



**FCC CFR47 PART 15 SUBPART C
CERTIFICATION TEST REPORT**

**EUT
RF4CE 2.4GHz Radio**

MODEL NUMBER: ID:068

**FCC ID: DKNST321
IC: Not applicable**

REPORT NUMBER: 13U16177

ISSUE DATE: 2013-11-20

**Prepared for
Echostar
90 Inverness Circle East
Englewood, CO 80112**

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NVLAP LAB CODE 100255-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	2013-11-20	Initial Issue	Joseph Danisi
--	2013-11-21	Corrected antenna port set up photo, added high channel data, added ANSI C63.10-2009	Joseph Danisi

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Echostar
90 Inverness Circle East
Englewood, CO 80112

EUT DESCRIPTION: RF4CE 2.4GHz radio

MODEL: ID:068

SERIAL NUMBER: Prototype

DATE TESTED: 2011-11-06 to 2013-11-20

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

UL LLC. tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC. based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation, as described by the referenced documents. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL By:

Tested By:



Bob DeLisi
WiSE Principal Engineer
UL

Joseph Danisi
WiSE Project Lead
UL

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.15.4 Zigbee transceiver .

The radio module is manufactured by Echostar 90 Inverness Circle East Englewood, CO 80112

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2425 - 2475	802.15.4	5.20	3.31

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB antenna, with a maximum gain of 0 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SWP3, rev. rev01.1.

The EUT driver software installed during testing was RF4CE Dev01.7.

The test utility software used during testing was not applicable

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated Emission below 1GHz and power line Conducted Emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

5.1. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Keyboard	Microsoft	5211AU	G2080001203	E5XKB5211AU
Laptop	IBM	2687	L3-BB983	E-A012-03-0857(B)
DVD Player	Toshiba	SD4300KU	A48S 9604 5U53 00	N/A
Television	Samsung	MD65C-C	H04UHCDD800038R	A3LWIDT20R

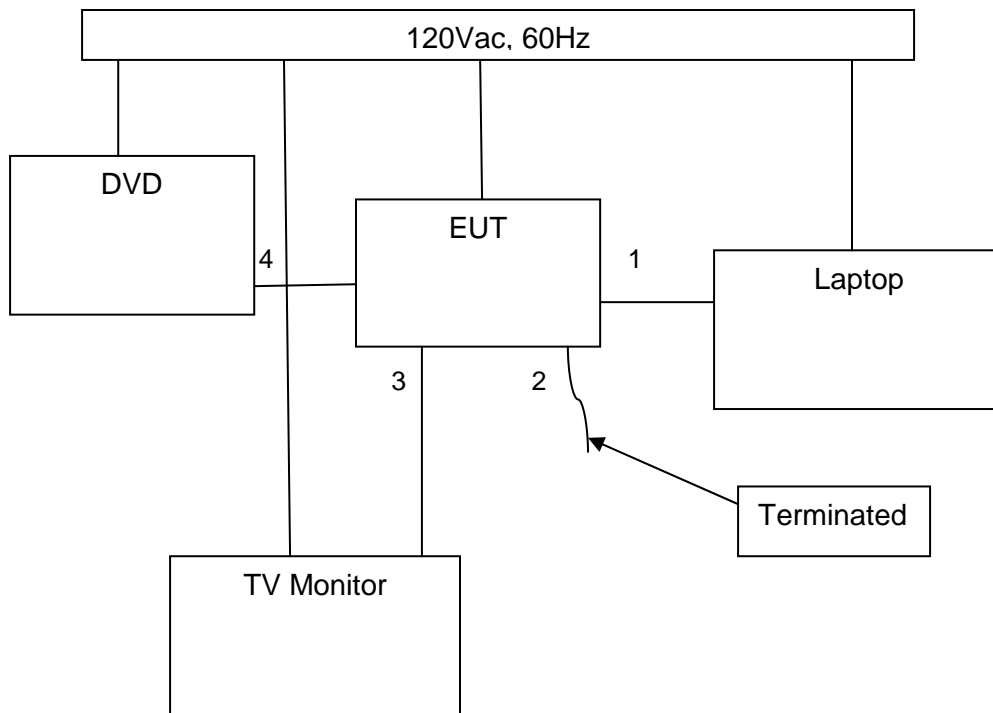
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	Network	1	RJ45	Ethernet	1M	None
2	External	1	ESATA	ESATA	1M	None
3	HDMI	1	HDMI	HDMI	5M	None
4	Video	1	Composite	Composite	1M	None

TEST SETUP

The EUT is stand-alone device software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2013-01-30	2014-01-31
Bicon Antenna	Schaffner	VBA6106A	43441	2012-11-12	2013-11-13
Log-P Antenna	Schaffner	UPA6109	44068	2012-11-12	2013-11-13
Preamp	Miteq	AM-3A-000110-7687	44391		N/A
Preamp	Miteq	AM-3A-000110-7687	44394		N/A
Switch Driver	HP	11713A	ME7A-627		N/A
System Controller	Sunol Sciences	SC99V	44396		N/A
Camera Controller	Panasonic	WV-CU254	44395		N/A
RF Switch Box	UL	1	44398		N/A
Measurement Software	UL	Version 9.5	44740		N/A
Multimeter	Fluke	83III	ME5B-305	2013-01-29	2014-01-31
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E4446A	72823	2013-01-29	2014-01-31
Horn Antenna (1-2 GHz)	ETS	3161-01 (26°)**	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below
Horn Antenna (8-12 GHz)	ETS	3160-07 (26°)**	8933	2008-11-24	See * below
Horn Antenna (12-18 GHz)	ETS	3160-08 (26°)**	8932	2007-09-27	See * below
Horn Antenna (18-26.5 GHz)	ETS	3160-09 (27°)**	8947	2007-09-26	See * below
Signal Path Controller	HP	11713A	50250		N/A
Gain Controller	HP	11713A	50251		N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249		N/A
System Controller	UL	BOMS2	50252		N/A
Measurement Software	UL	Version 9.5	44740		N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2013-01-29	2014-01-31

Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration. Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than $2D^2/\lambda$. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances. ** - Number in parentheses denotes antenna beam width.					

Conducted Emissions					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2013-01-27	2014-01-31
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2013-01-02	2014-01-28
Switch Driver	HP	11713A	44397	N/A	
RF Switch Box	UL	4	44404	N/A	
Measurement Software	UL	Version 9.5	44736	N/A	
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-03	2014-03-13
Multimeter	Fluke	83V	43443	2013-01-28	2014-31-01

Bench Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 1					
Spectrum Analyzer	Agilent	E4446A	72823	2013-01-24	2014-01-31
Horn Antenna	EMCO	RGA-180	ME5-565	2013-09-05	2014-09-05
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-03-13	2014-03-13
Measurement Software	UL	Version 9.5	44740	N/A	
Multimeter	Fluke	83V	43443	2013-01-28	2014-31-01

7. ANTENNA PORT TEST RESULTS

7.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

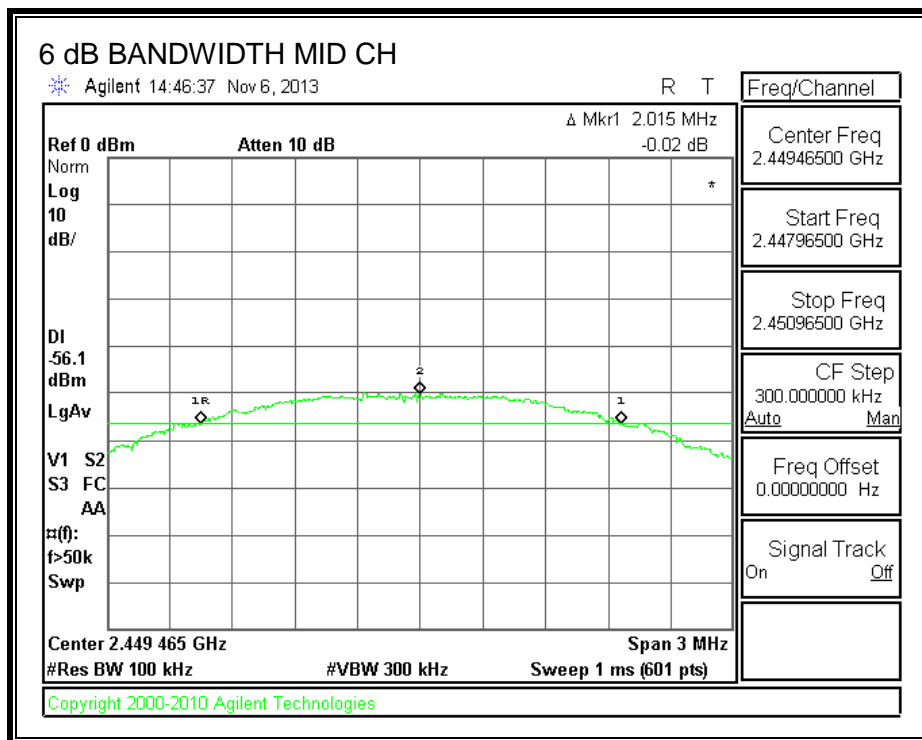
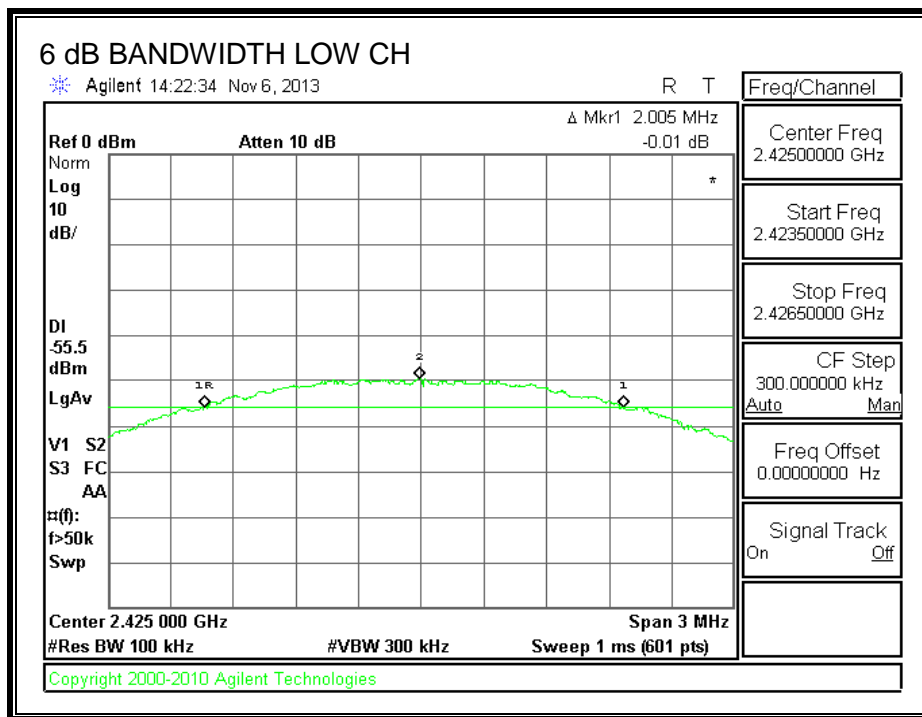
TEST PROCEDURE

