

TEST REPORT

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Project Number: G100457286

Report Issue Date: 7/25/2011

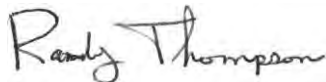
Product Designation: Model DE51

Standards: FCC 47 CFR Part 15.247
IC RSS 210: Issue 8:2010
IC RSS-GEN Issue 3:2010

Tested by:
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TABLE OF CONTENTS

1 Introduction and Conclusion 3

2 Test Summary 3

3 Description of Equipment Under Test..... 5

4 System setup including cable interconnection details, support equipment and simplified block diagram 9

5 Radiated Emissions – Fundamental Power & Harmonics of the Fundamental 11

6 Radiated Emissions – Unintentional and Spurious of the Transmitter 23

7 Band Edge Measurements – Unintentional and Spurious of the Transmitter..... 62

8 Unintentional Radiated Emissions - Receiver..... 67

9 6dB Bandwidth 81

10 Power Spectral Density (PSD)..... 85

11 Occupied Bandwidth (OBW)..... 90

12 AC Mains Conducted Emissions 96

13 Measurement Uncertainty..... 104

14 Duty Cycle Correction Factor..... 105

15 Revision History 106

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded **the product tested complies with the requirements of the standard(s) indicated**. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Test date	Result
5	Radiated Emissions – Field Strength of the Fundamental & Harmonics of the Fundamental – FCC 247(b)(3)(d)/15.205/209 (Covers RSS-210 A8.4(4) & A8.5)	07/15/2011	Pass
6	Radiated Emissions – Unintentional and Spurious of the Transmitter - FCC 15.209/15.247(d)/15.205 (Covers RSS-210 A8.5, & RSS-GEN 7.2.2)	07/18/2011 07/19/2011 07/21/2011 07/22/2011	Pass
7	Radiated Emissions – Unintentional and Spurious – Band Edge FCC 15.209/15.247(d)/15.205 (Covers RSS-210 A8.5, & RSS-GEN 7.2.2)	07/18/2011 07/19/2011	Pass
8	Radiated Emissions – Unintentional – Receiver FCC 5.209/15.247(d)/15.205 (Covers RSS-GEN Section 6)	07/18/2011 07/19/2011	Pass
9	6dB Bandwidth – FCC 15.247(a)(2) (Covers RSS-210 A8.2(a))	07/19/2011	Pass
10	Power Spectral Density (PSD) – FCC 15.247(e) (Covers RSS-210 A8.2(b))	07/19/2011	Pass
11	Occupied Bandwidth – RSS-GEN, Section 4.6.1	07/19/2011	Pass
12	AC Conducted Emissions – FCC 15.207 (Covers RSS-GEN Section 7.2.4)	07/19/2011	Pass

Notes:

- 1) Product FCC Model DE51 is also marketed as XiP110

2.1 Test Facility

Intertek Denver's testing facilities are located at 1795 Dogwood St. Suite 200 Louisville, CO 80027. The testing facility is ISO17025:2005 accredited by A2LA, our lab code is 2506.02, our VCCI registration numbers are. R-1643, C-1752 and T-1558, our FCC designation no. US1121 and our IC lab no. 2042N.

Testing contained in this test report may not be covered under the laboratories scope of accreditation. A note will be placed in the specific test section for testing not covered under the laboratories scope.

General Radio Remarks:

Testing was performed in 3 different orthogonal axes to determine the worst-case emissions from the device. The worst-case axis and emissions are shown in this report.

FCC CFR Part 15.31(e): For a product with an ac voltage supply, the ac voltage was varied between 85% and 115% of the nominal rated supply voltage to determine worst-case fundamental frequency level.

FCC CFR Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing measurements within this report.

Whenever possible the approved test procedures specified in ANSI C63.10 – 2009 for DTS devices were used for testing.

When the field strength (or envelope power) is not constant or when it pulses, and an average detector/limit is specified to be used, a duty cycle correction factor may be utilized to determine the pulsed “average” of the field strength or power.

The product tested was configured with an integral antenna – therefore all measurements are radiated field strength measurements. If antenna conducted port tests cannot be performed, radiated field strength measurements may be taken to demonstrate compliance with the various conducted port power requirements of FCC 15.247. When applicable, the following equation was utilized to covert measurements from conducted port power to radiated field strength for a given test distance.

Product-Specific Radio Remarks:

- 1) The manufacturer has declared an antenna gain of 0dBi.
- 2) The product has an integral on-board RF4CE antenna.
- 3) The product incorporates an RF transceiver which is a 802.15.4 standard compliant radio that operates in one of three channels (15, 20 and 25) in the 2.4GHz ISM frequency band. These three channels are at: 2.425GHz, 2.450GHz and 2.475GHz. The transceiver supports 250kbps O-QPSK data in 3.0MHz channels and full direct sequence spread-spectrum encode and decode.
- 4) Duty Cycle Correction Factors were not utilized in this testing and report per client request.

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

3 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
MoCa Converter Set-Top Box	EchoStar Technologies	DE51	EMC1

Receive Date:	07/15/2011
Received Condition:	Good
Type:	Production Sample

Description of Equipment Under Test (provided by client)

FCC Model DE51 Advance MoCa Converter Set-Top Box.

Product is designed to receive MoCa signals from a host device and convert the signal into composite Audio/Video (A/V).

The product provides the following signal outputs on the rear panel: composite audio/video, USB, HDMI and Ethernet.

AC Wall Adapter: LITEON Model: PB-1190-88ET, S/N: ETC152200F4, Input 100-120VAC/60Hz, 0.5A Output: 12VDC, 1.57A, 19W,

For remote control operations, the product is configured with a 2.4GHz RF4CE radio. The radio incorporates an internal antenna – 0dBi antenna gain.

Enclosure: Plastic

Product to be marketed and sold in the USA and Canada.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
Input: 100-120 VAC	0.5 A	60Hz	1

Operating modes of the EUT: Intentional Tx Testing

No.	Descriptions of EUT Exercising
1	Tx – Product set up in transmit mode at full power, CW mode
2	Tx – Product configured in continuous transmission with modulation/data transfer enabled.
3	Ethernet data transfer, USB data transfer and video output to all A/V connections

Operating modes of the EUT: Unintentional Rx Testing

No.	Descriptions of EUT Exercising
1	2.4GHz RF4CE Radio transmit function disabled.
2	Product configured in receive/standby mode for unintentional testing.
3	Product configured in receive/standby mode of operation - Ethernet data transfer, USB data transfer, Video output to all A/V ports/cables.

Clock Frequencies of the EUT:

No.	Descriptions of EUT Exercising
1	Lowest frequency used or generated in the product: 65kHz (AC adapter), 340kHz (main board)
2	Highest frequency used or generated in the product: 2.475GHz (High Channel Tx)

3.1 Product Photo:

Product Tested – Model: DE51



(MoCa Converter Set-Top Box)

Product Test Photo:

Product Back Panel Ports/Connectors



Cables used during testing

Product Photo:

AC Adapter – 12VDC Output

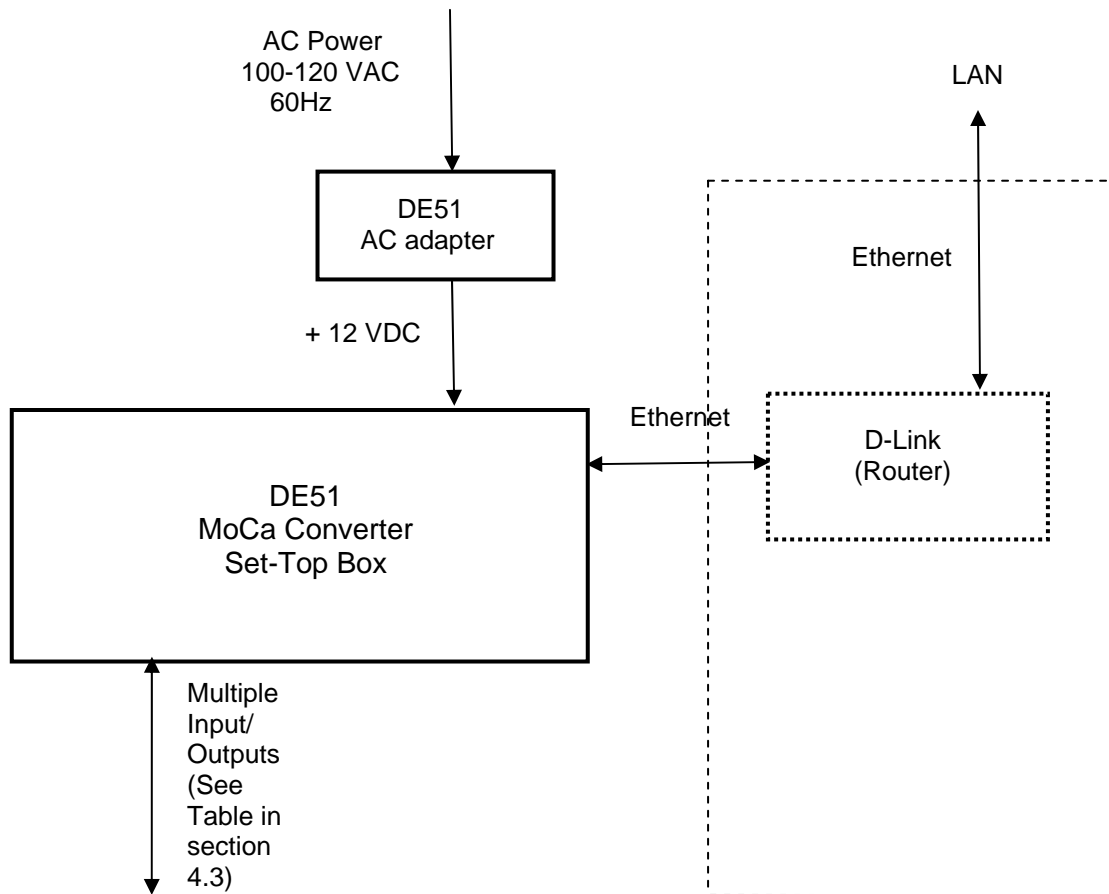


4 System setup including cable interconnection details, support equipment and simplified block diagram

4.1 Method:

Record the details of EUT cabling, document the support equipment, and show the interconnections in a block diagram.

4.2 EUT Block Diagram:



Note: Dashed lines indicate auxiliary/support equipment outside the test area

4.3 Support Data:

ID	Description/ Function	Shield Type	Length	Connector	Connection	Ferrites
1	AC Adapter DC Power Cable	None	1 meter	DC Power	DE51 Power In	Yes-Molded
2	Ethernet	None	3 meter	RJ-45	Router/Switch	No
3	USB	Foil	< 1 meter	USB	Terminator	No
4	Composite A/V Outputs	Braid	1 meter	RCA	Matched Impedance Loads	No
5	HDMI Digital Video Out	Foil	1 meter	HDMI	EDIDI Simulation Box	No
6	RF Coax Cable	Braid	> 3 meter	Type F	Terminator	No

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Router/Switch	D-Link	EBR-2310	----

Notes:

- 1) All product ports populated with appropriate cables. All cables terminated with an active load or typical device/peripheral.

5 Radiated Emissions – Fundamental Power & Harmonics of the Fundamental

5.1 Method

The test methods used comply with ANSI C63.10 . Unless otherwise stated no deviations were made from **FCC CFR47 15.247 & IC RSS-210**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

5.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	12/06/2010	12/06/2011
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	12/10/2010	12/10/2011
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	12/06/2010	12/06/2011
18913	Spectrum Analyzer	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/03/2011	06/03/2012
18906	Pre-Amplifier (1-4 GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/03/2011	06/03/2012
18900	RF Pre-Amplifier (4-8 GHz)	Avantek	AFT97-8434-10F	1007	06/03/2011	06/03/2012
18901	RF Pre-Amplifier (8-18 GHz)	Avantek	AWT-18037	1002	06/03/2011	06/03/2012
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011
18805	HF Antenna/Harmonic Mixer 18 GHz to 26.5 GHz	Hewlett-Packard	11970K	2332A01280	10/04/2010	10/04/2011
SW-6	Software application for Radiated and Conducted Emissions	Intertek	OATS_CVI	V.1.0	01/01/2011	01/01/2012

5.3 Results:

The sample tested was found to comply with the requirements of:

- FCC 247(b)(3) (d)/15.205/15.209
- RSS-210 A8.4(4) & A8.5

5.4 Setup Photographs:

Test setup – Field Strength Measurements (Front View)



Test setup – Field Strength Measurements (Rear View)



Test Axis Photos

Test Axis 1 (Product Flat on Table)



Test Axis 2 (Product Vertical)



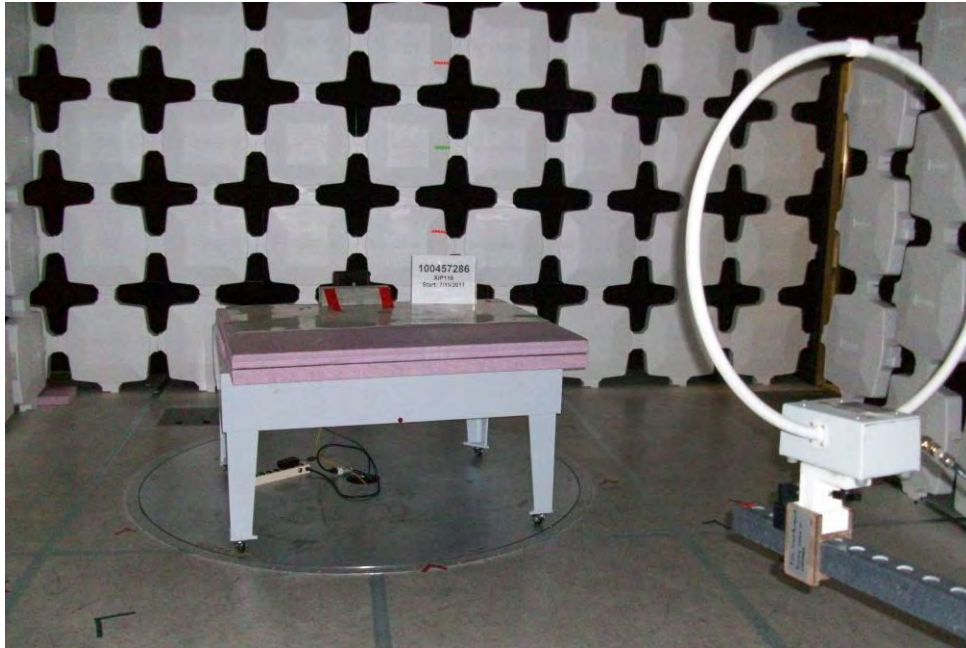
Test Axis 3 (Product Vertical and Rotated 90 degrees)



Axis 3 was determined to be the "worst-case" product orientation

Photo: Antenna Setups

Active Loop Antenna (9kHz to 30MHz)



BiLog Antenna (30MHz to 1000MHz)



Photo: Antenna Setups

Horn (1GHz – 18GHz)



HF Active Antenna/Harmonic Mixer (18GHz – 26.5GHz)



5.5 Test Data: AC Variation – Fundamental Frequency

Radiated Electromagnetic Emissions

Test Report #: <u>AC Voltage Variation Run 01</u>	Test Area: <u>CC1 Radiated</u>	Temperature: <u>23.4</u> °C
Test Method: <u>FCC 15.31(e)</u>	Test Date: <u>27-Jul-2011</u>	Relative Humidity: <u>34.9</u> %
EUT Model #: <u>DE51 (XiP110)</u>	EUT Power: <u>120VAC/60Hz</u>	Air Pressure: <u>83.1</u> kPa
EUT Serial #: <u>EMC1</u>		
Manufacturer: <u>Echostar</u>		
EUT Description: <u>MoCa Converter Set-Top Box</u>		
Notes: _____		

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	N/A	N/A
AC @ Nominal Voltage: 120VAC/60Hz						
2450.06	64.5 Pk	3.6 / 29.6 / 0.0	97.7	V / 1.0 / 0.0	N/A	N/A
AC @ 115% Nominal Voltage: 138VAC/60Hz						
2450.06	64.4 Pk	3.6 / 29.6 / 0.0	97.6	V / 1.0 / 0.0	N/A	N/A
AC @ 85% Nominal Voltage: 102VAC/60Hz						
2450.06	64.1 Pk	3.6 / 29.6 / 0.0	97.3	V / 1.0 / 0.0	N/A	N/A

Conclusion:

There is no significant difference in the radiated field strength of the fundamental frequency with respect to varying the ac voltage. Therefore, all measurements will be taken using the nominal rated voltage of the product.

Intertek

Report Number: 100457286DEN-002

Issued: 7/25/2011

5.6 Test Data: Fundamental Power & Harmonics of the Fundamental

Fundamental Power and Spurious of the Transmitter

Test Report #: 100457286	Test Area: CC1 Radiated (3m)	Temperature: 23.4 °C
Test Method: FCC 15.247	Test Date: 15-July-2011 19-July-2011	Relative Humidity: 27.1 %
EUT Model #: DE51 (ViP110)	EUT Power: 115VAC/60Hz	Air Pressure: 82.7 kPa
EUT Serial #: EMC1		

Manufacturer: Echostar	Level Key
EUT Description: MoCa Converter Set-Top Box	Pk – Peak
Notes: Product transmitting full power CW	Qp – QuasiPeak
Note: Product configured specifically for this test – not normal operation	Av - Average

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit FCC 15.247	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Duty Cycle Correction Factor not utilized per client request. All measurements Peak Detector.								
Part 15.247 and 15.205 Respectively								
Fundamental Measurements								
Fundamental - Low Channel – Axis 1 (EUT Flat on Table)								
2425.06	67.0 Pk	3.5 / 29.5 / 0.0	100.1	H / 1.1 / 348.0	0.0	100.1	125.2	-25.1
2425.06	65.3 Pk	3.5 / 29.5 / 0.0	98.4	V / 2.4 / 82.0	0.0	98.4	125.2	-26.8
Axis 2 (EUT Vertical)								
2425.07	61.8 Pk	3.5 / 29.5 / 0.0	94.8	H / 1.5 / 265.0	0.0	94.8	125.2	-30.4
2425.07	62.0 Pk	3.5 / 29.5 / 0.0	95.1	V / 1.3 / 312.0	0.0	95.1	125.2	-30.1
Axis 3 (EUT Vertical & Rotated 90 degrees)								
2425.06	66.6 Pk	3.5 / 29.5 / 0.0	99.7	H / 1.6 / 353.8	0.0	99.7	125.2	-25.5
2425.06	60.5 Pk	3.5 / 29.5 / 0.0	93.6	V / 3.2 / 114.9	0.0	93.6	125.2	-31.6
Fundamental - Mid Channel – Axis 1 (EUT Flat on Table)								
2450.06	65.2 Pk	3.6 / 29.6 / 0.0	98.4	V / 2.3 / 84.0	0.0	98.4	125.2	-26.8
2450.06	65.5 Pk	3.6 / 29.6 / 0.0	98.7	H / 1.2 / 62.0	0.0	98.7	125.2	-26.5
Axis 2 (EUT Vertical)								
2450.06	62.4 Pk	3.6 / 29.6 / 0.0	95.6	V / 1.2 / 283.2	0.0	95.6	125.2	-29.6
2450.06	58.0 Pk	3.6 / 29.6 / 0.0	91.2	H / 3.0 / 285.2	0.0	91.2	125.2	-34.0
Axis 3 (EUT Vertical & Rotated 90 degrees)								
2450.06	67.8 Pk	3.6 / 29.6 / 0.0	100.9	H / 3.0 / 285.2	0.0	100.9	125.2	-24.3
2450.06	61.2 Pk	3.6 / 29.6 / 0.0	94.4	V / 3.1 / 294.0	0.0	94.4	125.2	-30.8
Fundamental - High Channel – Axis 1 (EUT Flat on Table)								
2475.06	64.7 Pk	3.6 / 29.7 / 0.0	98.0	H / 1.1 / 345.0	0.0	98.0	125.2	-27.2
2475.06	63.7 Pk	3.6 / 29.7 / 0.0	97.0	V / 2.3 / 80.0	0.0	97.0	125.2	-28.2
Axis 2 (EUT Vertical)								

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit FCC 15.247	DELTA
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
2475.06	61.2 Pk	3.6 / 29.7 / 0.0	94.6	V / 1.3 / 312.0	0.0	94.6	125.2	-30.6
2475.06	59.5 Pk	3.6 / 29.7 / 0.0	92.8	H / 1.8 / 264.0	0.0	92.8	125.2	-32.4
Axis 3 (EUT Vertical & Rotated 90 degrees)								
2475.06	61.5 Pk	3.6 / 29.7 / 0.0	94.8	V / 2.1 / 294.2	0.0	94.8	125.2	-30.4
2475.06	65.8 Pk	3.6 / 29.7 / 0.0	99.1	H / 1.5 / 51.0	0.0	99.1	125.2	-26.1

Note: Worst-Case Fundamental Measurement – Mid Channel – Axis 3: 100.9 dBuV/m (24.3 dBuV below Limit)

Electric Field to Power Conversion

From FCC KDB 558074 – Alternative Test Procedures.

If antenna conducted tests cannot be performed on this device, radiated tests to show compliance with the peak output power limit specified in Section 15.247(b) and the spurious RF conducted emission limit specified in Section 15.247(c) are acceptable. As stated previously, a pre-amp, and, in the latter case, a high pass filter, are required for the following measurements.

- 1) Calculate the transmitter's peak power using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where: E is the measured maximum fundamental field strength in V/m, utilizing a RBW ≥ the 6dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.10-2009 with respect to maximizing the emission.

G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.

d is the distance in meters from which the field strength was measured.

P is the power in watts for which you are solving:

$$P = \frac{(E*d)^2}{30G}$$

In this case:

E = 100.9 dB/uV (from above mid channel - axis 3) = 0.11092 V/m

D = 3- meters

G = 1 (declared by manufacturer)

P = 0.00369 W

Limit from 15.247(b)(3) = 1.0 W

Delta from Limit = 0.00369 – 1.0 = -0.99631 W

Conversion of RF Port Output Power of the Fundamental Limit to Radiated Field Strength Limit

When limits are defined as conducted port power measurements and the product has an integral antenna, radiated field strength tests to demonstrate compliance are acceptable per FCC 15.247.

The following equation was used to convert RF Port Power (Watts) limit into a Radiated Field Strength (dBuV/m) limit:

$$P = \frac{(E*d)^2}{30G}$$

Therefore:

$$E = \frac{\sqrt{30PG}}{d}$$

Power Limit Fundamental Frequency = 1 W = 1.82574 V/m = 125.23 dBuV/m

Where:

E = Measured Field Strength in V/m (converted to dBuV/m in test data)

P = 1 Watt Fundamental Limit

G = Numeric Gain of transmitting antenna over an ideal isotropic radiator = 1 (declared by manufacturer)

d = EUT-to-Antenna Test Distance = 3-meters

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

Harmonics of the Fundamental

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit FCC 15.247	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Harmonics of the Fundamental - Worst-Case Axis 3 – FCC Restricted Bands are Highlighted in Yellow								
Harmonics - Low Channel								
4850.11	40.6 Pk	5.2 / 35.0 / 39.2	41.6	V / 1.5 / 242.0	0.0	41.6	54.0	-12.4
4850.11	45.5 Pk	5.2 / 35.0 / 39.2	46.5	H / 2.3 / 188.0	0.0	46.5	54.0	-7.5
7275.17	31.7 Pk	6.4 / 38.7 / 39.6	37.2	H / 1.3 / 264.0	0.0	37.2	54.0	-16.8
7275.17	30.9 Pk	6.4 / 38.7 / 39.6	36.4	V / 1.4 / 212.0	0.0	36.4	54.0	-17.6
9700.24	36.9 Pk	7.6 / 40.8 / 47.9	37.5	V / 1.9 / 121.3	0.0	37.5	80.1	-42.6
9700.24	35.6 Pk	7.6 / 40.8 / 47.9	36.1	H / 1.3 / 263.7	0.0	36.1	80.1	-44.0
12125.3	25.8 Pk	8.8 / 40.8 / 45.4	30.0	H / 1.4 / 0.0	0.0	30.0	54.0	-24.0
12125.3	25.9 Pk	8.8 / 40.8 / 45.4	30.1	V / 1.2 / 267.6	0.0	30.1	54.0	-23.9
14550.4	30.7 Pk	9.5 / 42.9 / 47.5	35.6	V / 1.6 / 20.4	0.0	35.6	80.1	-44.5
14550.4	30.4 Pk	9.5 / 42.9 / 47.5	35.3	H / 1.4 / 322.3	0.0	35.3	80.1	-44.8
16975.4	30.4 Pk	10.5 / 43.4 / 47.2	37.1	V / 1.9 / 123.0	0.0	37.1	80.1	-43.0
16975.4	32.8 Pk	10.5 / 43.4 / 47.2	39.5	H / 1.9 / 39.0	0.0	39.5	80.1	-40.6
19600.5	10.0 Pk	0.0 / 22.0 / 0.0	32	H / 1.0 / 0.0	0.0	32.0	54.0	-22.0
19600.5	9.5 Pk	0.0 / 22.0 / 0.0	31.5	V / 1.0 / 0.0	0.0	31.5	54.0	-22.5
22050.5	9.8 Pk	0.0 / 21.3 / 0.0	31.1	H / 1.0 / 0.0	0.0	31.1	80.1	-49.0
22050.5	9.5 Pk	0.0 / 21.3 / 0.0	30.9	V / 1.0 / 0.0	0.0	30.9	80.1	-49.2
24500.6	9.5 Pk	0.0 / 21.7 / 0.0	31.2	H / 1.0 / 0.0	0.0	31.2	80.1	-48.9
24500.6	11.1 Pk	0.0 / 21.7 / 0.0	32.8	V / 1.0 / 0.0	0.0	32.8	80.1	-47.3
Harmonics - Mid Channel								
4900.12	43.3 Pk	5.2 / 35.1 / 39.2	44.5	V / 1.3 / 284.0	0.0	44.5	54.0	-9.5
4900.12	47.2 Pk	5.2 / 35.1 / 39.2	48.4	H / 1.9 / 148.0	0.0	48.4	54.0	-5.6
7350.18	33.1 Pk	6.5 / 38.7 / 39.4	38.9	H / 1.4 / 48.0	0.0	38.9	54.0	-15.1
7350.18	32.5 Pk	6.5 / 38.7 / 39.4	38.3	V / 1.3 / 306.0	0.0	38.3	54.0	-15.7
9800.24	33.0 Pk	7.7 / 40.8 / 48.0	33.4	H / 1.0 / 254.0	0.0	33.4	80.9	-47.5
9800.24	33.0 Pk	7.7 / 40.8 / 48.0	33.5	V / 1.8 / 0.0	0.0	33.5	80.9	-47.4
12250.3	26.2 Pk	8.8 / 41.0 / 45.2	30.8	V / 1.0 / 174.7	0.0	30.8	54.0	-23.2
12250.3	25.7 Pk	8.8 / 41.0 / 45.2	30.3	H / 1.0 / 60.0	0.0	30.3	54.0	-23.7
14700.4	30.1 Pk	9.5 / 43.2 / 47.4	35.4	H / 1.6 / 162.0	0.0	35.4	80.9	-45.5
14700.4	30.6 Pk	9.5 / 43.2 / 47.4	35.8	V / 1.6 / 305.5	0.0	35.8	80.9	-45.1
17150.4	27.9 Pk	10.6 / 44.0 / 46.6	36.0	V / 1.7 / 0.0	0.0	36.0	80.9	-44.9
17150.4	29.2 Pk	10.6 / 44.0 / 46.6	37.2	H / 1.9 / 136.0	0.0	37.2	80.9	-43.7
19400.5	11.8 Pk	0.0 / 22.2 / 0.0	34	V / 1.0 / 0.0	0.0	34.0	54.0	-20.0
19400.5	11.2 Pk	0.0 / 22.2 / 0.0	33.4	H / 1.0 / 0.0	0.0	33.4	54.0	-20.6
21825.5	11.7 Pk	0.0 / 21.4 / 0.0	33.1	V / 1.0 / 0.0	0.0	33.1	54.0	-20.9
21825.5	9.9 Pk	0.0 / 21.4 / 0.0	31.3	H / 1.0 / 0.0	0.0	31.3	54.0	-22.7
24250.6	9.8 Pk	0.0 / 21.5 / 0.0	31.2	V / 1.0 / 0.0	0.0	31.2	80.9	-49.7
24250.6	11.7 Pk	0.0 / 21.5 / 0.0	33.1	H / 1.0 / 0.0	0.0	33.1	80.9	-47.8

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

Harmonics - High Channel								
4950.12	42.4 Pk	5.2 / 35.3 / 39.1	43.7	V / 1.6 / 262.0	0.0	43.7	54.0	-10.3
4950.12	42.3 Pk	5.2 / 35.3 / 39.1	43.6	H / 1.7 / 298.0	0.0	43.6	54.0	-10.4
7425.18	33.7 Pk	6.5 / 38.8 / 39.4	39.6	H / 1.7 / 298.0	0.0	39.6	54.0	-14.4
7425.18	32.8 Pk	6.5 / 38.8 / 39.4	38.7	V / 1.2 / 82.0	0.0	38.7	54.0	-15.3
9900.24	34.8 Pk	7.7 / 40.8 / 48.1	35.2	V / 1.3 / 28.0	0.0	35.2	79.1	-43.9
9900.24	34.6 Pk	7.7 / 40.8 / 48.1	35.0	H / 1.3 / 112.0	0.0	35.0	79.1	-44.1
12375.3	25.9 Pk	8.9 / 41.2 / 45.0	30.9	H / 1.2 / 42.0	0.0	30.9	54.0	-23.1
12375.3	25.3 Pk	8.9 / 41.2 / 45.0	30.3	V / 1.2 / 92.0	0.0	30.3	54.0	-23.7
14850.4	30.9 Pk	9.6 / 43.4 / 47.4	36.4	V / 1.4 / 212.0	0.0	36.4	79.1	-42.7
14850.4	29.4 Pk	9.6 / 43.4 / 47.4	34.9	H / 1.4 / 136.0	0.0	34.9	79.1	-44.2
17325.4	31.0 Pk	10.7 / 44.4 / 45.9	40.2	H / 1.3 / 46.0	0.0	40.2	79.1	-38.9
17325.4	29.8 Pk	10.7 / 44.4 / 45.9	38.9	V / 1.3 / 46.0	0.0	38.9	79.1	-40.2
19800.5	11.6 Pk	0.0 / 21.8 / 0.0	33.4	V / 1.0 / 0.0	0.0	33.4	54.0	-20.6
19800.5	9.5 Pk	0.0 / 21.8 / 0.0	31.3	H / 1.0 / 0.0	0.0	31.3	54.0	-22.7
22275.5	8.8 Pk	0.0 / 21.1 / 0.0	29.9	V / 1.0 / 0.0	0.0	29.9	54.0	-24.1
22275.5	14.1 Pk	0.0 / 21.1 / 0.0	35.2	H / 1.0 / 0.0	0.0	35.2	54.0	-18.8
24750.6	9.8 Pk	0.0 / 21.6 / 0.0	31.5	V / 1.0 / 0.0	0.0	31.5	79.1	-47.6
24750.6	10.7 Pk	0.0 / 21.6 / 0.0	32.3	H / 1.0 / 0.0	0.0	32.3	79.1	-46.8

Notes:

1. Worst-Case Harmonic within FCC Restricted Band: Mid Channel 48.4 dBuV/m (5.6 dBuV below FCC 15.209 Limit)

2. Worst-Case Harmonic outside the FCC Restricted Band: High Channel 40.2 dBuV/m (38.9 dBuV below 20dBc Limit)

3. All harmonic measurements made with a RBW=1MHz and VBW=3MHz.

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

Example calculation for Intentional Radiated Emissions:

Measured Level	+	Transducer, Cable Loss Pre-Amplifier	=	Corrected Reading	-	Duty Cycle Correction	=	FINAL Measurement	-	Specification Limit	=	Delta from Specification Limit
(dB μ V)		(dB)		(dB μ V/m)		(dB μ V/m)		(dB μ V/m)		(dB μ V/m)		
24.0		14.9		38.9		10.0		28.9		40.0		-11.1

Notes:

- 1) All above measurements are Radiated Field Strength measurements.
- 2) All measurements taken using a peak detector – no duty cycle correction is applicable to this product.
- 3) All measurements 10kHz to 18GHz taken at a 3-meter product-to-antenna test distance. All measurements above 18GHz are taken at a 1-meter product-to-antenna test distance then extrapolated to 3m. The FCC limits were not altered.
- 4) HF active horn antenna/harmonic mixer combination used for frequencies above 18GHz. Note cable loss and antenna factors are combined into a single correction factor during calibration.

Deviations, Additions, or Exclusions: None

6 Radiated Emissions – Unintentional and Spurious of the Transmitter

6.1 Method

The test methods used comply with ANSI C63.10. Unless otherwise stated no deviations were made from **FCC 15.247 & IC RSS-210**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

6.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	12/06/2010	12/06/2011
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	12/10/2010	12/10/2011
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	12/06/2010	12/06/2011
18913	Spectrum Analyzer	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/03/2011	06/03/2012
18906	Pre-Amplifier (1-4 GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/03/2011	06/03/2012
18900	RF Pre-Amplifier (4-8 GHz)	Avantek	AFT97-8434-10F	1007	06/03/2011	06/03/2012
18901	RF Pre-Amplifier (8-18 GHz)	Avantek	AWT-18037	1002	06/03/2011	06/03/2012
18897	Magnetic loop antenna 10kHz-30MHz	EMCO	6502	9205-2738	11/18/2010	11/18/2011
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	10/11/2010	10/11/2011
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011
18805	HF Active Antenna/Harmonic Mixer 18 GHz to 26.5 GHz	Hewlett-Packard	11970K	2332A01280	10/04/2010	10/04/2011
SW-6	Software application for Radiated and Conducted Emissions	Intertek	OATS_CVI	V.1.0	01/01/2011	01/01/2012

6.3 Results:

The sample tested was found to comply with the requirements of:

- FCC 15.209/ 15.247(d)
- Covers RSS-210 A8.5, & RSS-GEN 7.2.2

6.4 Setup Photographs:

Test setup – Field Strength Measurements (Front View)



Test setup – Field Strength Measurements (Rear View)

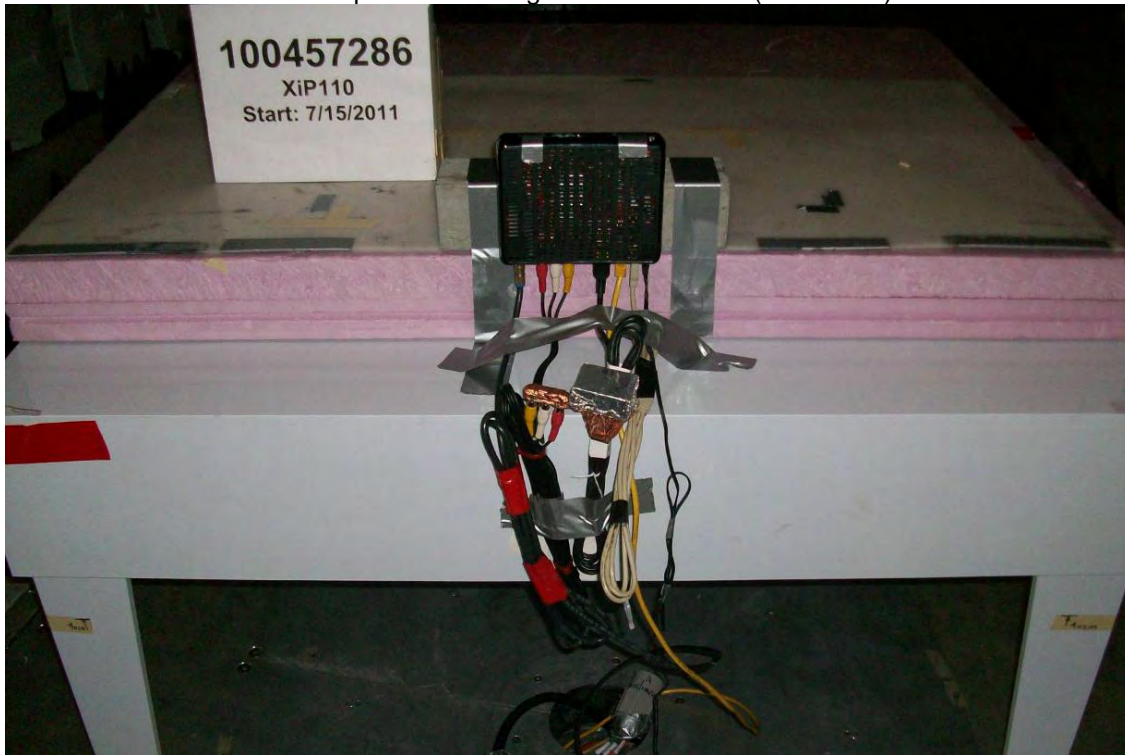
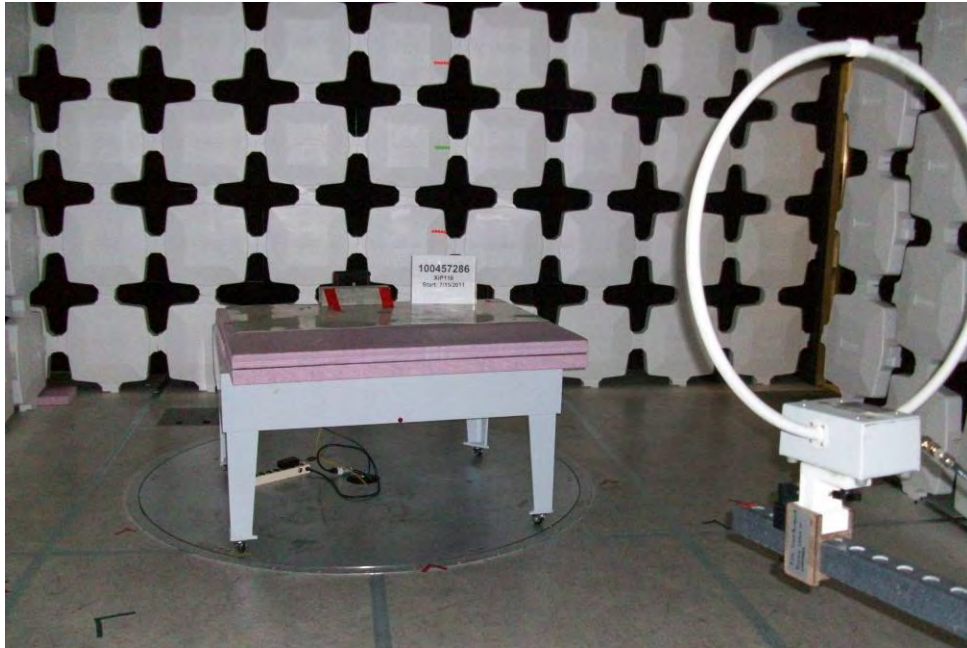


Photo: Antenna Setups

Active Loop Antenna (9kHz to 30MHz)



BiLog Antenna (30MHz to 1000MHz)

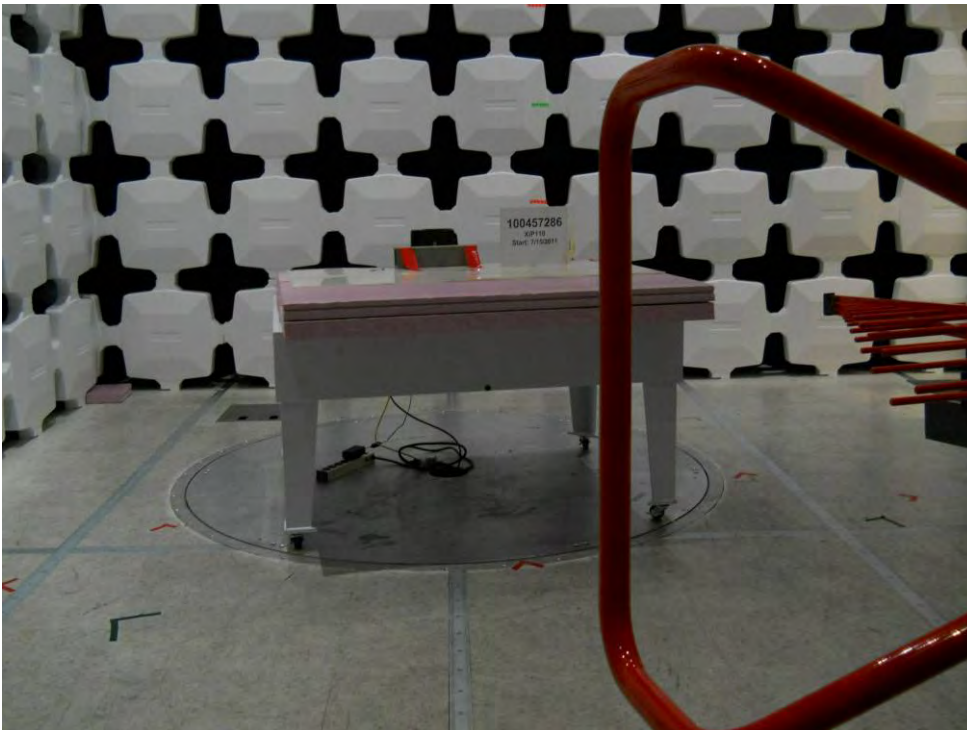


Photo: Antenna Setups

Horn (1GHz – 18GHz)

