.3	-40.3	0	39.76	54	-14.24	74	-34.24	148	171	H
3	* 22.026	47.14	PK2	33.4	-40.1	0	40.44	54	-13.56	74	-33.56	178	124	V
4	23.406	46.69	Pk	34.1	-39.2	0	41.59	54	-12.41	74	-32.41	0-360	299	V
5	24.614	46.05	Pk	34.3	-38.7	0	41.65	54	-12.35	74	-32.35	0-360	101	H
6	26.202	45.16	Pk	34.7	-37.5	0	42.36	54	-11.64	74	-31.64	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
PK2 - Maximum Peak

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

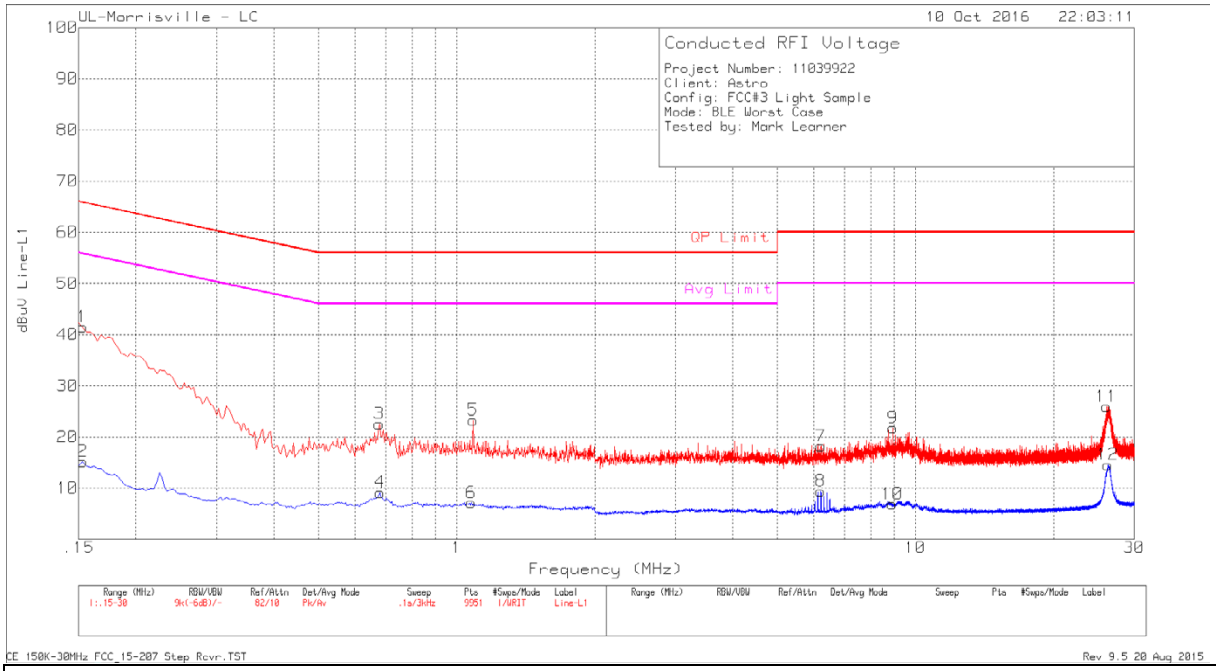
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