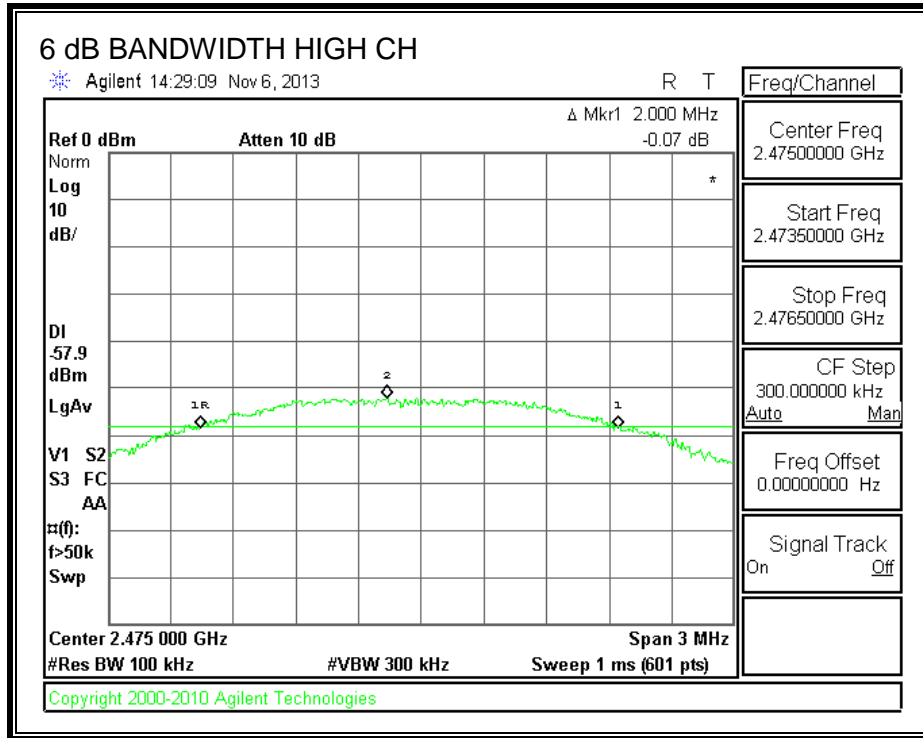
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2425	2.005	0.5
Middle	2450	2.015	0.5
High	2475	2	0.5

6 dB BANDWIDTH





7.1.2 OUTPUT POWER

LIMITS

FCC §15.247 (b)

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

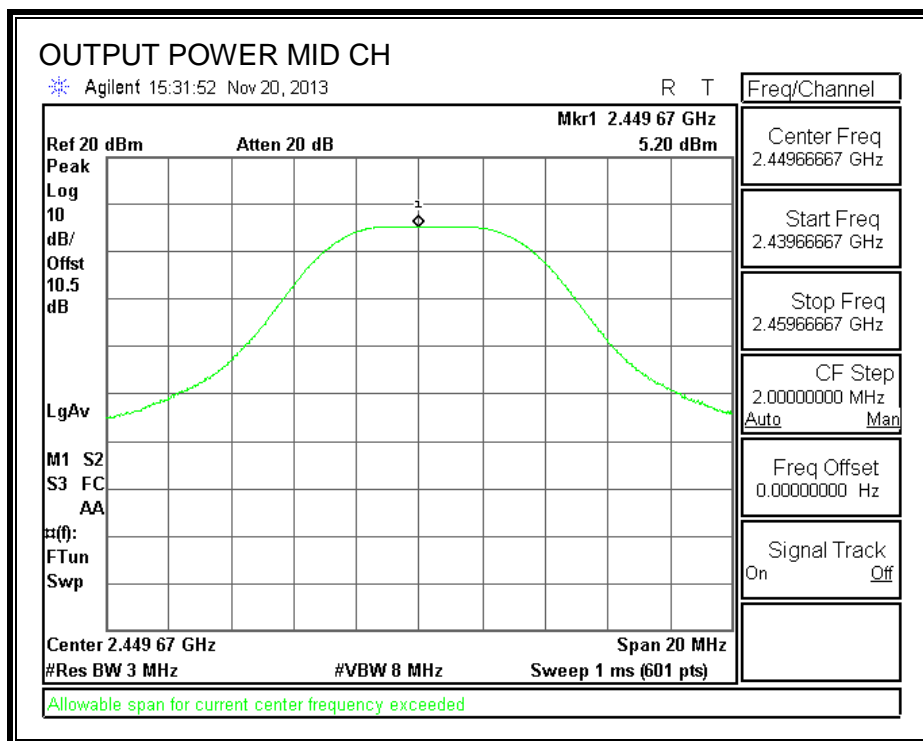
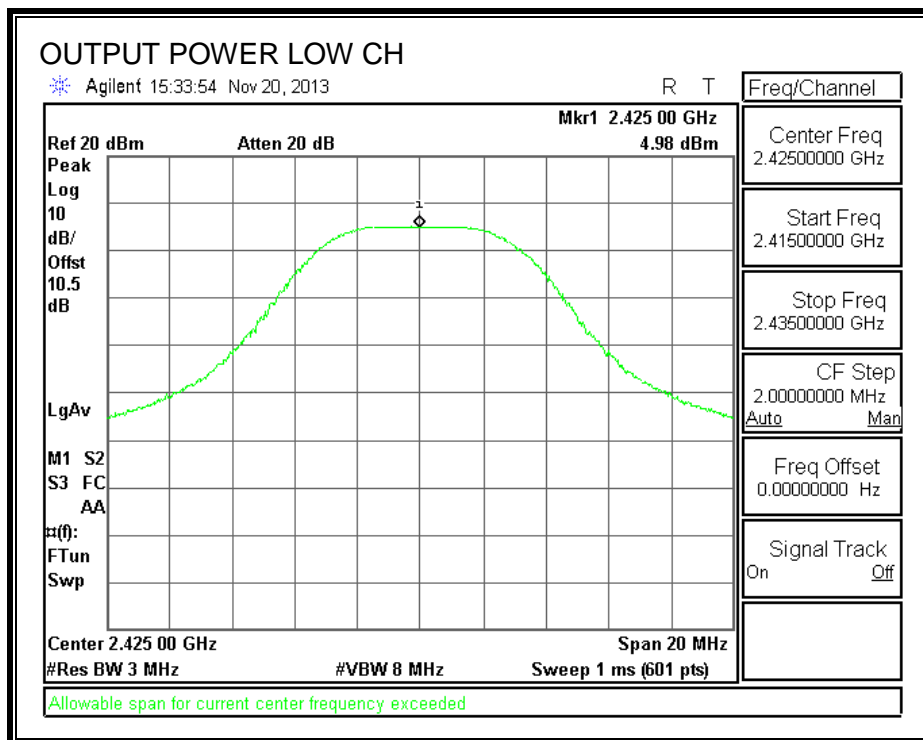
TEST PROCEDURE

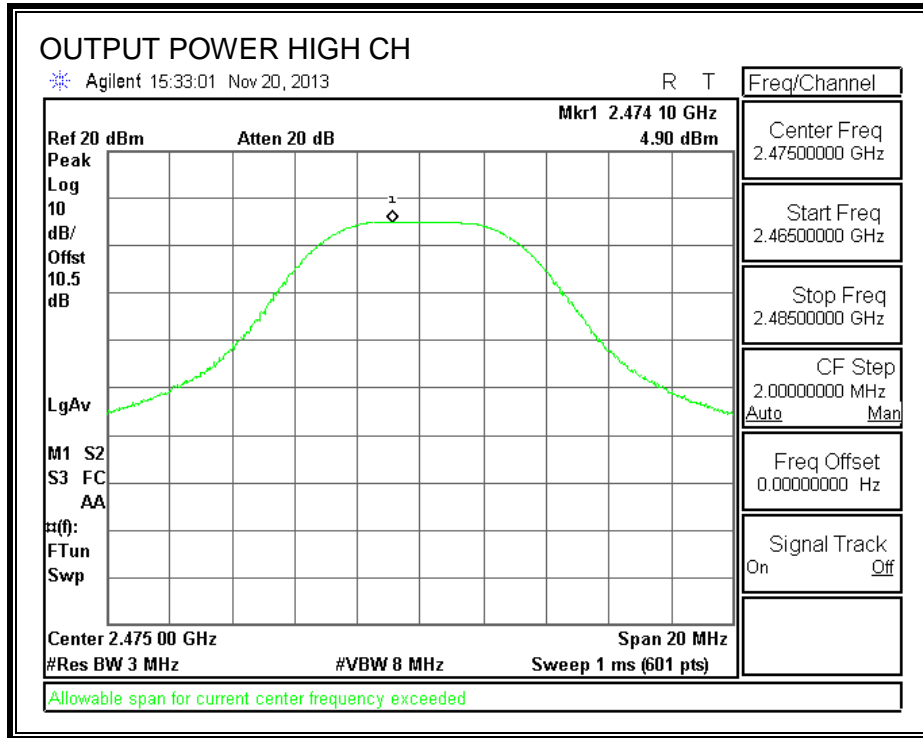
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the DTS bandwidth of the EUT.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2425	4.98	30	-25.02
Middle	2450	5.20	30	-24.80
High	2475	4.90	30	-25.10

OUTPUT POWER





7.1.3 AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Low	2425	4.68
Middle	2450	4.83
High	2475	4.58

7.1.4 POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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

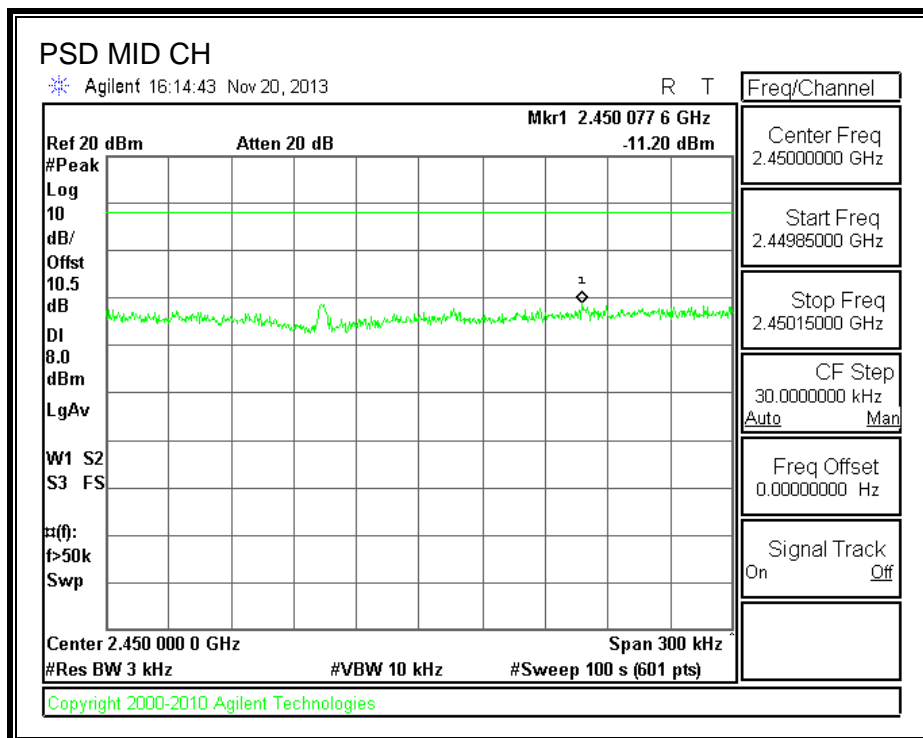
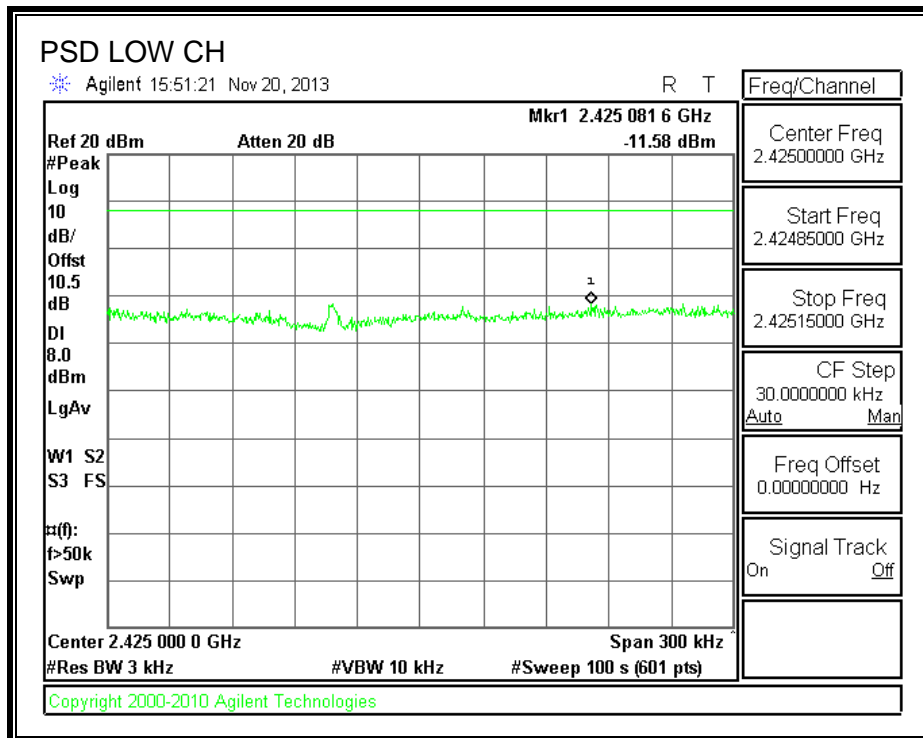
TEST PROCEDURE