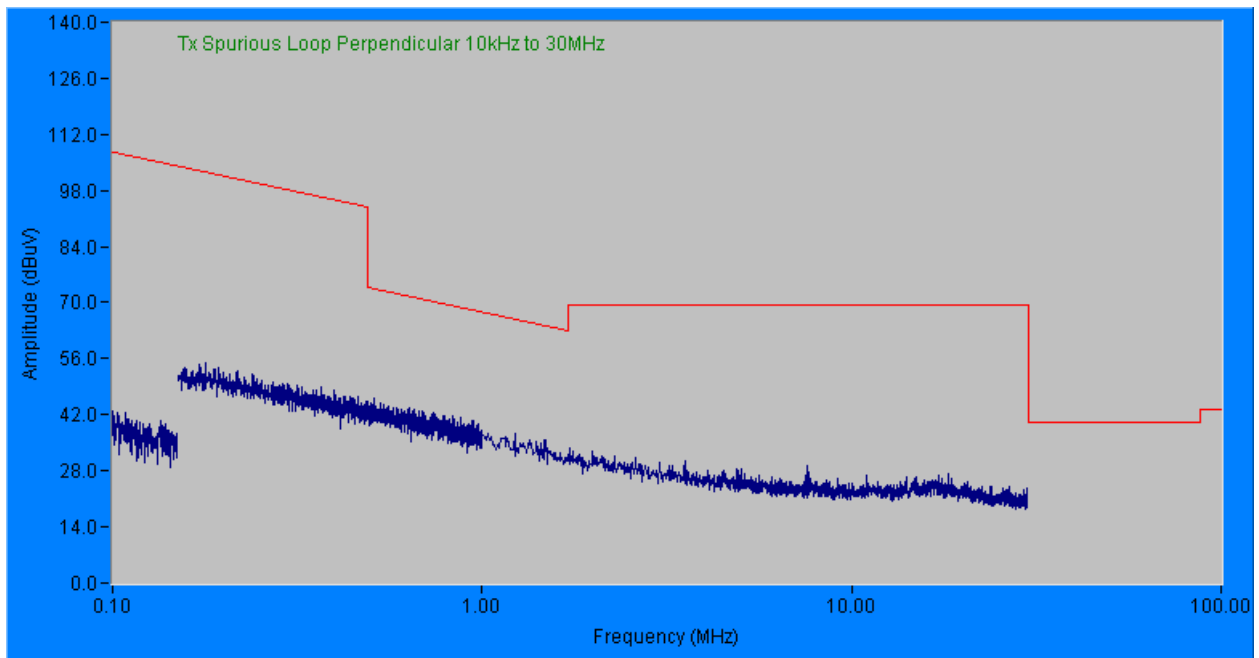
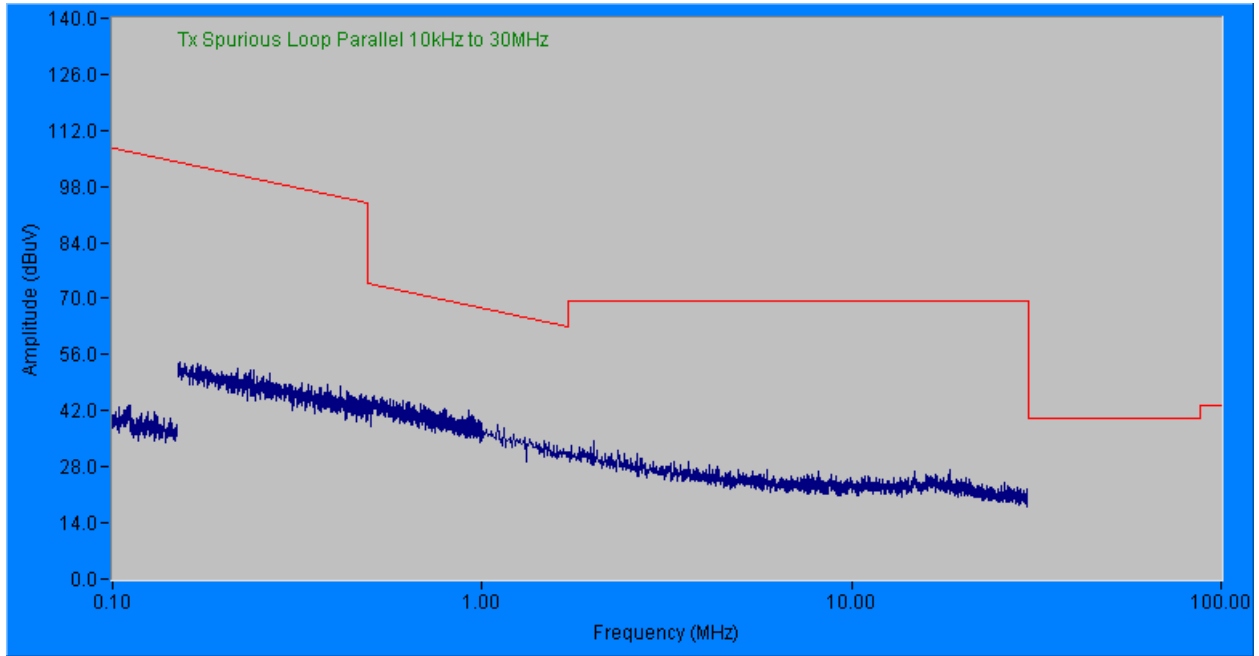


HF Active Antenna/Harmonic Mixer (18GHz – 26.5GHz)



6.5 Plots: Pre-Scan Peak Measurements – Not Final Data – Tx Low Channel

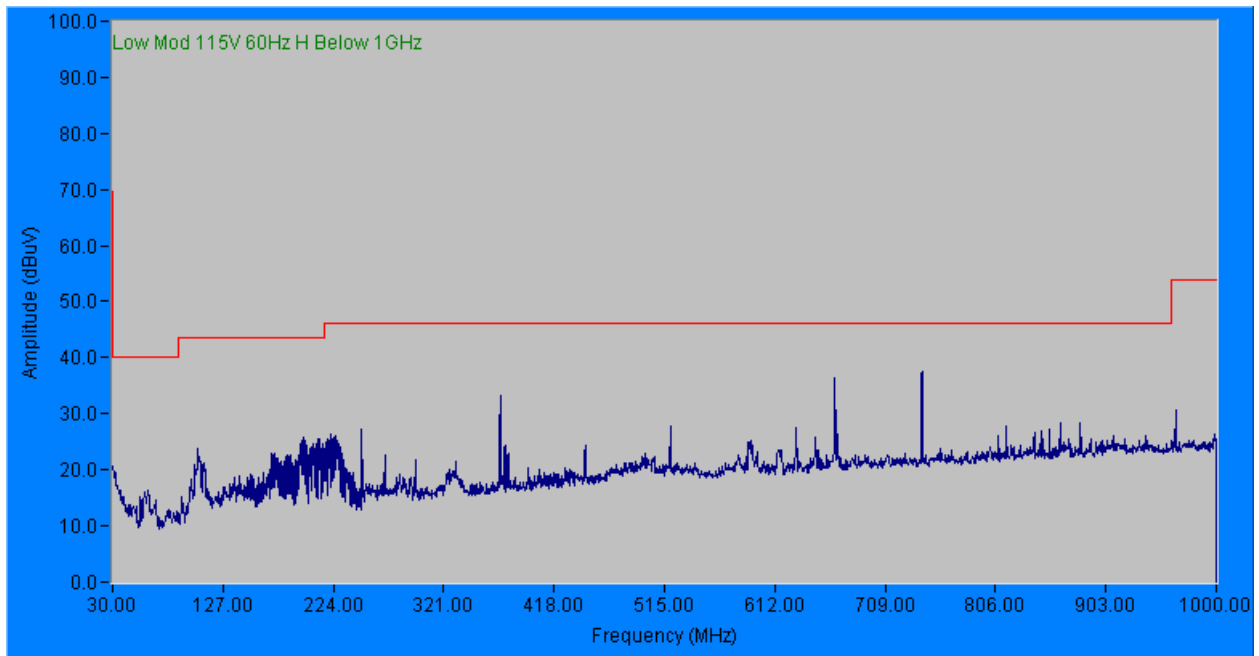
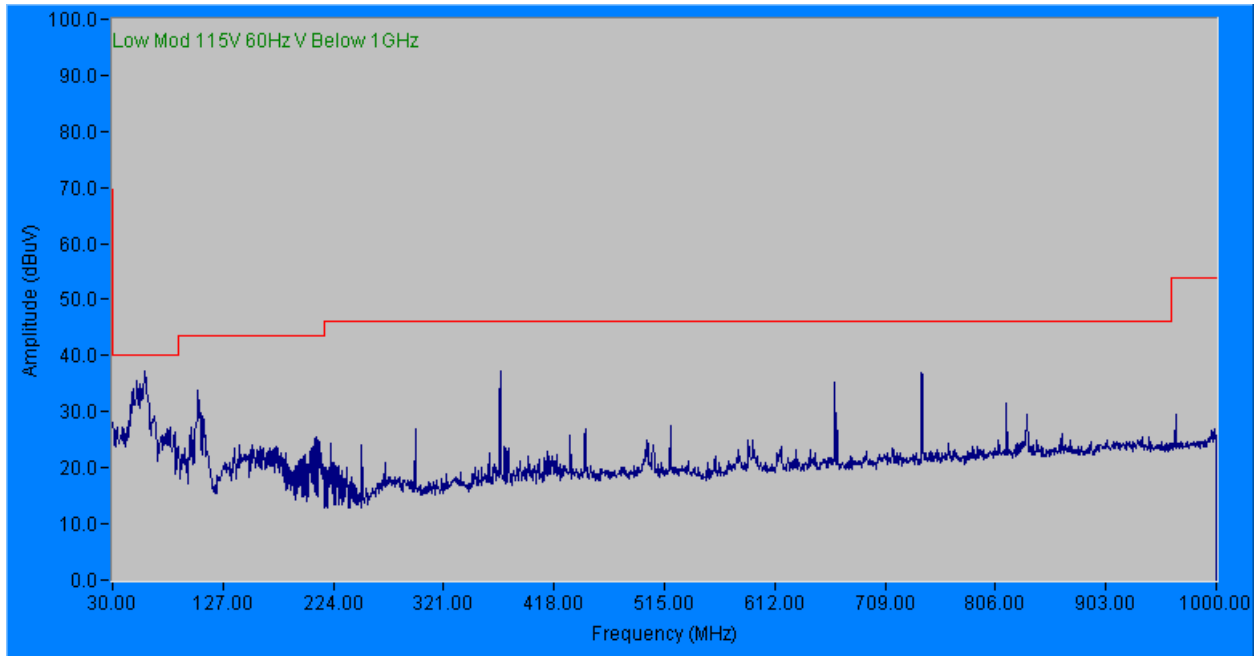
Radiated Emissions – FCC 15.209 (10kHz to 30MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Tx Low Channel

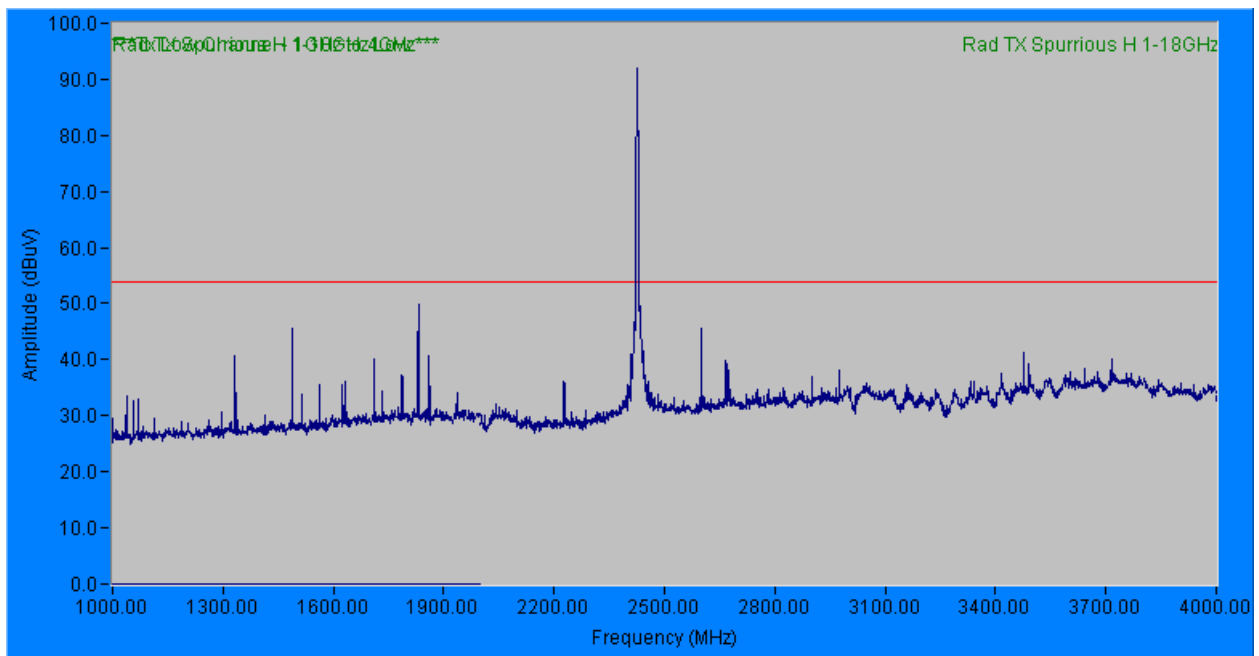
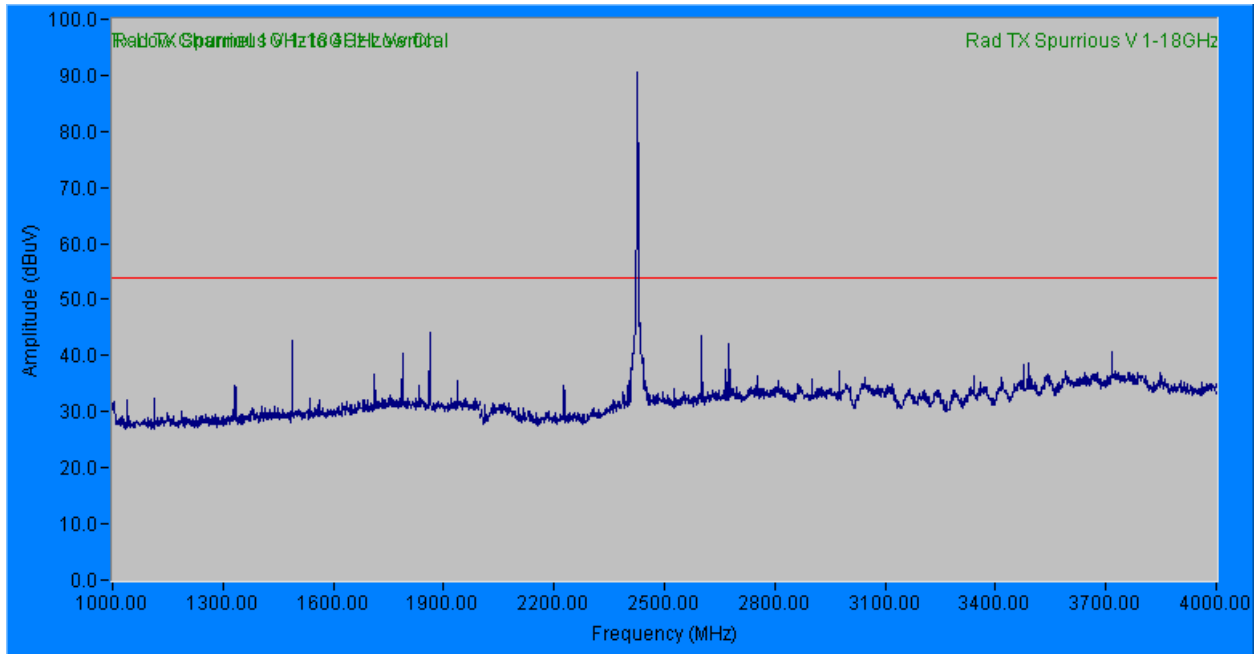
Radiated Emissions – FCC 15.209 (30MHz to 1000MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Low Channel

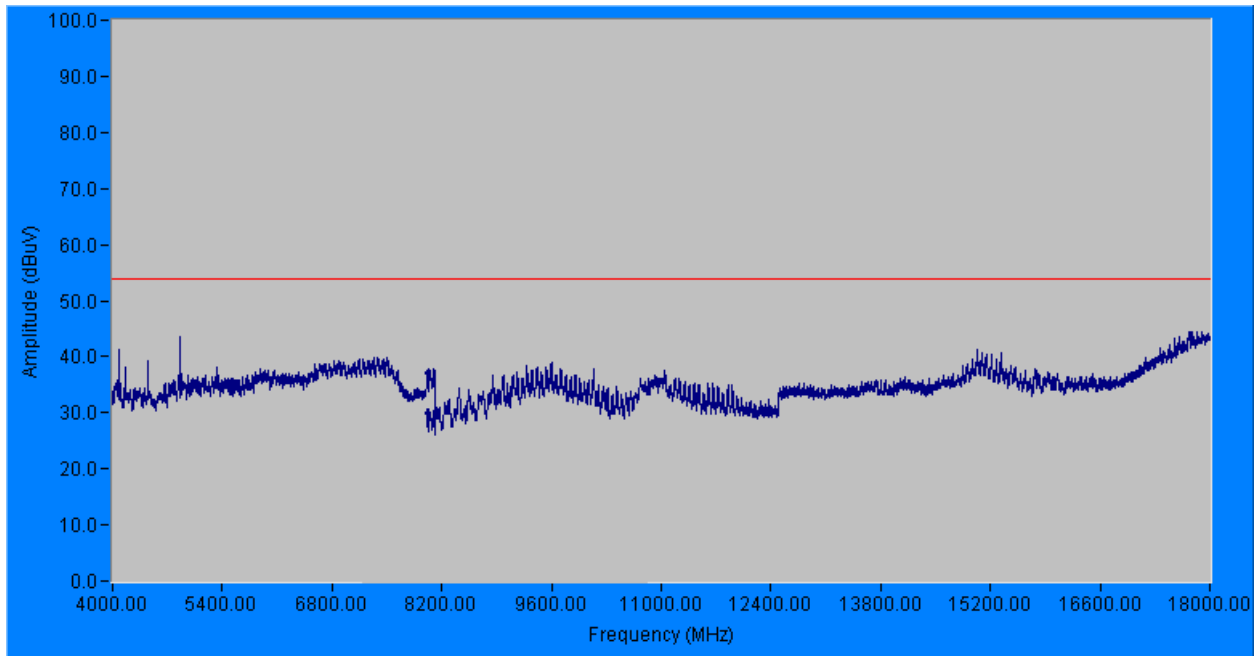
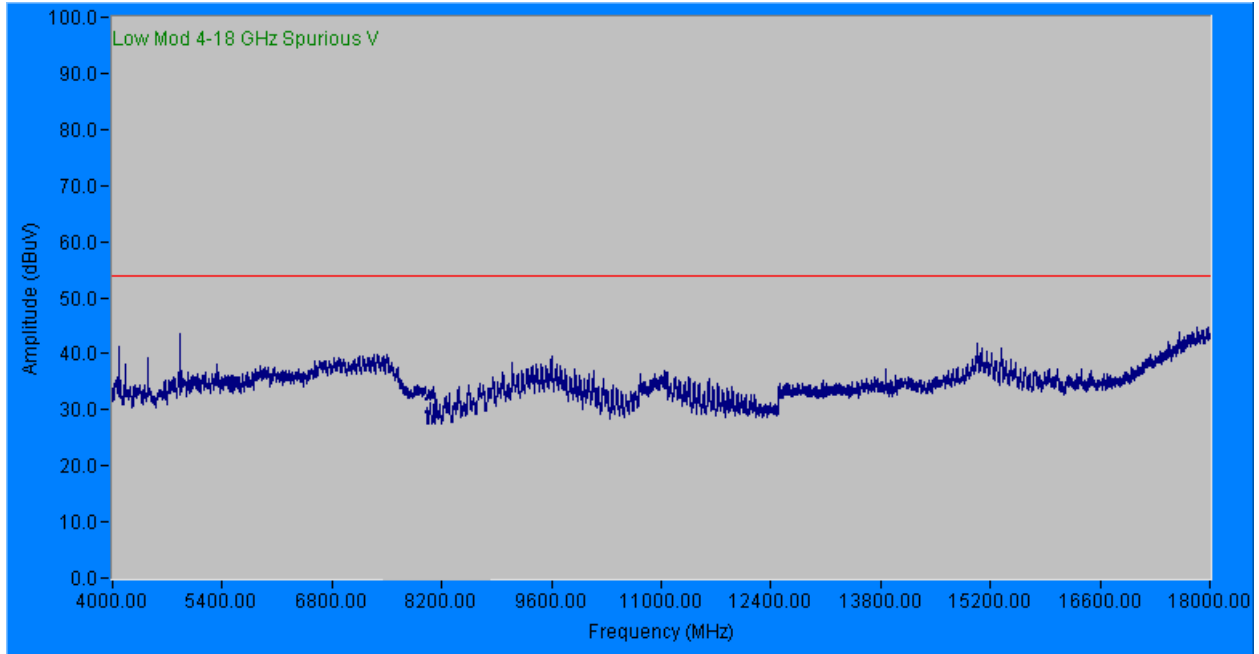
Radiated Emissions – FCC 15.209 (1GHz to 4GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Low Channel

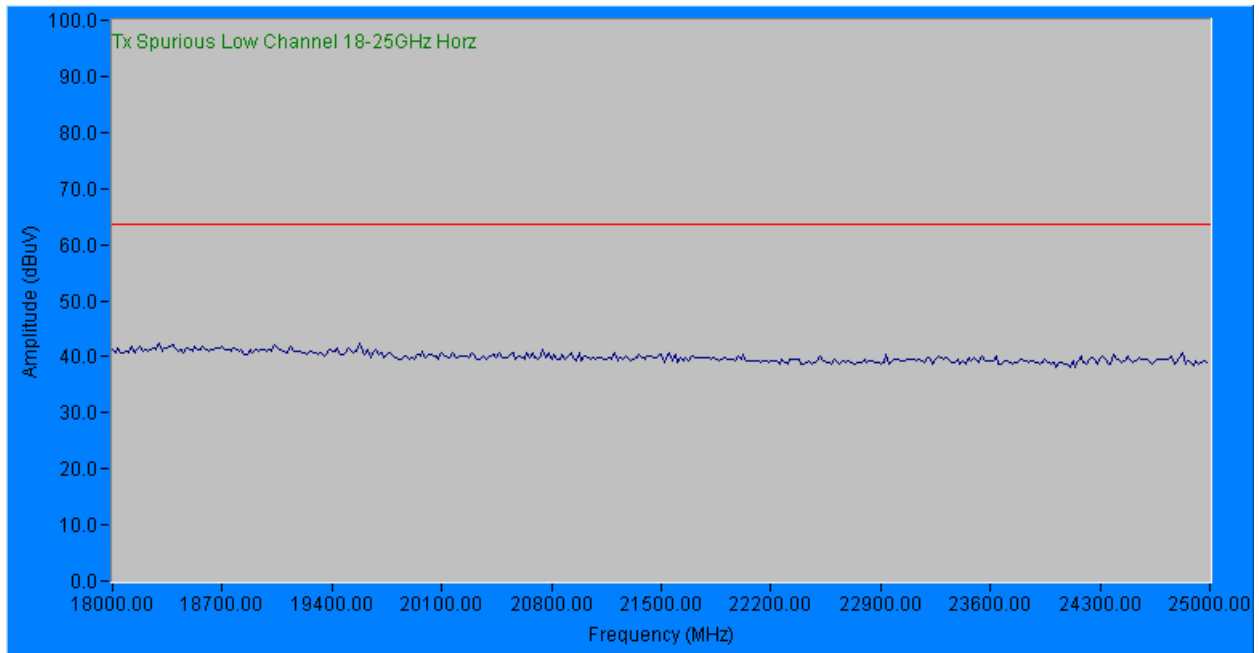
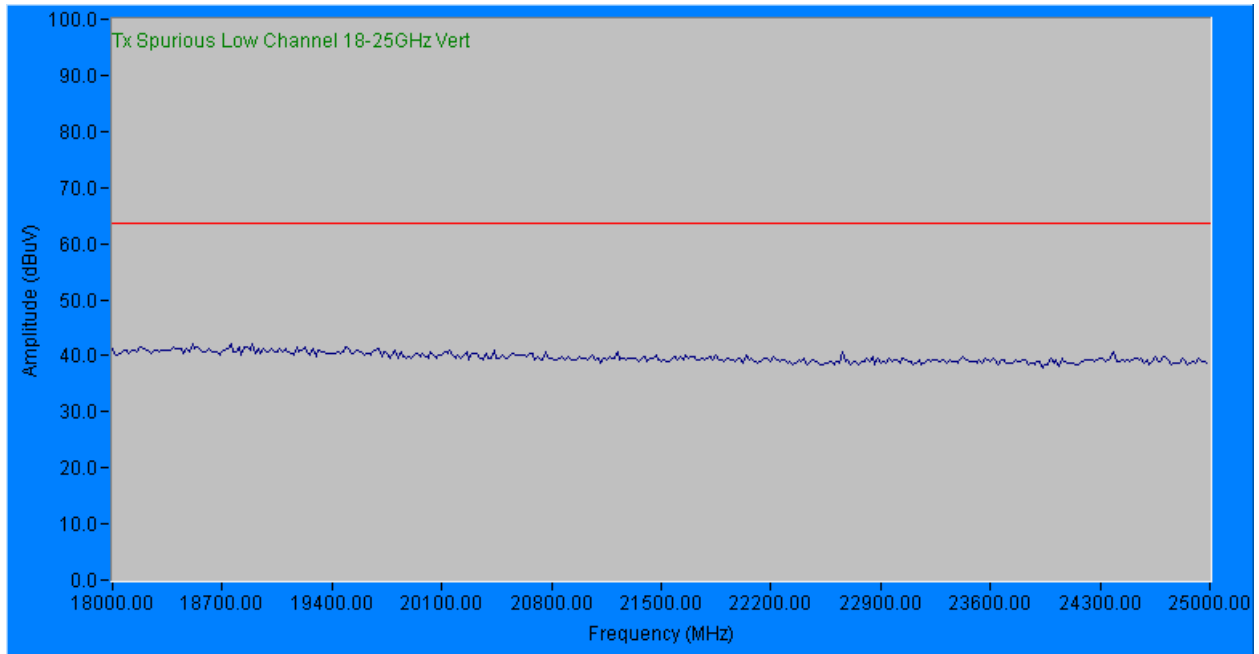
Radiated Emissions – FCC 15.209 (4GHz to 18GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Low Channel

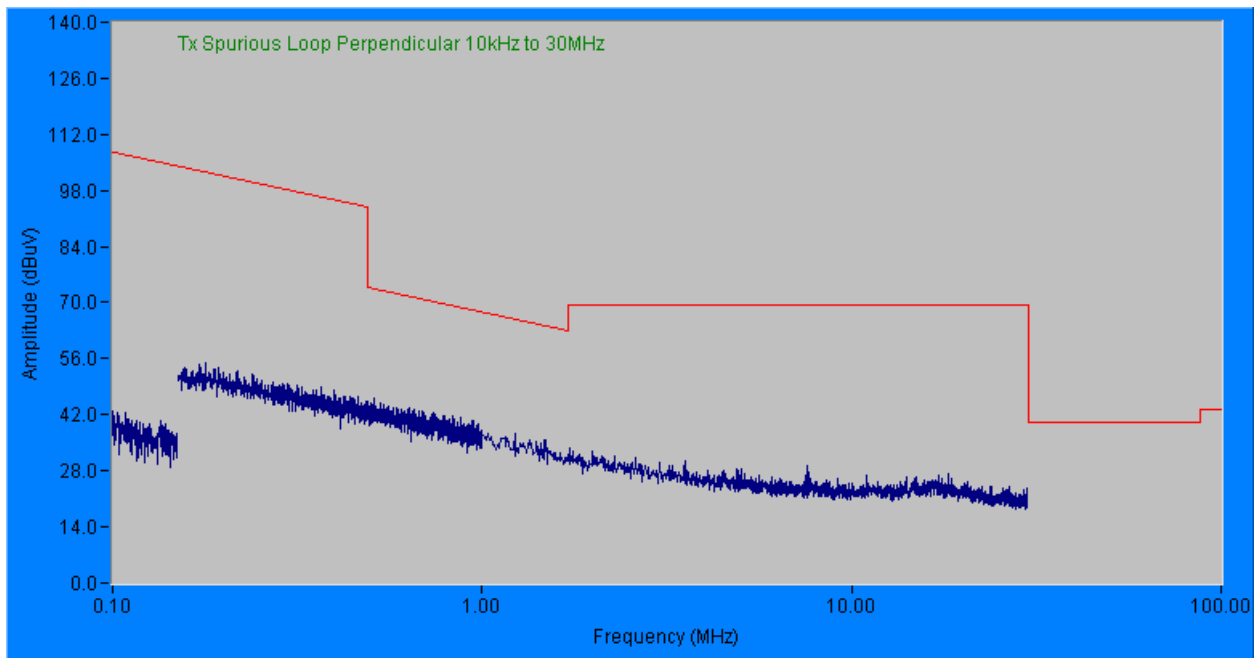
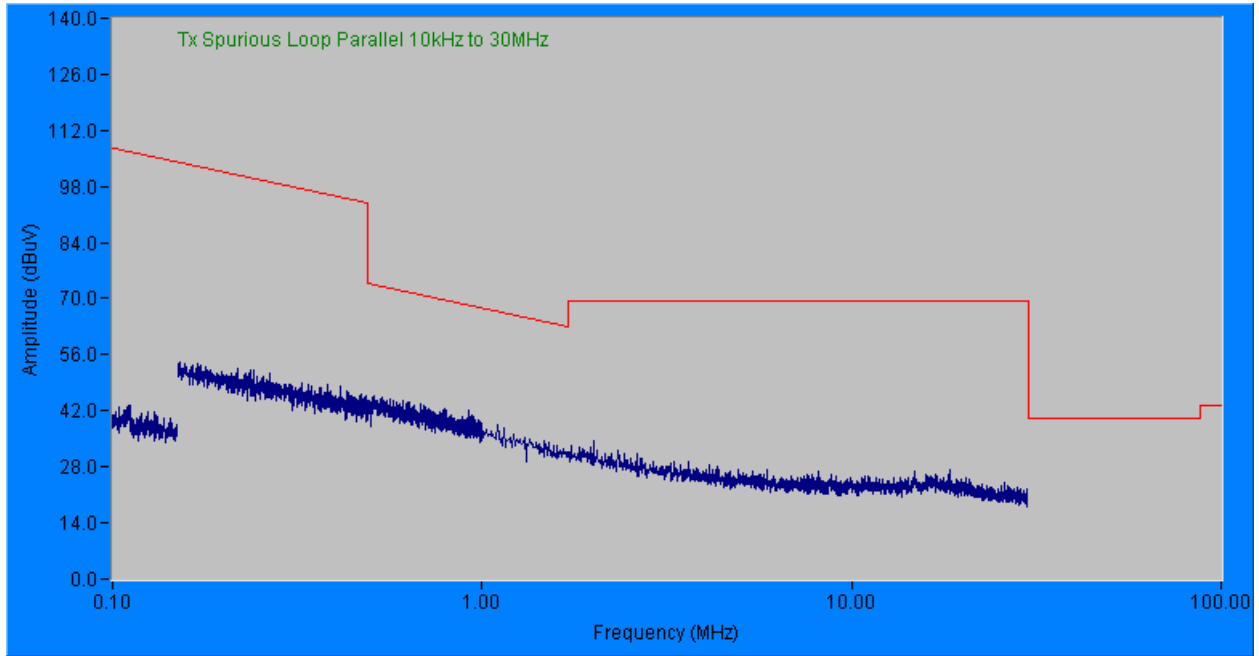
Radiated Emissions – FCC 15.209 (18GHz to 25GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit (extrapolated from 3-meter to 1-meter test distance)

6.6 Plots: Pre-Scan Peak Measurements – Not Final Data – Tx Mid Channel

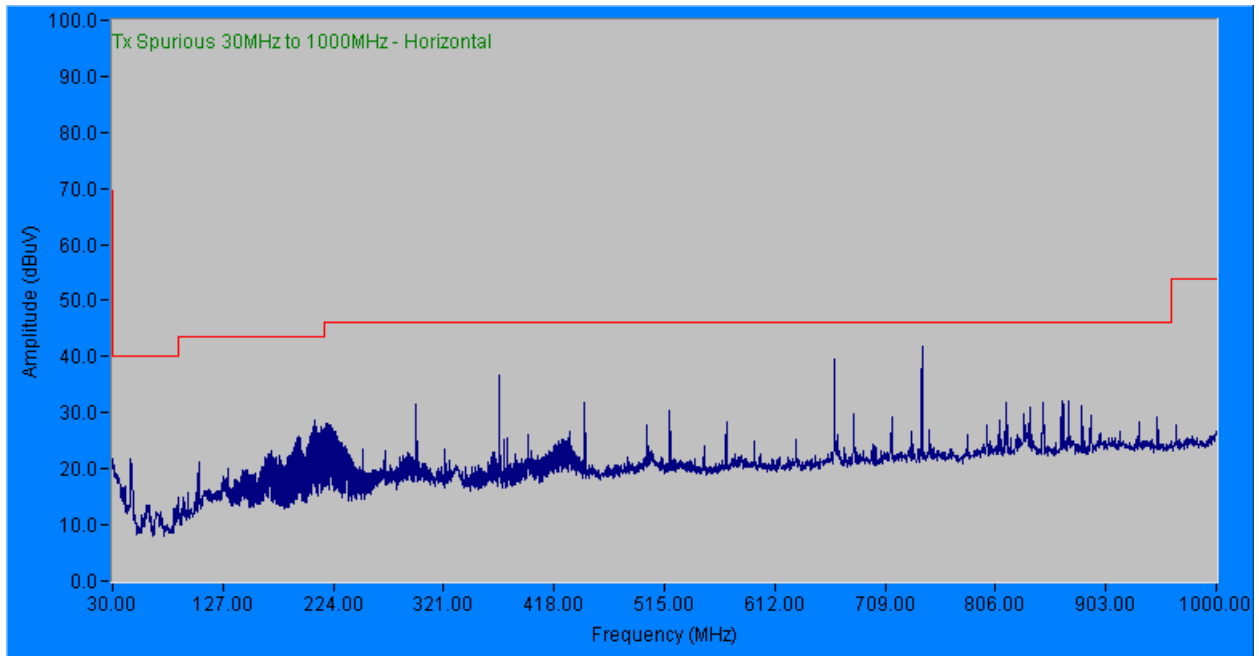
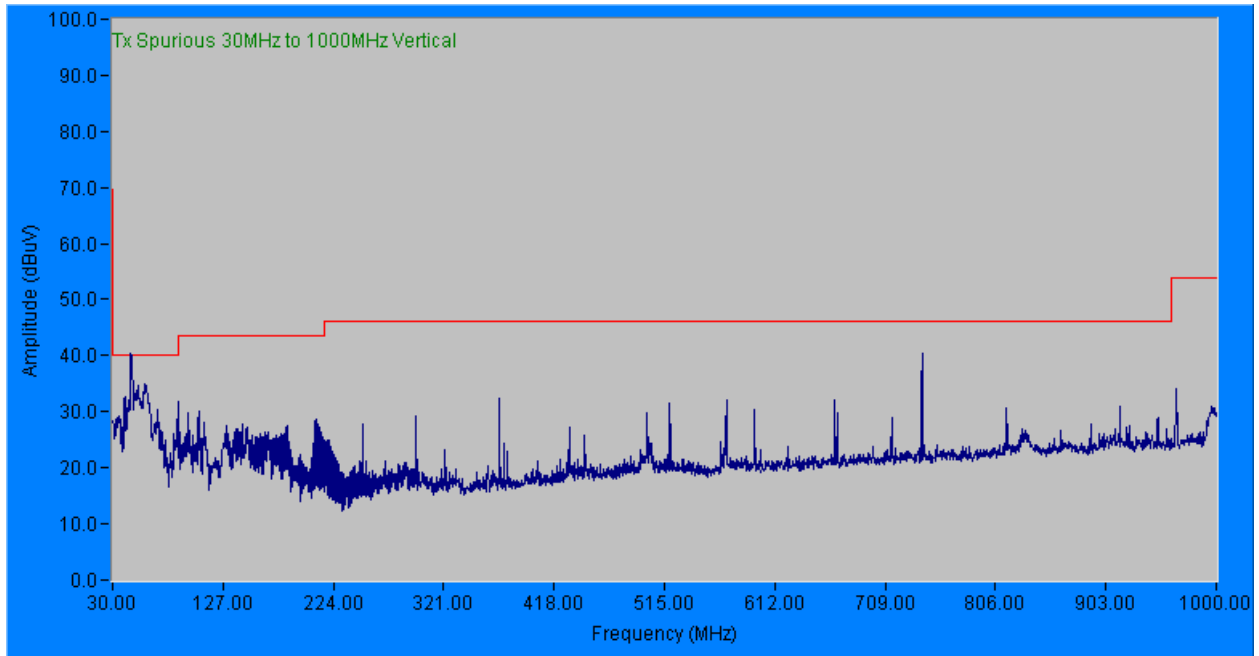
Radiated Emissions – FCC 15.209 (10kHz to 30MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Tx Mid Channel

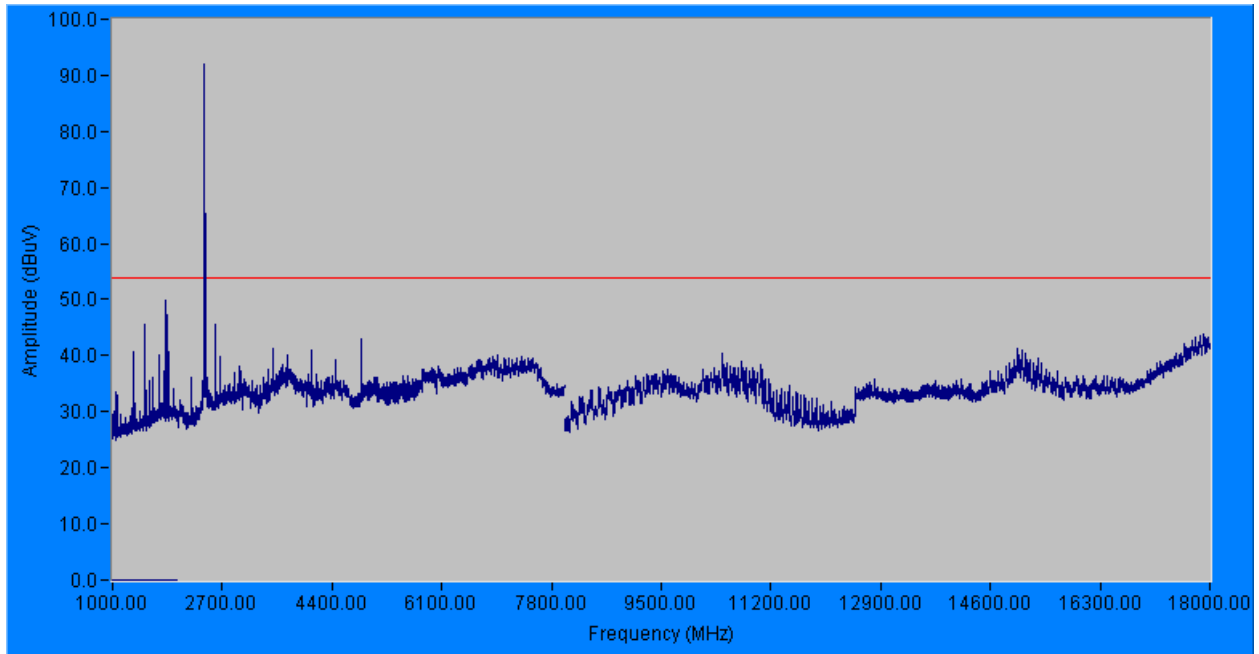
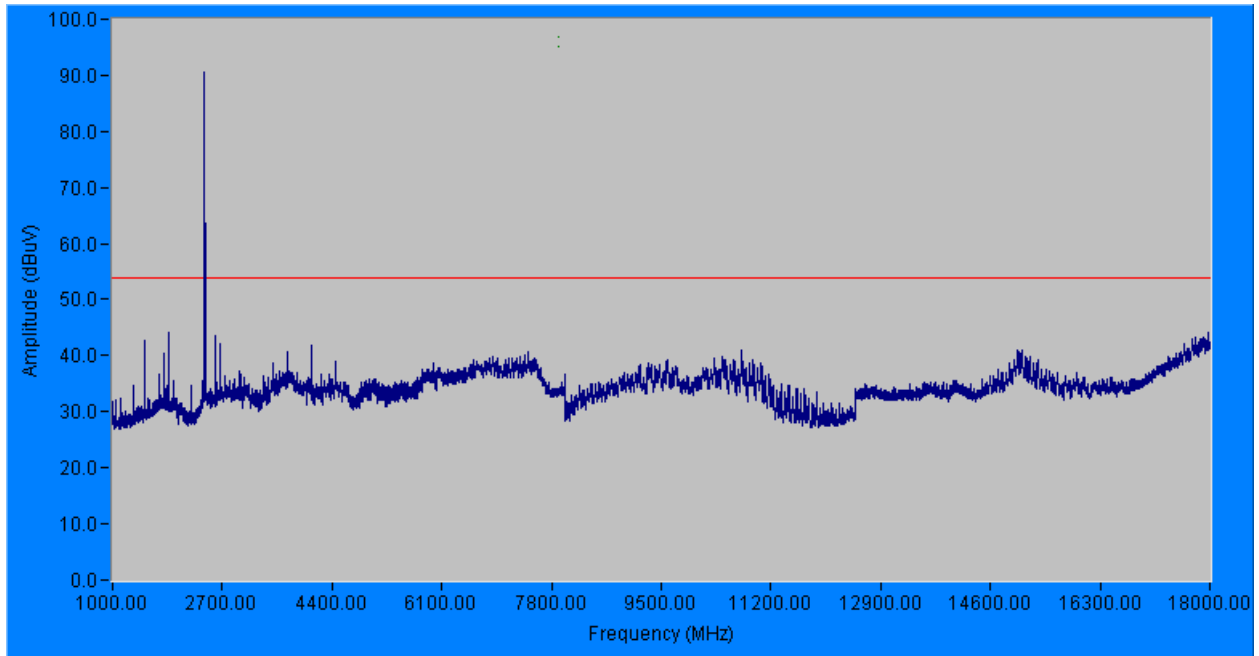
Radiated Emissions – FCC 15.209 (30MHz to 1000MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Mid Channel