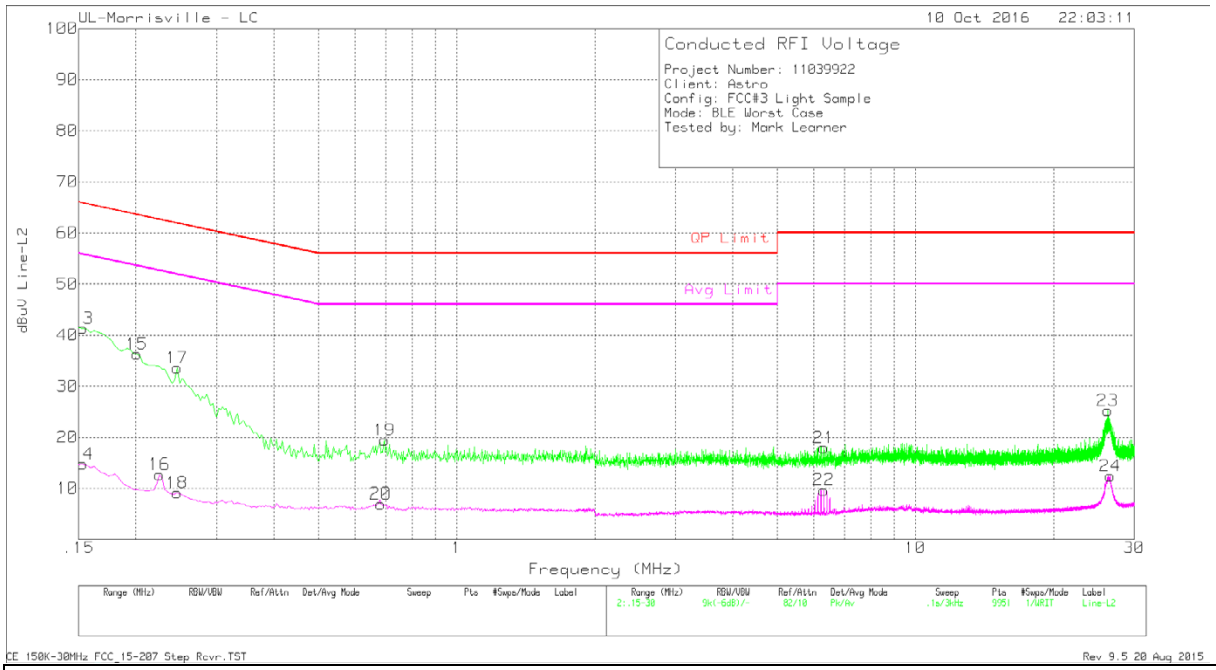
ANSI C63.10

RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	**Frequency (MHz)**	**Meter Reading (dBuV)**	**Det**	**LISN VCF (dB)**	**Cbl/Limiter (dB)**	**Corrected Reading dBuV**	**QP Limit**	**Margin (dB)**	**Avg Limit**	**Margin (dB)**
1	.153	31.31	Pk	.2	10	41.51	65.84	-24.33	-	-
2	.153	5	Av	.2	10	15.2	-	-	55.84	-40.64
3	.678	12.58	Pk	0	10	22.58	56	-33.42	-	-
4	.681	-.83	Av	0	10	9.17	-	-	46	-36.83
5	1.086	13.31	Pk	0	10	23.31	56	-32.69	-	-
6	1.077	-2.87	Av	0	10	7.13	-	-	46	-38.87
7	6.225	7.89	Pk	.1	10.2	18.19	60	-41.81	-	-
8	6.222	-.88	Av	.1	10.2	9.42	-	-	50	-40.58
9	8.922	11.34	Pk	.1	10.3	21.74	60	-38.26	-	-
10	8.904	-3.48	Av	.1	10.3	6.92	-	-	50	-43.08
11	26.109	14.98	Pk	.3	10.7	25.98	60	-34.02	-	-
12	26.289	3.59	Av	.3	10.7	14.59	-	-	50	-35.41

Pk - Peak detector
Av - Average detection



Range 2: Line-L2 .15 - 30MHz										
Marker	**Frequency (MHz)**	**Meter Reading (dBuV)**	**Det**	**LISN VCF (dB)**	**Cbl/Limiter (dB)**	**Corrected Reading dBuV**	**QP Limit**	**Margin (dB)**	**Avg Limit**	**Margin (dB)**
13	.153	31.15	Pk	.2	10	41.35	65.84	-24.49	-	-
14	.153	4.54	Av	.2	10	14.74	-	-	55.84	-41.1
15	.201	26.15	Pk	.1	10	36.25	63.57	-27.32	-	-
16	.225	2.62	Av	.1	10	12.72	-	-	52.63	-39.91
17	.246	23.47	Pk	.1	10	33.57	61.89	-28.32	-	-
18	.246	-1.01	Av	.1	10	9.09	-	-	51.89	-42.8
19	.696	9.43	Pk	0	10	19.43	56	-36.57	-	-
20	.684	-3.04	Av	0	10	6.96	-	-	46	-39.04
21	6.318	7.68	Pk	.1	10.2	17.98	60	-42.02	-	-
22	6.318	-.63	Av	.1	10.2	9.67	-	-	50	-40.33
23	26.271	14.19	Pk	.3	10.7	25.19	60	-34.81	-	-
24	26.622	1.41	Av	.3	10.7	12.41	-	-	50	-37.59

Pk - Peak detector
Av - Average detection