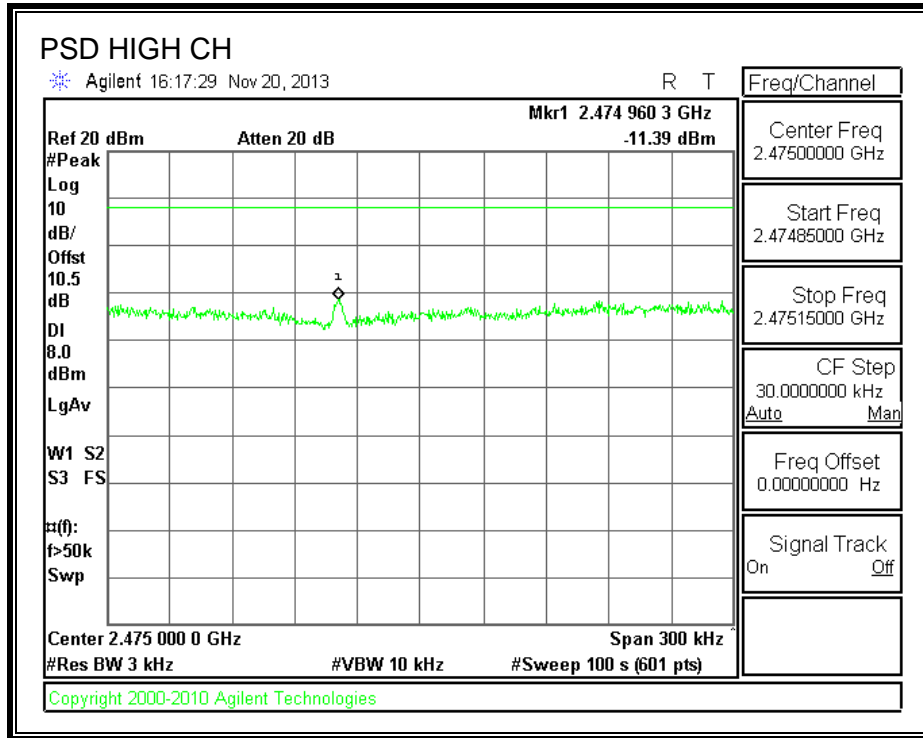
Output power was measured based on the use of a peak measurement, therefore the power spectral density was measured using PSD Option 1 in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2425	-11.58	8	-19.58
Middle	2450	-11.20	8	-19.20
High	2475	-11.39	8	-19.39

POWER SPECTRAL DENSITY





7.1.5 CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

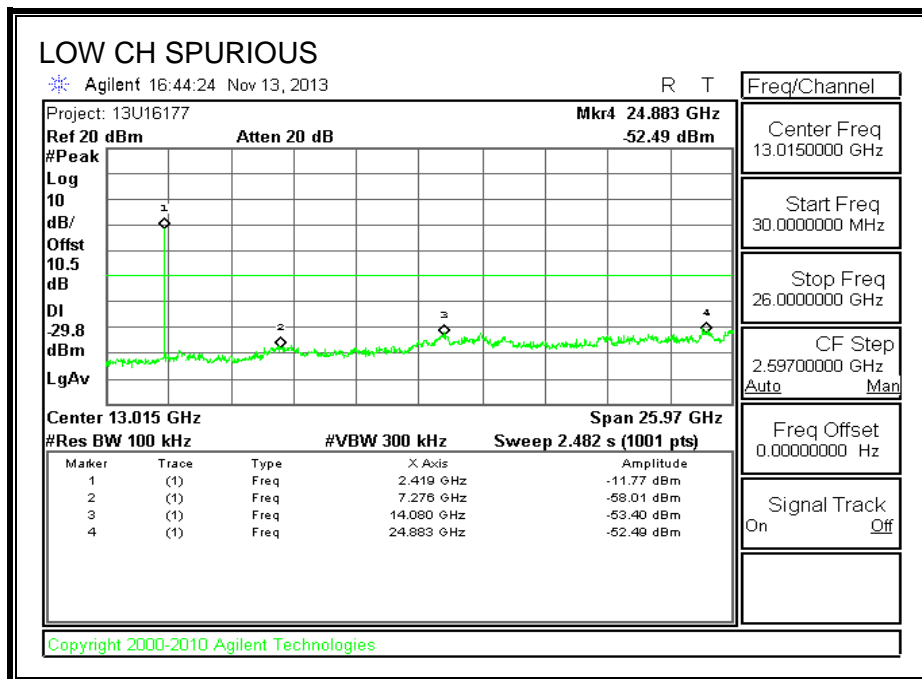
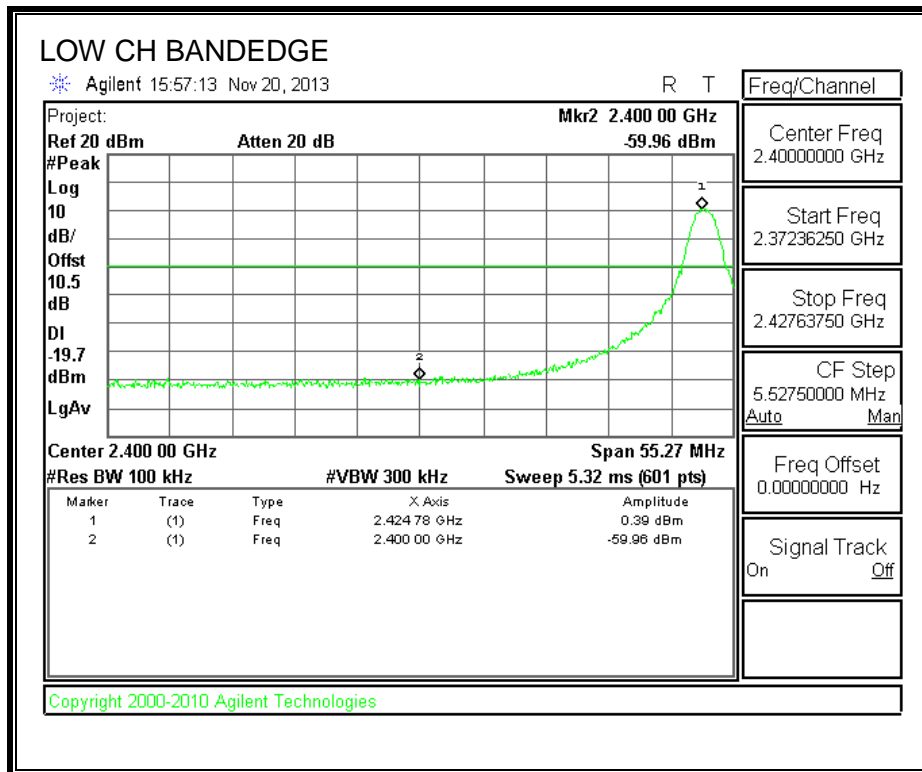
TEST PROCEDURE

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

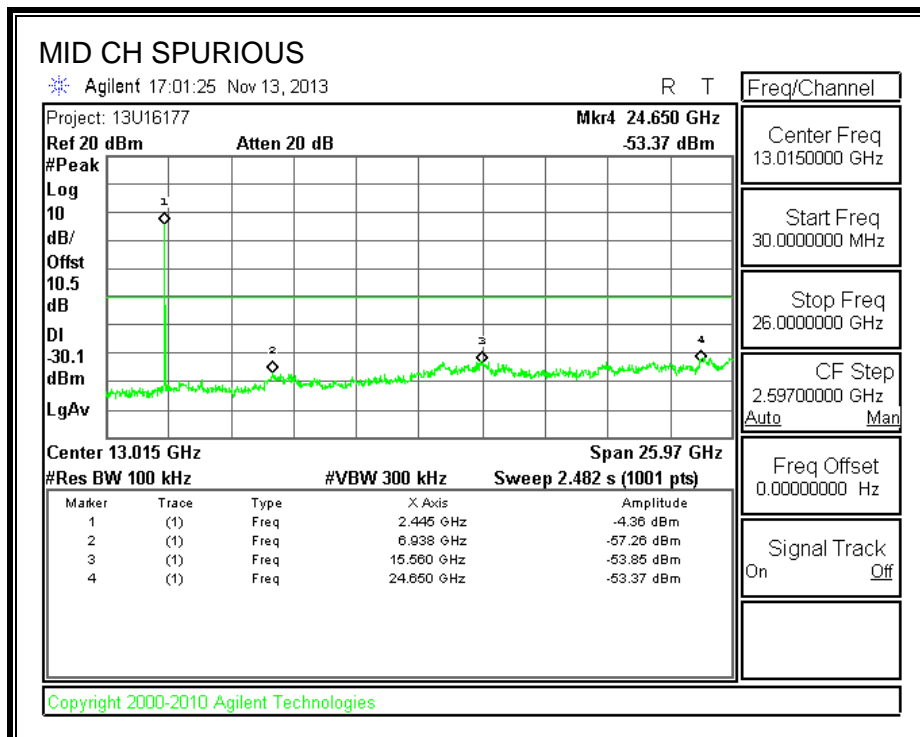
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