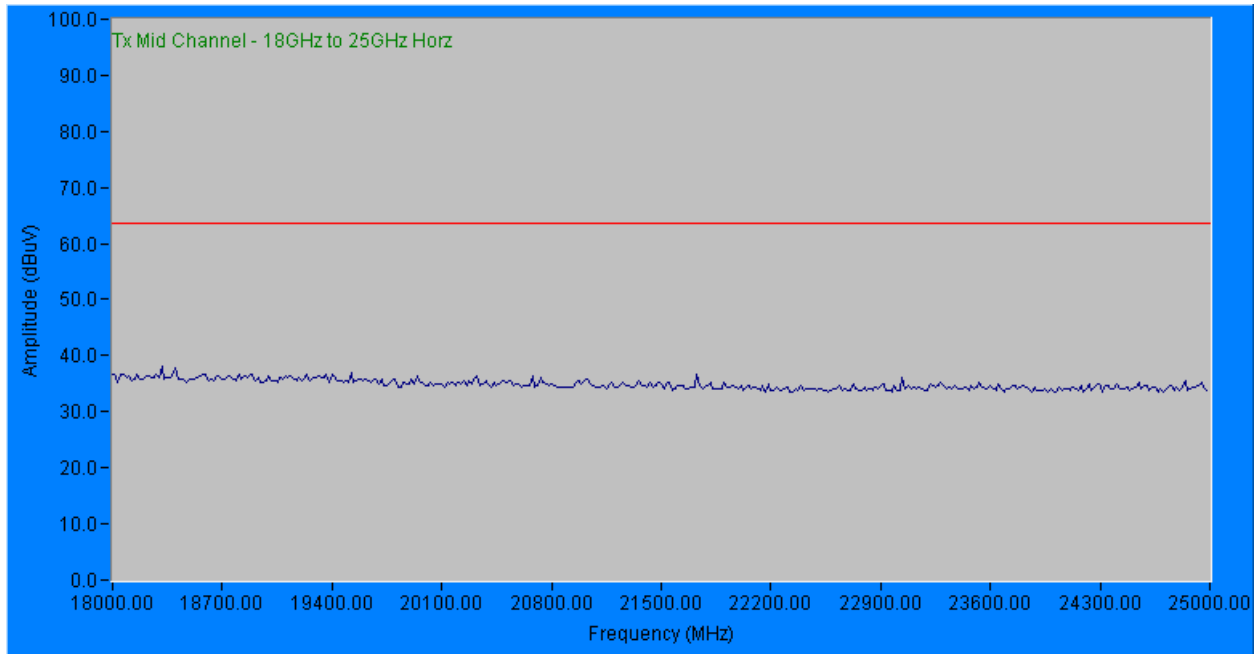
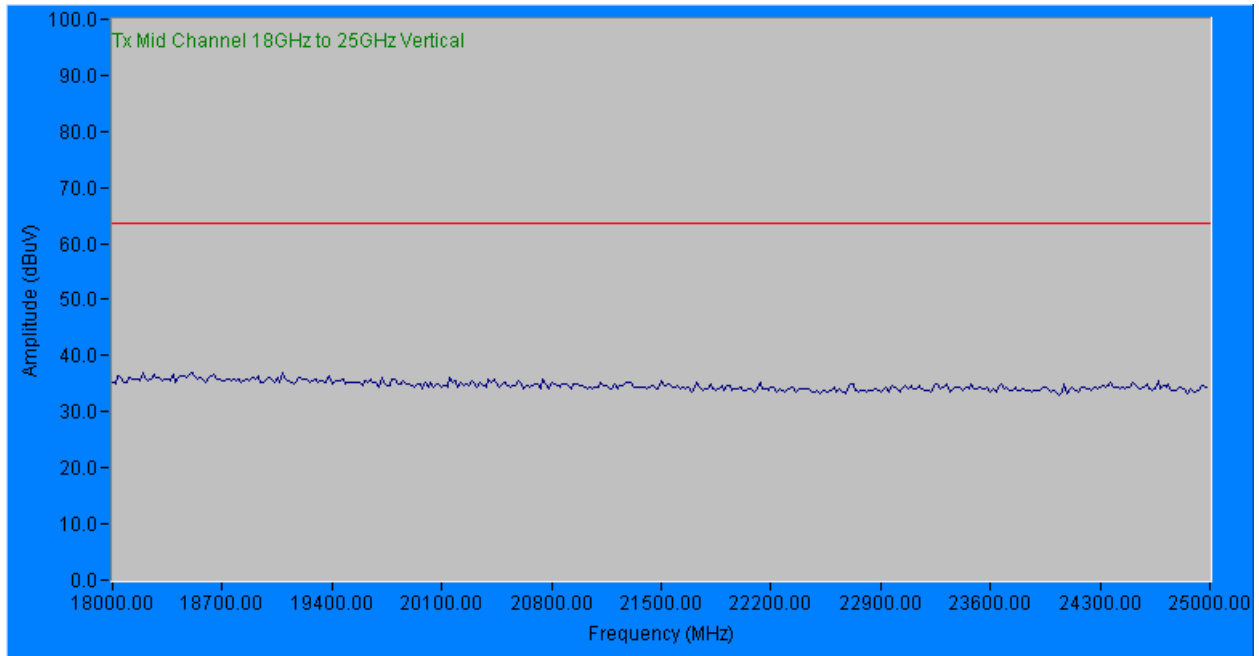
Radiated Emissions – FCC 15.209 (4GHz to 18GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Mid Channel

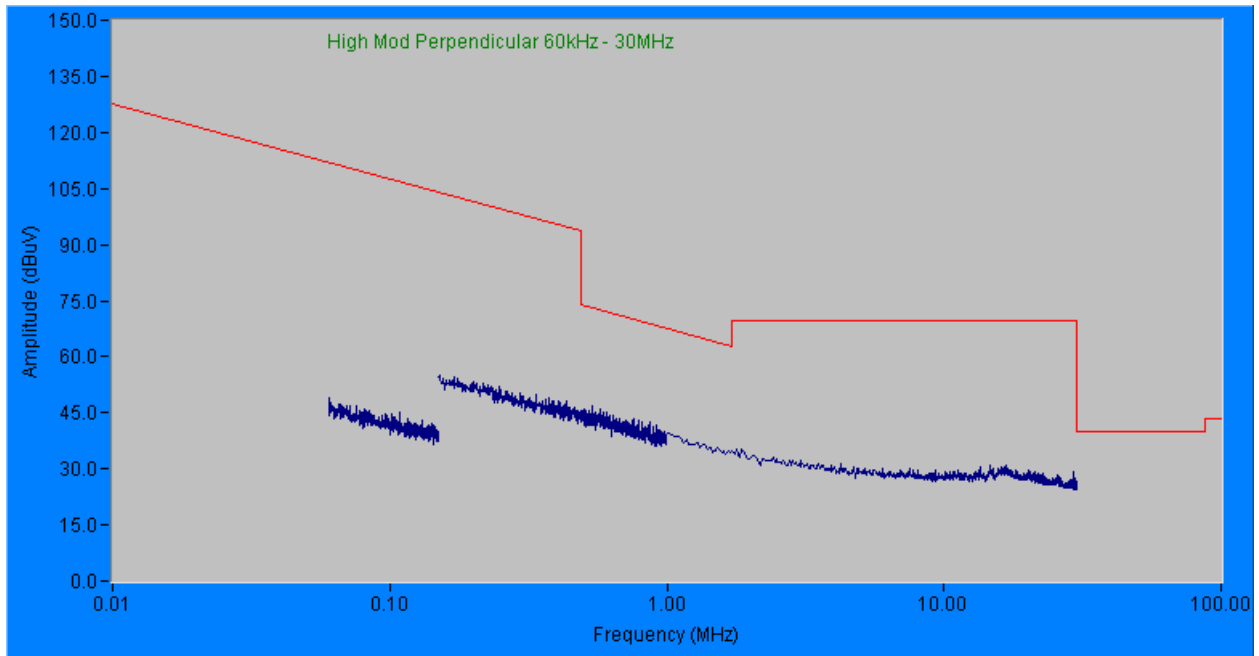
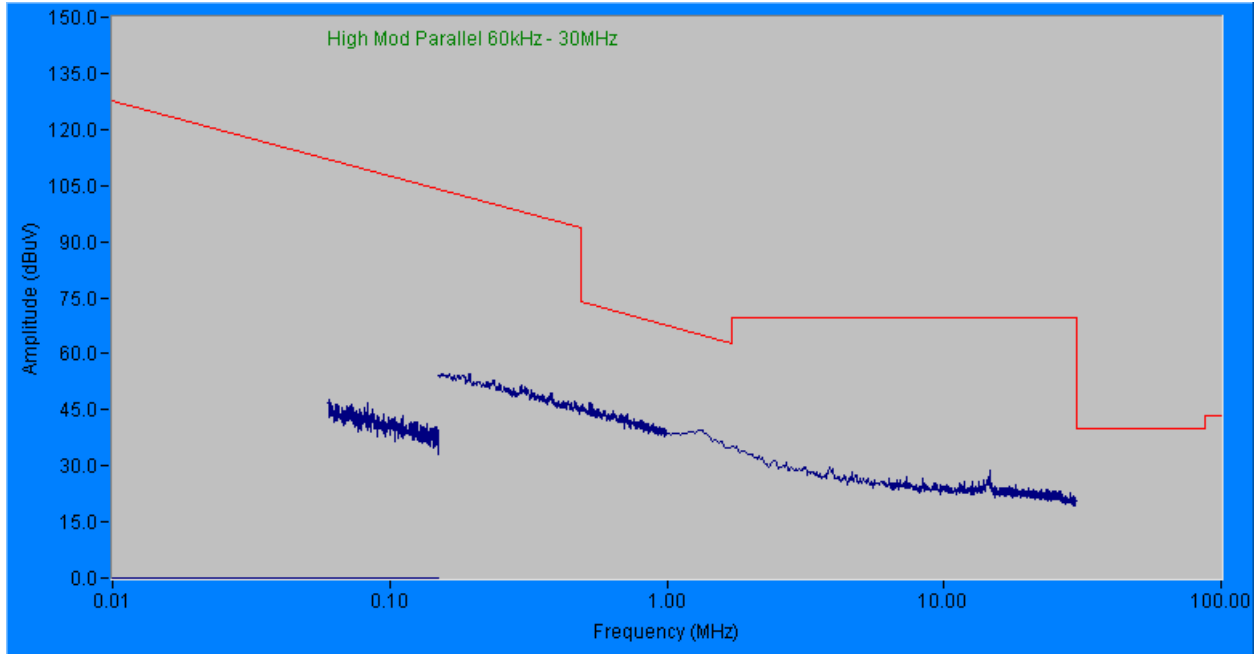
Radiated Emissions – FCC 15.209 (18GHz to 25GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit (extrapolated from 3-meter to 1-meter test distance)

Plots: Pre-Scan Peak Measurements – Not Final Data – Tx High Channel

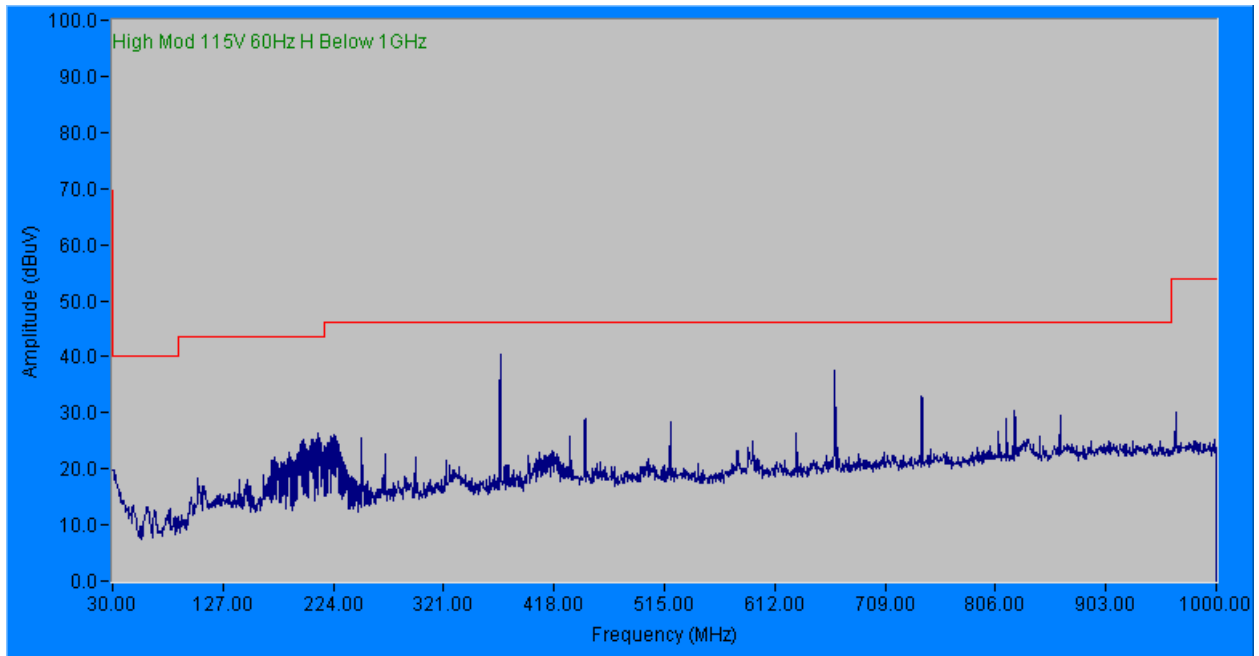
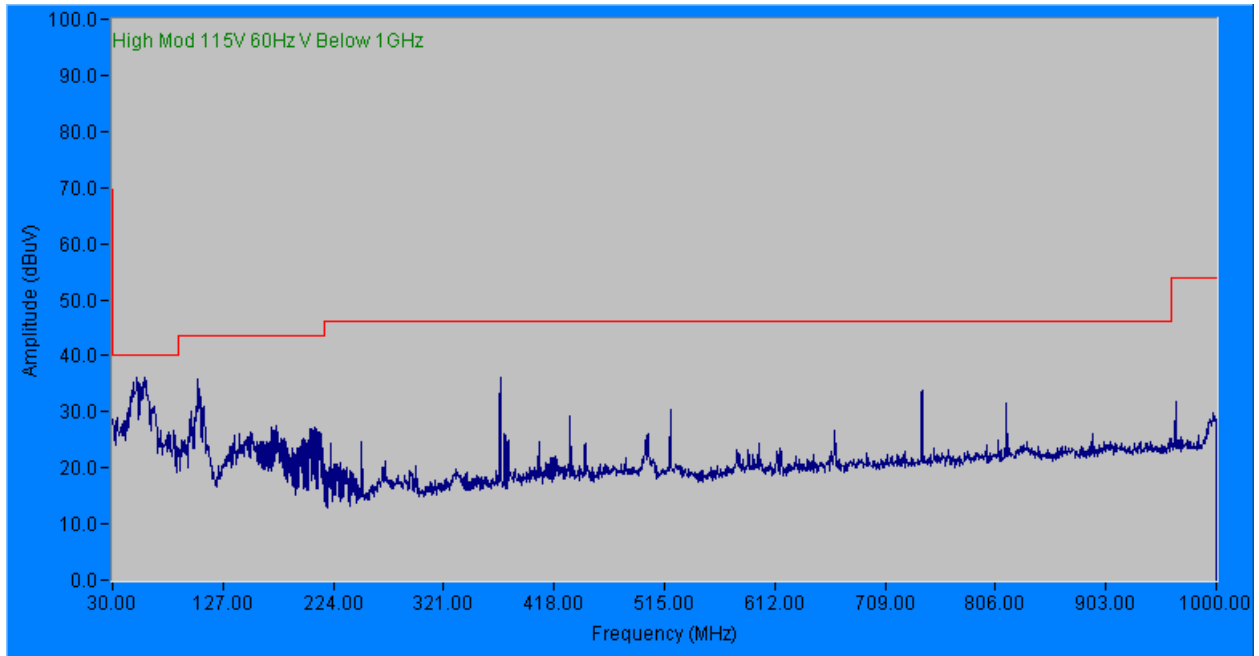
Radiated Emissions – FCC 15.209 (10kHz to 30MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – Tx High Channel

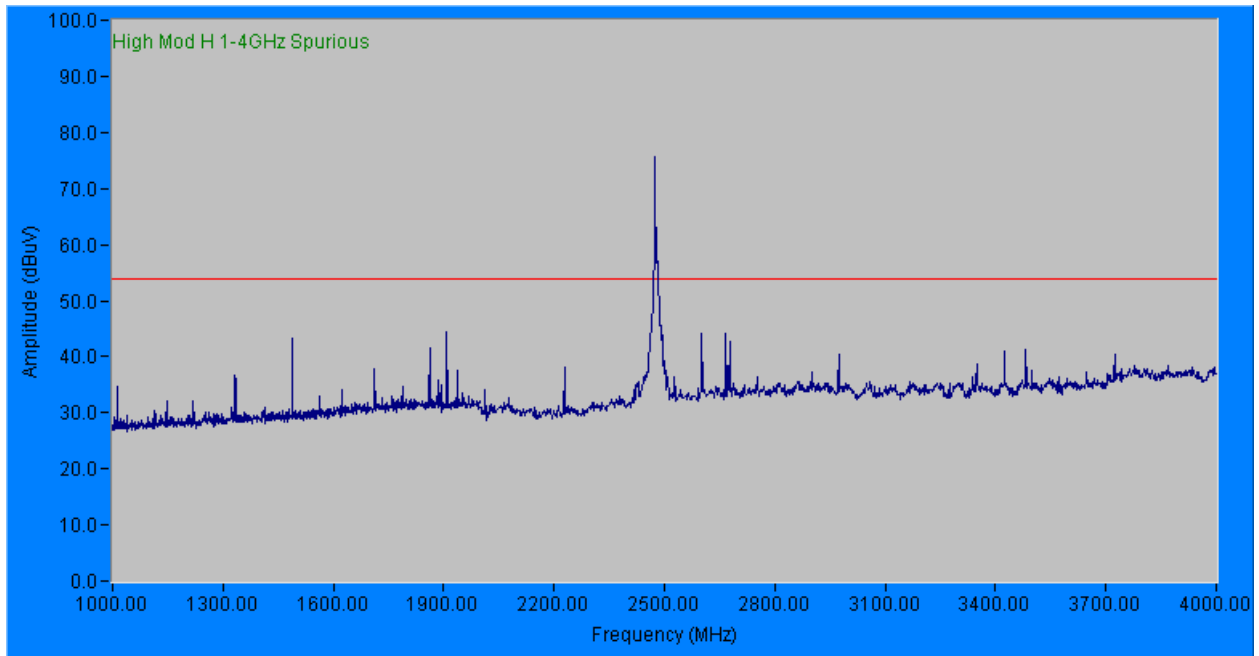
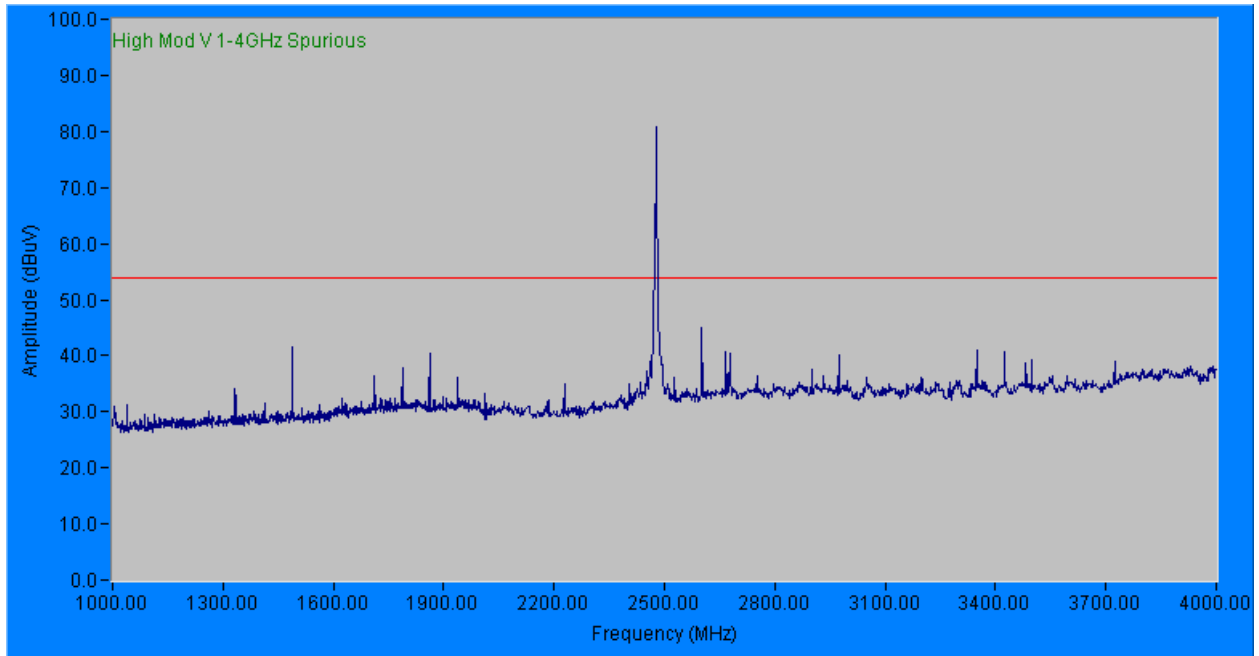
Radiated Emissions – FCC 15.209 (30MHz to 1000MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – High Channel

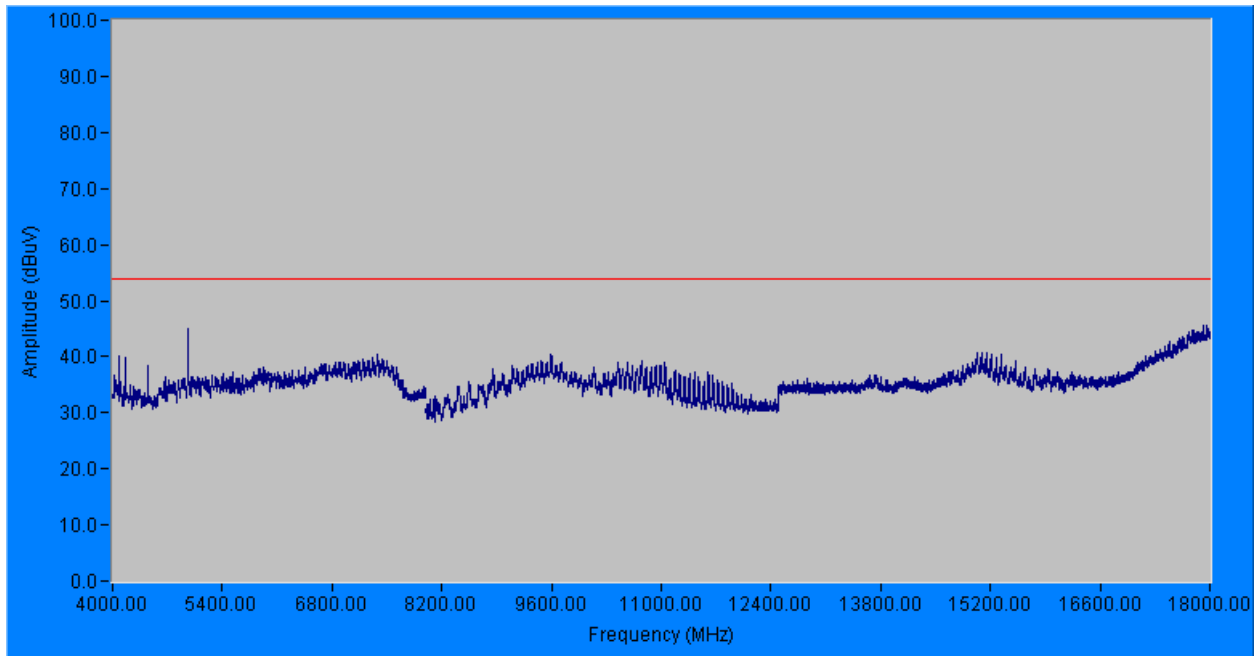
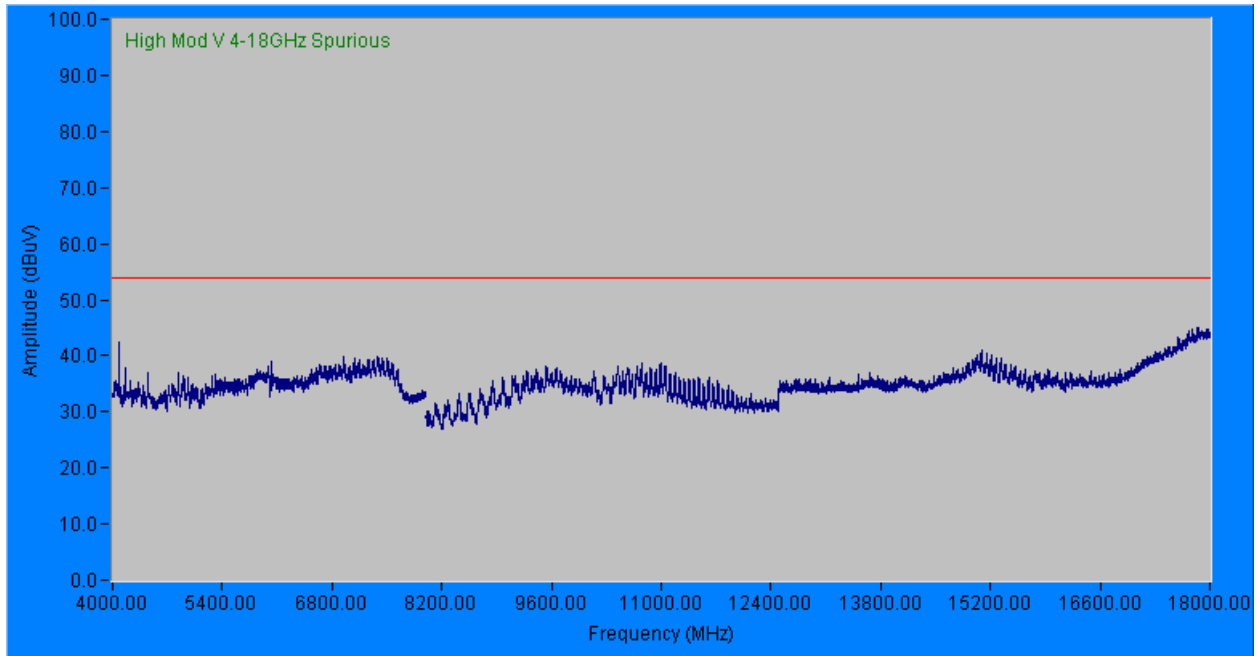
Radiated Emissions – FCC 15.209 (1GHz to 4GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – High Channel

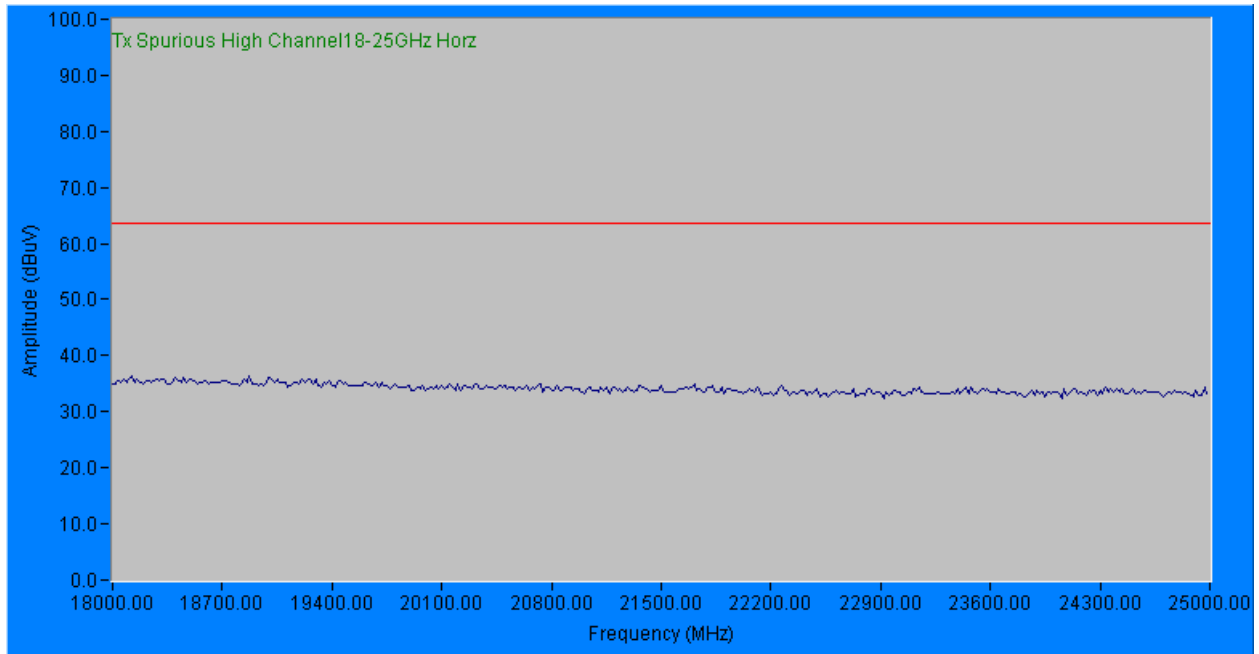
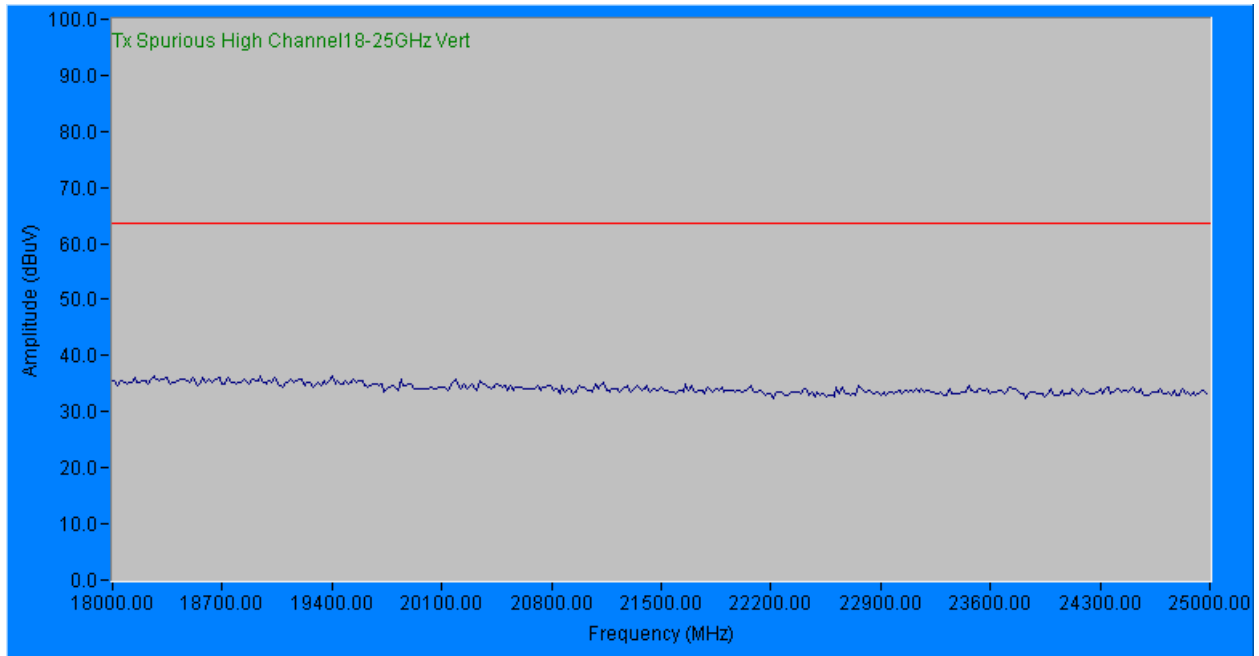
Radiated Emissions – FCC 15.209 (4GHz to 18GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data – High Channel

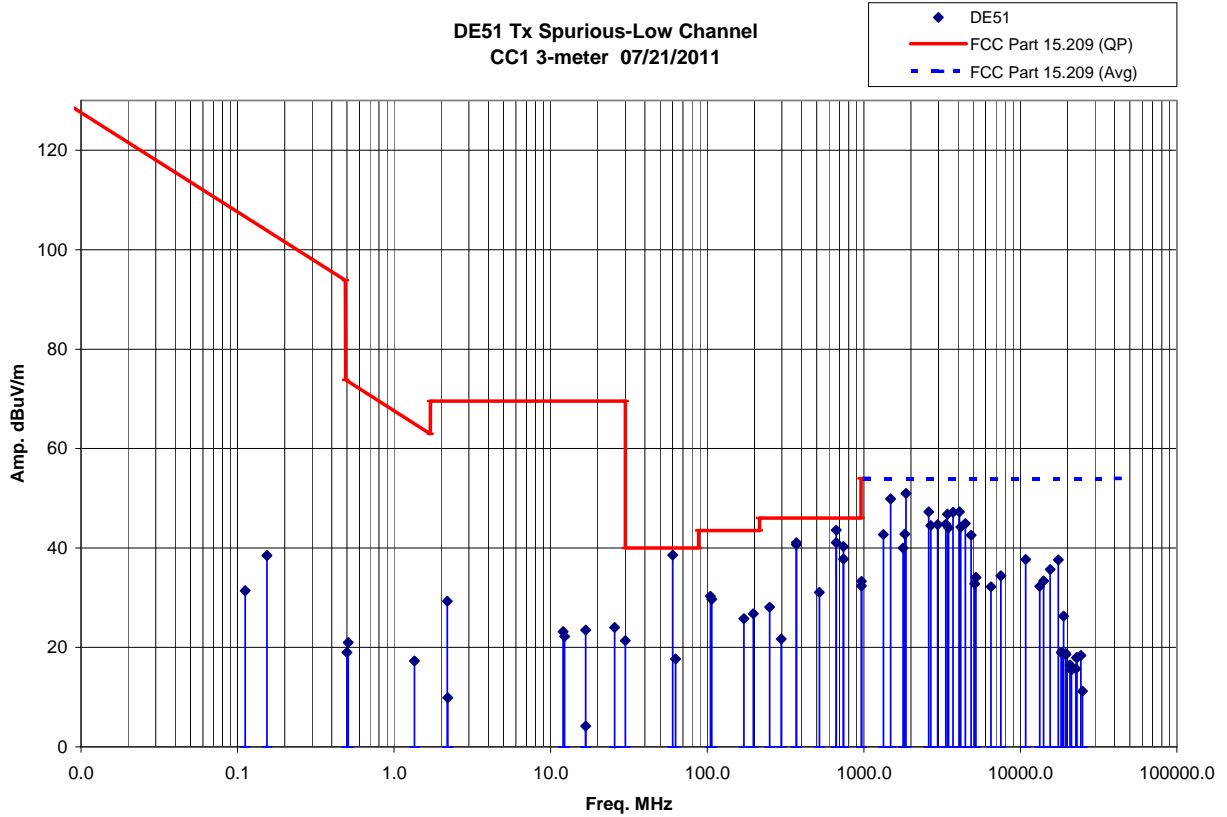
Radiated Emissions – FCC 15.209 (18GHz to 25GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit (extrapolated from 3-meter to 1-meter test distance)

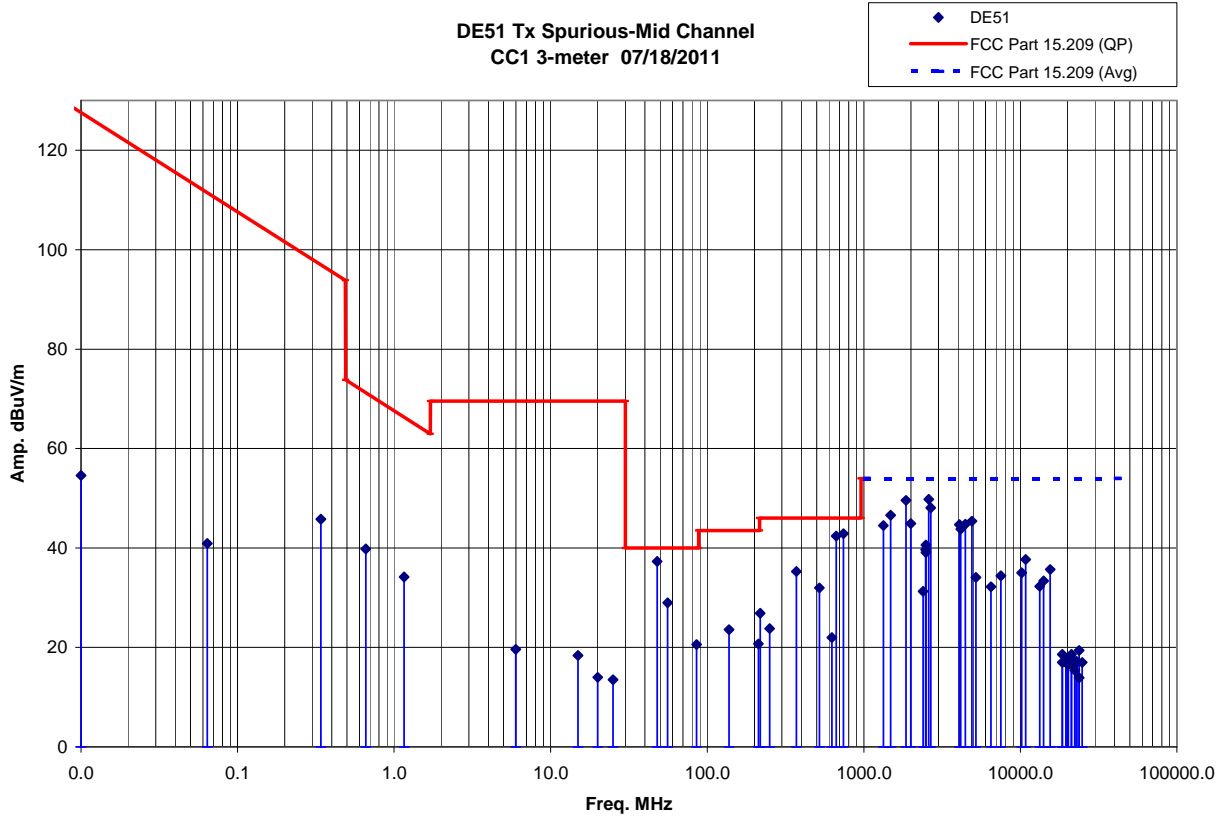
6.7 Plots: Final Peak Measurements – Tx Low Channel