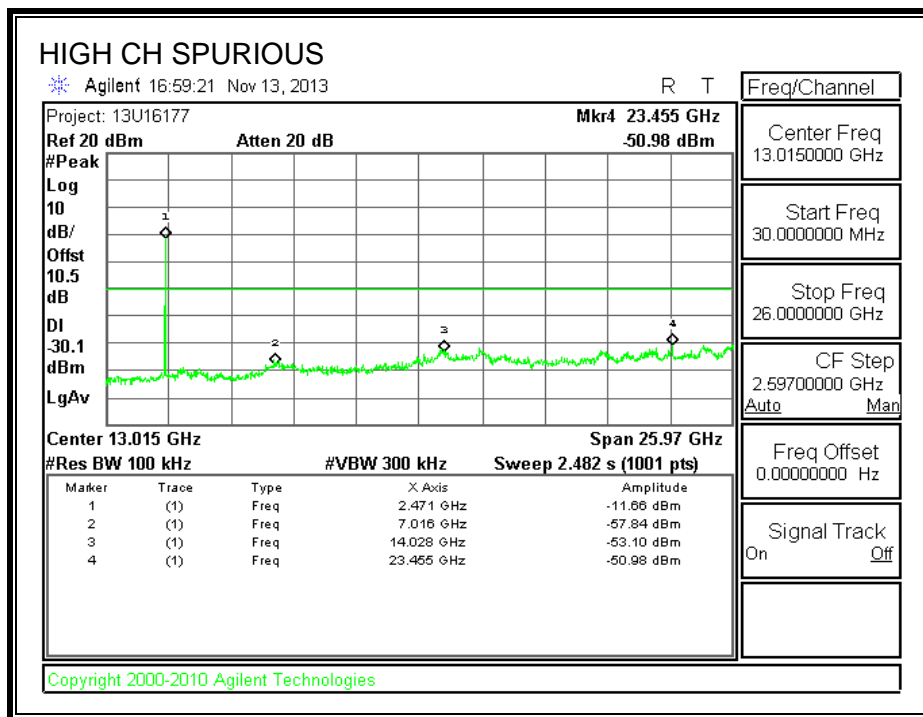
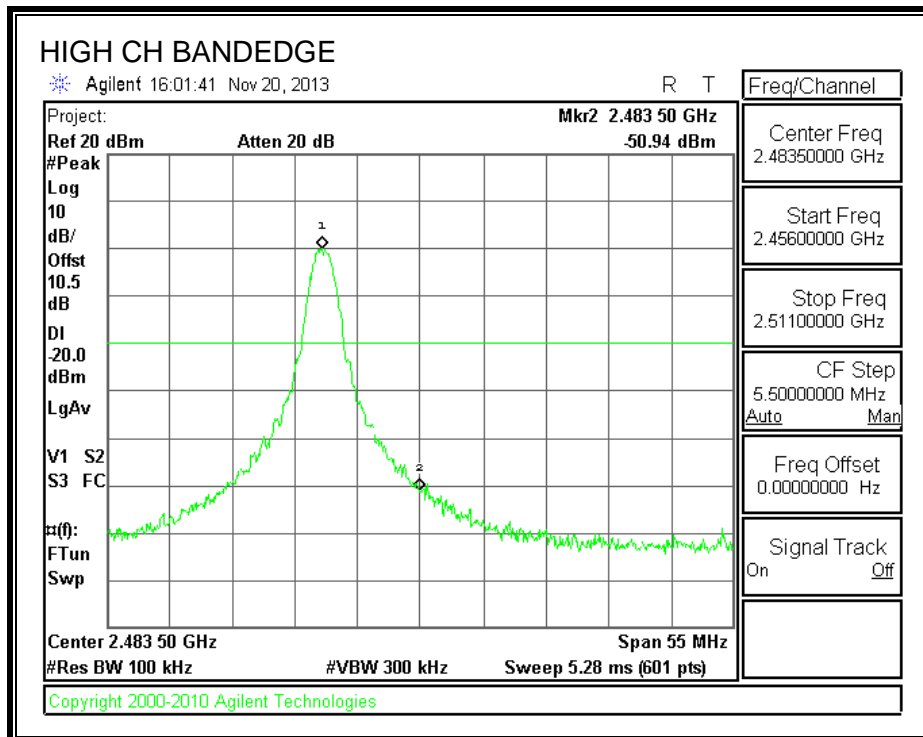
SPURIOUS EMISSIONS, LOW CHANNEL



SPURIOUS EMISSIONS, MID CHANNEL



SPURIOUS EMISSIONS, HIGH CHANNEL



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10-2009. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

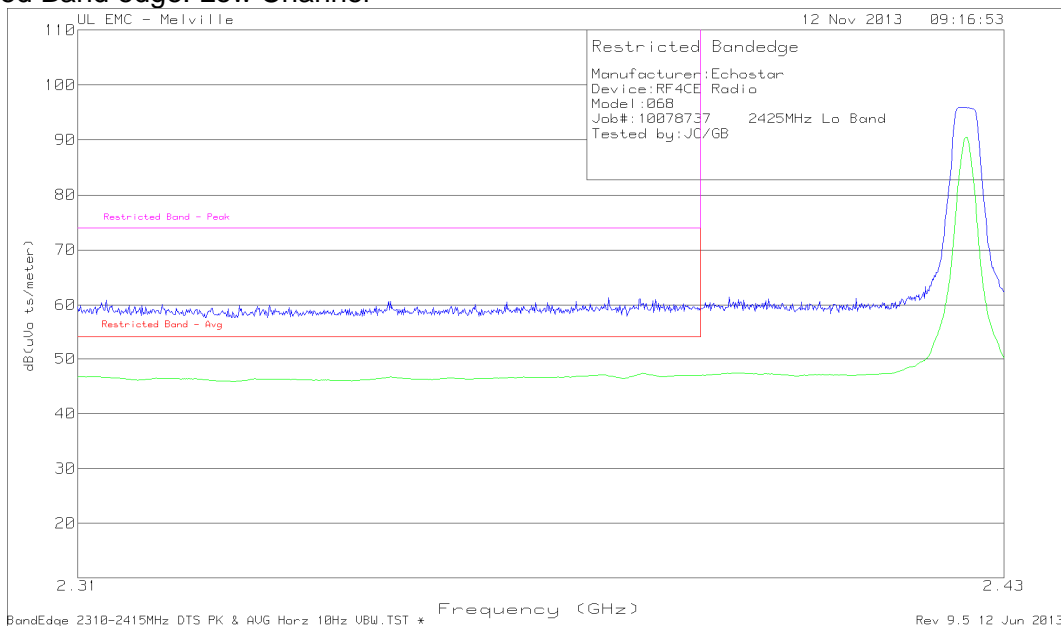
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

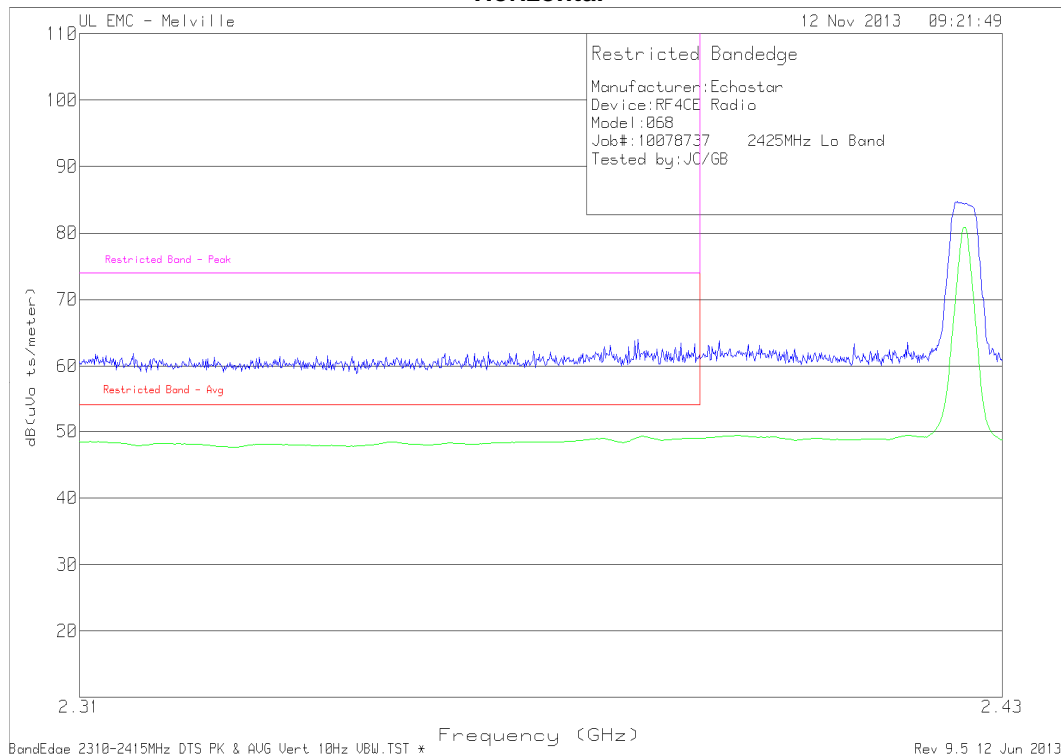
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

8.1.1 TRANSMITTER ABOVE 1 GHz

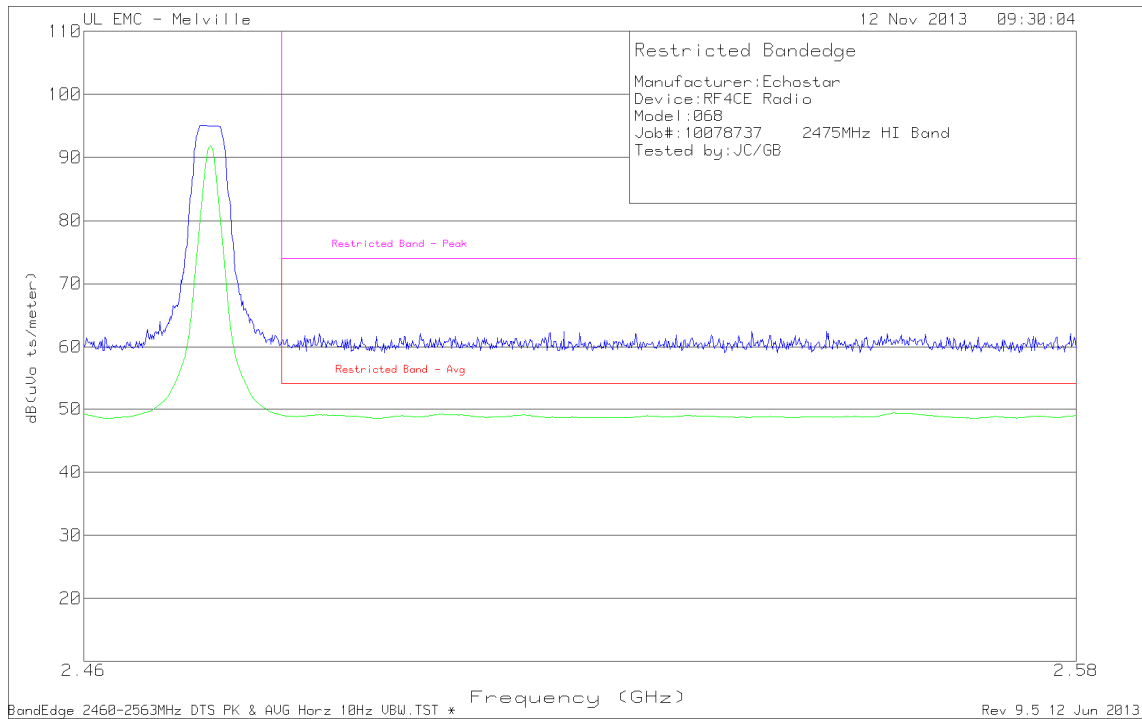
Radiated Band edge: Low Channel



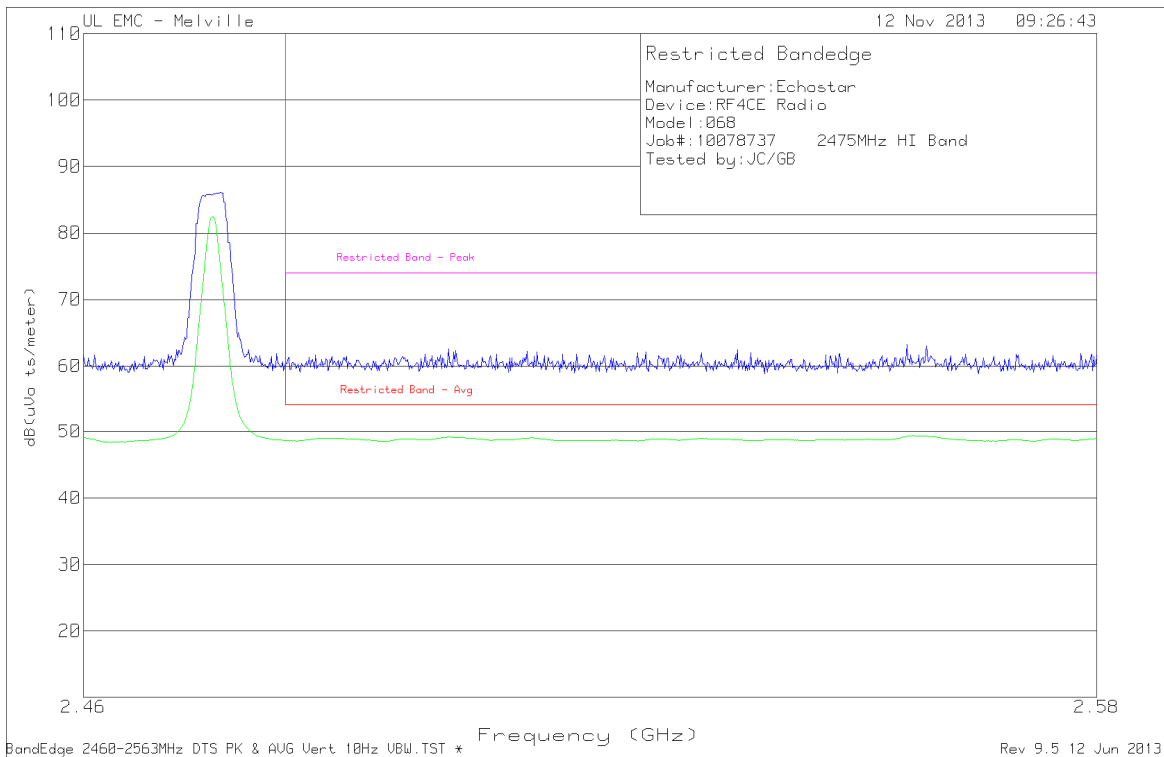
Horizontal



Vertical

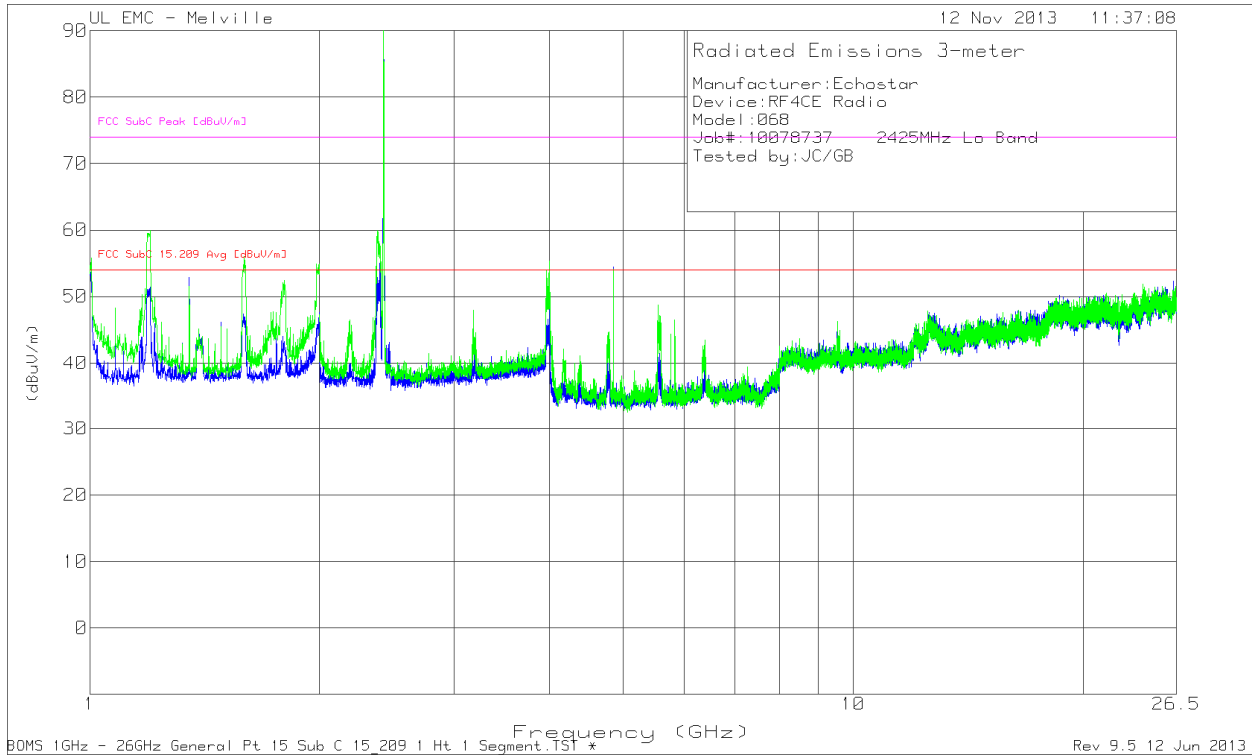


Horizontal



Vertical

Low Channel



HORIZONTAL/VERTICAL DATA

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2425MHz Lo Band												
Tested by:JC/GB												
Horizontal 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	79.25	PK	19.3	-44.19	54.36	-	-	74	-19.64	0-360	100	H
1.2	75.8	PK	19.8	-44.2	51.4	-	-	74	-22.6	0-360	100	H
1.35	76.45	PK	20.6	-44.13	52.92	-	-	74	-21.08	0-360	100	H
Horizontal 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.401	75.95	PK	21.1	-42.64	54.41	-	-	74	-19.59	0-360	100	H
3.997	67.38	PK	22.9	-41.51	48.77	-	-	74	-25.23	0-360	100	H
Horizontal 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.849	79.28	PK	27.1	-51.96	54.42	-	-	74	-19.58	0-360	100	H
Horizontal 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
26.2569	61.81	PK	41.1	-50.64	52.27	-	-	74	-21.73	0-360	100	H
PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2425MHz Lo Band												
Tested by:JC/GB												

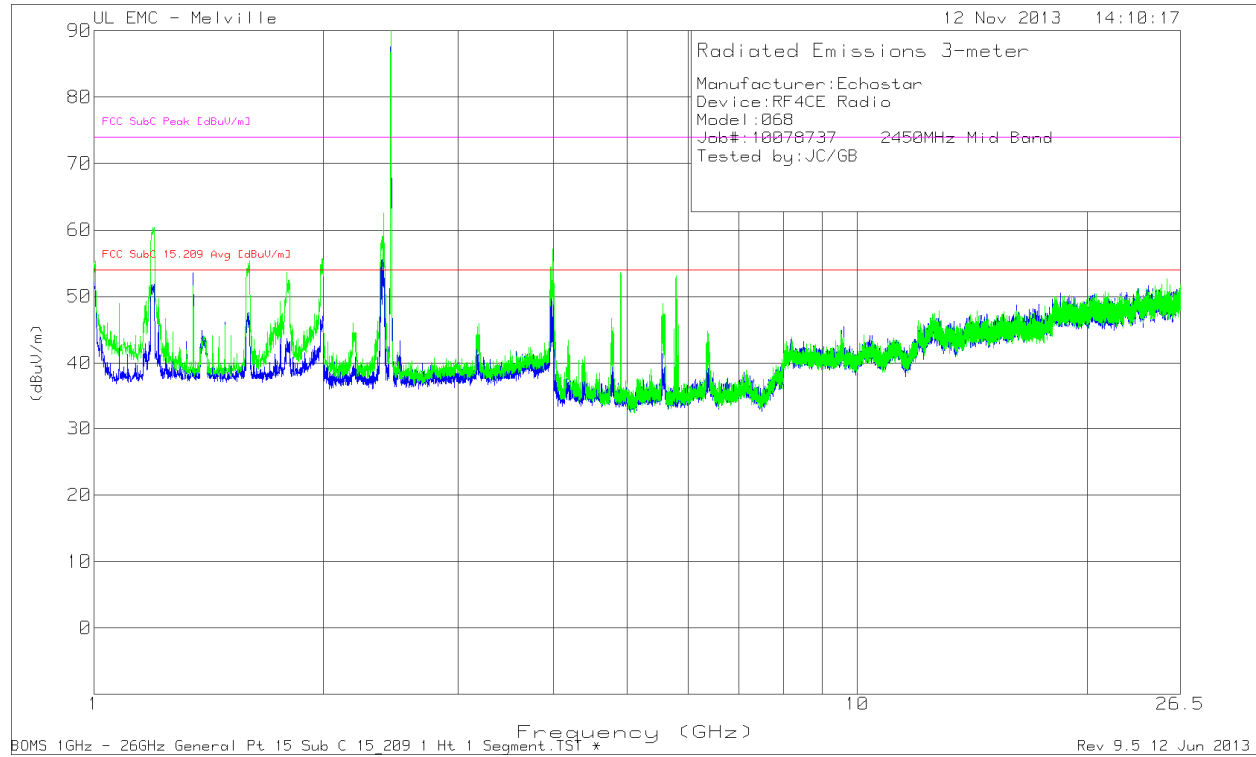
Vertical 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.005	80.99	PK	19.3	-44.47	55.82	-	-	74	-18.18	0-360	100	V
1.195	84.02	PK	19.8	-44.32	59.5	-	-	74	-14.5	0-360	100	V
1.35	75.06	PK	20.6	-44.13	51.53	-	-	74	-22.47	0-360	100	V
1.594	78.82	PK	21.2	-43.99	56.03	-	-	74	-17.97	0-360	100	V
1.797	75.14	PK	21	-43.7	52.44	-	-	74	-21.56	0-360	100	V
1.989	75.48	PK	22.1	-43.26	54.32	-	-	74	-19.68	0-360	100	V
Vertical 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
3.177	67.56	PK	22.1	-41.72	47.94	-	-	74	-26.06	0-360	100	V
3.995	70.76	PK	22.9	-41.55	52.11	-	-	74	-21.89	0-360	100	V
Vertical 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
5.551	73.13	PK	27.3	-51.73	48.7	-	-	74	-25.3	0-360	100	V
5.763	68.59	PK	27.6	-51.87	44.32	-	-	74	-29.68	0-360	100	V
5.838	70	PK	27.7	-51.23	46.47	-	-	74	-27.53	0-360	100	V
Vertical 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
26.4286	61.75	PK	41.1	-51.27	51.58	-	-	74	-22.42	0-360	100	V