Radiated Emissions – FCC 15.209 (10kHz to 25GHz)



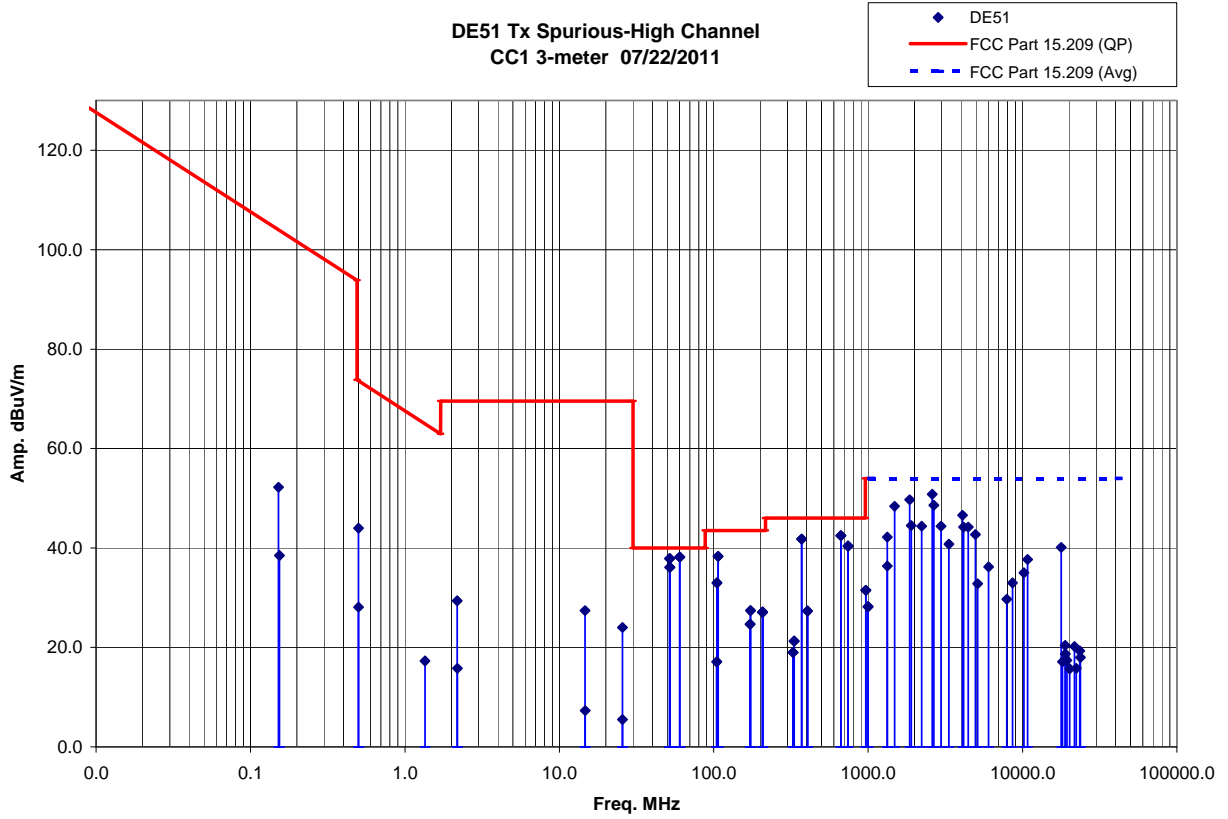
6.8 Plots: Final Peak Measurements – Tx Mid Channel

Radiated Emissions – FCC 15.209 (10kHz to 25GHz)



6.9 Plots: Final Peak Measurements – Tx High Channel

Radiated Emissions – FCC 15.209 (10kHz to 25GHz)



6.10 Test Data: Tx Low Channel

Radiated Electromagnetic Emissions

Test Report #: 100457286	Test Area: CC1 Radiated	Temperature: 22.3 °C
Test Method: FCC Part 15.209	Test Date: 21-Jul-2011	Relative Humidity: 40.1 %
EUT Model #: DE51 (ViP110)	EUT Power: 115VAC/60Hz	Air Pressure: 83.52 kPa

EUT Serial #: EMC 1

Manufacturer: Echostar

EUT Description: MoCa Converter Set-Top Box

Notes: Tx Spurious - Low Channel Modulated

Level Key

Pk – Peak

Qp – QuasiPeak

Av - Average

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
Tx Spurious 10kHz to 30MHz Restricted Band						
Loop Parallel to EUT						
0.499	8.6 Pk	0.1 / 10.3 / 0.0	19.0	V / 1.0 / 32.0	-54.6	N/A
2.19	18.7 Pk	0.1 / 10.5 / 0.0	29.3	V / 1.0 / 7.0	-40.2	N/A
12.29	11.2 Pk	0.3 / 10.7 / 0.0	22.2	V / 1.0 / 68.0	-47.3	N/A
25.64	14.2 Pk	0.4 / 9.4 / 0.0	24.0	V / 1.0 / 68.0	-45.5	N/A
Loop Perpendicular to EUT						
25.65	-10.0 Pk	0.4 / 9.4 / 0.0	-0.2	H / 1.0 / 26.0	-69.7	N/A
Tx Spurious 10kHz to 30MHz Non-Restricted Band						
Loop Perpendicular to EUT						
0.112	20.9 Pk	0.0 / 10.5 / 0.0	31.4	H / 1.0 / 23.0	-75.2	N/A
0.154	28.1 Pk	0.0 / 10.4 / 0.0	38.5	H / 1.0 / 0.0	-65.3	N/A
0.509	10.6 Pk	0.1 / 10.3 / 0.0	21.0	H / 1.0 / 23.0	-52.5	N/A
1.35	6.8 Pk	0.1 / 10.4 / 0.0	17.3	H / 1.5 / 21.3	-65.3	N/A
2.20	-0.8 Pk	0.1 / 10.5 / 0.0	9.9	H / 1.0 / 67.0	-59.6	N/A
16.71	-6.6 Pk	0.3 / 10.5 / 0.0	4.2	H / 1.0 / 45.0	-65.3	N/A
Loop Parallel to EUT						
12.02	12.2 Pk	0.3 / 10.7 / 0.0	23.2	V / 1.0 / 32.0	-46.3	N/A
16.71	12.7 Pk	0.3 / 10.5 / 0.0	23.5	V / 1.0 / 0.0	-46.0	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						
965.24	35.1 Pk	2.2 / 22.5 / 27.4	32.4	H / 1.0 / 130.9	-21.6	N/A
250.01	42.5 Pk	1.1 / 11.7 / 27.2	28.1	H / 1.7 / 66.3	-17.9	N/A
171.79	40.6 Pk	0.9 / 11.9 / 27.6	25.8	H / 2.1 / 127.4	-17.7	N/A
Tx Spurious 30MHz to 1000MHz Non-Restricted Band						
30.00	28.1 Pk	0.4 / 21.1 / 28.2	21.4	H / 1.0 / 0.0	-18.6	N/A
62.70	37.4 Pk	0.8 / 7.7 / 28.1	17.7	H / 1.0 / 0.0	-22.3	N/A
106.64	44.8 Pk	0.8 / 12.1 / 27.9	29.7	H / 2.7 / 288.4	-13.8	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
197.37	41.5 Pk	0.9 / 11.8 / 27.5	26.8	H / 1.5 / 113.6	-16.7	N/A
371.22	51.8 Pk	1.3 / 15.1 / 27.6	40.7	H / 1.0 / 262.1	-5.3	N/A
519.74	39.6 Pk	1.6 / 18.3 / 28.4	31.1	H / 1.0 / 37.5	-14.9	N/A
666.00	50.5 Pk	1.8 / 19.7 / 28.3	43.6	H / 1.2 / 175.6	-2.4	N/A
742.48	43.6 Pk	1.9 / 20.4 / 28.1	37.8	H / 1.6 / 182.7	-8.2	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						
965.35	36.0 Pk	2.2 / 22.5 / 27.4	33.3	V / 1.0 / 328.1	-20.7	N/A
Tx Spurious 30MHz to 1000MHz Non-Restricted Band						
60.20	58.5 Pk	0.8 / 7.5 / 28.2	38.6	V / 1.0 / 134.0	-1.4	N/A
104.72	45.8 Pk	0.8 / 11.7 / 27.9	30.3	V / 1.0 / 204.4	-13.2	N/A
296.86	34.0 Pk	1.2 / 13.6 / 27.2	21.7	V / 1.0 / 192.8	-24.3	N/A
371.22	52.2 Pk	1.3 / 15.1 / 27.6	41.1	V / 1.0 / 85.4	-4.9	N/A
665.98	48.0 Pk	1.8 / 19.7 / 28.3	41.1	V / 1.0 / 280.2	-4.9	N/A
742.49	46.1 Pk	1.9 / 20.4 / 28.1	40.3	V / 1.0 / 256.0	-5.7	N/A
Tx Spurious 1-4GHz Restricted Band						
1332.04	50.8 Pk	2.6 / 26.2 / 36.9	42.7	H / 1.1 / 144.3	-11.3	N/A
1332.04	49.0 Av	2.6 / 26.2 / 36.9	40.9	H / 1.1 / 144.3	-13.1	N/A
1485.04	51.1 Pk	2.7 / 26.6 / 36.6	43.9	H / 1.0 / 283.1	-10.1	N/A
1485.04	41.4 Av	2.7 / 26.6 / 36.6	34.1	H / 1.0 / 283.1	-19.9	N/A
1485.04	42.2 Pk	2.7 / 26.6 / 36.6	35.0	H / 1.0 / 283.1	-19.0	N/A
3712.61	47.2 Pk	4.5 / 33.3 / 37.8	47.2	H / 1.0 / 126.3	-6.8	N/A
3712.61	37.7 Av	4.5 / 33.3 / 37.8	37.7	H / 1.0 / 126.3	-16.3	N/A
Tx Spurious 1-4GHz Non-Restricted Band						
1827.62	48.5 Pk	3.0 / 28.2 / 36.9	42.8	H / 1.5 / 55.3	-11.2	N/A
1827.62	42.4 Av	3.0 / 28.2 / 36.9	36.6	H / 1.5 / 55.3	-17.4	N/A
1856.28	50.1 Pk	3.1 / 28.2 / 37.0	44.4	H / 1.6 / 147.4	-9.6	N/A
1856.28	42.0 Av	3.1 / 28.2 / 37.0	36.3	H / 1.6 / 147.4	-17.7	N/A
2598.81	49.5 Pk	3.7 / 30.0 / 37.4	45.7	H / 1.4 / 280.9	-8.3	N/A
2598.81	40.0 Av	3.7 / 30.0 / 37.4	36.3	H / 1.4 / 280.9	-17.7	N/A
2673.07	47.0 Pk	3.7 / 30.1 / 37.4	43.5	H / 1.4 / 218.4	-10.5	N/A
2673.07	34.5 Av	3.7 / 30.1 / 37.4	31.0	H / 1.4 / 218.4	-23.0	N/A
2970.09	46.6 Pk	4.0 / 31.5 / 37.3	44.7	H / 2.5 / 216.7	-9.3	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
2970.09	36.5 Av	4.0 / 31.5 / 37.3	34.6	H / 2.5 / 216.7	-19.4	N/A
3415.62	46.9 Pk	4.3 / 32.5 / 36.9	46.8	H / 1.0 / 112.3	-7.2	N/A
3415.62	36.2 Av	4.3 / 32.5 / 36.9	36.2	H / 1.0 / 112.3	-17.8	N/A
3473.35	44.3 Pk	4.3 / 32.7 / 37.2	44.1	H / 1.0 / 112.3	-9.9	N/A
3473.35	40.6 Av	4.3 / 32.7 / 37.2	40.4	H / 1.0 / 112.3	-13.6	N/A
Tx Spurious 1-4GHz Restricted Band						
1332.03	46.4 Pk	2.6 / 26.2 / 36.9	38.3	V / 2.3 / 175.8	-15.7	N/A
1332.03	44.2 Av	2.6 / 26.2 / 36.9	36.1	V / 2.3 / 175.8	-17.9	N/A
Tx Spurious 1-4GHz Non-Restricted Band						
1485.05	57.2 Pk	2.7 / 26.6 / 36.6	49.9	V / 1.0 / 316.4	-4.1	N/A
1485.05	45.9 Av	2.7 / 26.6 / 36.6	38.6	V / 1.0 / 316.4	-15.4	N/A
1782.06	45.8 Pk	3.0 / 28.1 / 36.9	40.0	V / 1.7 / 184.0	-14.0	N/A
1782.06	35.2 Av	3.0 / 28.1 / 36.9	29.4	V / 1.7 / 184.0	-24.6	N/A
1856.31	56.6 Pk	3.1 / 28.2 / 37.0	51.0	V / 2.4 / 3.4	-3.0	N/A
1856.31	49.6 Av	3.1 / 28.2 / 37.0	44.0	V / 2.4 / 3.4	-10.0	N/A
2598.81	51.1 Pk	3.7 / 30.0 / 37.4	47.3	V / 2.3 / 337.7	-6.7	N/A
2598.81	41.9 Av	3.7 / 30.0 / 37.4	38.1	V / 2.3 / 337.7	-15.9	N/A
2673.08	48.0 Pk	3.7 / 30.1 / 37.4	44.5	V / 1.9 / 25.9	-9.5	N/A
2673.08	36.5 Av	3.7 / 30.1 / 37.4	33.0	V / 1.9 / 25.9	-21.0	N/A
3341.32	45.0 Pk	4.2 / 32.4 / 36.9	44.8	V / 2.5 / 324.3	-9.2	N/A
3341.32	36.0 Av	4.2 / 32.4 / 36.9	35.7	V / 2.5 / 324.3	-18.3	N/A
3473.36	43.1 Pk	4.3 / 32.7 / 37.2	43.0	V / 1.8 / 156.4	-11.0	N/A
3473.36	39.8 Av	4.3 / 32.7 / 37.2	39.6	V / 1.8 / 156.4	-14.4	N/A
TX Spurious						
Restricted Bands						
4083.84	47.5 Pk	4.7 / 33.9 / 38.8	47.3	H / 1.0 / 112.3	-6.7	N/A
4083.84	37.8 Av	4.7 / 33.9 / 38.8	37.6	H / 1.0 / 112.3	-16.4	N/A
4158.12	44.9 Pk	4.8 / 33.8 / 39.3	44.2	H / 2.3 / 212.0	-9.8	N/A
4158.12	34.8 Av	4.8 / 33.8 / 39.3	34.1	H / 2.3 / 212.0	-19.9	N/A
4849.11	41.3 Pk	5.2 / 35.0 / 38.9	42.6	H / 2.1 / 182.4	-11.4	N/A
4849.11	35.4 Av	5.2 / 35.0 / 38.9	36.6	H / 2.1 / 182.4	-17.4	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
7500.00	28.4 Av	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
10800.0	37.4 Pk	8.1 / 40.8 / 48.6	37.7	V / 1.0 / 0.0	-16.3	N/A
10800.0	34.9 Av	8.1 / 40.8 / 48.6	35.2	V / 1.0 / 0.0	-18.8	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
13300.0	27.9 Pk	9.0 / 42.2 / 46.8	32.3	V / 1.0 / 0.0	-21.7	N/A
13300.0	26.8 Av	9.0 / 42.2 / 46.8	31.1	V / 1.0 / 0.0	-22.9	N/A
Non-Restricted Bands						
4455.10	45.6 Pk	5.0 / 34.2 / 39.9	44.9	H / 1.5 / 265.6	-9.1	N/A
4455.10	36.1 Av	5.0 / 34.2 / 39.9	35.4	H / 1.5 / 265.6	-18.6	N/A
Restricted Bands						
4083.88	46.0 Pk	4.7 / 33.9 / 38.8	45.8	V / 1.7 / 20.6	-8.2	N/A
4158.13	40.1 Pk	4.8 / 33.8 / 39.3	39.4	V / 2.6 / 294.6	-14.6	N/A
4158.13	32.9 Av	4.8 / 33.8 / 39.3	32.2	V / 2.6 / 294.6	-21.8	N/A
4083.88	36.0 Av	4.7 / 33.9 / 38.8	35.8	V / 1.7 / 20.7	-18.2	N/A
4849.07	39.9 Pk	5.2 / 35.0 / 38.9	41.2	V / 1.8 / 286.0	-12.8	N/A
4849.07	34.4 Av	5.2 / 35.0 / 38.9	35.6	V / 1.8 / 286.0	-18.4	N/A
Non-Restricted Bands						
4455.13	43.0 Pk	5.0 / 34.2 / 39.9	42.2	V / 2.0 / 115.6	-11.8	N/A
4455.13	34.8 Av	5.0 / 34.2 / 39.9	34.0	V / 2.0 / 115.6	-20.0	N/A
6500.00	28.9 Pk	6.0 / 37.2 / 40.0	32.2	V / 1.0 / 0.0	-21.8	N/A
6500.00	29.9 Av	6.0 / 37.2 / 40.0	33.1	V / 1.0 / 0.0	-20.9	N/A
7900.00	23.6 Pk	6.8 / 39.0 / 39.8	29.7	V / 1.0 / 0.0	-24.3	N/A
7900.00	22.4 Av	6.8 / 39.0 / 39.8	28.4	V / 1.0 / 0.0	-25.6	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
14100.0	28.2 Av	9.3 / 42.6 / 47.9	32.2	V / 1.0 / 0.0	-21.8	N/A
17500.0	28.4 Pk	10.8 / 44.4 / 45.9	37.6	V / 1.0 / 0.0	-16.4	N/A
Tx Spurious Low Channel 18GHz to 25GHz						
Restricted Band Measurements						
18892.5	13.4 Pk	0.0 / 22.4 / 0.0	26.2	V / 1.0 / 0.0	-27.7	N/A
18892.5	0.0 Av	0.0 / 22.4 / 0.0	12.8	V / 1.0 / 0.0	-41.1	N/A
18507.5	6.1 Pk	0.0 / 22.4 / 0.0	18.9	V / 1.0 / 0.0	-35.0	N/A
18507.5	0.4 Av	0.0 / 22.4 / 0.0	13.2	V / 1.0 / 0.0	-40.7	N/A
19487.5	6.2 Pk	0.0 / 22.1 / 0.0	18.7	V / 1.0 / 0.0	-35.2	N/A
19487.5	0.2 Av	0.0 / 22.1 / 0.0	12.7	V / 1.0 / 0.0	-41.2	N/A
21220.0	3.5 Pk	0.0 / 21.5 / 0.0	15.4	V / 1.0 / 0.0	-38.5	N/A
21220.0	0.2 Av	0.0 / 21.5 / 0.0	11.7	V / 1.0 / 0.0	-42.2	N/A
22655.0	4.1 Pk	0.0 / 21.1 / 0.0	15.6	V / 1.0 / 0.0	-38.3	N/A
22655.0	0.5 Av	0.0 / 21.1 / 0.0	10.9	V / 1.0 / 0.0	-43.0	N/A
18297.5	6.2 Pk	0.0 / 22.3 / 0.0	18.9	H / 1.0 / 0.0	-35.0	N/A
18297.5	0.6 Av	0.0 / 22.3 / 0.0	13.2	H / 1.0 / 0.0	-40.7	N/A
19575.0	6.1 Pk	0.0 / 22.0 / 0.0	18.5	H / 1.0 / 0.0	-35.4	N/A
19575.0	0.1 Av	0.0 / 22.0 / 0.0	12.5	H / 1.0 / 0.0	-41.4	N/A
20747.5	4.3 Pk	0.0 / 21.7 / 0.0	16.4	H / 1.0 / 0.0	-37.5	N/A
20747.5	0.3 Av	0.0 / 21.7 / 0.0	11.8	H / 1.0 / 0.0	-42.1	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
22935.0	6.0 Pk	0.0 / 21.3 / 0.0	17.8	H / 1.0 / 0.0	-36.1	N/A
22935.0	5.9 Pk	0.0 / 21.6 / 0.0	17.9	H / 1.0 / 0.0	-36.0	N/A
18297.5	6.2 Pk	0.0 / 22.3 / 0.0	18.9	H / 1.0 / 0.0	-35.0	N/A
18297.5	0.6 Av	0.0 / 22.3 / 0.0	13.2	H / 1.0 / 0.0	-40.7	N/A
Non-Restricted Band Measurements						
24387.5	6.4 Pk	0.0 / 21.6 / 0.0	18.3	V / 1.0 / 0.0	-35.6	N/A
24387.5	0.8 Av	0.0 / 21.6 / 0.0	11.2	V / 1.0 / 0.0	-42.7	N/A
24935.0	0.6 Av	0.0 / 21.3 / 0.0	11.1	H / 1.0 / 0.0	-42.8	N/A
24935.0	1.0 Pk	0.0 / 21.6 / 0.0	11.1	H / 1.0 / 0.0	-42.8	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
***** Measurement Summary *****						
2.19	18.7 Pk	0.1 / 10.5 / 0.0	29.3	V / 1.0 / 7.0	-40.2	N/A
25.64	14.2 Pk	0.4 / 9.4 / 0.0	24	V / 1.0 / 68.0	-45.5	N/A
16.71	12.7 Pk	0.3 / 10.5 / 0.0	23.5	V / 1.0 / 0.0	-46.0	N/A
12.02	12.2 Pk	0.3 / 10.7 / 0.0	23.2	V / 1.0 / 32.0	-46.3	N/A
12.29	11.2 Pk	0.3 / 10.7 / 0.0	22.2	V / 1.0 / 68.0	-47.3	N/A
0.509	10.6 Pk	0.1 / 10.3 / 0.0	21.0	H / 1.0 / 23.0	-52.5	N/A
0.499	8.6 Pk	0.1 / 10.3 / 0.0	19	V / 1.0 / 32.0	-54.6	N/A
2.20	-0.8 Pk	0.1 / 10.5 / 0.0	9.9	H / 1.0 / 67.0	-59.6	N/A
0.154	28.1 Pk	0.0 / 10.4 / 0.0	38.5	H / 1.0 / 0.0	-65.3	N/A
1.35	6.8 Pk	0.1 / 10.4 / 0.0	17.3	H / 1.5 / 21.3	-65.3	N/A
16.71	-6.6 Pk	0.3 / 10.5 / 0.0	4.2	H / 1.0 / 45.0	-65.3	N/A
25.65	-10.0 Pk	0.4 / 9.4 / 0.0	-0.2	H / 1.0 / 26.0	-69.7	N/A
0.112	20.9 Pk	0.0 / 10.5 / 0.0	31.4	H / 1.0 / 23.0	-75.2	N/A
60.21	58.5 Pk	0.8 / 7.5 / 28.2	38.6	V / 1.0 / 134.0	-1.4	N/A
666.02	50.5 Pk	1.8 / 19.7 / 28.3	43.6	H / 1.2 / 175.6	-2.4	N/A
371.22	52.2 Pk	1.3 / 15.1 / 27.6	41.1	V / 1.0 / 85.4	-4.9	N/A
665.98	48.0 Pk	1.8 / 19.7 / 28.3	41.1	V / 1.0 / 280.2	-4.9	N/A
371.22	51.8 Pk	1.3 / 15.1 / 27.6	40.7	H / 1.0 / 262.1	-5.3	N/A
742.49	46.1 Pk	1.9 / 20.4 / 28.1	40.3	V / 1.0 / 256.0	-5.7	N/A
742.48	43.6 Pk	1.9 / 20.4 / 28.1	37.8	H / 1.6 / 182.7	-8.2	N/A
104.72	45.8 Pk	0.8 / 11.7 / 27.9	30.3	V / 1.0 / 204.4	-13.2	N/A
106.64	44.8 Pk	0.8 / 12.1 / 27.9	29.7	H / 2.7 / 288.4	-13.8	N/A
519.74	39.6 Pk	1.6 / 18.3 / 28.4	31.1	H / 1.0 / 37.5	-14.9	N/A
197.37	41.5 Pk	0.9 / 11.8 / 27.5	26.8	H / 1.5 / 113.6	-16.7	N/A
171.79	40.6 Pk	0.9 / 11.9 / 27.6	25.8	H / 2.1 / 127.4	-17.7	N/A
250.01	42.5 Pk	1.1 / 11.7 / 27.2	28.1	H / 1.7 / 66.3	-17.9	N/A
30.02	28.1 Pk	0.4 / 21.1 / 28.2	21.4	H / 1.0 / 0.0	-18.6	N/A
965.35	36.0 Pk	2.2 / 22.5 / 27.4	33.3	V / 1.0 / 328.1	-20.7	N/A
965.24	35.1 Pk	2.2 / 22.5 / 27.4	32.4	H / 1.0 / 130.9	-21.6	N/A
62.71	37.4 Pk	0.8 / 7.7 / 28.1	17.7	H 1.0 / 0.0	-22.3	N/A
296.86	34.0 Pk	1.2 / 13.6 / 27.2	21.7	V / 1.0 / 192.8	-24.3	N/A
1856.31	56.6 Pk	3.1 / 28.2 / 37.0	51.0	V / 2.4 / 3.4	-3.0	N/A
1485.05	57.2 Pk	2.7 / 26.6 / 36.6	49.9	V / 1.0 / 316.4	-4.1	N/A
2598.81	51.1 Pk	3.7 / 30.0 / 37.4	47.3	V / 2.3 / 337.7	-6.7	N/A
3712.61	47.2 Pk	4.5 / 33.3 / 37.8	47.2	H / 1.0 / 126.3	-6.8	N/A
3415.62	46.9 Pk	4.3 / 32.5 / 36.9	46.8	H / 1.0 / 112.3	-7.2	N/A
3341.32	45.0 Pk	4.2 / 32.4 / 36.9	44.8	V / 2.5 / 324.3	-9.2	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
2970.09	46.6 Pk	4.0 / 31.5 / 37.3	44.7	H / 2.5 / 216.7	-9.3	N/A
2673.08	48.0 Pk	3.7 / 30.1 / 37.4	44.5	V / 1.9 / 25.9	-9.5	N/A
3473.35	44.3 Pk	4.3 / 32.7 / 37.2	44.1	H / 1.0 / 112.3	-9.9	N/A
1827.62	48.5 Pk	3.0 / 28.2 / 36.9	42.8	H / 1.5 / 55.3	-11.2	N/A
1332.04	50.8 Pk	2.6 / 26.2 / 36.9	42.7	H / 1.1 / 144.3	-11.3	N/A
1782.06	45.8 Pk	3.0 / 28.1 / 36.9	40.0	V / 1.7 / 184.0	-14.0	N/A
4083.84	47.5 Pk	4.7 / 33.9 / 38.8	47.3	H / 1.0 / 112.3	-6.7	N/A
4455.10	45.6 Pk	5.0 / 34.2 / 39.9	44.9	H / 1.5 / 265.6	-9.1	N/A
4158.12	44.9 Pk	4.8 / 33.8 / 39.3	44.2	H / 2.3 / 212.0	-9.8	N/A
4849.11	41.3 Pk	5.2 / 35.0 / 38.9	42.6	H / 2.1 / 182.4	-11.4	N/A
10800.0	37.4 Pk	8.1 / 40.8 / 48.6	37.7	V / 1.0 / 0.0	-16.3	N/A
17500.0	28.4 Pk	10.8 / 44.4 / 45.9	37.6	V / 1.0 / 0.0	-16.4	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
13300.0	27.9 Pk	9.0 / 42.2 / 46.8	32.3	V / 1.0 / 0.0	-21.7	N/A
6500.00	28.9 Pk	6.0 / 37.2 / 40.0	32.2	V / 1.0 / 0.0	-21.8	N/A
7900.00	23.6 Pk	6.8 / 39.0 / 39.8	29.7	V / 1.0 / 0.0	-24.3	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
18892.5	13.4 Pk	0.0 / 22.4 / 0.0	26.2	V / 1.0 / 0.0	-27.7	N/A
18507.5	6.1 Pk	0.0 / 22.4 / 0.0	18.9	V / 1.0 / 0.0	-35.0	N/A
18297.5	6.2 Pk	0.0 / 22.3 / 0.0	18.9	H / 1.0 / 0.0	-35.0	N/A
18297.5	6.2 Pk	0.0 / 22.3 / 0.0	18.9	H / 1.0 / 0.0	-35.0	N/A
19487.5	6.2 Pk	0.0 / 22.1 / 0.0	18.7	V / 1.0 / 0.0	-35.2	N/A
19575	6.1 Pk	0.0 / 22.0 / 0.0	18.5	H / 1.0 / 0.0	-35.4	N/A
24387.5	6.4 Pk	0.0 / 21.6 / 0.0	18.3	V / 1.0 / 0.0	-35.6	N/A
22935	5.9 Pk	0.0 / 21.6 / 0.0	17.9	H / 1.0 / 0.0	-36.0	N/A
22935	6.0 Pk	0.0 / 21.3 / 0.0	17.8	H / 1.0 / 0.0	-36.1	N/A
20747.5	4.3 Pk	0.0 / 21.7 / 0.0	16.4	H / 1.0 / 0.0	-37.5	N/A
22655	4.1 Pk	0.0 / 21.1 / 0.0	15.6	V / 1.0 / 0.0	-38.3	N/A
21220	3.5 Pk	0.0 / 21.5 / 0.0	15.4	V / 1.0 / 0.0	-38.5	N/A
24935.0	1.0 Pk	0.0 / 21.6 / 0.0	11.1	H / 1.0 / 0.0	-42.8	N/A

6.11 Test Data: Tx Mid Channel

Radiated Electromagnetic Emissions

Test Report #:	100457286	Test Area:	CC1 Radiated	Temperature:	22.8 °C
Test Method:	FCC Part 15.209	Test Date:	19-Jul-2011	Relative Humidity:	34.7 %
EUT Model #:	DE51 (ViP110)	EUT Power:	115VAC/60Hz	Air Pressure:	82.9 kPa
EUT Serial #:	EMC1				

Manufacturer:	Echostar	Level Key
EUT Description:	MoCa Converter Set-Top Box	Pk – Peak
Notes:	Tx Spurious – Mid Channel Modulated	Qp – QuasiPeak
		Av - Average