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2425MHz Lo Band												
Tested by:JC/GB												
Horizontal 1 - 2GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	61.71	Avg	19.3	-44.19	36.82	54	-17.18	-	-	228	174	H
1.1999	60.31	Avg	19.8	-44.2	35.91	54	-18.09	-	-	243	306	H
1.35	69.54	Avg	20.6	-44.13	46.01	54	-7.99	-	-	276	263	H
Horizontal 2 - 4GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.3943	52.87	Avg	21.1	-42.68	31.29	54	-22.71	-	-	308	277	H
3.9955	48.97	Avg	22.9	-41.54	30.33	54	-23.67	-	-	118	324	H
Horizontal 4 - 8GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.8493	67.89	Avg	27.1	-51.95	43.04	54	-10.96	-	-	349	394	H
Horizontal 18 - 26.5GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
26.261	47.09	Avg	41.1	-50.14	38.05	54	-15.95	-	-	152	117	H
Vertical 1 - 2GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	61.9	Avg	19.3	-44.19	37.01	54	-16.99	-	-	218	148	V
1.2	72.93	Avg	19.8	-44.2	48.53	54	-5.47	-	-	315	287	V
1.35	68.89	Avg	20.6	-44.13	45.36	54	-8.64	-	-	177	190	V
PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2425MHz Lo Band												
Tested by:JC/GB												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.5931	56.72	Avg	21.2	-43.93	33.99	54	-20.01	-	-	354	259	V
1.7922	55.43	Avg	21	-43.78	32.65	54	-21.35	-	-	303	329	V
1.989	55.02	Avg	22.1	-43.26	33.86	54	-20.14	-	-	115	183	V
Vertical 2 - 4GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
3.177	49.07	Avg	22.1	-41.72	29.45	54	-24.55	-	-	0	164	V
3.9932	51.56	Avg	22.9	-41.51	32.95	54	-21.05	-	-	349	280	V
Vertical 4 - 8GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
5.551	50.04	Avg	27.3	-51.73	25.61	54	-28.39	-	-	360	308	V
5.7634	47.13	Avg	27.6	-51.87	22.86	54	-31.14	-	-	241	177	V
5.838	47.08	Avg	27.7	-51.23	23.55	54	-30.45	-	-	44	369	V
Vertical 18 - 26.5GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
26.4286	48.02	Avg	41.1	-51.27	37.85	54	-16.15	-	-	348	234	V
PK - Peak detector												
Av - Average detector												

Mid Channel



HORIZONTAL/VERTICAL DATA

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2450MHz Mid Band												
Tested by: JC/GB												
Trace Markers												
Horizontal 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.001	77.14	PK	19.3	-44.3	52.14	-	-	74	-21.86	0-360	100	H
1.2	76.26	PK	19.8	-44.2	51.86	-	-	74	-22.14	0-360	100	H
1.35	77.07	PK	20.6	-44.13	53.54	-	-	74	-20.46	0-360	100	H
Horizontal 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.399	77.3	PK	21.1	-42.62	55.78	-	-	74	-18.22	0-360	100	H
Horizontal 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.002	72.45	PK	28	-51.76	48.69	-	-	74	-25.31	0-360	100	H
4.901	76.91	PK	27.2	-51.99	52.12	-	-	74	-21.88	0-360	100	H
Horizontal 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
24.0335	60.94	PK	40.9	-50.18	51.66	-	-	74	-22.34	0-360	100	H

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device: RF4CE Radio												
Model: ID:068												
Job#:10078737 2450MHz Mid Band												
Tested by: JC/GB												
Trace Markers												

Vertical 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.004	80.53	PK	19.3	-44.52	55.31	-	-	74	-18.69	0-360	100	V
1.191	84.2	PK	19.8	-44.27	59.73	-	-	74	-14.27	0-360	100	V
1.35	75.21	PK	20.6	-44.13	51.68	-	-	74	-22.32	0-360	100	V
1.593	77.7	PK	21.2	-43.92	54.98	-	-	74	-19.02	0-360	100	V
1.79	76.52	PK	21	-43.86	53.66	-	-	74	-20.34	0-360	100	V
1.995	76.57	PK	22.2	-43.12	55.65	-	-	74	-18.35	0-360	100	V
Vertical 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.397	83.87	PK	21.3	-42.65	62.52	-	-	74	-11.48	0-360	100	V
3.988	75.59	PK	22.9	-41.31	57.18	-	-	74	-16.82	0-360	100	V
Vertical 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.898	78.2	PK	27.6	-52.11	53.69	-	-	74	-20.31	0-360	100	V
5.569	73.63	PK	27.3	-51.94	48.99	-	-	74	-25.01	0-360	100	V
5.786	76.96	PK	27.7	-51.54	53.12	-	-	74	-20.88	0-360	100	V
Vertical 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
25.4555	62.54	PK	40.9	-50.76	52.68	-	-	74	-21.32	0-360	100	V

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2450MHz Mid Band												
Tested by:JC/GB												
Radiated Emission Data												
Horizontal 1 - 2GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.0006	62.87	Avg	19.3	-44.26	37.91	54	-16.09	-	-	195	153	H
1.2	58.43	Avg	19.8	-44.2	34.03	54	-19.97	-	-	303	100	H
1.35	70.5	Avg	20.6	-44.13	46.97	54	-7.03	-	-	333	118	H
Horizontal 2 - 4GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.3876	55.45	Avg	21.1	-42.61	33.94	54	-20.06	-	-	14	197	H
Horizontal 4 - 8GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4	50.98	Avg	28	-51.75	27.23	54	-26.77	-	-	257	189	H
4.8991	63.81	Avg	27.2	-52.06	38.95	54	-15.05	-	-	39	224	H
Horizontal 18 - 26.5GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
24.0335	46.76	Avg	40.9	-50.18	37.48	54	-16.52	-	-	189	301	H

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device: RF4CE Radio												
Model: ID:068												
Job#:10078737 2450MHz Mid Band												
Tested by:JC/GB												
Radiated Emission Data												

Vertical 1 - 2GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	61.7	Avg	19.3	-44.19	36.81	54	-17.19	-	-	324	149	V
1.1944	62.91	Avg	19.8	-44.29	38.42	54	-15.58	-	-	324	149	V
1.35	71.11	Avg	20.6	-44.12	47.59	54	-6.41	-	-	171	198	V
1.593	56.01	Avg	21.2	-43.92	33.29	54	-20.71	-	-	229	116	V
1.79	56.27	Avg	21	-43.85	33.42	54	-20.58	-	-	0	193	V
2	69.04	Avg	22.2	-43.48	47.76	54	-6.24	-	-	293	125	V

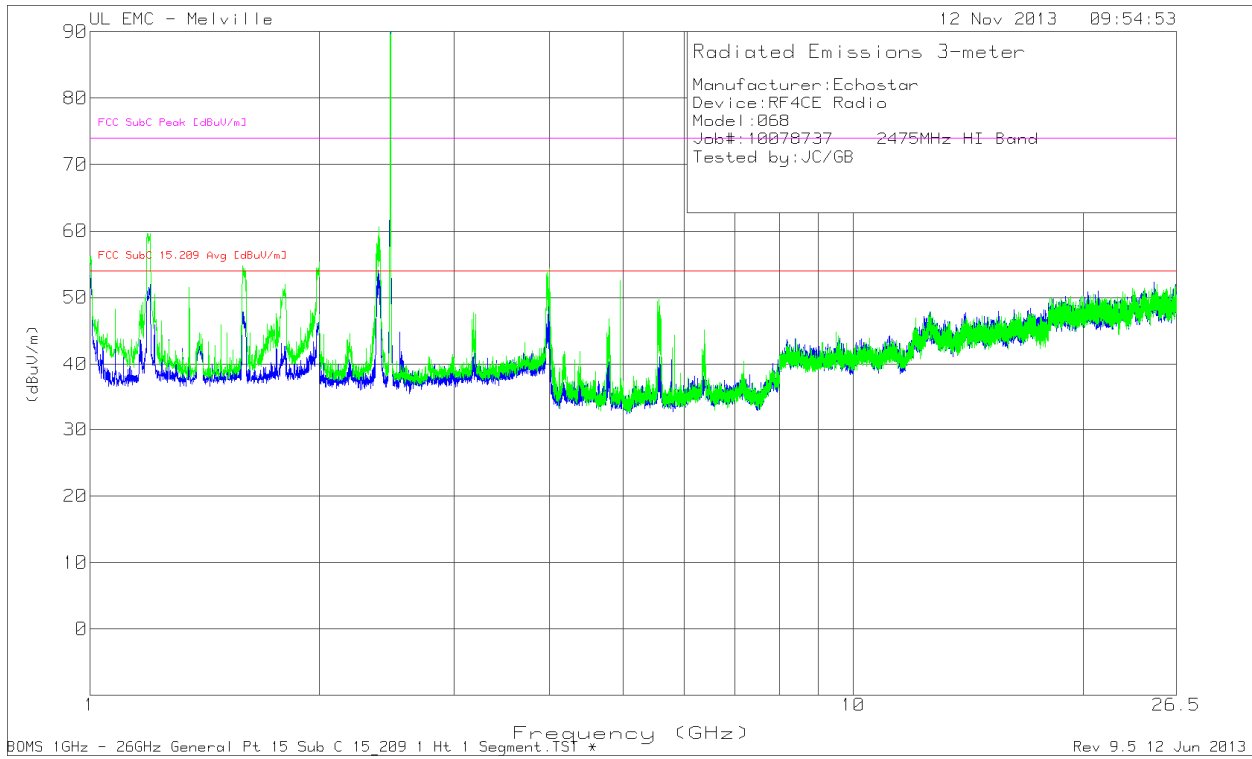
Vertical 2 - 4GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.3924	57.61	Avg	21.3	-42.67	36.24	54	-17.76	-	-	248	132	V
3.988	48.65	Avg	22.9	-41.31	30.24	54	-23.76	-	-	212	233	V

Vertical 4 - 8GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.989	48.02	Avg	27.3	-51.65	23.67	54	-30.33	-	-	319	242	V
5.569	49.54	Avg	27.3	-51.94	24.9	54	-29.1	-	-	269	340	V
5.786	47.08	Avg	27.7	-51.54	23.24	54	-30.76	-	-	225	167	V

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2450MHz Mid Band												
Tested by:JC/GB												
Radiated Emission Data												
Vertical 18 - 26.5GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
25.4555	47.2	Avg	40.9	-50.76	37.34	54	-16.66	-	-	82	100	V
PK - Peak detector												
Av - Average detector												

High Channel



Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2475MHz HI Band												
Tested by: JC/GB												
Trace Markers												
Horizontal 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.001	78.29	PK	19.3	-44.3	53.29	-	-	74	-20.71	0-360	100	H
1.2	76.34	PK	19.8	-44.2	51.94	-	-	74	-22.06	0-360	100	H
Horizontal 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.395	74.14	PK	21.1	-42.69	52.55	-	-	74	-21.45	0-360	100	H
3.989	67.87	PK	22.9	-41.38	49.39	-	-	74	-24.61	0-360	100	H
Horizontal 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.951	75.1	PK	27.3	-52.06	50.34	-	-	74	-23.66	0-360	100	H
Horizontal 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
24.7874	62.17	PK	40.9	-50.72	52.35	-	-	74	-21.65	0-360	100	H
26.4346	61.96	PK	41.2	-51.21	51.95	-	-	74	-22.05	0-360	100	H

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device: RF4CE Radio												
Model: ID:068												
Job#:10078737 2475MHz HI Band												
Tested by: JC/GB												

Vertical 1 - 2MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	81.18	PK	19.3	-44.19	56.29	-	-	74	-17.71	0-360	100	V
1.1905	84.03	PK	19.8	-44.22	59.61	-	-	74	-14.39	0-360	100	V
1.35	75.12	PK	20.6	-44.13	51.59	-	-	74	-22.41	0-360	100	V
1.587	77.75	PK	21.1	-44.06	54.79	-	-	74	-19.21	0-360	100	V
1.804	73.19	PK	21	-43.79	50.4	-	-	74	-23.6	0-360	100	V
1.999	76.41	PK	22.2	-43.3	55.31	-	-	74	-18.69	0-360	100	V
Vertical 2 - 4MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.39	81.98	PK	21.3	-42.6	60.68	-	-	74	-13.32	0-360	100	V
3.982	71.68	PK	22.8	-41.4	53.08	-	-	74	-20.92	0-360	100	V
Vertical 4 - 8MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4.951	77.25	PK	27.4	-52.06	52.59	-	-	74	-21.41	0-360	100	V
5.568	74.36	PK	27.3	-51.91	49.75	-	-	74	-24.25	0-360	100	V
Vertical 18 - 26.5MHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
24.9736	62.09	PK	41	-51.13	51.96	-	-	74	-22.04	0-360	100	V
26.3836	62.35	PK	41.1	-51.65	51.8	-	-	74	-22.2	0-360	100	V

PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2475MHz HI Band												
Tested by: JC/GB												
Radiated Emission Data												
Horizontal 1 - 2GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC Sub C Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1.0025	60.55	Avg	19.3	-44.27	35.58	54	-18.42	-	-	292	354	V
1.1988	61.26	Avg	19.8	-44.17	36.89	54	-17.11	-	-	10	195	V
1.2	72.37	Avg	19.8	-44.2	47.97	54	-6.03	-	-	303	251	V
1.3501	70.59	Avg	20.6	-44.13	47.06	54	-6.94	-	-	174	188	V
1.5916	53.58	Avg	21.2	-43.76	31.02	54	-22.98	-	-	308	392	V
1.7991	53.66	Avg	21	-43.8	30.86	54	-23.14	-	-	313	230	V
1	60.31	Avg	19.3	-44.19	35.42	54	-18.58	-	-	186	211	H
1.2	61.77	Avg	19.8	-44.2	37.37	54	-16.63	-	-	319	322	H
Horizontal 2 - 4GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.3901	57.32	Avg	21.1	-42.6	35.82	54	-18.18	-	-	92	280	V
3.985	51.81	Avg	22.9	-41.35	33.36	54	-20.64	-	-	3	287	V
2.3921	52.87	Avg	21.1	-42.66	31.31	54	-22.69	-	-	129	339	H
3.989	49.1	Avg	22.9	-41.38	30.62	54	-23.38	-	-	119	266	H
Horizontal 4 - 8GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
5.568	50.51	Avg	27.5	-51.91	26.1	54	-27.9	-	-	353	351	V
4.9507	65.87	Avg	27.3	-52.07	41.1	54	-12.9	-	-	17	262	H

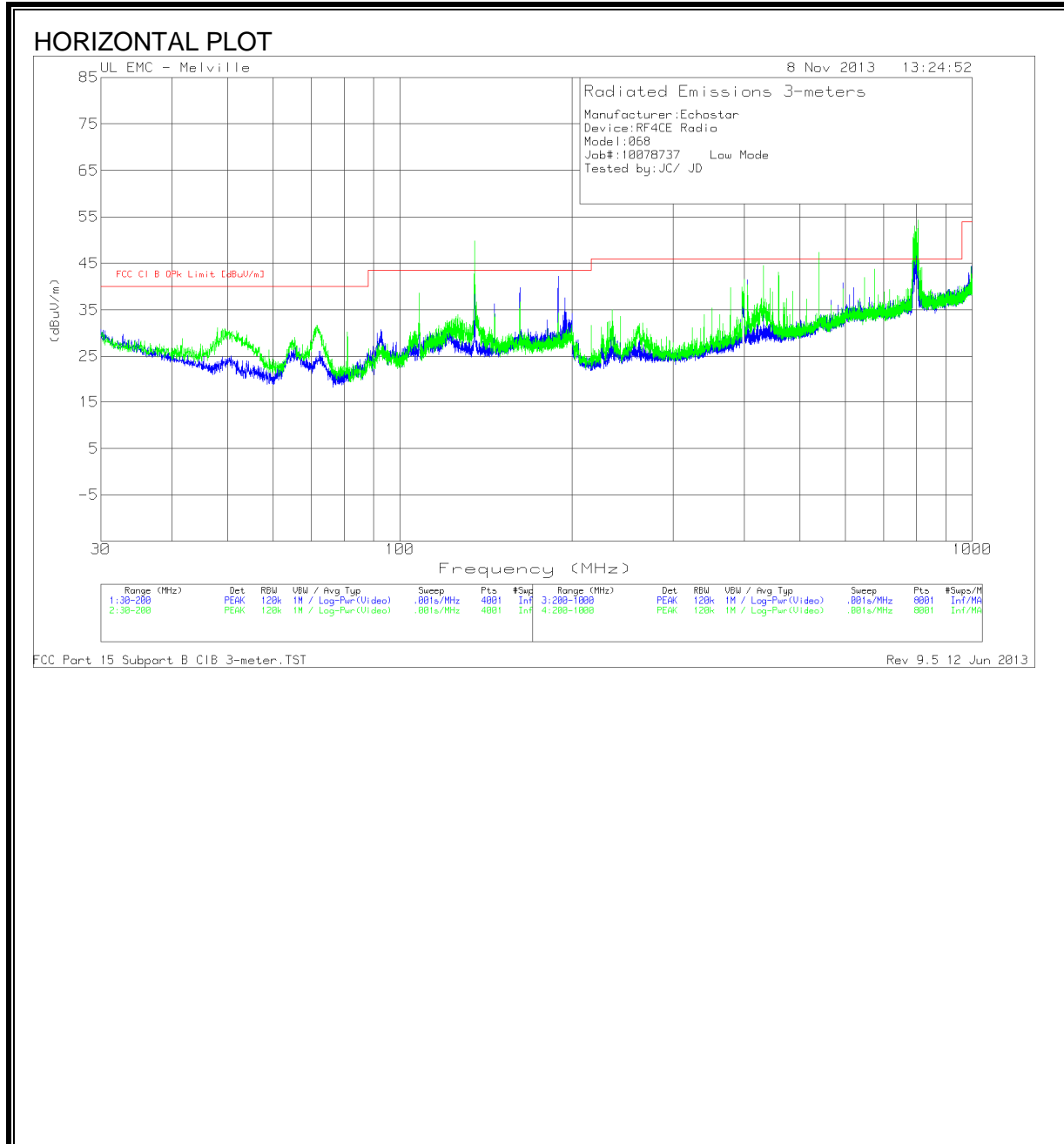
PK - Peak detector												
Av - Average detector												

Manufacturer: Echostar												
Device:RF4CE Radio												
Model: ID:068												
Job#:10078737 2475MHz HI Band												
Tested by: JC/GB												
Horizontal 18 - 26.5GHz												
Test Frequency (GHz)	Meter Reading (dBuV)	Detector	AF-8947 [dB/m]	BOMS Factor (dB)	Corrected Reading (dBuV/m)	FCC SubC 15.209 Avg [dBuV/m]	Margin (dB)	FCC SubC Peak [dBuV/m]	PK Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
24.9736	47.3	Avg	40.9	-51.12	37.08	54	-16.92	-	-	188	379	V
26.3909	48.42	Avg	41.1	-51.32	38.2	54	-15.8	-	-	41	116	V
24.787	47.06	Avg	40.9	-50.73	37.23	54	-16.77	-	-	101	399	H
26.4346	48.45	Avg	41.2	-51.21	38.44	54	-15.56	-	-	59	135	H

PK - Peak detector												
Av - Average detector												

8.1.2 WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL/VERTICAL)



HORIZONTAL/ VERTICAL DATA

Radiated Emissions

Manufacturer: Echostar										
Device:RF4CE Radio										
Model: ID:068										
Job#:10078737 Low Mode										
Tested by:JC/ JD										
Radiated Emission Data										
Horizontal 30 - 200MHz										
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	Corrected Reading (dBuV/m)	FCC Cl B QPk Limit [dBuV/m]	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
135.0645	19.29	QP	14.1	0.6	33.99	43.5	-9.51	91	221	H
162.0513	20.12	QP	14.9	0.6	35.62	43.5	-7.88	329	286	H
189.035	20.96	QP	15.6	0.8	37.36	43.5	-6.14	155	187	H
192.1313	4.6	QP	15.6	0.7	20.9	43.5	-22.6	126	208	H
Vertical 30 - 200MHz										
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	Corrected Reading (dBuV/m)	FCC Cl B QPk Limit [dBuV/m]	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
108.0075	25.33	QP	12.1	0.4	37.83	43.5	-5.67	283	100	V
134.9838	19.13	QP	14.1	0.6	33.83	43.5	-9.67	287	119	V
PK - Peak detector										
QP - Quasi-Peak detector										
PK - Peak detector										
QP - Quasi-Peak detector										

Manufacturer: Echostar									
Device:RF4CE Radio									
Model: ID:068									
Job#:10078737 Low Mode									
Tested by:JC/ JD									

Frequency (MHz)	Meter Reading (dBuV)	Detector	AF-67 [dB/m]	GL-3M [dB]	Corrected Reading (dBuV/m)	FCC Cl B QPk Limit [dBuV/m]	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
404.9513	16.09	QP	15.7	1.4	33.19	46	-12.81	15	252	H
594.0038	17.87	QP	19.5	1.6	38.97	46	-7.03	325	166	H
621	3.06	QP	19.9	1.6	24.56	46	-21.44	145	361	H
796.1563	18.19	QP	21.2	1.9	41.29	46	-4.71	220	195	H
789.2	18.89	QP	21	2	41.89	46	-4.11	209	123	H
796.185	19.83	QP	21.2	1.9	42.93	46	-3.07	30	374	H
796.6025	19.39	QP	21.3	1.9	42.59	46	-3.41	6	137	H
803.9375	16.22	QP	21.7	2	39.92	46	-6.08	32	253	H
798.7238	18.4	QP	21.3	2.1	41.8	46	-4.2	209	146	H
799.3386	21.66	QP	21.4	2.1	45.16	46	-0.84	0	131	H