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
Tx Spurious 30MHz to 1000MHz – Restricted Band						
Loop Parallel to EUT						
25.64	10.8 Pk	0.4 / 9.4 / 0.0	20.6	V / 1.0 / 36.0	-48.9	N/A
2.18	18.6 Pk	0.1 / 10.5 / 0.0	29.3	V / 1.0 / 186.0	-40.2	N/A
0.499	16.4 Pk	0.1 / 10.3 / 0.0	26.8	V / 1.0 / 186.0	-46.8	N/A
Loop Perpendicular to EUT						
0.497	28.9 Pk	0.1 / 10.3 / 0.0	39.4	H / 1.0 / 186.0	-34.3	N/A
12.57	10.6 Pk	0.3 / 10.7 / 0.0	21.5	H / 1.0 / 113.0	-48.0	N/A
Tx Spurious 10kHz to 30MHz Non-Restricted Band						
Loop Parallel to EUT						
0.0100	35.9 Pk	0.0 / 18.7 / 0.0	54.6	V / 1.0 / 36.0	-73.0	N/A
0.0640	30.1 Pk	0.0 / 10.8 / 0.0	40.9	V / 1.0 / 68.0	-70.6	N/A
0.340	35.5 Pk	0.0 / 10.3 / 0.0	45.8	V / 1.0 / 68.0	-51.2	N/A
1.16	23.7 Pk	0.1 / 10.4 / 0.0	34.2	V / 1.0 / 216.0	-32.1	N/A
5.98	8.8 Pk	0.2 / 10.6 / 0.0	19.6	V / 1.0 / 336.0	-49.9	N/A
14.20	14.1 Pk	0.3 / 10.6 / 0.0	25.0	V / 1.0 / 36.0	-44.5	N/A
14.95	7.5 Pk	0.3 / 10.6 / 0.0	18.4	V / 1.0 / 336.0	-51.1	N/A
20.00	3.3 Pk	0.3 / 10.4 / 0.0	14.0	V / 1.0 / 0.0	-55.5	N/A
25.00	3.5 Pk	0.4 / 9.6 / 0.0	13.5	V / 1.0 / 0.0	-56.0	N/A
Tx Spurious 10kHz to 30MHz – Non-Restricted Band						
Loop Perpendicular to EUT						
0.0100	35.7 Pk	0.0 / 18.7 / 0.0	54.4	H / 1.0 / 86.0	-73.2	N/A
0.0650	29.2 Pk	0.0 / 10.8 / 0.0	40.0	H / 1.0 / 86.0	-71.3	N/A
0.340	35.3 Pk	0.0 / 10.3 / 0.0	45.6	H / 1.0 / 124.0	-51.4	N/A
0.493	14.7 Pk	0.1 / 10.3 / 0.0	25.1	H / 1.0 / 186.0	-48.6	N/A
0.660	29.4 Pk	0.1 / 10.3 / 0.0	39.8	H / 1.0 / 124.0	-31.4	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
250.01	38.1 Pk	1.1 / 11.7 / 27.1	23.8	H / 1.4 / 98.0	-22.2	N/A
264.40	31.9 Pk	1.1 / 13.0 / 27.2	18.8	H / 1.0 / 0.0	-27.2	N/A
Tx Spurious 30MHz to 1000MHz Non-Restricted Band						
217.66	42.5 Pk	1.0 / 10.6 / 27.2	26.9	H / 1.6 / 84.0	-19.1	N/A
371.24	45.5 Pk	1.3 / 15.1 / 27.4	34.4	H / 1.3 / 216.0	-11.6	N/A
625.04	29.3 Pk	1.7 / 19.1 / 28.2	22.0	H / 1.2 / 158.0	-24.0	N/A
665.99	49.0 Pk	1.8 / 19.7 / 28.1	42.4	H / 1.2 / 158.0	-3.6	N/A
742.50	48.5 Pk	1.9 / 20.5 / 28.0	42.9	H / 1.1 / 8.0	-3.1	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						
137.99	37.8 Pk	0.8 / 12.7 / 27.6	23.6	V / 1.1 / 258.0	-19.9	N/A
250.01	41.8 Pk	1.1 / 11.7 / 27.2	27.3	V / 1.0 / 16.8	-18.7	N/A
250.73	35.9 Pk	1.1 / 11.7 / 27.2	21.5	V / 1.0 / 25.8	-24.5	N/A
Tx Spurious 30MHz to 1000MHz Non-Restricted Band						
47.80	55.5 Pk	0.8 / 9.0 / 28.0	37.3	V / 1.0 / 224.0	-2.7	N/A
55.89	49.0 Pk	0.8 / 7.3 / 28.0	29.0	V / 1.0 / 216.0	-11.0	N/A
85.49	40.0 Pk	0.8 / 7.6 / 27.8	20.6	V / 1.0 / 78.0	-19.4	N/A
211.93	36.5 Pk	1.0 / 10.5 / 27.2	20.7	V / 1.1 / 168.0	-22.8	N/A
371.25	46.4 Pk	1.3 / 15.1 / 27.4	35.3	V / 1.3 / 138.0	-10.7	N/A
519.75	40.3 Pk	1.6 / 18.3 / 28.2	32.0	V / 1.8 / 296.0	-14.0	N/A
742.50	46.2 Pk	1.9 / 20.4 / 28.0	40.6	V / 1.6 / 272.0	-5.4	N/A
Tx Spurious Restricted Band						
1485.04	54.0 Pk	2.7 / 26.6 / 36.7	46.6	V / 1.7 / 342.0	-7.4	N/A
1485.04	46.3 Av	2.7 / 26.6 / 36.7	38.9	V / 1.7 / 342.0	-15.1	N/A
Tx Spurious – Non Restricted Band						
1856.30	55.5 Pk	3.1 / 28.2 / 37.1	49.6	V / 1.8 / 178.0	-4.4	N/A
1856.30	48.3 Av	3.1 / 28.2 / 37.1	42.5	V / 1.8 / 178.0	-11.5	N/A
2598.81	53.7 Pk	3.7 / 30.0 / 37.6	49.8	V / 1.6 / 342.0	-4.2	N/A
2598.81	44.4 Av	3.7 / 30.0 / 37.6	40.5	V / 1.6 / 342.0	-13.5	N/A
2673.07	51.8 Pk	3.7 / 30.1 / 37.5	48.1	V / 1.4 / 336.0	-5.9	N/A
Tx Spurious – Restricted Band						
1332.03	52.7 Pk	2.6 / 26.2 / 37.0	44.5	H / 1.8 / 145.0	-9.5	N/A
1332.03	51.0 Av	2.6 / 26.2 / 37.0	42.8	H / 1.8 / 145.0	-11.2	N/A
1485.04	52.2 Pk	2.7 / 26.6 / 36.7	44.8	H / 1.7 / 184.0	-9.2	N/A
1485.04	43.8 Av	2.7 / 26.6 / 36.7	36.3	H / 1.7 / 184.0	-17.7	N/A
4083.86	43.1 Pk	4.7 / 33.9 / 38.5	43.3	H / 2.0 / 0.0	-10.7	N/A
4083.86	39.7 Av	4.7 / 33.9 / 38.5	39.9	H / 1.0 / 112.9	-14.1	N/A
4083.89	44.6 Pk	4.7 / 33.9 / 38.5	44.7	H / 1.0 / 223.4	-9.3	N/A
4083.89	37.5 Av	4.7 / 33.9 / 38.5	37.6	H / 1.0 / 223.4	-16.4	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
4158.10	43.9 Pk	4.8 / 33.8 / 38.7	43.8	H / 1.0 / 227.4	-10.2	N/A
4158.10	26.9 Av	4.8 / 33.8 / 38.7	26.8	H / 1.0 / 227.4	-27.2	N/A
4899.28	38.0 Av	5.2 / 35.1 / 39.2	39.2	H / 2.0 / 0.0	-14.8	N/A
4899.12	44.2 Pk	5.2 / 35.1 / 39.2	45.4	H / 2.0 / 0.0	-8.6	N/A
5120.00	30.2 Pk	5.3 / 35.7 / 38.4	32.8	V / 1.0 / 0.0	-21.2	N/A
5120.00	28.9 Av	5.3 / 35.7 / 38.4	31.4	V / 1.0 / 0.0	-22.6	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
7500.00	28.4 Av	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
13300.0	27.9 Pk	9.0 / 42.2 / 46.8	32.3	V / 1.0 / 0.0	-21.7	N/A
13300.0	26.8 Av	9.0 / 42.2 / 46.8	31.1	V / 1.0 / 0.0	-22.9	N/A
15500.0	32.9 Pk	9.9 / 40.7 / 47.9	35.7	V / 1.0 / 0.0	-18.3	N/A
15500.0	32.4 Av	9.9 / 40.7 / 47.9	35.1	V / 1.0 / 0.0	-18.9	N/A
Tx Spurious Non-Restricted Band						
1998.05	50.5 Pk	3.2 / 28.5 / 37.2	44.9	H / 1.5 / 212.0	-9.1	N/A
1998.05	49.2 Av	3.2 / 28.5 / 37.2	43.6	H / 1.5 / 212.0	-10.4	N/A
2673.06	50.1 Pk	3.7 / 30.1 / 37.5	46.4	H / 1.6 / 235.0	-7.6	N/A
2673.06	38.0 Av	3.7 / 30.1 / 37.5	34.3	H / 1.6 / 235.0	-19.7	N/A
4455.11	44.6 Pk	5.0 / 34.2 / 39.0	44.7	H / 1.5 / 220.2	-9.3	N/A
4455.11	35.0 Av	5.0 / 34.2 / 39.0	35.1	H / 1.5 / 220.2	-18.9	N/A
4455.16	44.7 Pk	5.0 / 34.2 / 39.0	44.8	H / 1.6 / 154.5	-9.2	N/A
4455.16	35.9 Av	5.0 / 34.2 / 39.0	36.0	H / 1.6 / 154.5	-18.0	N/A
7900.00	23.6 Pk	6.8 / 39.0 / 39.8	29.7	V / 1.0 / 0.0	-24.3	N/A
7900.00	22.4 Av	6.8 / 39.0 / 39.8	28.4	V / 1.0 / 0.0	-25.6	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
14100.0	28.2 Av	9.3 / 42.6 / 47.9	32.2	V / 1.0 / 0.0	-21.8	N/A
17500.0	28.4 Pk	10.8 / 44.4 / 45.9	37.6	V / 1.0 / 0.0	-16.4	N/A
17500.0	27.5 Av	10.8 / 44.4 / 45.9	36.8	V / 1.0 / 0.0	-17.2	N/A
Tx Spurious Low Channel 18GHz to 25GHz						
Restricted Band Measurements						
18507.5	4.1 Pk	0.0 / 22.4 / 0.0	16.9	H / 1.0 / 0.0	-37.0	N/A
19575.0	5.2 Pk	0.0 / 22.0 / 0.0	17.7	H / 1.0 / 0.0	-36.2	N/A
20187.5	4.3 Pk	0.0 / 21.7 / 0.0	16.4	H / 1.0 / 0.0	-37.5	N/A
21220.0	6.6 Pk	0.0 / 21.5 / 0.0	18.5	H / 1.0 / 0.0	-35.4	N/A
22270.0	5.5 Pk	0.0 / 21.1 / 0.0	17.1	H / 1.0 / 0.0	-36.8	N/A
22935.0	5.2 Pk	0.0 / 21.3 / 0.0	16.9	H / 1.0 / 0.0	-37.0	N/A
23722.5	7.6 Pk	0.0 / 21.3 / 0.0	19.3	H / 1.0 / 0.0	-34.6	N/A
19575.0	0.2 Av	0.0 / 22.0 / 0.0	12.7	H / 1.0 / 0.0	-41.2	N/A
18507.0	0.6 Av	0.0 / 22.4 / 0.0	13.4	H / 1.0 / 0.0	-40.5	N/A
20187.5	0.1 Av	0.0 / 21.7 / 0.0	12.2	H / 1.0 / 0.0	-41.7	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
21220.0	-0.1 Av	0.0 / 21.5 / 0.0	11.8	H / 1.0 / 0.0	-42.1	N/A
22270.0	-0.3 Av	0.0 / 21.1 / 0.0	11.2	H / 1.0 / 0.0	-42.7	N/A
22935.0	-0.5 Av	0.0 / 21.3 / 0.0	11.2	H / 1.0 / 0.0	-42.7	N/A
23722.5	-0.6 Av	0.0 / 21.3 / 0.0	11.1	H / 1.0 / 0.0	-42.8	N/A
18507.5	5.7 Pk	0.0 / 22.4 / 0.0	18.5	V / 1.0 / 0.0	-35.4	N/A
19575.0	4.9 Pk	0.0 / 22.0 / 0.0	17.3	V / 1.0 / 0.0	-36.6	N/A
20187.5	4.9 Pk	0.0 / 21.7 / 0.0	17	V / 1.0 / 0.0	-36.9	N/A
21220.0	4.9 Pk	0.0 / 21.5 / 0.0	16.8	V / 1.0 / 0.0	-37.1	N/A
22270.0	3.8 Pk	0.0 / 21.1 / 0.0	15.3	V / 1.0 / 0.0	-38.6	N/A
22935.0	5.4 Pk	0.0 / 21.3 / 0.0	17.1	V / 1.0 / 0.0	-36.8	N/A
23722.5	2.0 Pk	0.0 / 21.3 / 0.0	13.8	V / 1.0 / 0.0	-40.1	N/A
18507.5	0.4 Av	0.0 / 22.4 / 0.0	13.2	V / 1.0 / 0.0	-40.7	N/A
19575.0	0.1 Av	0.0 / 22.0 / 0.0	12.5	V / 1.0 / 0.0	-41.4	N/A
20187.5	-0.1 Av	0.0 / 21.7 / 0.0	12	V / 1.0 / 0.0	-41.9	N/A
21220.0	-0.3 Av	0.0 / 21.5 / 0.0	11.6	V / 1.0 / 0.0	-42.3	N/A
22270.0	-0.5 Av	0.0 / 21.1 / 0.0	11.1	V / 1.0 / 0.0	-42.8	N/A
22935.0	-0.8 Av	0.0 / 21.3 / 0.0	11	V / 1.0 / 0.0	-42.9	N/A
23722.5	-0.8 Av	0.0 / 21.3 / 0.0	10.9	V / 1.0 / 0.0	-43.0	N/A
Non-Restricted Band Measurements						
24825.0	4.9 Pk	0.0 / 21.6 / 0.0	16.9	V / 1.0 / 0.0	-37.0	N/A
24825.0	-1.1 Av	0.0 / 21.6 / 0.0	10.9	V / 1.0 / 0.0	-43.0	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
***** Measurement Summary *****						
0.66	29.4 Pk	0.1 / 10.3 / 0.0	39.8	H / 1.0 / 124.0	-31.4	N/A
1.16	23.7 Pk	0.1 / 10.4 / 0.0	34.2	V / 1.0 / 216.0	-32.1	N/A
0.497	28.9 Pk	0.1 / 10.3 / 0.0	39.4	H / 1.0 / 186.0	-34.3	N/A
2.18	18.6 Pk	0.1 / 10.5 / 0.0	29.3	V / 1.0 / 186.0	-40.2	N/A
14.2	14.1 Pk	0.3 / 10.6 / 0.0	25	V / 1.0 / 36.0	-44.5	N/A
0.499	16.4 Pk	0.1 / 10.3 / 0.0	26.8	V / 1.0 / 186.0	-46.8	N/A
12.57	10.6 Pk	0.3 / 10.7 / 0.0	21.5	H / 1.0 / 113.0	-48	N/A
0.493	14.7 Pk	0.1 / 10.3 / 0.0	25.1	H / 1.0 / 186.0	-48.6	N/A
25.64	10.8 Pk	0.4 / 9.4 / 0.0	20.6	V / 1.0 / 36.0	-48.9	N/A
5.98	8.8 Pk	0.2 / 10.6 / 0.0	19.6	V / 1.0 / 336.0	-49.9	N/A
14.95	7.5 Pk	0.3 / 10.6 / 0.0	18.4	V / 1.0 / 336.0	-51.1	N/A
0.34	35.5 Pk	0.0 / 10.3 / 0.0	45.8	V / 1.0 / 68.0	-51.2	N/A
0.34	35.3 Pk	0.0 / 10.3 / 0.0	45.6	H / 1.0 / 124.0	-51.4	N/A
20.02	3.3 Pk	0.3 / 10.4 / 0.0	14	V / 1.0 / 0.0	-55.5	N/A
25.00	3.5 Pk	0.4 / 9.6 / 0.0	13.5	V / 1.0 / 0.0	-56	N/A
0.064	30.1 Pk	0.0 / 10.8 / 0.0	40.9	V / 1.0 / 68.0	-70.6	N/A
0.065	29.2 Pk	0.0 / 10.8 / 0.0	40	H / 1.0 / 86.0	-71.3	N/A
0.01	35.9 Pk	0.0 / 18.7 / 0.0	54.6	V / 1.0 / 36.0	-73	N/A
0.01	35.7 Pk	0.0 / 18.7 / 0.0	54.4	H / 1.0 / 86.0	-73.2	N/A
47.8	55.5 Pk	0.8 / 9.0 / 28.0	37.3	V / 1.0 / 224.0	-2.7	N/A
742.5	48.5 Pk	1.9 / 20.5 / 28.0	42.9	H / 1.1 / 8.0	-3.1	N/A
665.99	49.0 Pk	1.8 / 19.7 / 28.1	42.4	H / 1.2 / 158.0	-3.6	N/A
742.5	46.2 Pk	1.9 / 20.4 / 28.0	40.6	V / 1.6 / 272.0	-5.4	N/A
371.25	46.4 Pk	1.3 / 15.1 / 27.4	35.3	V / 1.3 / 138.0	-10.7	N/A
55.89	49.0 Pk	0.8 / 7.3 / 28.0	29	V / 1.0 / 216.0	-11	N/A
371.24	45.5 Pk	1.3 / 15.1 / 27.4	34.4	H / 1.3 / 216.0	-11.6	N/A
519.75	40.3 Pk	1.6 / 18.3 / 28.2	32	V / 1.8 / 296.0	-14	N/A
250.01	41.8 Pk	1.1 / 11.7 / 27.2	27.3	V / 1.0 / 16.8	-18.7	N/A
217.66	42.5 Pk	1.0 / 10.6 / 27.2	26.9	H / 1.6 / 84.0	-19.1	N/A
85.49	40.0 Pk	0.8 / 7.6 / 27.8	20.6	V / 1.0 / 78.0	-19.4	N/A
137.99	37.8 Pk	0.8 / 12.7 / 27.6	23.6	V / 1.1 / 258.0	-19.9	N/A
250.01	38.1 Pk	1.1 / 11.7 / 27.1	23.8	H / 1.4 / 98.0	-22.2	N/A
211.93	36.5 Pk	1.0 / 10.5 / 27.2	20.7	V / 1.1 / 168.0	-22.8	N/A
625.04	29.3 Pk	1.7 / 19.1 / 28.2	22	H / 1.2 / 158.0	-24	N/A
250.73	35.9 Pk	1.1 / 11.7 / 27.2	21.5	V / 1.0 / 25.8	-24.5	N/A
264.4	31.9 Pk	1.1 / 13.0 / 27.2	18.8	H / 1.0 / 0.0	-27.2	N/A
2598.81	53.7 Pk	3.7 / 30.0 / 37.6	49.8	V / 1.6 / 342.0	-4.2	N/A
1856.30	55.5 Pk	3.1 / 28.2 / 37.1	49.6	V / 1.8 / 178.0	-4.4	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
2673.07	51.8 Pk	3.7 / 30.1 / 37.5	48.1	V / 1.4 / 336.0	-5.9	N/A
1485.04	54.0 Pk	2.7 / 26.6 / 36.7	46.6	V / 1.7 / 342.0	-7.4	N/A
4899.12	44.2 Pk	5.2 / 35.1 / 39.2	45.4	H / 2.0 / 0.0	-8.6	N/A
1998.05	50.5 Pk	3.2 / 28.5 / 37.2	44.9	H / 1.5 / 212.0	-9.1	N/A
4455.16	44.7 Pk	5.0 / 34.2 / 39.0	44.8	H / 1.6 / 154.5	-9.2	N/A
4083.89	44.6 Pk	4.7 / 33.9 / 38.5	44.7	H / 1.0 / 223.4	-9.3	N/A
1332.03	52.7 Pk	2.6 / 26.2 / 37.0	44.5	H / 1.8 / 145.0	-9.5	N/A
4158.10	43.9 Pk	4.8 / 33.8 / 38.7	43.8	H / 1.0 / 227.4	-10.2	N/A
2490.31	45.0 Pk	3.6 / 29.8 / 37.7	40.6	V / 1.6 / 68.0	-13.4	N/A
2483.59	44.1 Pk	3.6 / 29.8 / 37.7	39.7	V / 1.6 / 235.0	-14.3	N/A
2491.63	43.4 Pk	3.6 / 29.8 / 37.7	39.1	V / 1.7 / 76.0	-14.9	N/A
17500.0	28.4 Pk	10.8 / 44.4 / 45.9	37.6	V / 1.0 / 0.0	-16.4	N/A
15500.0	32.9 Pk	9.9 / 40.7 / 47.9	35.7	V / 1.0 / 0.0	-18.3	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
5120.00	30.2 Pk	5.3 / 35.7 / 38.4	32.8	V / 1.0 / 0.0	-21.2	N/A
13300.0	27.9 Pk	9.0 / 42.2 / 46.8	32.3	V / 1.0 / 0.0	-21.7	N/A
2390.00	36.0 Pk	3.5 / 29.4 / 37.6	31.3	H / 1.0 / 0.0	-22.7	N/A
7900.00	23.6 Pk	6.8 / 39.0 / 39.8	29.7	V / 1.0 / 0.0	-24.3	N/A
23722.5	7.6 Pk	0.0 / 21.3 / 0.0	19.3	H / 1.0 / 0.0	-34.6	N/A
21220	6.6 Pk	0.0 / 21.5 / 0.0	18.5	H / 1.0 / 0.0	-35.4	N/A
18507.5	5.7 Pk	0.0 / 22.4 / 0.0	18.5	V / 1.0 / 0.0	-35.4	N/A
19575	5.2 Pk	0.0 / 22.0 / 0.0	17.7	H / 1.0 / 0.0	-36.2	N/A
19575.0	4.9 Pk	0.0 / 22.0 / 0.0	17.3	V / 1.0 / 0.0	-36.6	N/A
22270	5.5 Pk	0.0 / 21.1 / 0.0	17.1	H / 1.0 / 0.0	-36.8	N/A
22935.0	5.4 Pk	0.0 / 21.3 / 0.0	17.1	V / 1.0 / 0.0	-36.8	N/A
20187.5	4.9 Pk	0.0 / 21.7 / 0.0	17	V / 1.0 / 0.0	-36.9	N/A
22935	5.2 Pk	0.0 / 21.3 / 0.0	16.9	H / 1.0 / 0.0	-37.0	N/A
18507.5	4.1 Pk	0.0 / 22.4 / 0.0	16.9	H / 1.0 / 0.0	-37.0	N/A
24825.0	4.9 Pk	0.0 / 21.6 / 0.0	16.9	V / 1.0 / 0.0	-37.0	N/A
21220.0	4.9 Pk	0.0 / 21.5 / 0.0	16.8	V / 1.0 / 0.0	-37.1	N/A
20187.5	4.3 Pk	0.0 / 21.7 / 0.0	16.4	H / 1.0 / 0.0	-37.5	N/A
22270.0	3.8 Pk	0.0 / 21.1 / 0.0	15.3	V / 1.0 / 0.0	-38.6	N/A
23722.5	2.0 Pk	0.0 / 21.3 / 0.0	13.8	V / 1.0 / 0.0	-40.1	N/A

6.12 Test Data: Tx High Channel

Radiated Electromagnetic Emissions

Test Report #:	100457286	Test Area:	CC1 Radiated	Temperature:	22.3 °C
Test Method:	FCC Part 15.209	Test Date:	21-Jul-2011	Relative Humidity:	40.1 %
EUT Model #:	DE51 (ViP110)	EUT Power:	115VAC/60Hz	Air Pressure:	83.52 kPa
EUT Serial #:	EMC 1				

Manufacturer:	Echostar	Level Key
EUT Description:	MoCa Converter Set-Top Box	Pk – Peak
Notes:	Tx Spurious – High Channel Modulated	Qp – QuasiPeak
		Av - Average

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
High Channel Spurious 10kHz to 30MHz Restricted Band						
Loop Parallel to EUT						
0.500	17.7 Pk	0.1 / 10.3 / 0.0	28.1	H / 1.0 / 184.6	-53.7	N/A
2.19	5.2 Pk	0.1 / 10.5 / 0.0	15.8	H / 1.0 / 304.8	-64.0	N/A
25.67	-4.2 Pk	0.4 / 9.4 / 0.0	5.5	H / 1.0 / 235.2	-64.0	N/A
14.73	-3.6 Pk	0.3 / 10.6 / 0.0	7.3	H / 1.0 / 21.3	-47.6	N/A
1.35	6.8 Pk	0.1 / 10.4 / 0.0	17.3	H / 1.5 / 21.3	-65.3	N/A
0.154	28.1 Pk	0.0 / 10.4 / 0.0	38.5	H / 1.0 / 0.0	-65.3	N/A
High Channel Spurious 10kHz to 30MHz Non-Restricted Band						
Loop Perpendicular to EUT						
0.500	33.6 Pk	0.1 / 10.3 / 0.0	44.0	H / 1.0 / 0.0	-40.1	N/A
2.18	18.8 Pk	0.1 / 10.5 / 0.0	29.4	H / 1.0 / 0.0	-45.5	N/A
25.66	14.2 Pk	0.4 / 9.4 / 0.0	24.0	H / 1.0 / 0.0	-45.5	N/A
14.67	16.4 Pk	0.3 / 10.6 / 0.0	27.4	H / 1.0 / 0.0	-51.8	N/A
0.152	41.8 Pk	0.0 / 10.4 / 0.0	52.2	H / 1.0 / 0.0	-18.0	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						
965.23	34.2 Pk	2.2 / 22.5 / 27.4	31.5	V / 1.9 / 212.8	-22.5	N/A
999.58	30.6 Pk	2.2 / 22.8 / 27.3	28.2	V / 1.0 / 0.0	-25.8	N/A
173.20	42.4 Pk	0.9 / 11.8 / 27.6	27.4	V / 1.0 / 314.1	-16.1	N/A
Tx Spurious 30MHz to 1000MHz Non-Restricted Band						
51.79	57.6 Pk	0.8 / 7.7 / 28.2	37.9	V / 1.0 / 331.5	-2.1	N/A
60.17	58.1 Pk	0.8 / 7.5 / 28.2	38.2	V / 1.0 / 144.4	-1.8	N/A
105.05	48.4 Pk	0.8 / 11.8 / 27.9	33.0	V / 1.0 / 239.6	-10.5	N/A
106.67	53.4 Pk	0.8 / 12.1 / 27.9	38.3	V / 1.0 / 168.6	-5.2	N/A
404.96	37.8 Pk	1.4 / 15.9 / 27.8	27.3	V / 1.4 / 194.1	-18.7	N/A
207.27	42.6 Pk	1.0 / 11.0 / 27.4	27.1	V / 1.0 / 56.0	-16.4	N/A
371.23	50.9 Pk	1.3 / 15.1 / 27.6	39.7	V / 1.5 / 212.7	-6.3	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
742.48	44.5 Pk	1.9 / 20.4 / 28.1	38.7	V / 1.9 / 212.7	-7.3	N/A
Tx Spurious 30MHz to 1000MHz Restricted Band						
171.79	39.5 Pk	0.9 / 11.9 / 27.6	24.7	H / 1.6 / 104.7	-18.8	N/A
326.08	30.9 Pk	1.2 / 14.1 / 27.3	19.0	H / 1.5 / 188.1	-27.0	N/A
331.99	33.3 Pk	1.3 / 14.1 / 27.3	21.3	H / 1.0 / 323.1	-24.7	N/A
Tx Spurious 30MHz to 1000MHz Non-restricted Band						
104.72	32.5 Pk	0.8 / 11.7 / 27.9	17.1	H / 1.4 / 225.6	-26.4	N/A
207.36	42.6 Pk	1.0 / 11.0 / 27.4	27.1	H / 1.3 / 140.4	-16.4	N/A
371.23	53.0 Pk	1.3 / 15.1 / 27.6	41.8	H / 1.0 / 266.4	-4.2	N/A
665.98	49.4 Pk	1.8 / 19.7 / 28.3	42.5	H / 1.2 / 191.2	-3.5	N/A
742.47	46.2 Pk	1.9 / 20.4 / 28.1	40.4	H / 1.0 / 15.8	-5.6	N/A
Tx 1GHz to 4GHz Restricted Band						
1485.01	54.2 Pk	2.7 / 26.6 / 36.6	47.0	H / 1.9 / 0.0	-7.0	N/A
1485.01	45.2 Av	2.7 / 26.6 / 36.6	38.0	H / 1.9 / 0.0	-16.0	N/A
1331.99	50.3 Pk	2.6 / 26.2 / 36.9	42.2	H / 1.1 / 144.6	-11.8	N/A
1332.00	48.3 Av	2.6 / 26.2 / 36.9	40.2	H / 1.1 / 144.6	-13.8	N/A
2227.52	49.5 Pk	3.4 / 28.8 / 37.2	44.4	H / 2.2 / 32.5	-9.6	N/A
2227.52	41.0 Av	3.4 / 28.8 / 37.2	35.9	H / 2.2 / 32.5	-18.1	N/A
Tx 1GHz to 4GHz Non-Restricted Band						
1902.60	49.7 Pk	3.1 / 28.3 / 37.0	44.1	H / 1.6 / 52.3	-9.9	N/A
1902.60	43.2 Av	3.1 / 28.3 / 37.0	37.6	H / 1.6 / 52.3	-16.4	N/A
1902.54	50.1 Pk	3.1 / 28.3 / 37.0	44.5	H / 1.5 / 48.6	-9.5	N/A
1902.54	42.9 Av	3.1 / 28.3 / 37.0	37.3	H / 1.5 / 48.6	-16.7	N/A
2664.02	52.1 Pk	3.7 / 30.1 / 37.4	48.6	H / 1.8 / 186.1	-5.4	N/A
2664.02	50.5 Av	3.7 / 30.1 / 37.4	47.0	H / 1.8 / 186.1	-7.0	N/A
2970.07	45.2 Pk	4.0 / 31.5 / 37.3	43.3	H / 1.1 / 170.4	-10.7	N/A
2970.07	35.3 Av	4.0 / 31.5 / 37.3	33.4	H / 1.1 / 170.4	-20.6	N/A
1856.28	48.5 Pk	3.1 / 28.2 / 37.0	42.8	H / 1.5 / 202.3	-11.2	N/A
1856.28	40.3 Av	3.1 / 28.2 / 37.0	34.6	H / 1.5 / 202.3	-19.4	N/A
Tx 1GHz to 4GHz Restricted Band						
1485.00	55.7 Pk	2.7 / 26.6 / 36.6	48.4	V / 1.8 / 23.3	-5.6	N/A
1485.00	44.5 Av	2.7 / 26.6 / 36.6	37.2	V / 1.8 / 23.3	-16.8	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
1331.99	46.9 Pk	2.6 / 26.2 / 36.9	38.8	V / 2.3 / 174.2	-15.2	N/A
1332.00	44.5 Av	2.6 / 26.2 / 36.9	36.4	V / 2.3 / 174.2	-17.6	N/A
2227.51	47.8 Pk	3.4 / 28.8 / 37.2	42.7	V / 1.0 / 318.3	-11.3	N/A
2227.52	37.0 Av	3.4 / 28.8 / 37.2	31.9	V / 1.0 / 318.3	-22.1	N/A
Tx 1GHz to 4GHz Non-Restricted Band						
1856.26	55.4 Pk	3.1 / 28.2 / 37.0	49.7	V / 2.2 / 0.0	-4.3	N/A
1856.26	48.6 Av	3.1 / 28.2 / 37.0	42.9	V / 2.2 / 0.0	-11.1	N/A
2598.79	54.6 Pk	3.7 / 30.0 / 37.4	50.8	V / 1.1 / 177.9	-3.2	N/A
2598.79	45.7 Av	3.7 / 30.0 / 37.4	42.0	V / 1.1 / 177.9	-12.0	N/A
2664.04	48.6 Pk	3.7 / 30.1 / 37.4	45.1	V / 2.5 / 176.8	-8.9	N/A
2664.04	46.9 Av	3.7 / 30.1 / 37.4	43.3	V / 2.5 / 176.8	-10.7	N/A
2970.05	46.4 Pk	4.0 / 31.5 / 37.3	44.4	V / 2.2 / 212.2	-9.6	N/A
2970.05	36.8 Av	4.0 / 31.5 / 37.3	34.9	V / 2.2 / 212.2	-19.1	N/A
3341.29	41.0 Pk	4.2 / 32.4 / 36.9	40.8	V / 2.3 / 44.7	-13.2	N/A
3341.29	33.6 Av	4.2 / 32.4 / 36.9	33.4	V / 2.3 / 44.7	-20.6	N/A
Tx Spurious 4GHz to 18GHz						
Restricted Band						
4083.80	44.5 Pk	4.7 / 33.9 / 38.8	44.3	V / 1.6 / 228.6	-9.7	N/A
4083.80	35.1 Av	4.7 / 33.9 / 38.8	34.9	V / 1.6 / 228.6	-19.1	N/A
4158.07	41.9 Pk	4.8 / 33.8 / 39.3	41.2	V / 1.3 / 183.8	-12.8	N/A
4158.07	33.2 Av	4.8 / 33.8 / 39.3	32.5	V / 1.3 / 183.8	-21.5	N/A
5120.00	30.2 Pk	5.3 / 35.7 / 38.4	32.8	V / 1.0 / 0.0	-21.2	N/A
5120.00	28.9 Av	5.3 / 35.7 / 38.4	31.4	V / 1.0 / 0.0	-22.6	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
7500.00	28.4 Av	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
Non-Restricted Band						
4455.08	40.6 Pk	5.0 / 34.2 / 39.9	39.9	V / 1.2 / 250.2	-14.1	N/A
4455.08	33.6 Av	5.0 / 34.2 / 39.9	32.9	V / 1.2 / 250.2	-21.1	N/A
6034.88	32.8 Pk	5.8 / 36.8 / 39.2	36.2	V / 1.9 / 144.8	-17.8	N/A
6034.88	30.7 Av	5.8 / 36.8 / 39.2	34.1	V / 1.9 / 144.8	-19.9	N/A
10200.0	35.2 Pk	7.9 / 40.7 / 48.9	35.0	V / 1.0 / 0.0	-19.0	N/A
10200.0	35.5 Av	7.9 / 40.7 / 48.9	35.2	V / 1.0 / 0.0	-18.8	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
14100.0	28.2 Av	9.3 / 42.6 / 47.9	32.2	V / 1.0 / 0.0	-21.8	N/A
Tx Spurious 4GHz to 18GHz						
Restricted Band						
4083.86	46.8 Pk	4.7 / 33.9 / 38.8	46.6	H / 2.2 / 104.9	-7.4	N/A
4083.86	35.2 Av	4.7 / 33.9 / 38.8	35.0	H / 2.2 / 104.9	-19.0	N/A
4158.13	44.9 Pk	4.8 / 33.8 / 39.3	44.2	H / 1.5 / 207.9	-9.8	N/A
4158.13	34.9 Av	4.8 / 33.8 / 39.3	34.2	H / 1.5 / 207.9	-19.8	N/A
4949.09	40.9 Pk	5.2 / 35.2 / 38.7	42.7	H / 1.9 / 287.2	-11.3	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

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(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
4949.09	35.1 Av	5.2 / 35.2 / 38.7	36.8	H / 1.9 / 287.2	-17.2	N/A
Non-Restricted Band						
4455.11	44.9 Pk	5.0 / 34.2 / 39.9	44.2	H / 1.1 / 246.6	-9.8	N/A
4455.11	35.5 Av	5.0 / 34.2 / 39.9	34.7	H / 1.1 / 246.6	-19.3	N/A
Tx Spurious Low Channel 18GHz to 25GHz						
Restricted Band Measurements						
18875.0	7.5 Pk	0.0 / 22.4 / 0.0	20.3	H / 1.0 / 0.0	-33.6	N/A
18875.0	0.2 Av	0.0 / 22.4 / 0.0	13	H / 1.0 / 0.0	-40.9	N/A
18122.5	4.4 Pk	0.0 / 22.2 / 0.0	17	H / 1.0 / 0.0	-36.9	N/A
18122.5	0.6 Av	0.0 / 22.2 / 0.0	13.2	H / 1.0 / 0.0	-40.7	N/A
22270.0	4.2 Pk	0.0 / 21.1 / 0.0	15.7	H / 1.0 / 0.0	-38.2	N/A
22270.0	0.5 Av	0.0 / 21.1 / 0.0	11.1	H / 1.0 / 0.0	-42.8	N/A
18945.0	5.8 Pk	0.0 / 22.4 / 0.0	18.6	V / 1.0 / 0.0	-35.3	N/A
18945.0	0.2 Av	0.0 / 22.4 / 0.0	13	V / 1.0 / 0.0	-40.9	N/A
19400.0	4.8 Pk	0.0 / 22.2 / 0.0	17.3	V / 1.0 / 0.0	-36.6	N/A
19400.0	0.2 Av	0.0 / 22.2 / 0.0	12.7	V / 1.0 / 0.0	-41.2	N/A
20187.0	0.1 Av	0.0 / 21.7 / 0.0	12	V / 1.0 / 0.0	-41.9	N/A
20187.5	3.6 Pk	0.0 / 21.7 / 0.0	15.6	V / 1.0 / 0.0	-38.3	N/A
23722.5	6.2 Pk	0.0 / 21.3 / 0.0	17.9	V / 1.0 / 0.0	-36.0	N/A
23722.5	0.7 Av	0.0 / 21.3 / 0.0	11	V / 1.0 / 0.0	-42.9	N/A
Non-Restricted Band Measurements						
21710.0	8.3 Pk	0.0 / 21.4 / 0.0	20.1	H / 1.0 / 0.0	-33.8	N/A
21710.0	0.2 Av	0.0 / 21.4 / 0.0	11.6	H / 1.0 / 0.0	-42.3	N/A
23460.0	7.4 Pk	0.0 / 21.4 / 0.0	19.2	V / 1.0 / 0.0	-34.7	N/A
23460.0	0.6 Av	0.0 / 21.4 / 0.0	11.2	V / 1.0 / 0.0	-42.7	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
***** Measurement Summary *****						
0.152	41.8 Pk	0.0 / 10.4 / 0.0	52.2	H / 1.0 / 0.0	-18.0	N/A
0.500	33.6 Pk	0.1 / 10.3 / 0.0	44.0	H / 1.0 / 0.0	-40.1	N/A
2.18	18.8 Pk	0.1 / 10.5 / 0.0	29.4	H / 1.0 / 0.0	-45.5	N/A
25.66	14.2 Pk	0.4 / 9.4 / 0.0	24.0	H / 1.0 / 0.0	-45.5	N/A
14.73	-3.6 Pk	0.3 / 10.6 / 0.0	7.3	H / 1.0 / 21.3	-47.6	N/A
14.67	16.4 Pk	0.3 / 10.6 / 0.0	27.4	H / 1.0 / 0.0	-51.8	N/A
0.50	17.7 Pk	0.1 / 10.3 / 0.0	28.10	H / 1.0 / 184.6	-53.70	N/A
2.19	5.2 Pk	0.1 / 10.5 / 0.0	15.80	H / 1.0 / 304.8	-64.00	N/A
25.67	-4.2 Pk	0.4 / 9.4 / 0.0	5.5	H / 1.0 / 235.2	-64.0	N/A
1.35	6.8 Pk	0.1 / 10.4 / 0.0	17.3	H / 1.5 / 21.3	-65.3	N/A
0.154	28.1 Pk	0.0 / 10.4 / 0.0	38.5	H / 1.0 / 0.0	-65.3	N/A
60.17	58.1 Pk	0.8 / 7.5 / 28.2	38.2	V / 1.0 / 144.4	-1.8	N/A
51.79	57.6 Pk	0.8 / 7.7 / 28.2	37.9	V / 1.0 / 331.5	-2.1	N/A
665.98	49.4 Pk	1.8 / 19.7 / 28.3	42.5	H / 1.2 / 191.2	-3.5	N/A
52.05	55.8 Pk	0.8 / 7.7 / 28.2	36.1	V / 1.0 / 0.0	-3.9	N/A
371.23	53.0 Pk	1.3 / 15.1 / 27.6	41.8	H / 1.0 / 266.4	-4.2	N/A
106.67	53.4 Pk	0.8 / 12.1 / 27.9	38.3	V / 1.0 / 168.6	-5.2	N/A
742.47	46.2 Pk	1.9 / 20.4 / 28.1	40.4	H / 1.0 / 15.8	-5.6	N/A
105.05	48.4 Pk	0.8 / 11.8 / 27.9	33.0	V / 1.0 / 239.6	-10.5	N/A
173.20	42.4 Pk	0.9 / 11.8 / 27.6	27.4	V / 1.0 / 314.1	-16.1	N/A
207.27	42.6 Pk	1.0 / 11.0 / 27.4	27.1	V / 1.0 / 56.0	-16.4	N/A
207.36	42.6 Pk	1.0 / 11.0 / 27.4	27.1	H / 1.3 / 140.4	-16.4	N/A

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209	N/A
404.96	37.8 Pk	1.4 / 15.9 / 27.8	27.3	V / 1.4 / 194.1	-18.7	N/A
171.79	39.5 Pk	0.9 / 11.9 / 27.6	24.7	H / 1.6 / 104.7	-18.8	N/A
965.23	34.2 Pk	2.2 / 22.5 / 27.4	31.5	V / 1.9 / 212.8	-22.5	N/A
331.99	33.3 Pk	1.3 / 14.1 / 27.3	21.3	H / 1.0 / 323.1	-24.7	N/A
999.58	30.6 Pk	2.2 / 22.8 / 27.3	28.2	V / 1.0 / 0.0	-25.8	N/A
104.72	32.5 Pk	0.8 / 11.7 / 27.9	17.1	H / 1.4 / 225.6	-26.4	N/A
326.08	30.9 Pk	1.2 / 14.1 / 27.3	19.0	H / 1.5 / 188.1	-27.0	N/A
2598.79	54.6 Pk	3.7 / 30.0 / 37.4	50.8	V / 1.1 / 177.9	-3.2	N/A
1856.26	55.4 Pk	3.1 / 28.2 / 37.0	49.7	V / 2.2 / 0.0	-4.3	N/A
2664.02	52.1 Pk	3.7 / 30.1 / 37.4	48.6	H / 1.8 / 186.1	-5.4	N/A
1485.00	55.7 Pk	2.7 / 26.6 / 36.6	48.4	V / 1.8 / 23.3	-5.6	N/A
1902.54	50.1 Pk	3.1 / 28.3 / 37.0	44.5	H / 1.5 / 48.6	-9.5	N/A
2227.52	49.5 Pk	3.4 / 28.8 / 37.2	44.4	H / 2.2 / 32.5	-9.6	N/A
2970.05	46.4 Pk	4.0 / 31.5 / 37.3	44.4	V / 2.2 / 212.2	-9.6	N/A
1331.99	50.3 Pk	2.6 / 26.2 / 36.9	42.2	H / 1.1 / 144.6	-11.8	N/A
3341.29	41.0 Pk	4.2 / 32.4 / 36.9	40.8	V / 2.3 / 44.7	-13.2	N/A
1332.00	44.5 Av	2.6 / 26.2 / 36.9	36.4	V / 2.3 / 174.2	-17.6	N/A
4083.86	46.8 Pk	4.7 / 33.9 / 38.8	46.6	H / 2.2 / 104.9	-7.4	N/A
4158.13	44.9 Pk	4.8 / 33.8 / 39.3	44.2	H / 1.5 / 207.9	-9.8	N/A
4455.11	44.9 Pk	5.0 / 34.2 / 39.9	44.2	H / 1.1 / 246.6	-9.8	N/A
4949.09	40.9 Pk	5.2 / 35.2 / 38.7	42.7	H / 1.9 / 287.2	-11.3	N/A
6034.88	32.8 Pk	5.8 / 36.8 / 39.2	36.2	V / 1.9 / 144.8	-17.8	N/A
10200.0	35.2 Pk	7.9 / 40.7 / 48.9	35.0	V / 1.0 / 0.0	-19.0	N/A
7500.00	28.4 Pk	6.6 / 38.9 / 39.4	34.4	V / 1.0 / 0.0	-19.6	N/A
14100.0	29.4 Pk	9.3 / 42.6 / 47.9	33.4	V / 1.0 / 0.0	-20.6	N/A
18875	7.5 Pk	0.0 / 22.4 / 0.0	20.3	H / 1.0 / 0.0	-33.6	N/A
21710	8.3 Pk	0.0 / 21.4 / 0.0	20.1	H / 1.0 / 0.0	-33.8	N/A
23460	7.4 Pk	0.0 / 21.4 / 0.0	19.2	V / 1.0 / 0.0	-34.7	N/A
18945	5.8 Pk	0.0 / 22.4 / 0.0	18.6	V / 1.0 / 0.0	-35.3	N/A
23722.5	6.2 Pk	0.0 / 21.3 / 0.0	17.9	V / 1.0 / 0.0	-36	N/A
19400	4.8 Pk	0.0 / 22.2 / 0.0	17.3	V / 1.0 / 0.0	-36.6	N/A
18122.5	4.4 Pk	0.0 / 22.2 / 0.0	17	H / 1.0 / 0.0	-36.9	N/A
22270	4.2 Pk	0.0 / 21.1 / 0.0	15.7	H / 1.0 / 0.0	-38.2	N/A
20187.5	3.6 Pk	0.0 / 21.7 / 0.0	15.6	V / 1.0 / 0.0	-38.3	N/A

Example Unintentional Radiated Emissions Calculation:

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

Measured Level		Transducer, Cable Loss & Amplifier corrections		Corrected Reading	Specification Limit		Corrected Reading		Delta Specification
(dB μ V)	+	(dB)	=	(dB μ V/m)	(dB μ V/m)	-	(dB μ V/m)	=	
14.0		14.9		28.9	40.0		28.9		-11.1

Notes: Measurements made >18GHz were made at a test distance of 1m and the measurement data was extrapolated to 3m. The FCC limits were not changed.

Deviations, Additions, or Exclusions: None

7 Band Edge Measurements – Unintentional and Spurious of the Transmitter

7.1 Method

The test methods used comply with ANSI C63.10. Unless otherwise stated no deviations were made from **FCC 15.247 & IC RSS-210**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

7.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	12/06/2010	12/06/2011
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	12/10/2010	12/10/2011
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	12/06/2010	12/06/2011
18906	Pre-Amplifier (1-4 GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/03/2011	06/03/2012
SW-6	Software application for Radiated and Conducted Emissions	Intertek	OATS_CVI	V.1.0	01/01/2011	01/01/2012

7.3 Results:

The sample tested was found to comply with the requirements of:

- FCC 15.209/ 15.247(d)
- Covers RSS-210 A8.5, & RSS-GEN 7.2.2

7.4 Setup Photographs:

Test setup – Field Strength Measurements (Front View)



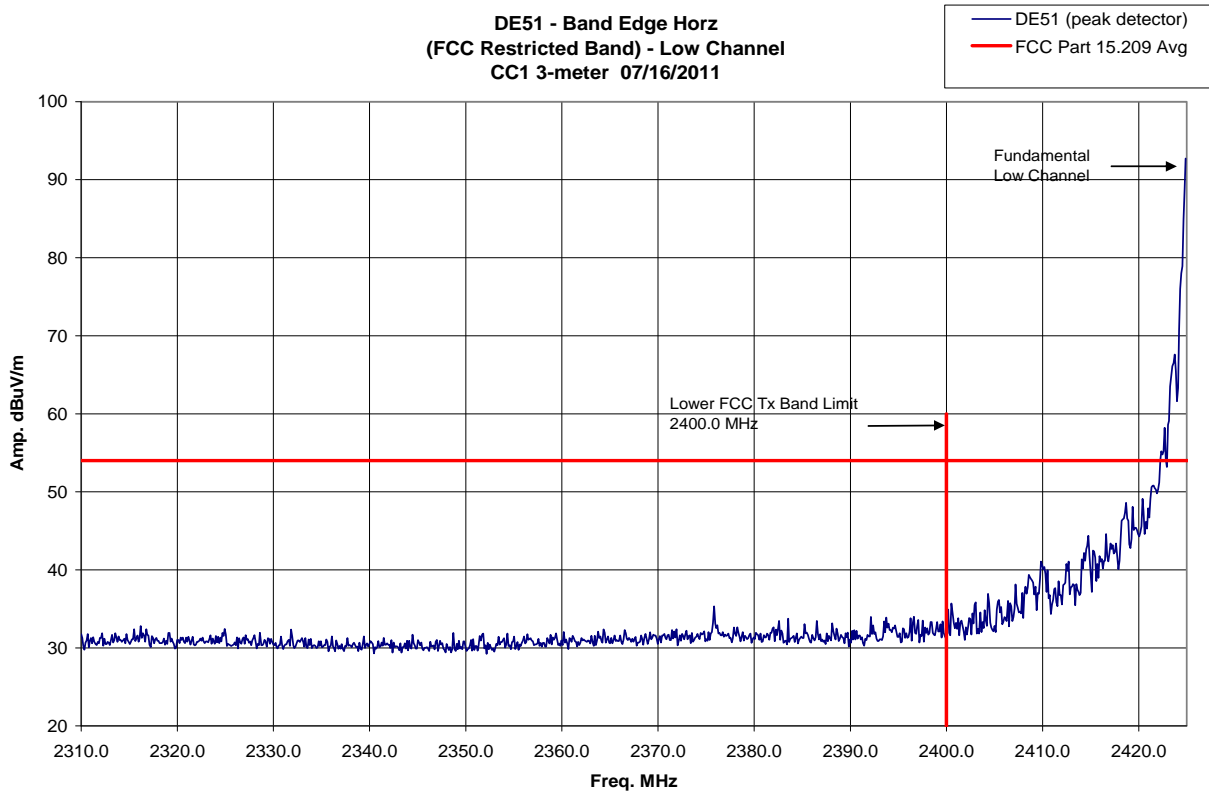
Test setup – Field Strength Measurements (Rear View)



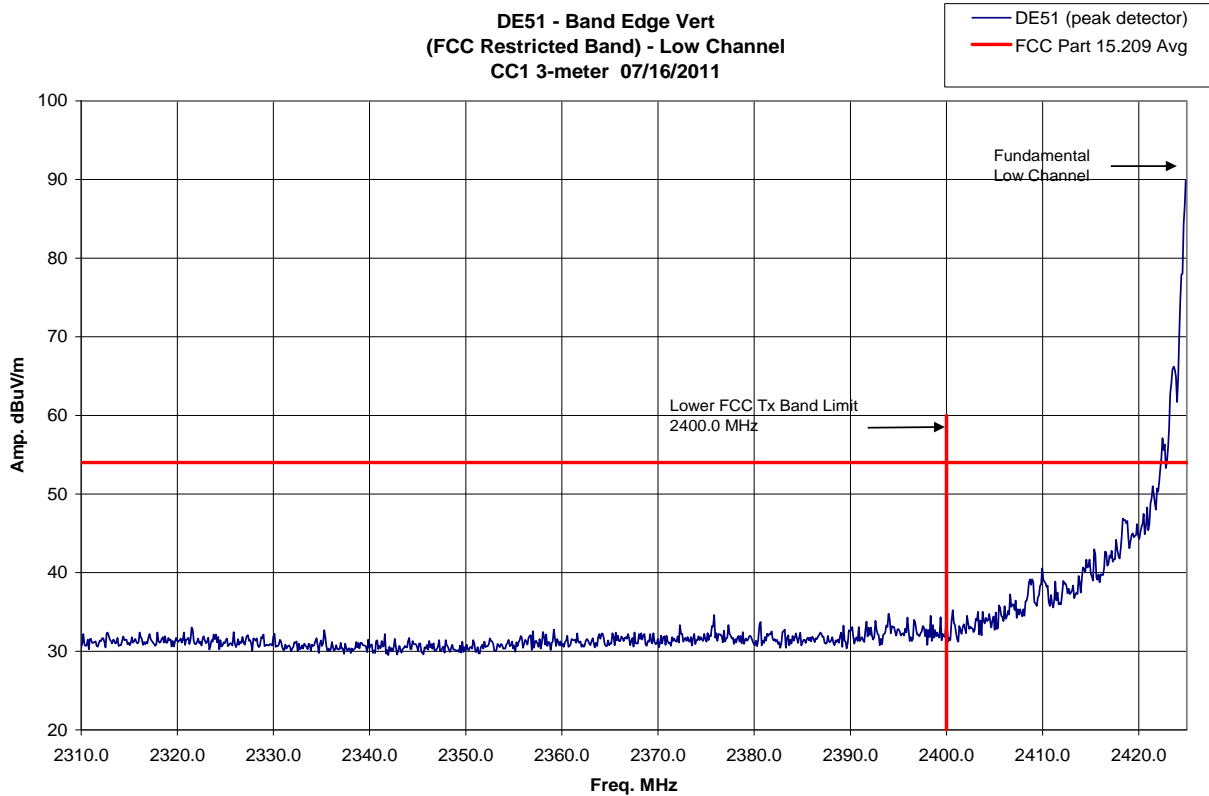
7.5 Band Edge Plot – Low Channel

FCC 15.247(d) / 15.205/209/ RSS-210 A8.5

DE51 - Band Edge Horz
(FCC Restricted Band) - Low Channel
CC1 3-meter 07/16/2011



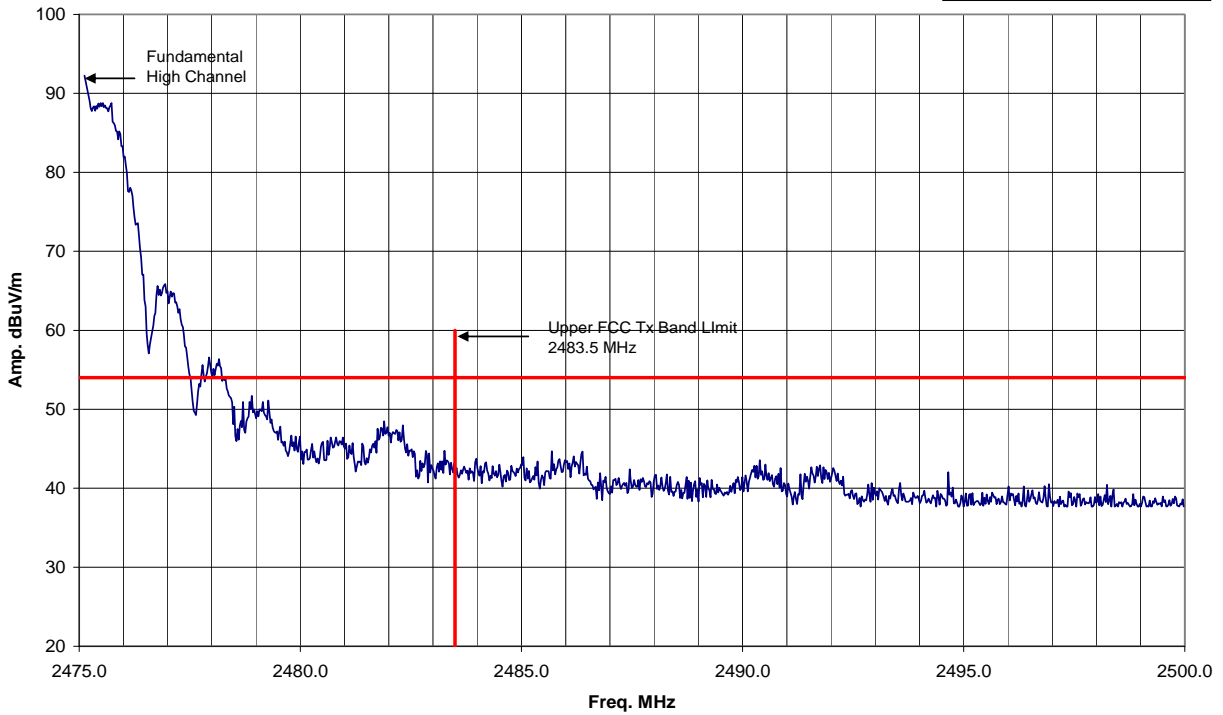
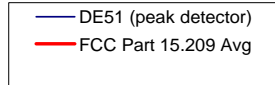
DE51 - Band Edge Vert
(FCC Restricted Band) - Low Channel
CC1 3-meter 07/16/2011



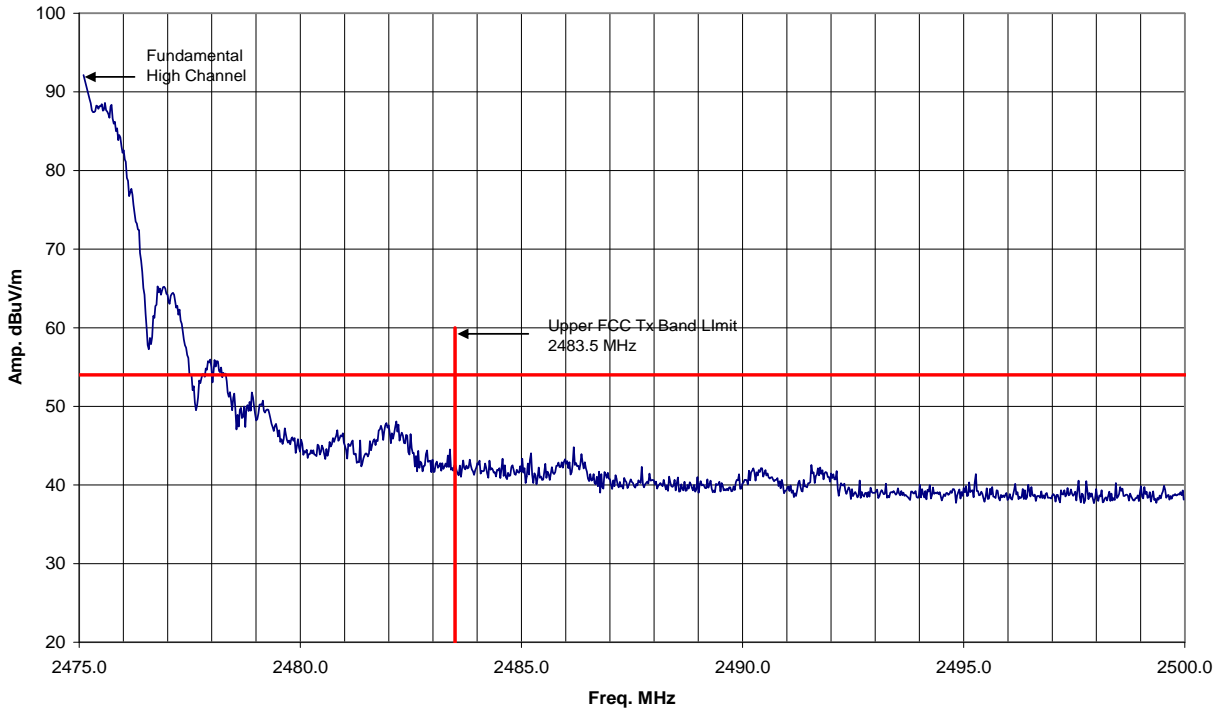
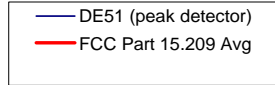
7.6 Band Edge Plot – High Channel

FCC 15.247(d) / 15.205/15.209/ RSS-210 A8.5

DE51 - Band Edge Horz
(FCC Restricted Band) - High Channel
CC1 3-meter 07/16/2011



DE51 - Band Edge Vert
(FCC Restricted Band) - High Channel
CC1 3-meter 07/16/2011



7.7 Test Data: Band Edge

Radiated Electromagnetic Emissions – Band Edge

Test Report #:	100457286	Test Area:	CC1 Radiated	Temperature:	23.7 °C
Test Method:	FCC Part 15.209	Test Date:	15-Jul-2011	Relative Humidity:	43.1 %
EUT Model #:	DE51 (XiP110)	EUT Power:	115VAC/60Hz	Air Pressure:	83.3 kPa
EUT Serial #:	EMC1				

Manufacturer:	Echostar	Level Key	
EUT Description:	MoCa Converter Set-Top Box	Pk – Peak	Nb – Narrow Band
Notes:	TX Band Edge Spurious	Qp – QuasiPeak	Bb – Broad Band
		Av - Average	

Note: Measurements in yellow shading – restricted band

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209	N/A
Tx High Band Edge 2483.5MHz to 2500MHz						
2483.59	44.1 Pk	3.6 / 29.8 / 37.7	39.7	V / 1.6 / 235.0	-14.3	N/A
2483.59	41.1 Av	3.6 / 29.8 / 37.7	36.7	V / 1.6 / 235.0	-17.3	N/A
2490.31	45.0 Pk	3.6 / 29.8 / 37.7	40.6	V / 1.6 / 68.0	-13.4	N/A
2490.31	41.5 Av	3.6 / 29.8 / 37.7	37.1	V / 1.6 / 68.0	-16.9	N/A
2491.63	43.4 Pk	3.6 / 29.8 / 37.7	39.1	H / 1.7 / 76.0	-14.9	N/A
2491.63	41.5 Av	3.6 / 29.8 / 37.7	37.2	H / 1.7 / 76.0	-16.8	N/A
Tx Low Band Edge 2310MHz to 2390MHz						
2358.81	49.5 Pk	3.7 / 30.0 / 37.4	45.7	H / 1.4 / 280.9	-8.3	N/A
2358.81	40.0 Av	3.7 / 30.0 / 37.4	36.3	H / 1.4 / 280.9	-17.7	N/A
2358.81	51.1 Pk	3.7 / 30.0 / 37.4	47.3	V / 2.3 / 337.7	-6.7	N/A
2358.81	41.9 Av	3.7 / 30.0 / 37.4	38.1	V / 2.3 / 337.7	-15.9	N/A
2390.00	27.3 Pk	3.5 / 29.4 / 37.6	22.6	V / 1.7 / 76.0	-31.4	N/A
2390.00	33.7 Av	3.5 / 29.4 / 37.6	29.0	V / 1.7 / 76.0	-25.0	N/A
2390.00	36.0 Pk	3.5 / 29.4 / 37.6	31.3	H / 1.5 / 32.0	-22.7	N/A
2390.00	34.0 Av	3.5 / 29.4 / 37.6	29.3	H / 1.5 / 32.0	-24.7	N/A
2486.38	49.34 Pk	3.5 / 29.4 / 37.6	44.64	H / 1.4 / 280.9	-9.36	N/A
2486.38	47.34 Av	3.5 / 29.4 / 37.6	42.63	H / 1.4 / 280.9	-11.37	N/A
2490.39	48.26 Pk	3.5 / 29.4 / 37.6	43.56	H / 1.4 / 272.9	-10.44	N/A
2490.39	46.76 Av	3.5 / 29.4 / 37.6	42.06	H / 1.4 / 272.9	-11.94	N/A

Notes:

- 1) All measurements are Radiated Field Strength peak measurements taken at 3-meter product-to-antenna.

Deviations, Additions, or Exclusions: None

8 Unintentional Radiated Emissions - Receiver

8.1 Method

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from **FCC CFR47 15.247(d)15.209/15.109/RSS-GEN Section 6**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

8.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18882	Spectrum Analyzer (dc-22 GHz)	Hewlett-Packard	8566B	2410A00154	12/06/2010	12/06/2011
18660	Spectrum Analyzer Display Section (set 1)	Hewlett-Packard	85662A	2318A04983	12/10/2010	12/10/2011
18880	Q.P Adapter	Hewlett-Packard	85650A	2811A01300	12/06/2010	12/06/2011
18913	Spectrum Analyzer	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18912	9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	3113A05545	06/03/2011	06/03/2012
18906	RF Pre-Amplifier (1-4 GHz)	Mini-Circuits Lab	ZHL-42	N052792-2	06/03/2011	06/03/2012
18900	RF Pre-Amplifier (4-8 GHz)	Avantek	AFT97-8434-10F	1007	06/03/2011	06/03/2012
18901	RF Pre-Amplifier (8-18 GHz)	Avantek	AWT-18037	1002	06/03/2011	06/03/2012
19936	Bilog Antenna 30MHz - 6GHz	Sunol Sciences	JB6	A050707-1	10/11/2010	10/11/2011
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011
18805	HF Active Antenna/Harmonic Mixer 18 GHz to 26.5 GHz	Hewlett-Packard	11970K	2332A01280	10/04/2010	10/04/2011
SW-6	Software application for Radiated and Conducted Emissions	Intertek	OATS_CVI	V.1.0	01/01/2011	01/01/2012

8.3 Results:

The sample tested was found to comply with the requirements of:

- **FCC 15.209/15.109**
- **RSS-GEN Section 6**

8.4 Setup Photographs:

Test Setup – Radiated Emissions (Front View)



Photo:

Test Setup – Radiated Emissions (Rear View)



Photo:

Test Setup – Radiated Emissions (Rear View)



Cables Left-to-Right: RF Coaxial, Composite A/V RCA, HDMI, Ethernet, USB, DC Power

Photo: Test Antennas

BiLog (30MHz to 1000MHz)



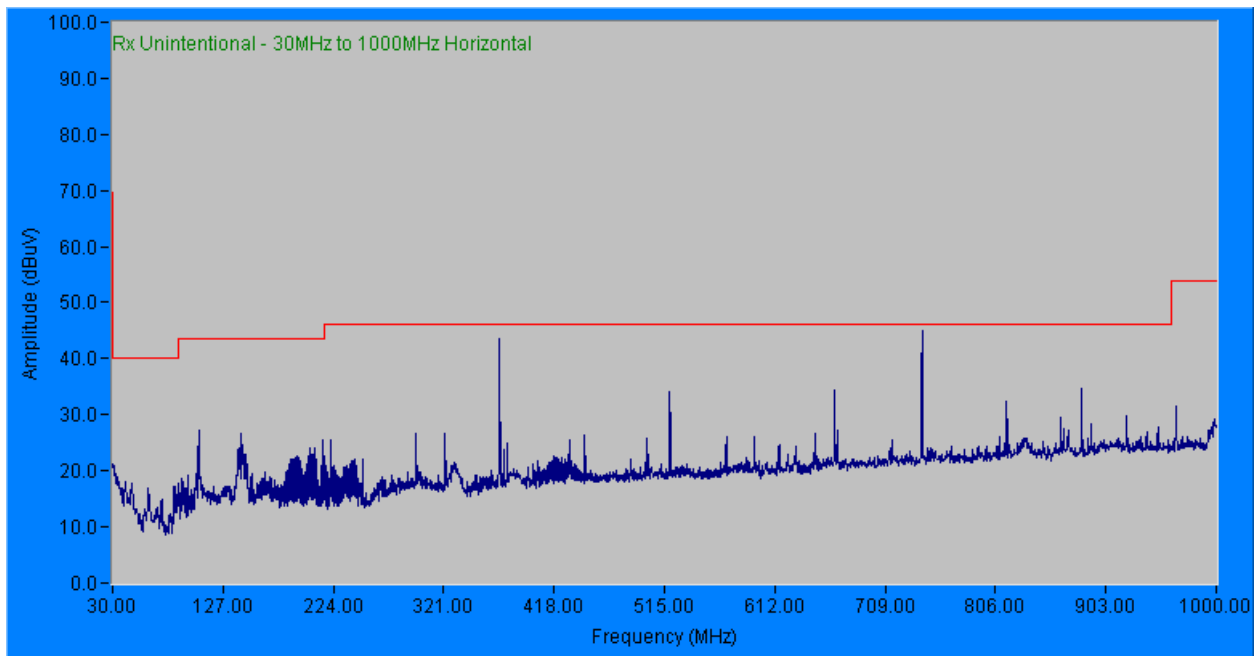
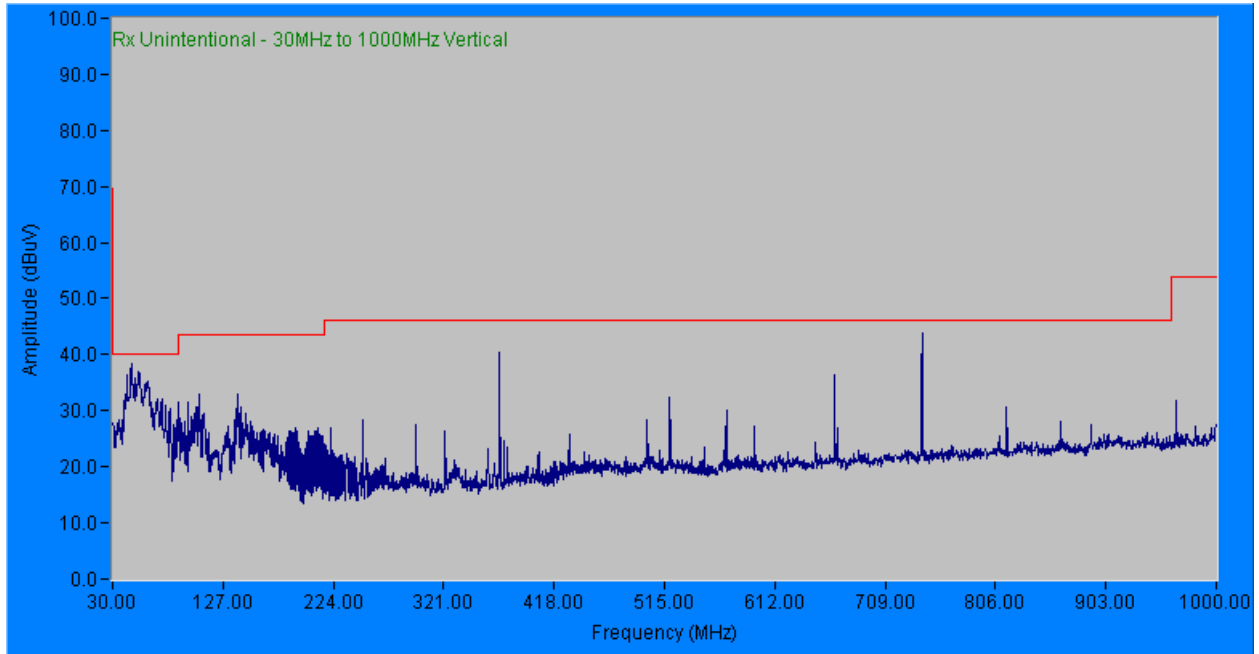
Ridge Guide Horn (1GHz to 18GHz)



Note: Testing above 1GHz utilizes a boar site antenna mast

8.5 Plots: Pre-Scan Peak Measurements - Not Final Data

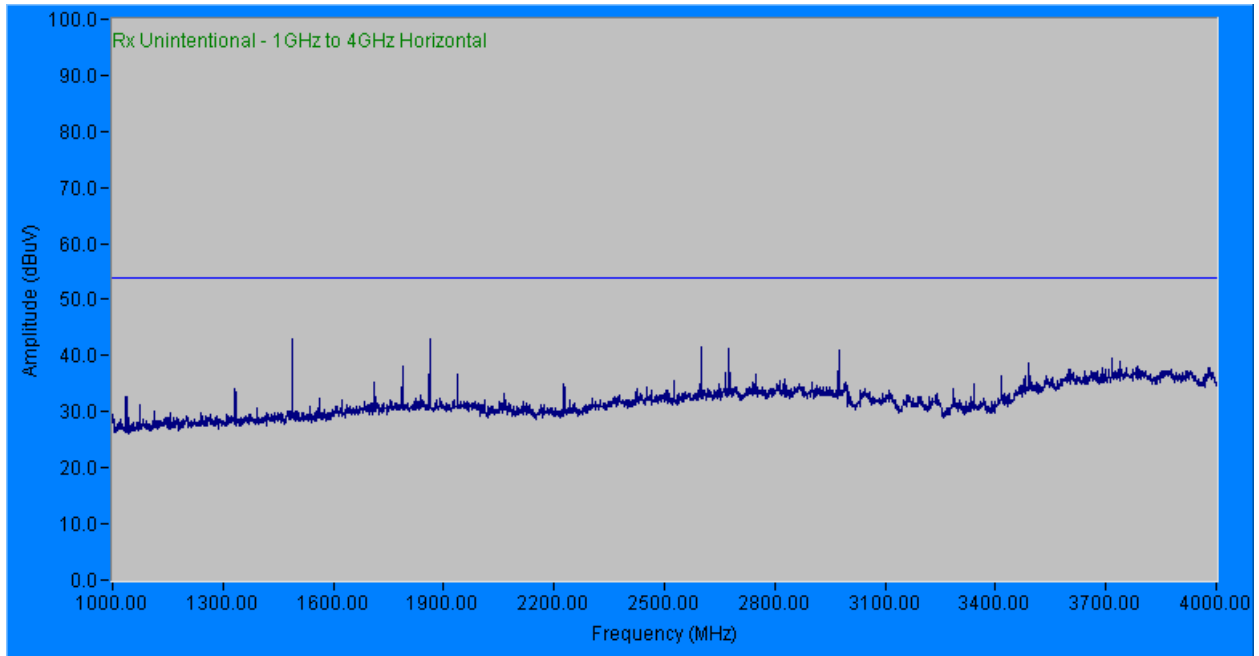
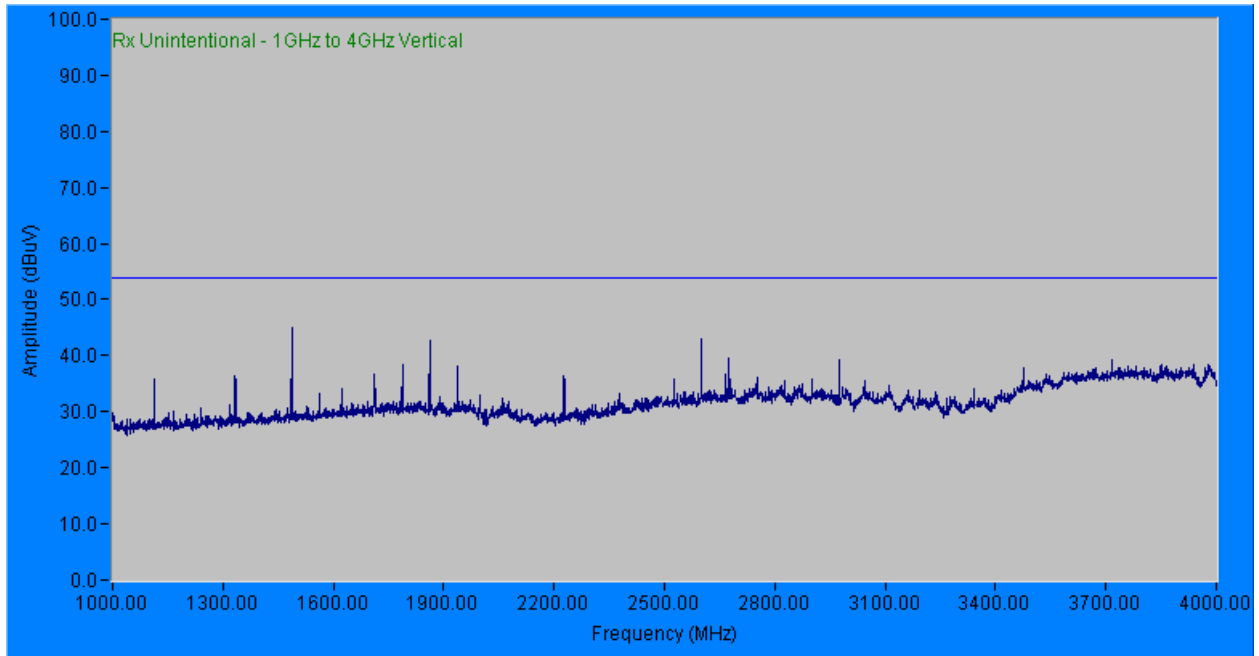
Radiated Emissions – FCC 15.209 (30MHz to 1000MHz)



Note: Peak measurements plotted against FCC 15.209 Quasi-Peak Limit

Plots: Pre-Scan Peak Measurements - Not Final Data

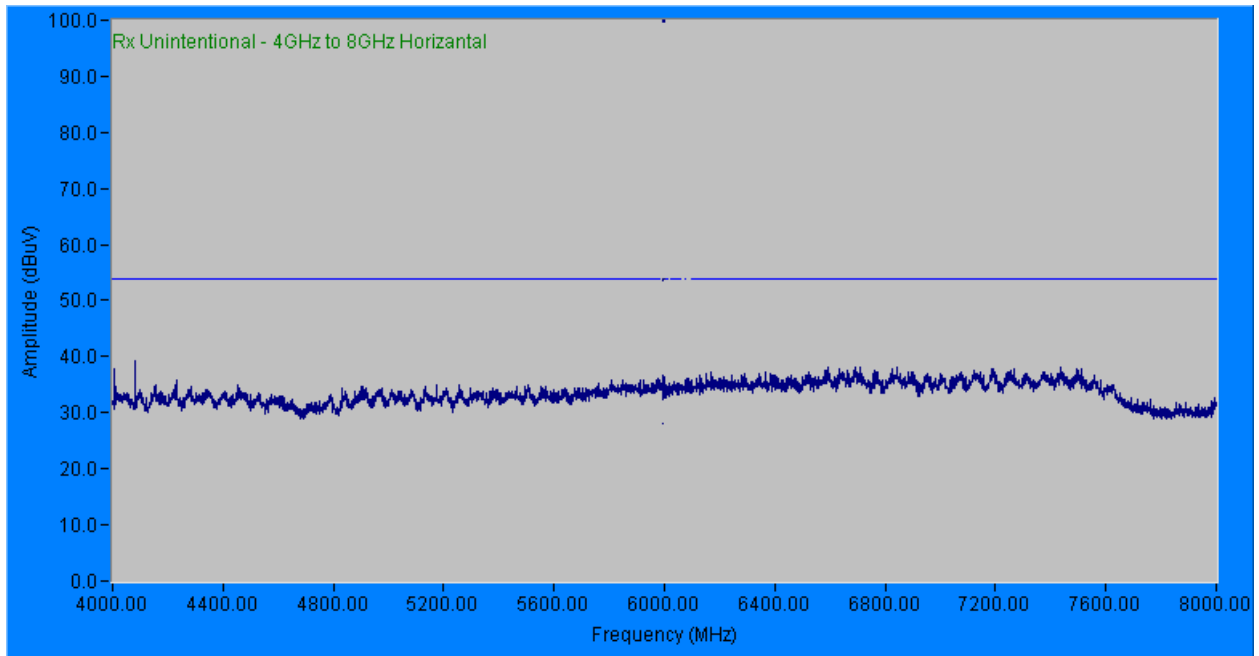
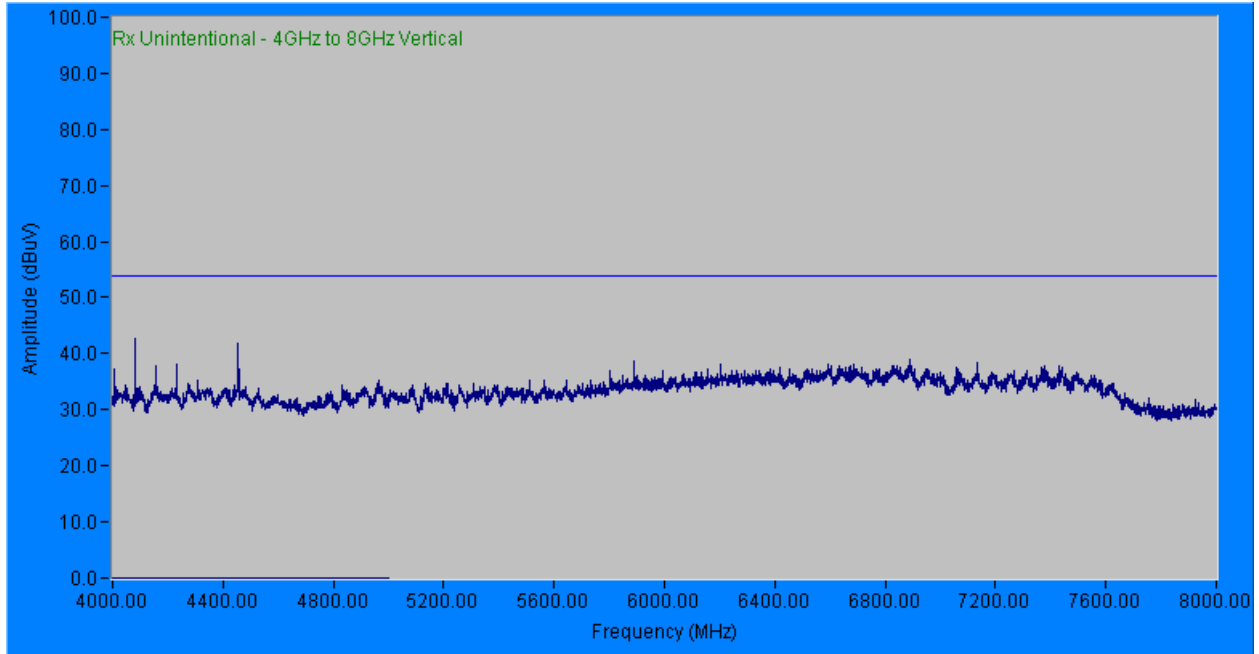
Radiated Emissions – FCC 15.209 (1GHz to 4GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data

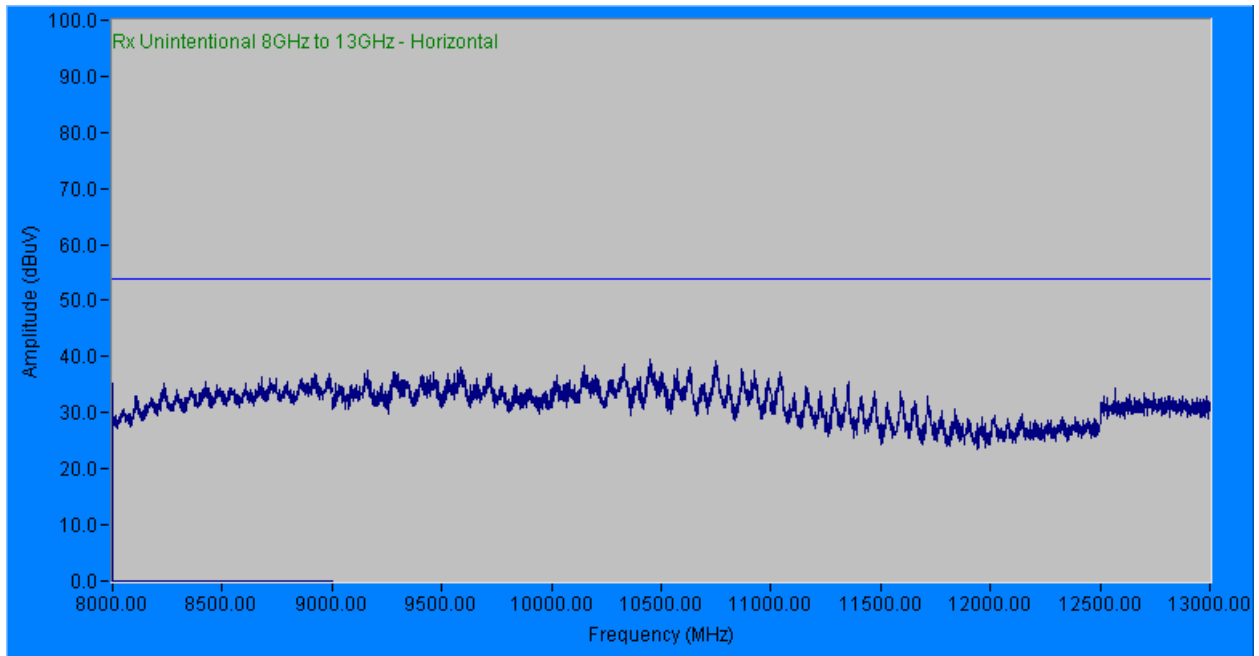
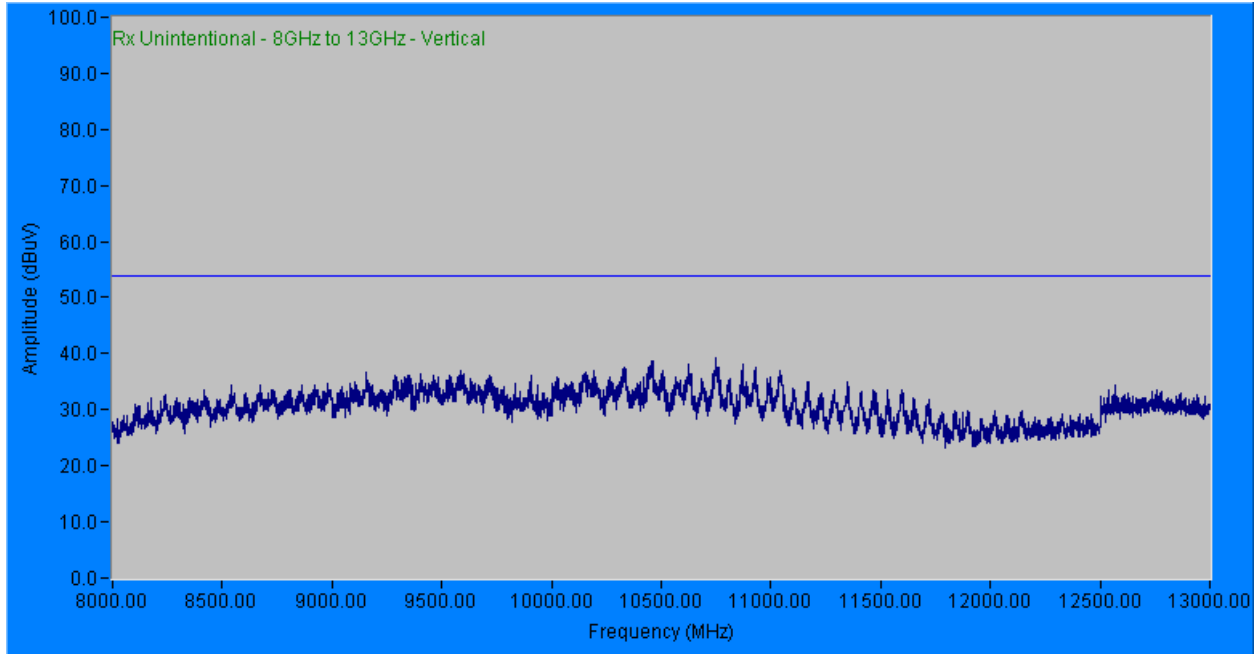
Radiated Emissions – FCC 15.209 (4GHz to 8GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Pre-Scan Peak Measurements - Not Final Data

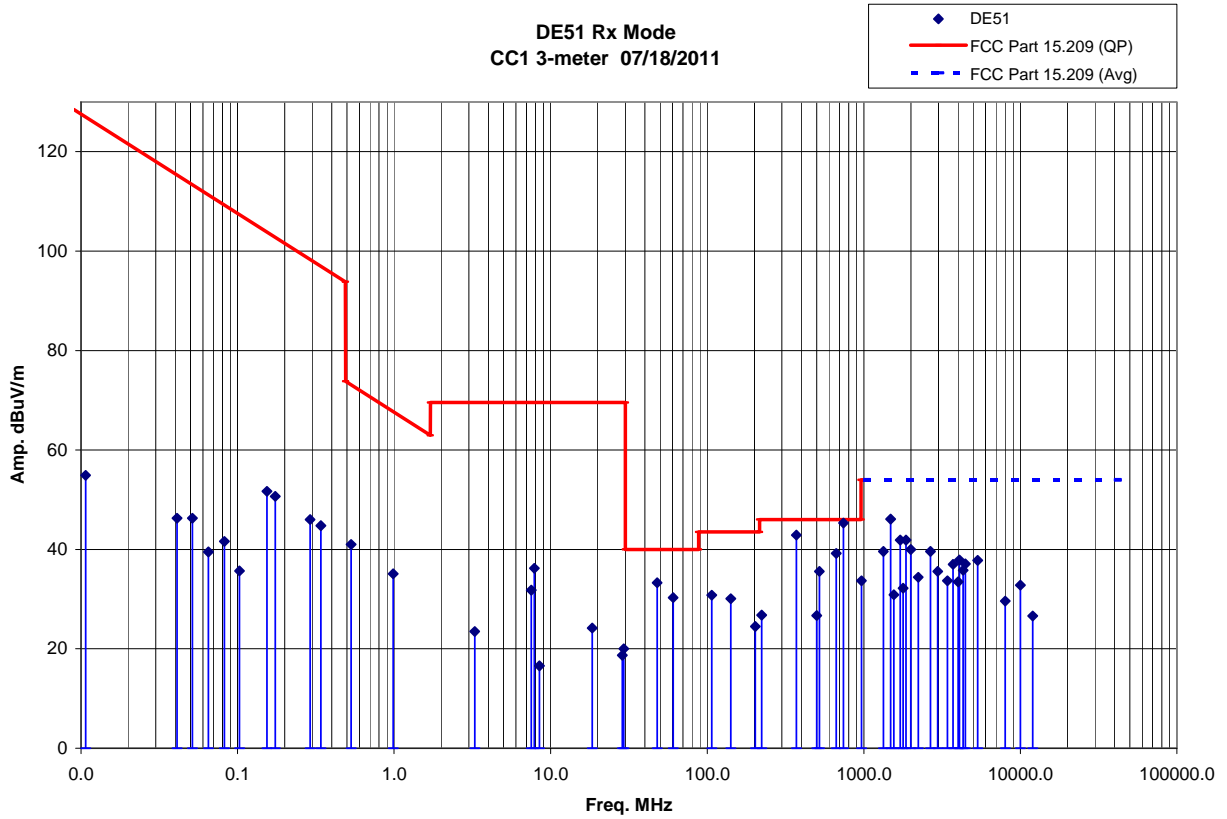
Radiated Emissions – FCC 15.209 (8GHz to 13GHz)



Note: Peak measurements plotted against FCC 15.209 Average Limit

Plots: Final Quasi-Peak & Average Measurements

Radiated Emissions – FCC 15.209 (9kHz to 13GHz)



Intertek

Report Number: 100457286DEN-002

Issued: 7/25/2011

8.6 Test Data: 30MHz to 1000MHz

Radiated Electromagnetic Emissions

Test Report #: 100457286	Test Area: <u>CC1 Radiated</u>	Temperature: <u>23.7</u> °C
Test Method: <u>FCC Part 15.209</u>	Test Date: <u>19-Jul-2011</u>	Relative Humidity: <u>28.4</u> %
EUT Model #: <u>DE51 (XiP110)</u>	EUT Power: <u>115VAC/60Hz</u>	Air Pressure: <u>83.9</u> kPa
EUT Serial #: <u>EMC1</u>		

Manufacturer: <u>Echostar</u>	Level Key
EUT Description: <u>MoCa Converter Set-Top Box</u>	Pk – Peak Nb – Narrow Band
Notes: <u>Product in Receive/Standby Mode (Tx radio disabled)</u>	Qp – QuasiPeak Bb – Broad Band
<u>Highest clock or frequency generated in product: 2.475GHz</u>	Av - Average

Unintentional Radiated Emissions: 30MHz to 1000MHz

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209 QP	FCC 15.209 AV
Rx Unintentional - 30MHz to 1000MHz Horizontal						
519.75	44.0 Qp	1.6 / 18.3 / 28.2	35.6	H / 1.2 / 12.0	-10.4	N/A
666.00	43.9 Qp	1.8 / 19.7 / 28.1	37.2	H / 1.3 / 22.0	-8.8	N/A
742.50	50.9 Qp	1.9 / 20.4 / 28.0	45.3	H / 1.1 / 5.0	-0.7	N/A
371.24	53.9 Qp	1.3 / 15.1 / 27.4	42.9	H / 1.2 / 176.0	-3.1	N/A
Rx Unintentional - 30MHz to 1000MHz Vertical						
47.80	51.5 Qp	0.8 / 9.0 / 28.0	33.3	V / 1.1 / 348.0	-6.7	N/A
60.46	50.0 Qp	0.8 / 7.5 / 27.9	30.3	V / 1.1 / 348.0	-9.7	N/A
106.69	45.6 Qp	0.8 / 12.1 / 27.7	30.8	V / 1.1 / 204.0	-12.7	N/A
141.19	44.4 Qp	0.8 / 12.5 / 27.6	30.1	V / 1.2 / 234.0	-13.4	N/A
202.81	39.0 Qp	1.0 / 11.8 / 27.3	24.5	V / 1.4 / 188.0	-19.0	N/A
222.73	42.0 Qp	1.0 / 11.0 / 27.2	26.8	V / 1.4 / 188.0	-19.2	N/A
371.24	50.5 Qp	1.3 / 15.1 / 27.4	39.5	V / 1.2 / 46.0	-6.5	N/A
500.02	35.5 Qp	1.5 / 17.8 / 28.1	26.7	V / 1.2 / 21.0	-19.3	N/A
519.75	40.0 Qp	1.6 / 18.3 / 28.2	31.6	V / 1.3 / 316.0	-14.4	N/A
666.00	45.9 Qp	1.8 / 19.7 / 28.1	39.2	V / 1.5 / 224.0	-6.8	N/A
742.51	50.2 Qp	1.9 / 20.5 / 28.0	44.6	V / 1.0 / 10.0	-1.4	N/A
965.25	36.2 Qp	2.2 / 22.5 / 27.3	33.7	V / 1.3 / 36.0	-20.3	N/A
Rx Unintentional Measurements						
1-4GHz Vertical - Maximized						
1332.04	47.9 Av	2.6 / 26.2 / 37.0	39.6	V / 2.4 / 46.0	N/A	-14.4
1485.04	53.5 Av	2.7 / 26.6 / 36.7	46.1	V / 2.8 / 12.0	N/A	-7.9
1559.29	37.9 Av	2.8 / 27.0 / 36.8	30.9	V / 2.4 / 286.0	N/A	-23.1
1707.80	48.0 Av	2.9 / 27.8 / 36.9	41.9	V / 2.6 / 10.0	N/A	-12.1
1782.06	38.1 Av	3.0 / 28.1 / 37.0	32.2	V / 2.6 / 10.0	N/A	-21.8
1856.30	47.8 Av	3.1 / 28.2 / 37.1	41.9	V / 1.9 / 18.0	N/A	-12.1
1998.05	45.6 Av	3.2 / 28.5 / 37.2	40.0	V / 1.9 / 36.0	N/A	-14.0
2227.57	39.0 Av	3.4 / 28.8 / 37.5	33.7	V / 1.6 / 17.0	N/A	-20.3

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	FCC 15.209 QP	FCC 15.209 AV
2664.07	43.3 Av	3.7 / 30.1 / 37.6	39.6	V / 1.5 / 224.0	N/A	-14.4
2970.08	37.7 Av	4.0 / 31.5 / 37.5	35.6	V / 1.4 / 216.0	N/A	-18.4
3415.61	34.2 Av	4.3 / 32.5 / 37.3	33.7	V / 1.9 / 76.0	N/A	-20.3
3712.62	36.9 Av	4.5 / 33.3 / 37.7	37.0	V / 1.6 / 115.0	N/A	-17.0
1-4 GHz - Horizontal Maximized						
1332.04	45.5 Av	2.6 / 26.2 / 37.0	37.3	H / 2.1 / 22.0	N/A	-16.7
1782.06	37.0 Av	3.0 / 28.1 / 37.0	31.0	H / 1.7 / 54.0	N/A	-23.0
1856.30	46.0 Av	3.1 / 28.2 / 37.1	40.2	H / 1.4 / 52.0	N/A	-13.8
2227.57	39.6 Av	3.4 / 28.8 / 37.5	34.4	H / 1.4 / 52.0	N/A	-19.6
4-8GHz Vertical - Maximized						
4009.61	33.1 Av	4.7 / 34.0 / 38.2	33.5	V / 1.6 / 124.0	N/A	-20.5
4083.86	37.8 Av	4.7 / 33.9 / 38.5	37.9	V / 1.9 / 112.0	N/A	-16.1
4306.62	36.0 Av	4.9 / 33.9 / 38.9	35.8	V / 1.7 / 262.0	N/A	-18.2
4455.12	37.0 Av	5.0 / 34.2 / 39.0	37.1	V / 1.7 / 262.0	N/A	-16.9
5328.15	35.4 Av	5.4 / 36.1 / 39.1	37.8	V / 1.6 / 253.0	N/A	-16.2
4-8GHz Horizontal - Maximized						
4009.61	32.2 Av	4.7 / 34.0 / 38.2	32.6	H / 1.4 / 76.0	N/A	-21.4
4306.62	34.0 Av	4.9 / 33.9 / 38.9	33.8	H / 1.4 / 76.0	N/A	-20.2
No signals found: 8GHz to 13GHz – Noise floor						
8000.00	29.1 Av	6.8 / 39.1 / 45.5	29.6	H / 1.0 / 0.0	N/A	-24.4
10000.0	32.5 Av	7.8 / 40.8 / 48.2	32.8	H / 1.0 / 0.0	N/A	-21.2
12000.0	22.9 Av	8.7 / 40.7 / 45.6	26.6	H / 1.0 / 0.0	N/A	-27.4

Intertek

Report Number: 100457286DEN-002

Issued:7/25/2011

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	FCC 15.209 QP	FCC 15.209 AV
***** Measurement Summary *****						
742.5	50.9 Qp	1.9 / 20.4 / 28.0	45.3	H / 1.1 / 5.0	-0.7	N/A
371.24	53.9 Qp	1.3 / 15.1 / 27.4	42.9	H / 1.2 / 176.0	-3.1	N/A
47.8	51.5 Qp	0.8 / 9.0 / 28.0	33.3	V / 1.1 / 348.0	-6.7	N/A
666	45.9 Qp	1.8 / 19.7 / 28.1	39.2	V / 1.5 / 224.0	-6.8	N/A
60.46	50.0 Qp	0.8 / 7.5 / 27.9	30.3	V / 1.1 / 348.0	-9.7	N/A
519.75	44.0 Qp	1.6 / 18.3 / 28.2	35.6	H / 1.2 / 12.0	-10.4	N/A
106.69	45.6 Qp	0.8 / 12.1 / 27.7	30.8	V / 1.1 / 204.0	-12.7	N/A
141.19	44.4 Qp	0.8 / 12.5 / 27.6	30.1	V / 1.2 / 234.0	-13.4	N/A
202.81	39.0 Qp	1.0 / 11.8 / 27.3	24.5	V / 1.4 / 188.0	-19	N/A
222.73	42.0 Qp	1.0 / 11.0 / 27.2	26.8	V / 1.4 / 188.0	-19.2	N/A
500.02	35.5 Qp	1.5 / 17.8 / 28.1	26.7	V / 1.2 / 21.0	-19.3	N/A
965.25	36.2 Qp	2.2 / 22.5 / 27.3	33.7	V / 1.3 / 36.0	-20.3	N/A
1485.04	53.5 Av	2.7 / 26.6 / 36.7	46.1	V / 2.8 / 12.0	N/A	-7.9
1707.80	48.0 Av	2.9 / 27.8 / 36.9	41.9	V / 2.6 / 10.0	N/A	-12.1
1856.30	47.8 Av	3.1 / 28.2 / 37.1	41.9	V / 1.9 / 18.0	N/A	-12.1
1998.05	45.6 Av	3.2 / 28.5 / 37.2	40.0	V / 1.9 / 36.0	N/A	-14.0
1332.04	47.9 Av	2.6 / 26.2 / 37.0	39.6	V / 2.4 / 46.0	N/A	-14.4
2664.07	43.3 Av	3.7 / 30.1 / 37.6	39.6	V / 1.5 / 224.0	N/A	-14.4
4083.86	37.8 Av	4.7 / 33.9 / 38.5	37.9	V / 1.9 / 112.0	N/A	-16.1
5328.15	35.4 Av	5.4 / 36.1 / 39.1	37.8	V / 1.6 / 253.0	N/A	-16.2
4455.12	37.0 Av	5.0 / 34.2 / 39.0	37.1	V / 1.7 / 262.0	N/A	-16.9
3712.62	36.9 Av	4.5 / 33.3 / 37.7	37.0	V / 1.6 / 115.0	N/A	-17.0
4306.62	36.0 Av	4.9 / 33.9 / 38.9	35.8	V / 1.7 / 262.0	N/A	-18.2
2970.08	37.7 Av	4.0 / 31.5 / 37.5	35.6	V / 1.4 / 216.0	N/A	-18.4
2227.57	39.6 Av	3.4 / 28.8 / 37.5	34.4	H / 1.4 / 52.0	N/A	-19.6
3415.61	34.2 Av	4.3 / 32.5 / 37.3	33.7	V / 1.9 / 76.0	N/A	-20.3
4009.61	33.1 Av	4.7 / 34.0 / 38.2	33.5	V / 1.6 / 124.0	N/A	-20.5
10000.0	32.5 Av	7.8 / 40.8 / 48.2	32.8	H / 1.0 / 0.0	N/A	-21.2
1782.06	38.1 Av	3.0 / 28.1 / 37.0	32.2	V / 2.6 / 10.0	N/A	-21.8
1559.29	37.9 Av	2.8 / 27.0 / 36.8	30.9	V / 2.4 / 286.0	N/A	-23.1
8000.00	29.1 Av	6.8 / 39.1 / 45.5	29.6	H / 1.0 / 0.0	N/A	-24.4
12000.0	22.9 Av	8.7 / 40.7 / 45.6	26.6	H / 1.0 / 0.0	N/A	-27.4

Example Unintentional Radiated Emissions Calculation:

Measured Level		+ Transducer, Cable Loss & Amplifier corrections		= Corrected Reading	Specification Limit		- Corrected Reading		= Delta Specification
(dBμV)		(dB)		(dBμV/m)	(dBμV/m)		(dBμV/m)		
14.0		14.9		28.9	40.0		28.9		-11.1

Notes:

- (1) All measurements taken a 3-meter test distance.
- (2) Measurements 30MHz to 1000MHz are quasi-peak detector
- (3) Measurements above 1GHz are average detector

Deviations, Additions, or Exclusions: None

9 6dB Bandwidth**9.1 Method**

The test methods used comply with ANSI C63.0. Unless otherwise stated no deviations were made from **FCC 15.247 & IC RSS-210**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

9.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18913	Spectrum Analyzer with Pre-Amp	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011

9.3 Results:

The sample tested was found to comply with the requirements of:

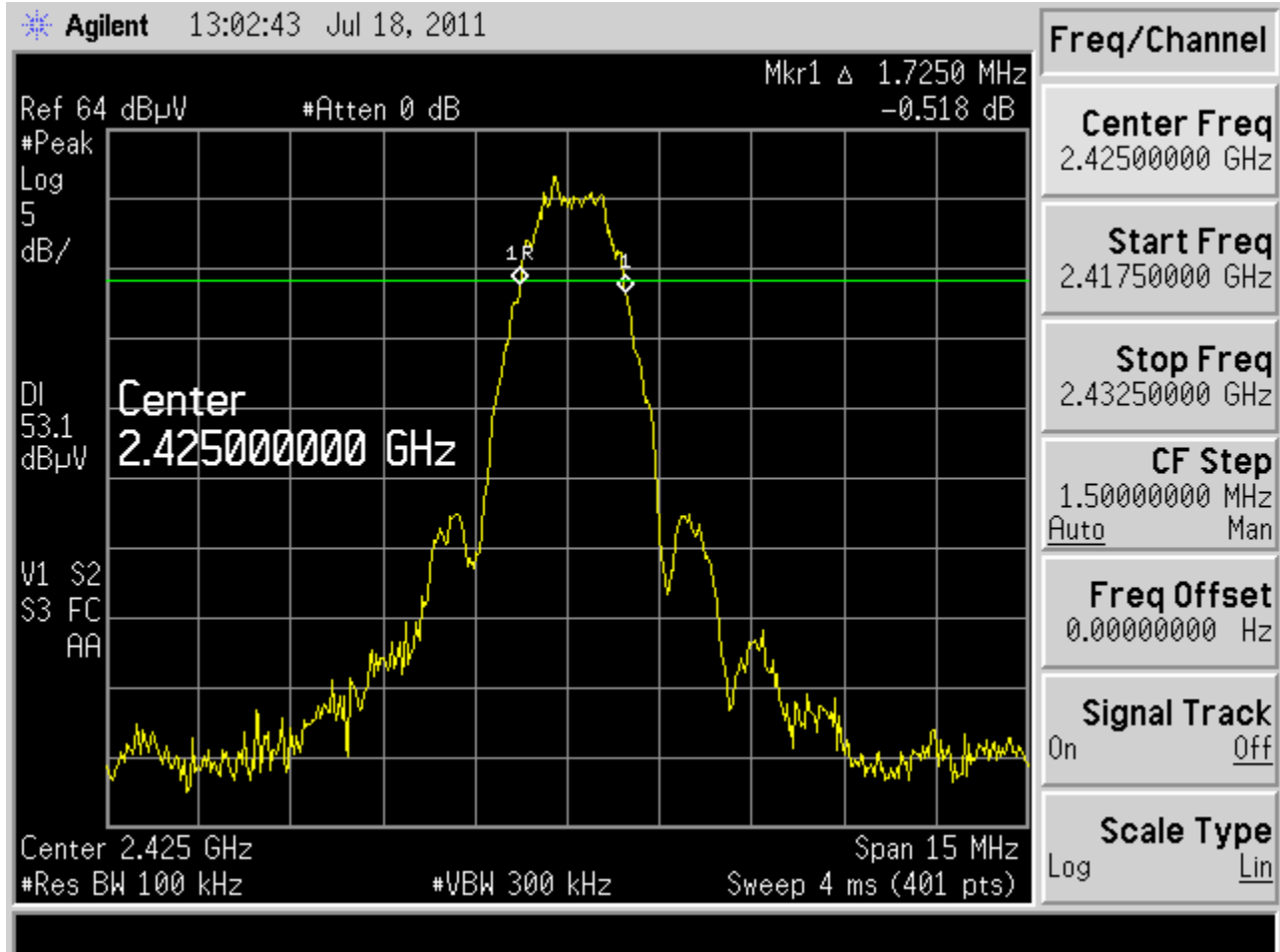
- FCC 15.247 (a)(2)
- IC RSS-210 A8.2(a)

9.4 Test Data:

6 dB Bandwidth – DE51 Product

FCC 15.247(a)(2) / RSS-210 A8.2(a)

Channel 1 – 2.425 GHz

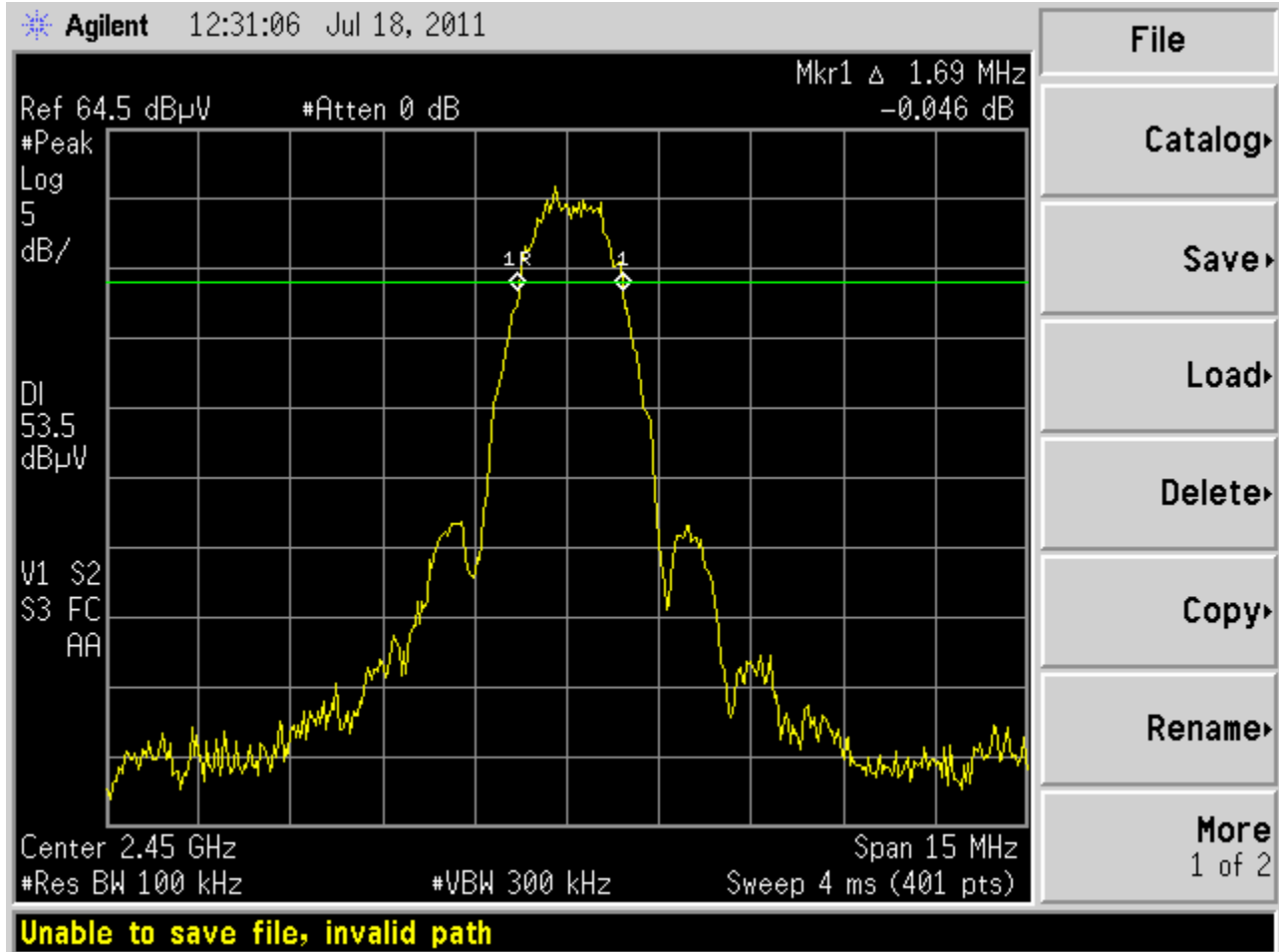


Specification: 6dB Bandwidth > 500 kHz

6 dB Bandwidth

FCC 15.247(a)(2) / RSS-210 A8.2(a)

Channel 2 – 2.450 GHz

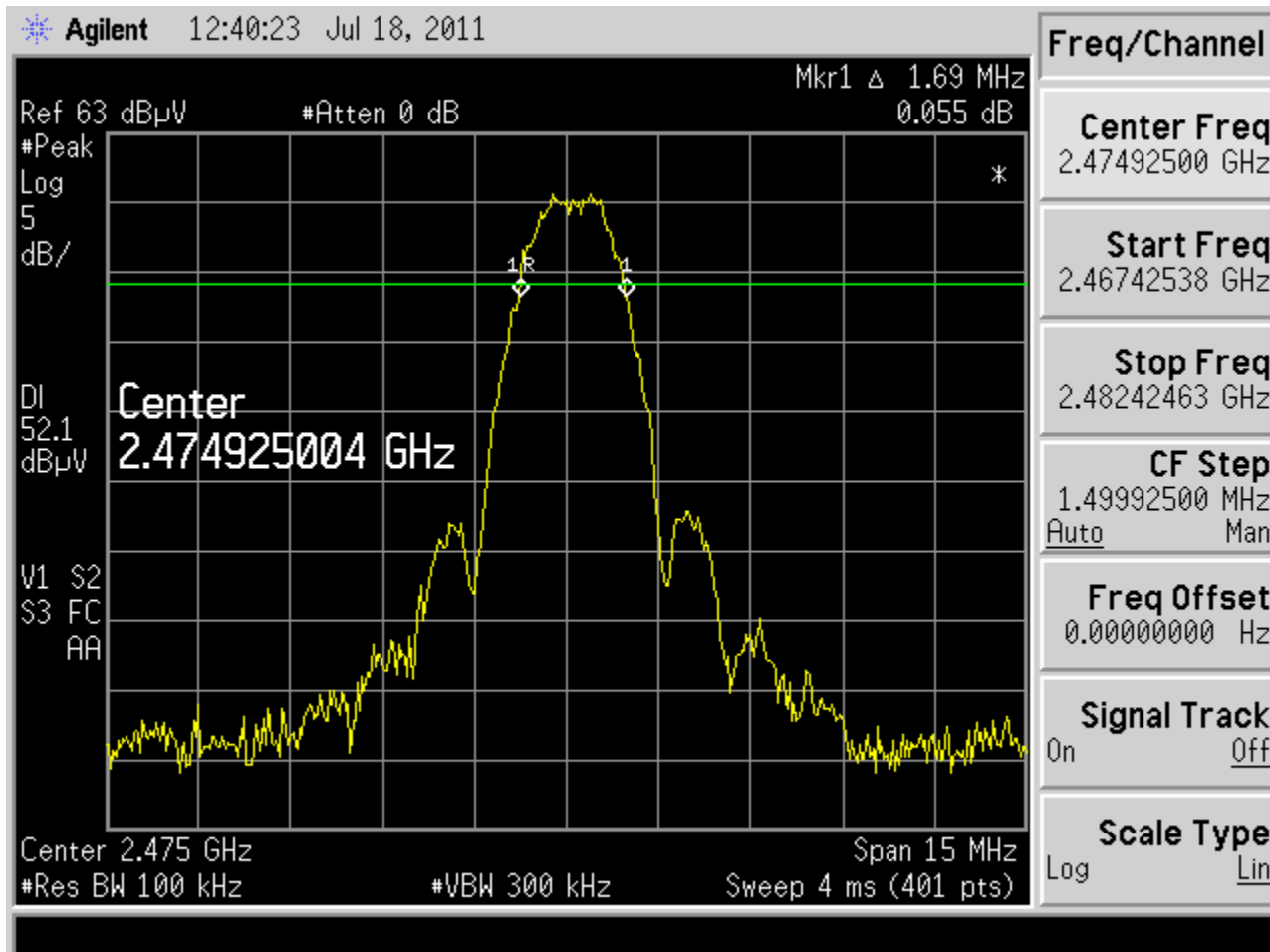


Specification: 6dB Bandwidth > 500 kHz

6 dB Bandwidth

FCC 15.247(a)(2) / RSS-210 A8.2(a)

Channel 3 – 2.475 GHz



Specification: 6dB Bandwidth > 500 kHz

Notes:

- (1) All measurements are Radiated Field Strength.
- (2) **Worst-case Channel(s) 2 & 3 – (6dB Bandwidth 1.69 MHz)**

Deviations, Additions, or Exclusions: None

10 Power Spectral Density (PSD)**10.1 Method**

The test methods used comply with ANSI C63.10. Unless otherwise stated no deviations were made from **FCC 15.247 & IC RSS-210**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

10.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18913	Spectrum Analyzer with Pre-Amp	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011

10.3 Results:

The sample tested was found to comply with the requirements of:

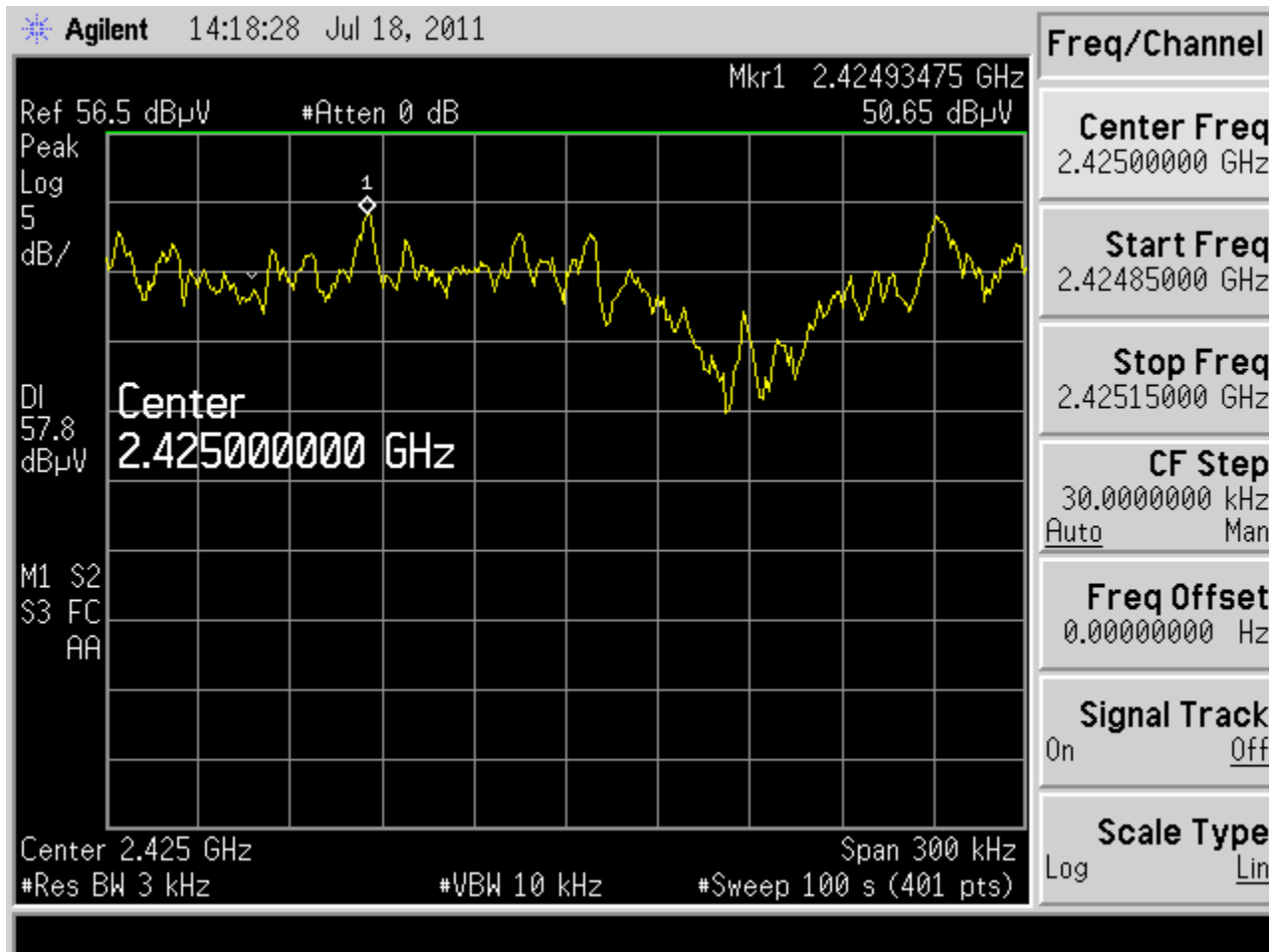
- FCC 15.247(e)
- IC RSS-210 A8.2(b)

10.4 Test Data:

Power Spectral Density (PSD) – DE51 Product

FCC 15.247(e) / RSS-210 A8.2(b)

Channel 1 – 2.425 GHz



Measured field strength + antenna factor + cable loss = Final corrected field strength (dBuV/m)
 50.65 + 29.5 + 3.5 = 83.65 dBuV/m

$$83.65 \text{ dBuV/m} = 0.015223 \text{ V/m}$$

$$P = .000069 \text{ W} = -11.58 \text{ dBm}$$

Specification: PSD < +8 dBm

Conversion of radiated field strength to power:

$$P = (E \times d)^2 / (30 \times G)$$

Whereby:

P = Power in watts

E= measured maximum field strength in V/m

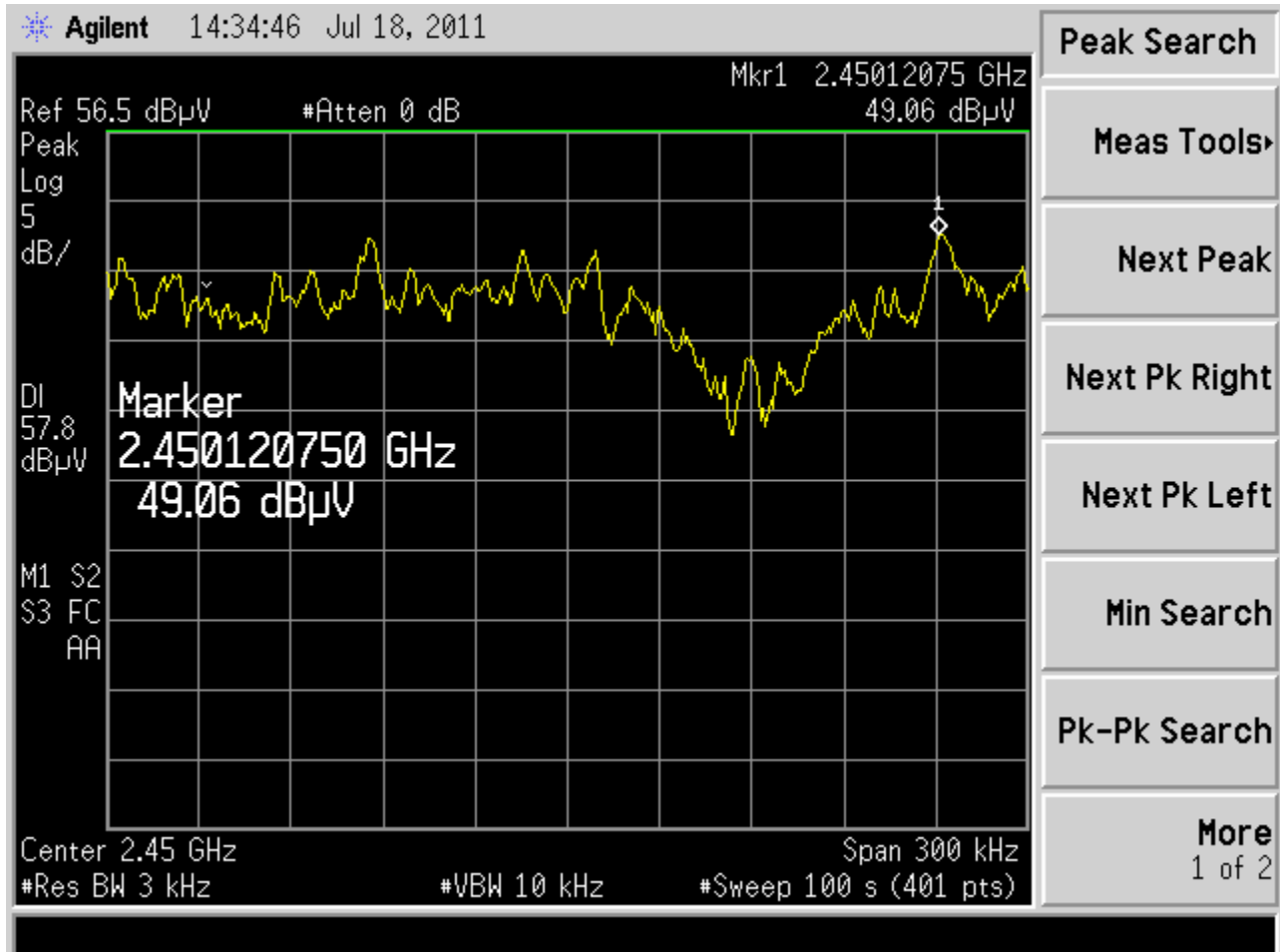
d = test distance in meters from which the field strength was measured = 3-meters

G = numeric gain of the transmitting antenna over an isotropic radiator = 1

Power Spectral Density (PSD)

FCC 15.247(e) / RSS-210 A8.2(b)

Channel 2 – 2.450 GHz



$$\text{Measured field strength} + \text{antenna factor} + \text{cable loss} = \text{Final corrected field strength (dBuV/m)}$$

$$49.06 + 29.6 + 3.6 = 82.26 \text{ dBuV/m}$$

$$82.26 \text{ dBuV/m} = 0.012972 \text{ V/m}$$

$$P = .000050 \text{ W} = \mathbf{-12.97 \text{ dBm}}$$

Specification: PSD < +8 dBm

Conversion of radiated field strength to power:

$$P = (E \times d)^2 / (30 \times G)$$

Whereby:

P = Power in watts

E= measured maximum field strength in Volts/meter

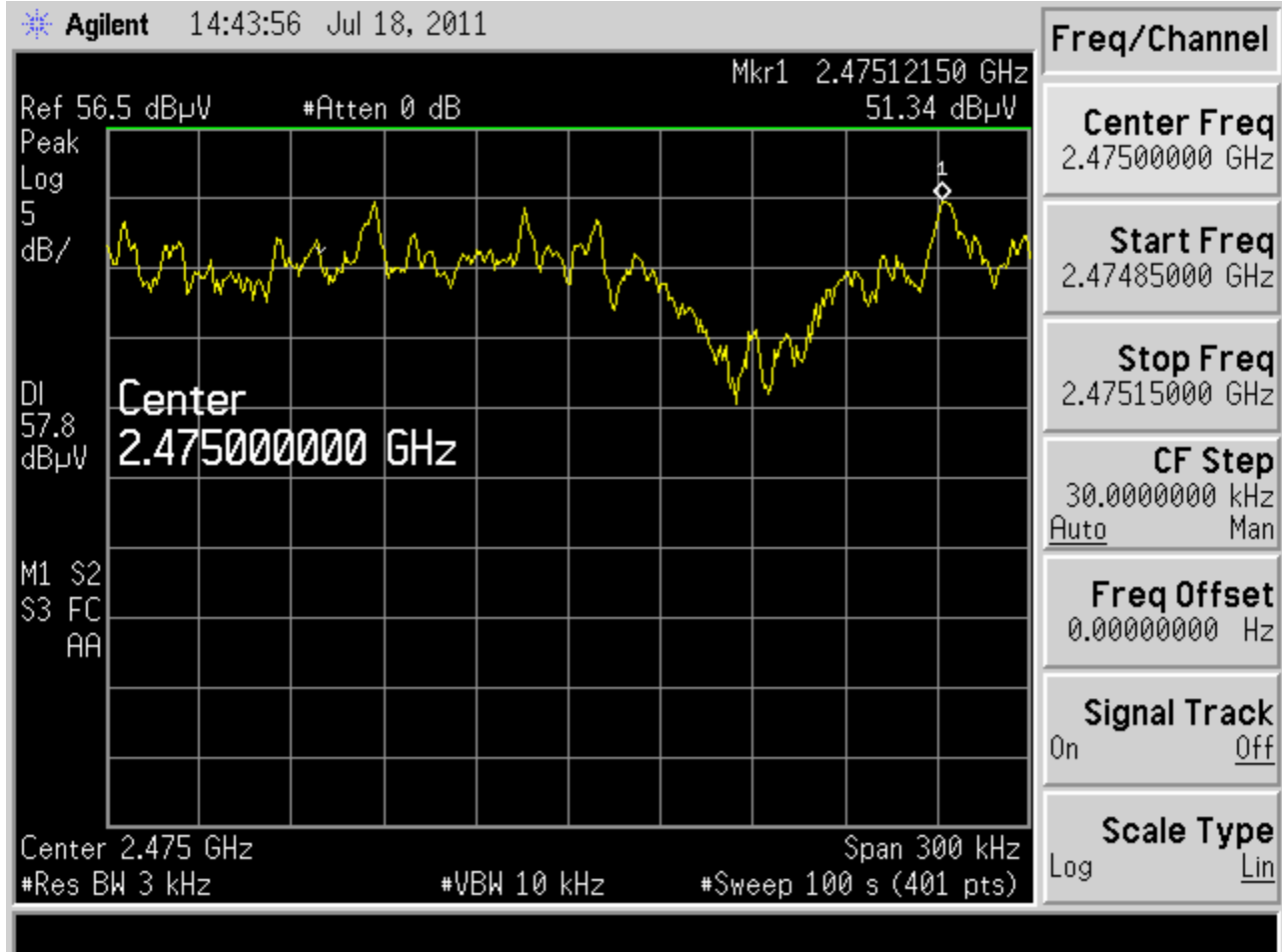
d = test distance in meters from which the field strength was measured

G = numeric gain of the transmitting antenna over an isotropic radiator

Power Spectral Density (PSD)

FCC 15.247(e) / RSS-210 A8.2(b)

Channel 3 – 2.475 GHz



$$\text{Measured field strength} + \text{antenna factor} + \text{cable loss} = \text{Final corrected field strength (dBuV/m)}$$

$$51.34 + 29.7 + 3.6 = 84.64 \text{ dBuV/m}$$

$$84.64 \text{ dBuV/m} = 0.017061 \text{ V/m}$$

$$P = .000087 \text{ W} = \mathbf{-10.59 \text{ dBm}}$$

Specification: PSD < +8 dBm

Conversion of radiated field strength to power:

$$P = (E \times d)^2 / (30 \times G)$$

Whereby:

P = Power in watts

E= measured maximum field strength in Volts/meter

d = test distance in meters from which the field strength was measured = 3-meters

G = numeric gain of the transmitting antenna over an isotropic radiator = 1

Notes:

- (1) All measurements are Radiated Field Strength – worst-case maximized signal
- (2) **Worst-case High Channel PSD: -10.59 dBm**

Deviations, Additions, or Exclusions: None

11 Occupied Bandwidth (OBW)

11.1 Method

The test methods used comply with ANSI C63.0. Unless otherwise stated no deviations were made from **IC RSS-GEN**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

11.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18913	Spectrum Analyzer with Pre-Amp	Hewlett-Packard	E7405A	My44211889	06/28/2011	06/28/2012
18887	Horn Antenna 1-18GHz	EMCO	3115	9205-3886	12/09/2010	12/09/2011

11.3 Results:

The sample tested was found to comply with the requirements of:

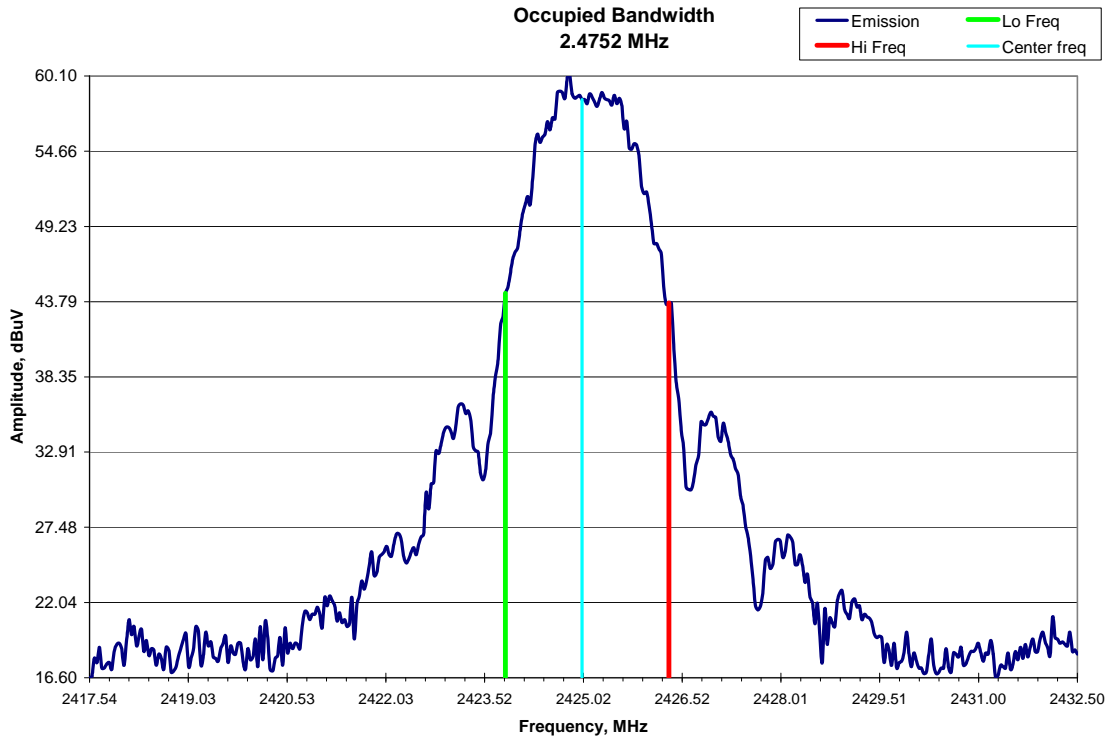
- RSS-GEN, Section 4.6.1

11.4 Test Data:

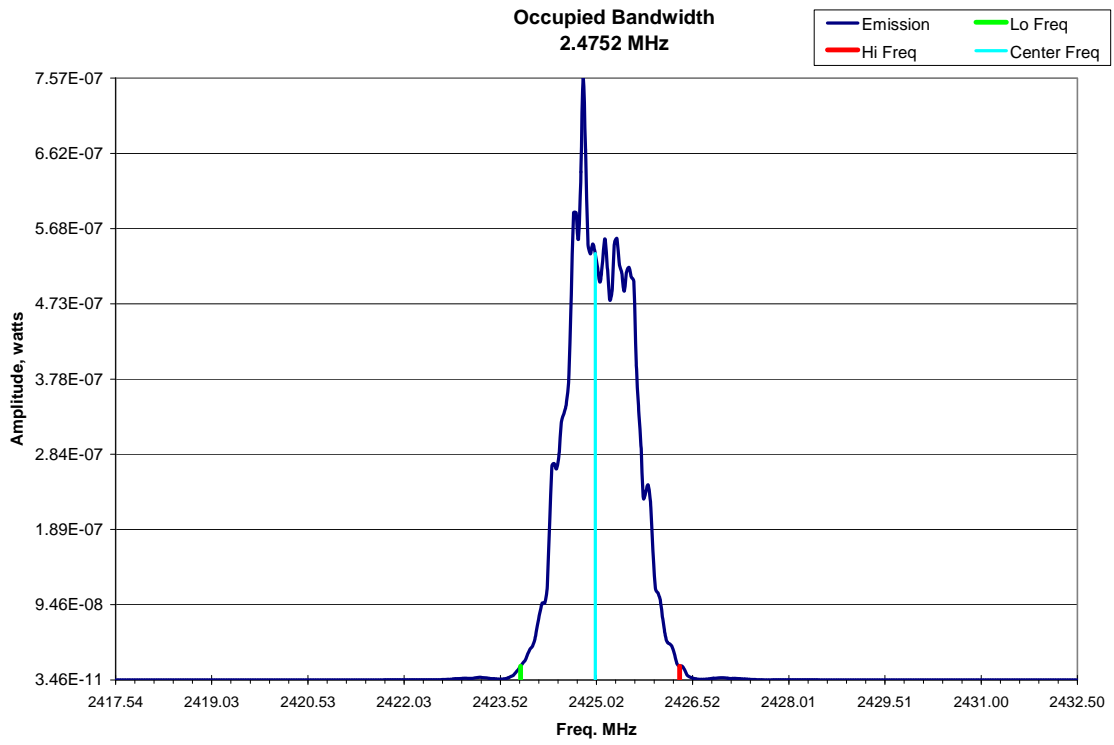
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Low Channel – 2.425 GHz

Field Strength Graph



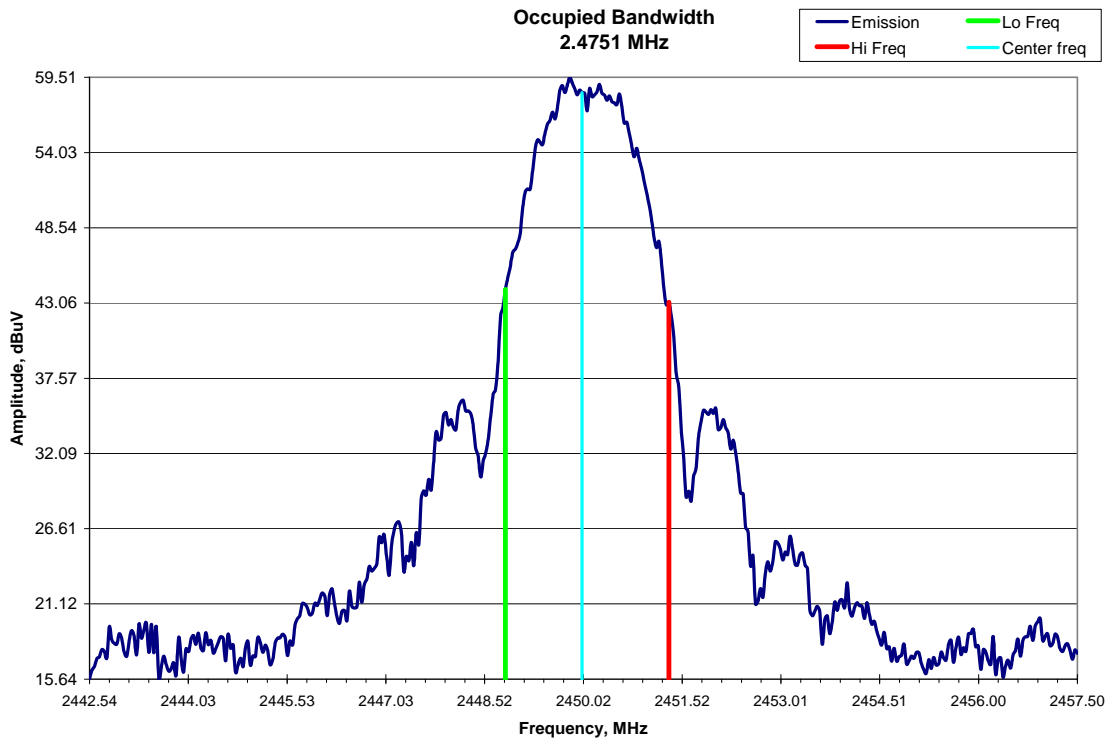
Power Graph



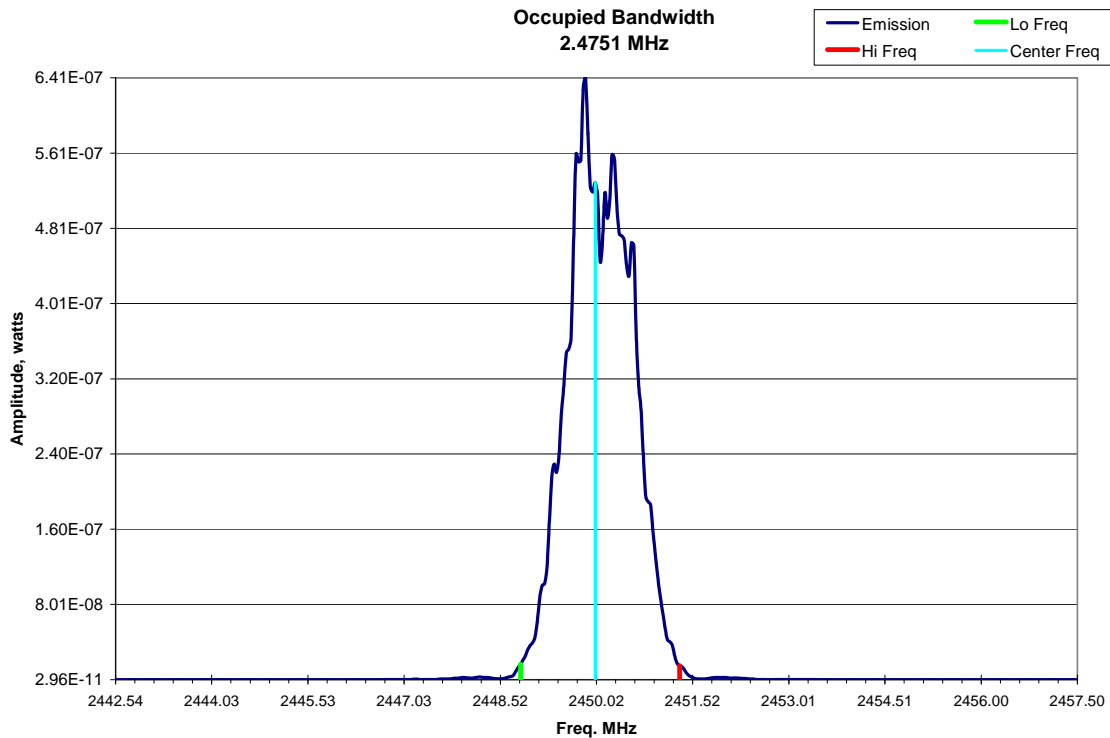
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

Mid Channel – 2.450 GHz

Field Strength Graph



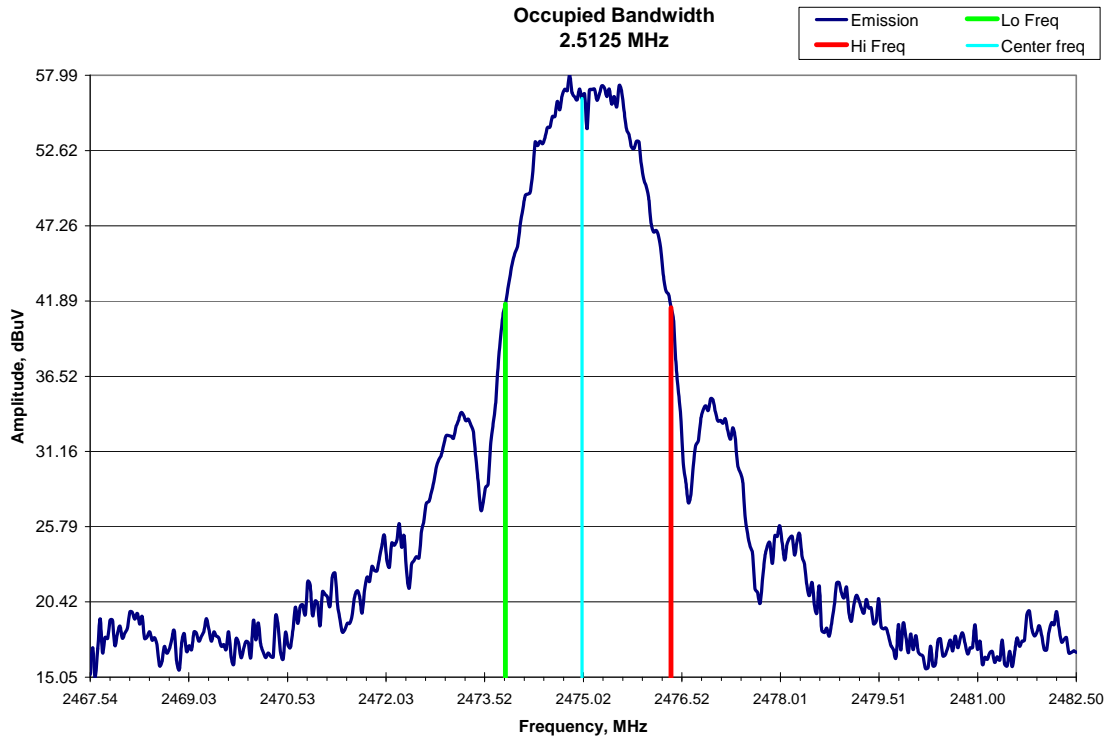
Power Graph



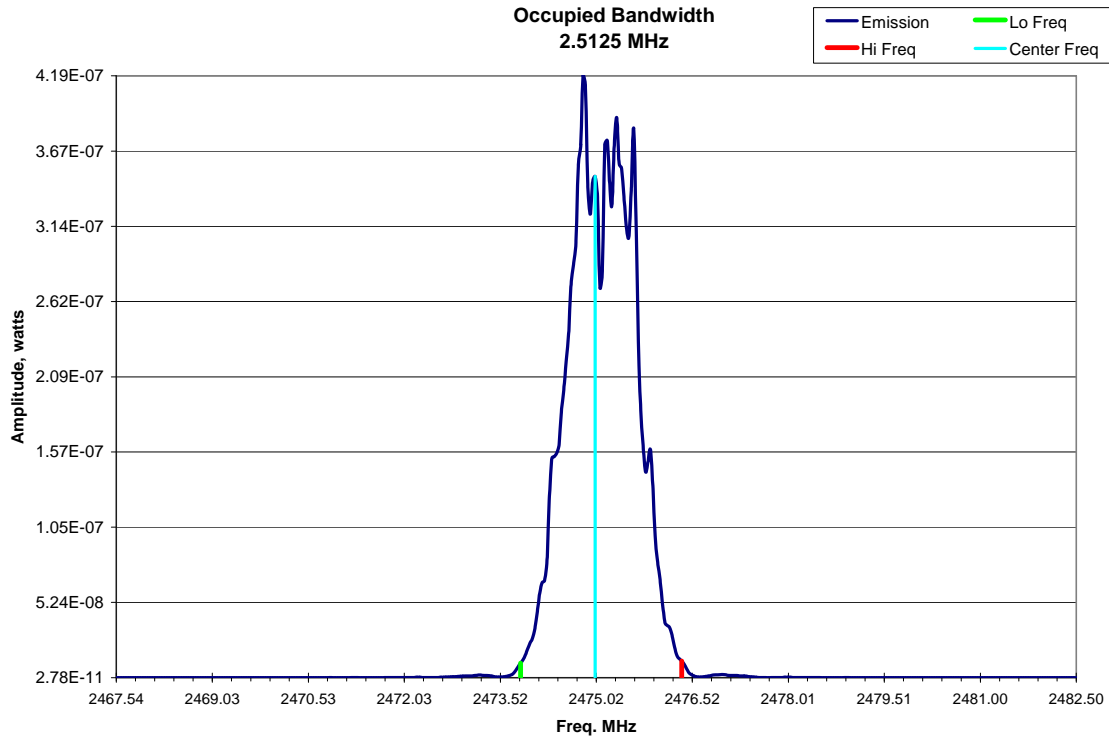
Occupied Bandwidth - (RSS-GEN, Section 4.6.1)

High Channel – 2.475 GHz

Field Strength Graph



Power Graph



Notes:

- (1) All measurements are Radiated Field Strength at 3-meters.
- (2) Worst-case Occupied Bandwidth (OBW): High Channel – 2.5125 MHz**

Deviations, Additions, or Exclusions: None

12 AC Mains Conducted Emissions**12.1 Method**

The test methods used comply with ANSI C63.4 and CISPR 16. Unless otherwise stated no deviations were made from **FCC 15.207/RSS-GEN**.

This testing was performed at Intertek Denver, located at 1795 Dogwood St. Suite 200, Louisville, CO 80027.

12.2 Test Equipment Used:

<u>Asset ID:</u>	<u>Description:</u>	<u>Manufacturer:</u>	<u>Model:</u>	<u>Serial:</u>	<u>Cal Date</u>	<u>Cal Due</u>
18909	EMI Test Receiver	RHODE & SCHWARZ	ESHS 30	842806/001	06/29/2011	06/29/2012
18765	LISN	EMCO	3825/2	9202-1945	01/31/2011	01/31/2012
18885	Transient Limiter	Hewlett-Packard	11947A	3107A00700	04/28/2011	04/28/2012
SW-6	Software application for Radiated and Conducted Emissions	Intertek	OATS_CVI	V.1.0	01/01/2011	01/01/2012

12.3 Results:

The sample tested was found to comply with the requirements of:

- **FCC 15.207/15.107 Class B**
- **RSS-GEN Section 7.2.4**

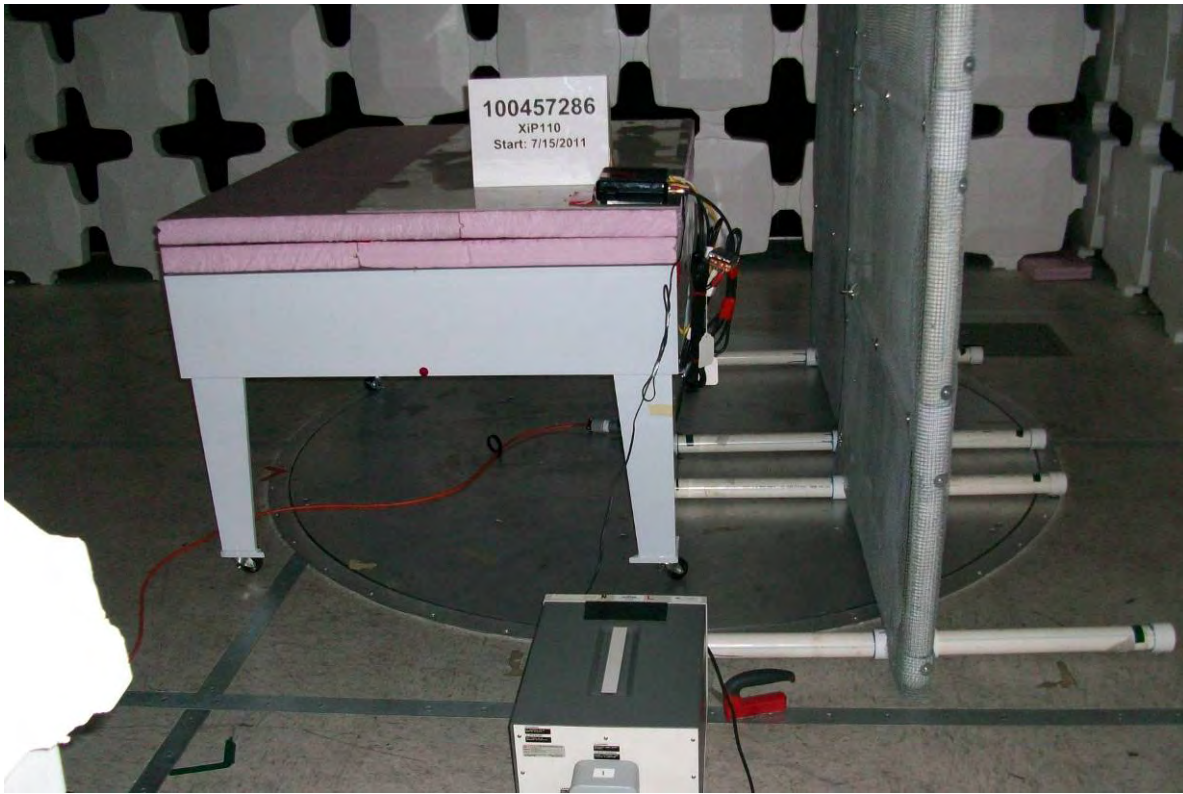
12.4 Setup Photographs:

Test Setup – Conducted Emissions (Front View)



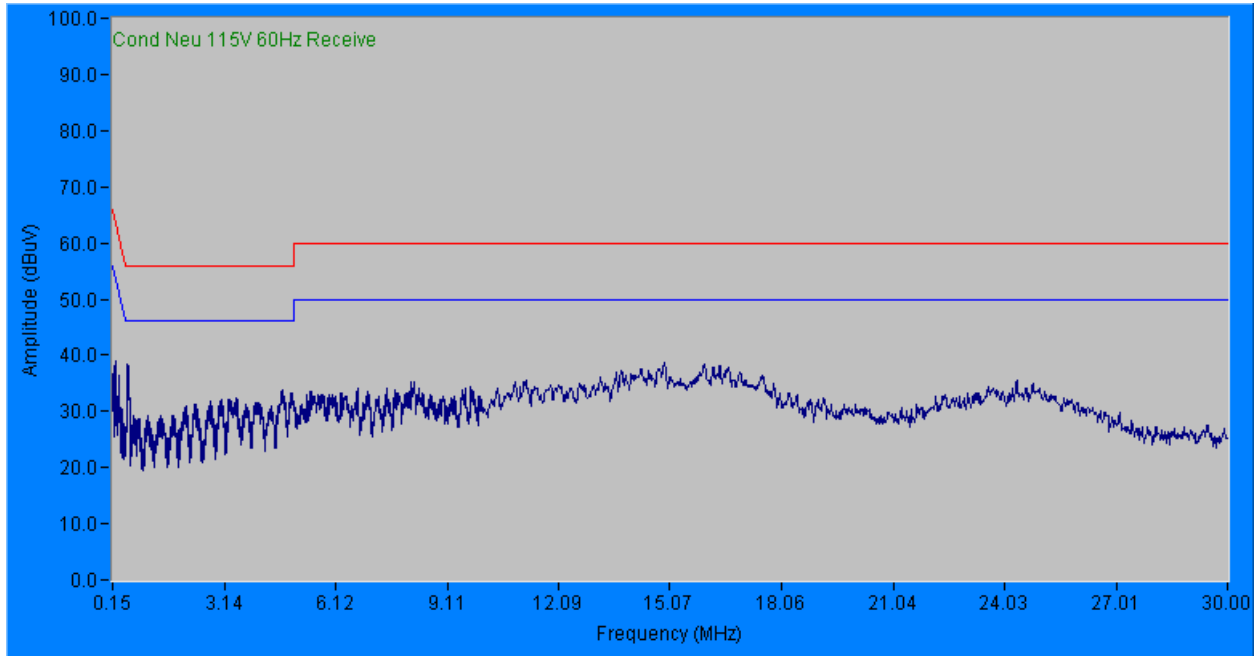
Photo:

Test Setup – Conducted Emissions (Side View)

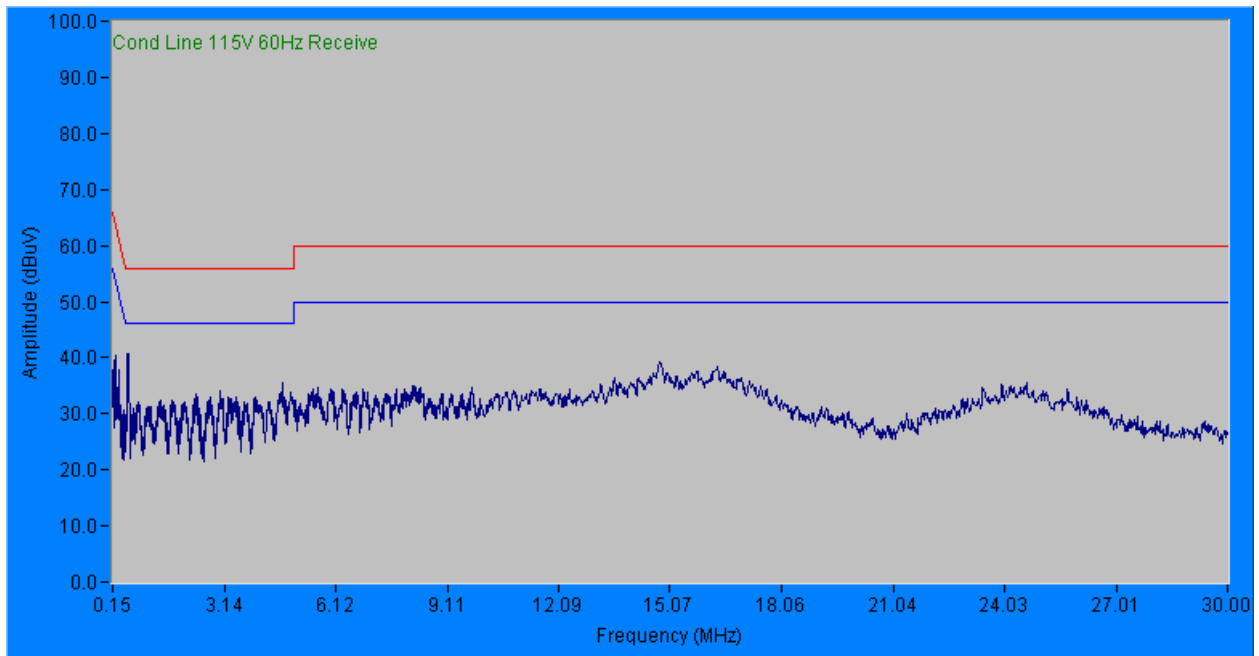


12.5 Plots: Pre-Scan Peak Measurements - Not Final Data

Conducted Emissions – FCC 15.107, Class B (150 kHz to 30 MHz)



Neutral Line

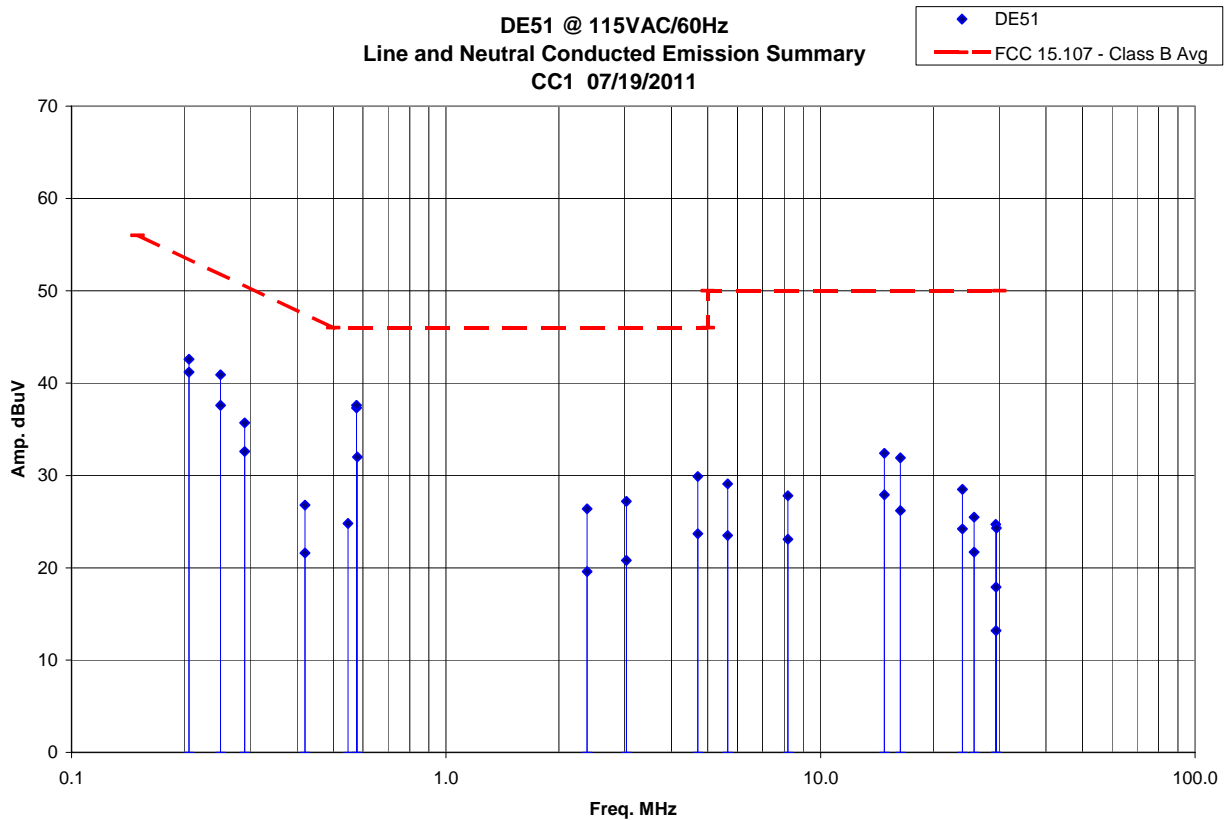
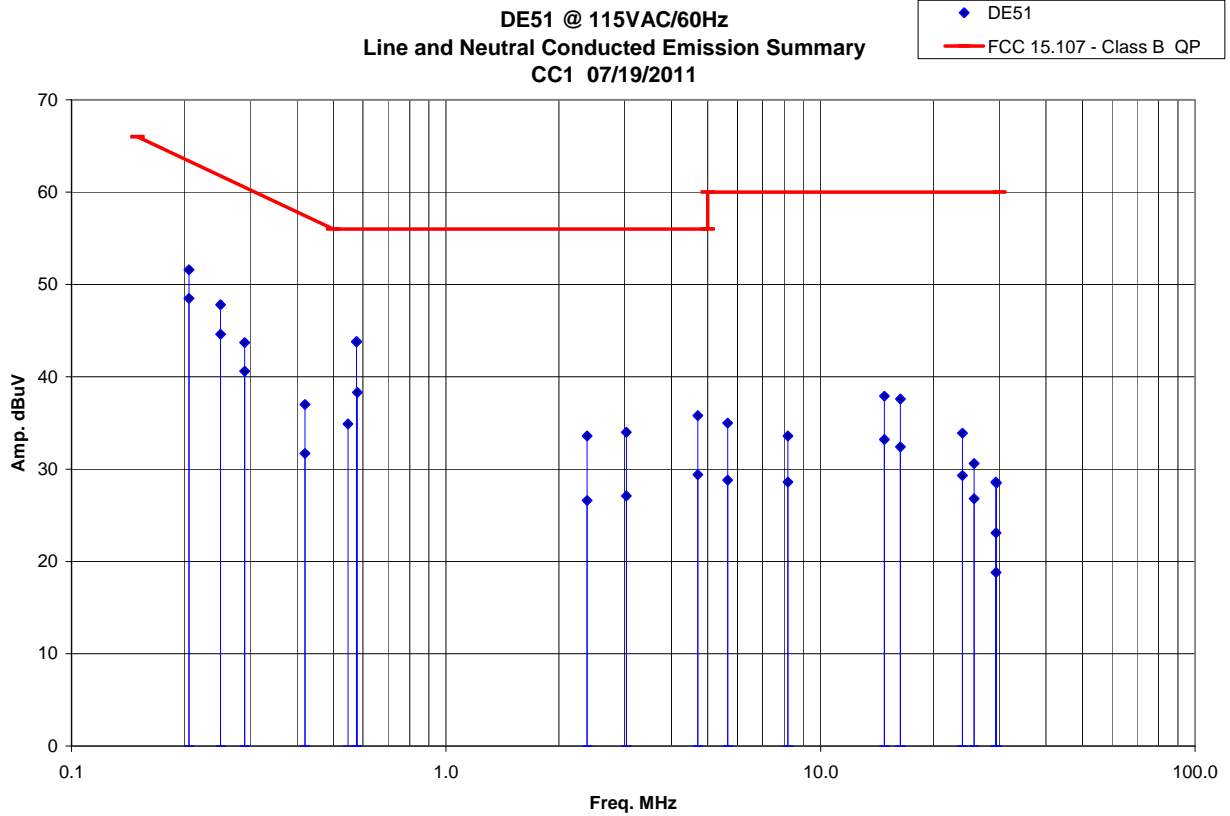


Live Line

Note: Peak measurements plotted against FCC 15.107 Average & Quasi-Peak Limit

Plots: Final Quasi-Peak and Average Measurements

Conducted Emissions – FCC 15.107, Class B (150 kHz to 30 MHz)



12.6 Test Data: 150kHz to 30MHz

Conducted Electromagnetic Emissions

Test Report #:	100457286	Test Area:	CC1 Conducted	Temperature:	23.0 °C
Test Method:	FCC Part 15.107 Class B	Test Date:	19-Jul-2011	Relative Humidity:	40.7 %
EUT Model #:	DE51 (XiP110)	EUT Power:	115VAC / 60Hz	Air Pressure:	83.58 kPa
EUT Serial #:	EMC 1				

Manufacturer:	Echostar	Level Key	
EUT Description:	MoCa Converter Set-Top Box	Pk – Peak	Nb – Narrow Band
Notes:	Product configured in Receive Mode (Tx radio disabled)	Qp – QuasiPeak	Bb – Broad Band
		Av - Average	

AC Conducted Emissions: 150kHz to 30MHz

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC 15.107 Class B (QP)	FCC 15.107 Class B (Average)
0.206	38.4 Qp	0.1 / 0.1 / -9.9	48.5	Line 1	-14.9	N/A
0.206	31.1 Av	0.1 / 0.1 / -9.9	41.2	Line 1	N/A	-12.2
0.250	34.5 Qp	0.1 / 0.1 / -9.9	44.6	Line 1	-17.2	N/A
0.250	27.5 Av	0.1 / 0.1 / -9.9	37.6	Line 1	N/A	-14.2
0.290	30.4 Qp	0.1 / 0.1 / -10.0	40.6	Line 1	-19.9	N/A
0.290	22.4 Av	0.1 / 0.1 / -10.0	32.6	Line 1	N/A	-17.9
0.420	21.5 Qp	0.1 / 0.1 / -10.0	31.7	Line 1	-25.7	N/A
0.420	11.4 Av	0.1 / 0.1 / -10.0	21.6	Line 1	N/A	-25.8
0.580	28.1 Qp	0.1 / 0.1 / -10.0	38.3	Line 1	-17.7	N/A
0.580	21.8 Av	0.1 / 0.1 / -10.0	32.0	Line 1	N/A	-14.0
0.547	24.7 Qp	0.1 / 0.1 / -10.0	34.9	Line 1	-21.1	N/A
0.547	14.6 Av	0.1 / 0.1 / -10.0	24.8	Line 1	N/A	-21.2
2.38	16.3 Qp	0.2 / 0.1 / -10.0	26.6	Line 1	-29.4	N/A
2.38	9.3 Av	0.2 / 0.1 / -10.0	19.6	Line 1	N/A	-26.4
3.03	16.7 Qp	0.3 / 0.1 / -10.0	27.1	Line 1	-28.9	N/A
3.03	10.4 Av	0.3 / 0.1 / -10.0	20.8	Line 1	N/A	-25.2
4.70	19.0 Qp	0.3 / 0.1 / -10.0	29.4	Line 1	-26.6	N/A
4.70	13.3 Av	0.3 / 0.1 / -10.0	23.7	Line 1	N/A	-22.3
5.65	18.3 Qp	0.4 / 0.1 / -10.0	28.8	Line 1	-31.2	N/A
5.65	13.0 Av	0.4 / 0.1 / -10.0	23.5	Line 1	N/A	-26.5
8.18	18.0 Qp	0.5 / 0.1 / -10.0	28.6	Line 1	-31.4	N/A
8.18	12.5 Av	0.5 / 0.1 / -10.0	23.1	Line 1	N/A	-26.9
14.80	22.0 Qp	1.0 / 0.2 / -10.0	33.2	Line 1	-26.8	N/A
14.80	16.7 Av	1.0 / 0.2 / -10.0	27.9	Line 1	N/A	-22.1
16.34	21.1 Qp	1.1 / 0.2 / -10.0	32.4	Line 1	-27.6	N/A
16.34	14.9 Av	1.1 / 0.2 / -10.0	26.2	Line 1	N/A	-23.8
23.94	17.5 Qp	1.2 / 0.6 / -10.0	29.3	Line 1	-30.7	N/A
23.94	12.4 Av	1.2 / 0.6 / -10.0	24.2	Line 1	N/A	-25.8

Intertek

Report Number: 100457286DEN-002

Issued: 7/25/2011

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC 15.107 Class B (QP)	FCC 15.107 Class B (Average)
25.71	15.0 Qp	1.2 / 0.6 / -10.0	26.8	Line 1	-33.2	N/A
25.71	9.9 Av	1.2 / 0.6 / -10.0	21.7	Line 1	N/A	-28.3
29.40	6.7 Qp	1.4 / 0.7 / -10.0	18.8	Line 1	-41.2	N/A
29.40	1.1 Av	1.4 / 0.7 / -10.0	13.2	Line 1	N/A	-36.8
0.206	41.5 Qp	0.1 / 0.1 / -9.9	51.6	Neutral	-11.8	N/A
0.206	32.5 Av	0.1 / 0.1 / -9.9	42.6	Neutral	N/A	-10.8
0.250	37.7 Qp	0.1 / 0.1 / -9.9	47.8	Neutral	-14.0	N/A
0.250	30.8 Av	0.1 / 0.1 / -9.9	40.9	Neutral	N/A	-10.9
0.290	33.5 Qp	0.1 / 0.1 / -10.0	43.7	Neutral	-16.8	N/A
0.290	25.5 Av	0.1 / 0.1 / -10.0	35.7	Neutral	N/A	-14.8
0.420	26.8 Qp	0.1 / 0.1 / -10.0	37.0	Neutral	-20.4	N/A
0.420	16.6 Av	0.1 / 0.1 / -10.0	26.8	Neutral	N/A	-20.6
0.577	33.6 Qp	0.1 / 0.1 / -10.0	43.8	Neutral	-12.2	N/A
0.577	27.1 Av	0.1 / 0.1 / -10.0	37.3	Neutral	N/A	-8.7
0.577	33.6 Qp	0.1 / 0.1 / -10.0	43.8	Neutral	-12.2	N/A
0.577	27.4 Av	0.1 / 0.1 / -10.0	37.6	Neutral	N/A	-8.4
2.38	23.3 Qp	0.2 / 0.1 / -10.0	33.6	Neutral	-22.4	N/A
2.38	16.1 Av	0.2 / 0.1 / -10.0	26.4	Neutral	N/A	-19.6
3.03	23.6 Qp	0.3 / 0.1 / -10.0	34.0	Neutral	-22.0	N/A
3.03	16.8 Av	0.3 / 0.1 / -10.0	27.2	Neutral	N/A	-18.8
4.70	25.4 Qp	0.3 / 0.1 / -10.0	35.8	Neutral	-20.2	N/A
4.70	19.5 Av	0.3 / 0.1 / -10.0	29.9	Neutral	N/A	-16.1
5.65	24.5 Qp	0.4 / 0.1 / -10.0	35.0	Neutral	-25.0	N/A
5.65	18.6 Av	0.4 / 0.1 / -10.0	29.1	Neutral	N/A	-20.9
8.18	17.2 Av	0.5 / 0.1 / -10.0	27.8	Neutral	N/A	-22.2
8.18	23.0 Qp	0.5 / 0.1 / -10.0	33.6	Neutral	-26.4	N/A
14.80	26.7 Qp	1.0 / 0.2 / -10.0	37.9	Neutral	-22.1	N/A
14.80	21.2 Av	1.0 / 0.2 / -10.0	32.4	Neutral	N/A	-17.6
16.34	26.3 Qp	1.1 / 0.2 / -10.0	37.6	Neutral	-22.4	N/A
16.34	20.6 Av	1.1 / 0.2 / -10.0	31.9	Neutral	N/A	-18.1
23.94	22.1 Qp	1.2 / 0.6 / -10.0	33.9	Neutral	-26.1	N/A
23.94	16.7 Av	1.2 / 0.6 / -10.0	28.5	Neutral	N/A	-21.5
25.71	18.8 Qp	1.2 / 0.6 / -10.0	30.6	Neutral	-29.4	N/A
25.71	13.7 Av	1.2 / 0.6 / -10.0	25.5	Neutral	N/A	-24.5
29.40	11.0 Qp	1.4 / 0.7 / -10.0	23.1	Neutral	-36.9	N/A
29.40	5.8 Av	1.4 / 0.7 / -10.0	17.9	Neutral	N/A	-32.1
29.36	16.5 Qp	1.4 / 0.7 / -10.0	28.6	Neutral	-31.4	N/A
29.36	12.6 Av	1.4 / 0.7 / -10.0	24.7	Neutral	N/A	-25.3
29.48	16.3 Qp	1.4 / 0.8 / -10.0	28.5	Neutral	-31.5	N/A
29.48	12.1 Av	1.4 / 0.8 / -10.0	24.3	Neutral	N/A	-25.7

Intertek

Report Number: 100457286DEN-002

Issued: 7/25/2011

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC 15.107 Class B (QP)	FCC 15.107 Class B (Average)
***** Measurement Summary *****						
0.577	27.4 Av	0.1 / 0.1 / -10.0	37.6	Neutral	N/A	-8.4
0.206	32.5 Av	0.1 / 0.1 / -9.9	42.6	Neutral	N/A	-10.8
0.250	30.8 Av	0.1 / 0.1 / -9.9	40.9	Neutral	N/A	-10.9
0.290	25.5 Av	0.1 / 0.1 / -10.0	35.7	Neutral	N/A	-14.8
4.70	19.5 Av	0.3 / 0.1 / -10.0	29.9	Neutral	N/A	-16.1
14.80	21.2 Av	1.0 / 0.2 / -10.0	32.4	Neutral	N/A	-17.6
16.34	20.6 Av	1.1 / 0.2 / -10.0	31.9	Neutral	N/A	-18.1
3.03	16.8 Av	0.3 / 0.1 / -10.0	27.2	Neutral	N/A	-18.8
2.38	16.1 Av	0.2 / 0.1 / -10.0	26.4	Neutral	N/A	-19.6
0.420	26.8 Qp	0.1 / 0.1 / -10.0	37.0	Neutral	-20.4	N/A
5.65	18.6 Av	0.4 / 0.1 / -10.0	29.1	Neutral	N/A	-20.9
0.547	24.7 Qp	0.1 / 0.1 / -10.0	34.9	Line 1	-21.1	N/A
23.94	16.7 Av	1.2 / 0.6 / -10.0	28.5	Neutral	N/A	-21.5
8.18	17.2 Av	0.5 / 0.1 / -10.0	27.8	Neutral	N/A	-22.2
25.71	13.7 Av	1.2 / 0.6 / -10.0	25.5	Neutral	N/A	-24.5
29.36	12.6 Av	1.4 / 0.7 / -10.0	24.7	Neutral	N/A	-25.3
29.48	12.1 Av	1.4 / 0.8 / -10.0	24.3	Neutral	N/A	-25.7
29.40	5.8 Av	1.4 / 0.7 / -10.0	17.9	Neutral	N/A	-32.1
25.71	15.0 Qp	1.2 / 0.6 / -10.0	26.8	Line 1	-33.2	N/A

Example calculation:

Measured Level	+	Transducer, Cable Loss & Amplifier corrections	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dB μ V)		(dB)		(dB μ V/m)	(dB μ V/m)		(dB μ V/m)		
14.0		14.9		28.9	40.0		28.9		-11.1

Notes:

- (1) All measurements taken with both Quasi-Peak and Average detectors.

Deviations, Additions, or Exclusions: None

13 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of $k = 2$, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty \pm	Notes
Radiated emissions, 10kHz to 1000 MHz	4.4 dB	
Radiated emissions, 1 to 18 GHz	4.7 dB	
AC mains Conducted emissions, 9kHz to 30 MHz	3.14 dB	

14 Duty Cycle Correction Factor

No duty cycle correction factor was applied during this testing – therefore, no product Duty Cycle verification was applicable.

15 Revision History

Revision Level	Date	Report Number	Notes
0	07/25/2011	100457286DEN-002	Original Issue
1	07/28/2011	100457286DEN-002	Revised report per TCB reviewer request: - added FCC 15.31(e) ac voltage variance comment – page 4 - added test data for above – page 16 Author: Randy Thompson <i>R.T.</i> Reviewer: Michael Spataro <i>MAS</i>