PK - Peak detector									
QP - Quasi-Peak detector									

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.10-2009

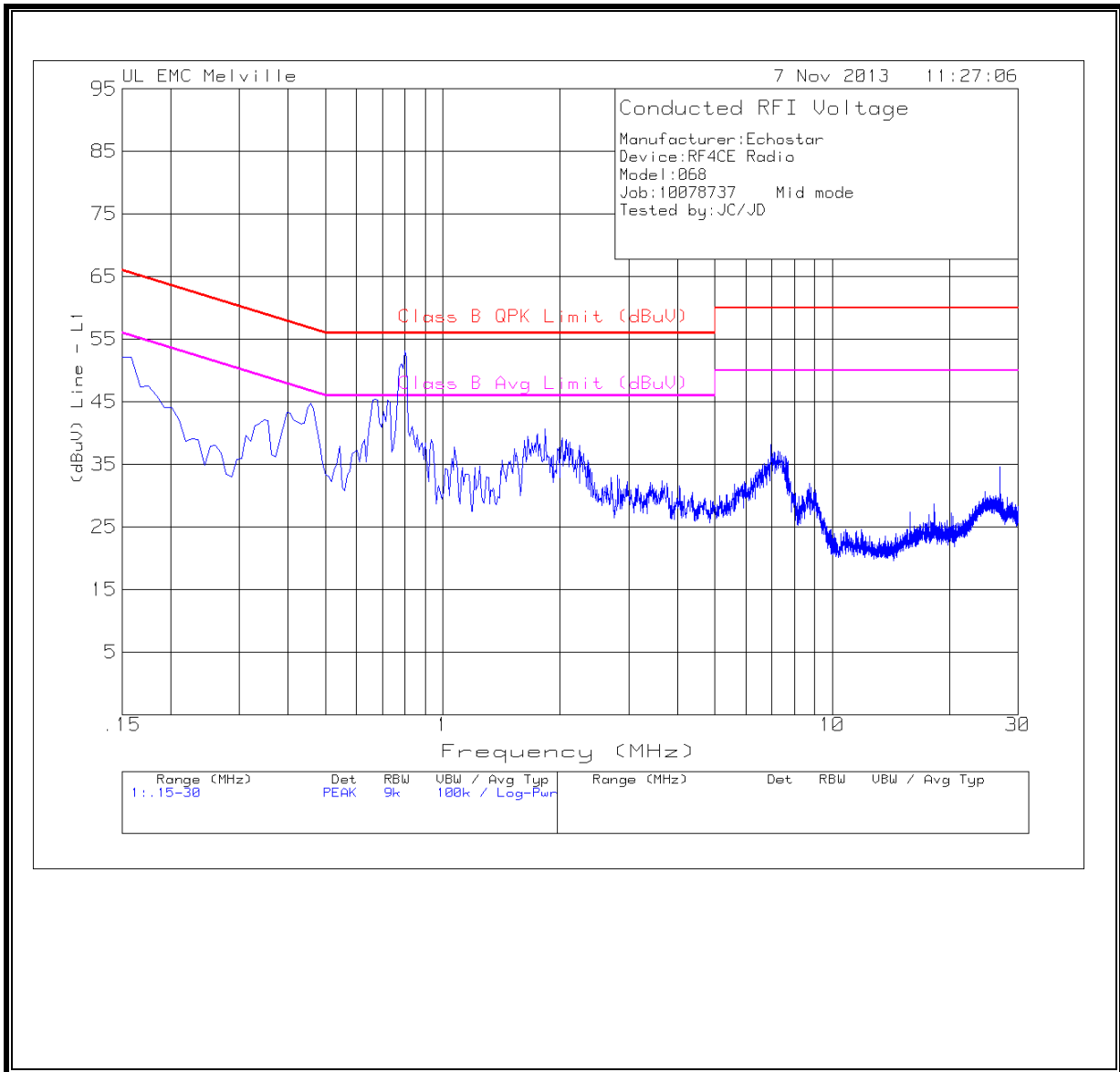
RESULTS

6 WORST EMISSIONS

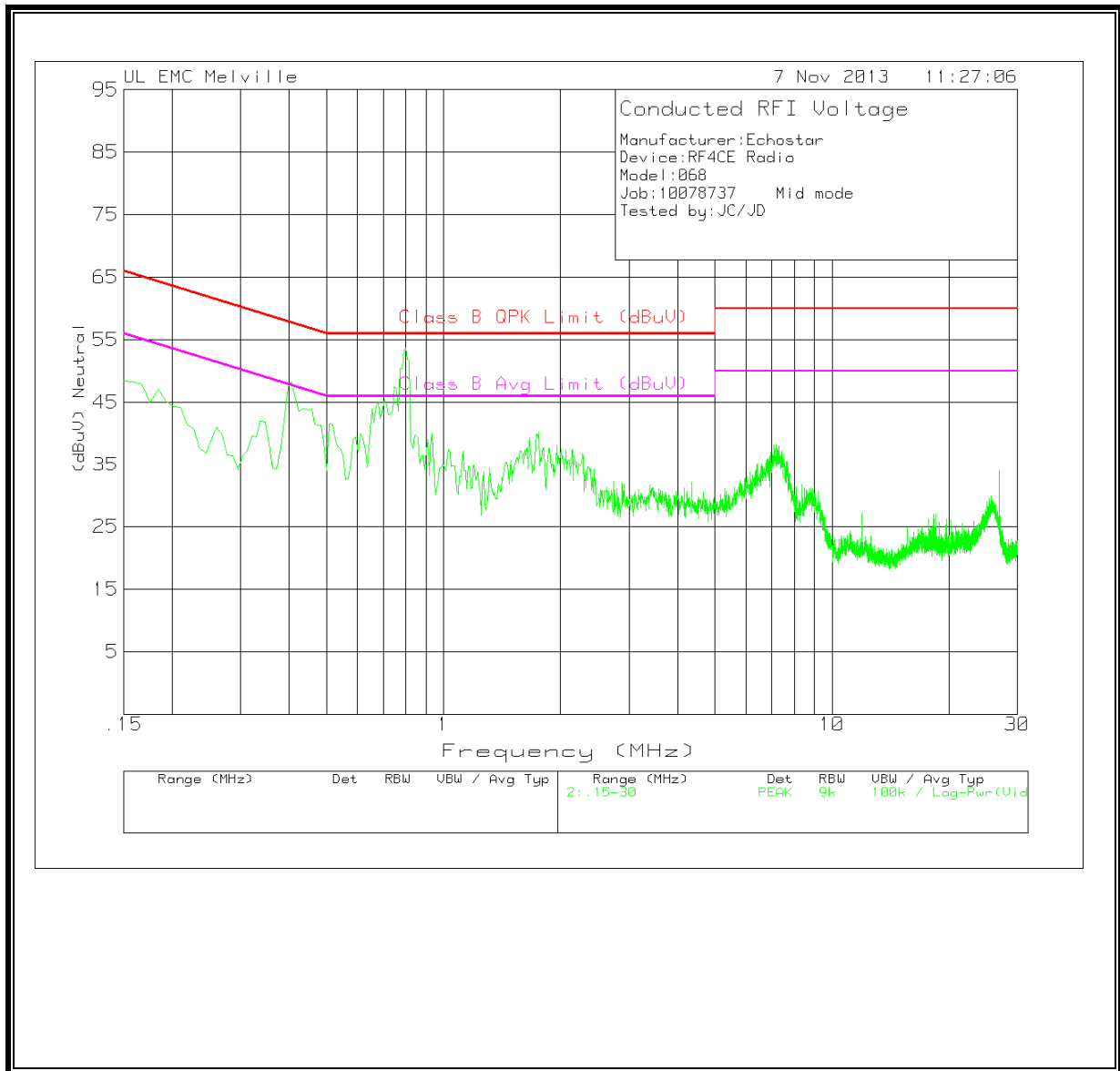
Manufacturer: Echostar								
Device:RF4CE Radio								
Model: ID:068								
Job:10078737 Mid mode								
Tested by: JC/JD								
Trace Markers								
Line - L1 .15 - 30MHz								
Test Frequency (MHz)	Meter Reading(dBuV)	Detector	Line 1 G/L (dB)	Corrected Reading (dBuV)	Class B QPK Limit (dBuV)	Margin (dB)	Class B Avg Limit (dBuV)	Margin (dB)
0.79836	43.22	PK	10	53.22	56	-2.78	-	-
0.80689	42.09	PK	10	52.09	56	-3.91	-	-
0.7813	41.12	PK	10	51.12	56	-4.88	-	-
0.77276	40.32	PK	10	50.32	56	-5.68	-	-
Neutral .15 - 30MHz								
Test Frequency (MHz)	Meter Reading(dBuV)	Detector	Line 2 G/L (dB)	Corrected Reading (dBuV)	Class B QPK Limit (dBuV)	Margin (dB)	Class B Avg Limit (dBuV)	Margin (dB)
0.40593	38.36	PK	10	48.36	57.73	-9.37	-	-
0.77276	40.34	PK	10.1	50.44	56	-5.56	-	-
0.79836	43.65	PK	10.1	53.75	56	-2.25	-	-
0.78983	43.37	PK	10.1	53.47	56	-2.53	-	-
0.81542	41.57	PK	10.1	51.67	56	-4.33	-	-
0.74717	37.41	PK	10.1	47.51	56	-8.49	-	-

Manufacturer: Echostar								
Device:RF4CE Radio								
Model: ID:068								
Job:10078737 Mid mode								
Tested by: JC/JD								
Average Data								
Line - L1 .15 - 30MHz								
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Line 1 G/L (dB)	Corrected Reading (dBuV)	Class B QPK Limit (dBuV)	Margin (dB)	Class B Avg Limit (dBuV)	Margin (dB)
0.15246	24.1	Av	10	34.1	65.86	-31.76	55.86	-21.76
0.15388	24.61	Av	10	34.61	65.79	-31.18	55.79	-21.18
0.17336	27.26	Av	10	37.26	64.8	-27.54	54.8	-17.54
0.34776	21.43	Av	10	31.43	59.02	-27.59	49.02	-17.59
0.40197	25.54	Av	10	35.54	57.81	-22.27	47.81	-12.27
0.72306	19.85	Av	10	29.85	56	-26.15	46	-16.15
0.85651	15.36	Av	10	25.36	56	-30.64	46	-20.64
Neutral .15 - 30MHz								
Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Line 2 G/L (dB)	Corrected Reading (dBuV)	Class B QPK Limit (dBuV)	Margin (dB)	Class B Avg Limit (dBuV)	Margin (dB)
0.15145	23.53	Av	10.1	33.63	65.92	-32.29	55.92	-22.29
0.16383	24.86	Av	10	34.86	65.27	-30.41	55.27	-20.41
0.3489	21.26	Av	10	31.26	58.99	-27.73	48.99	-17.73
0.40063	25.81	Av	10	35.81	57.84	-22.03	47.84	-12.03
0.67099	21.63	Av	10.1	31.73	56	-24.27	46	-14.27
0.85685	17.01	Av	10.1	27.11	56	-28.89	46	-18.89
PK - Peak detector								
QP - Quasi-Peak detector								
Av - Average detector								

LINE 1 RESULTS

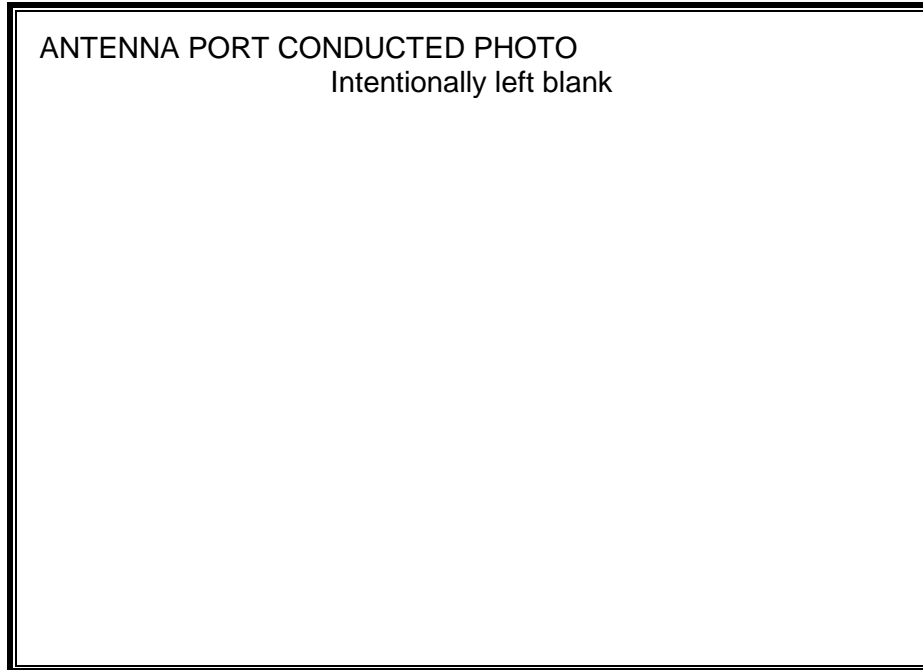


LINE 2 RESULTS

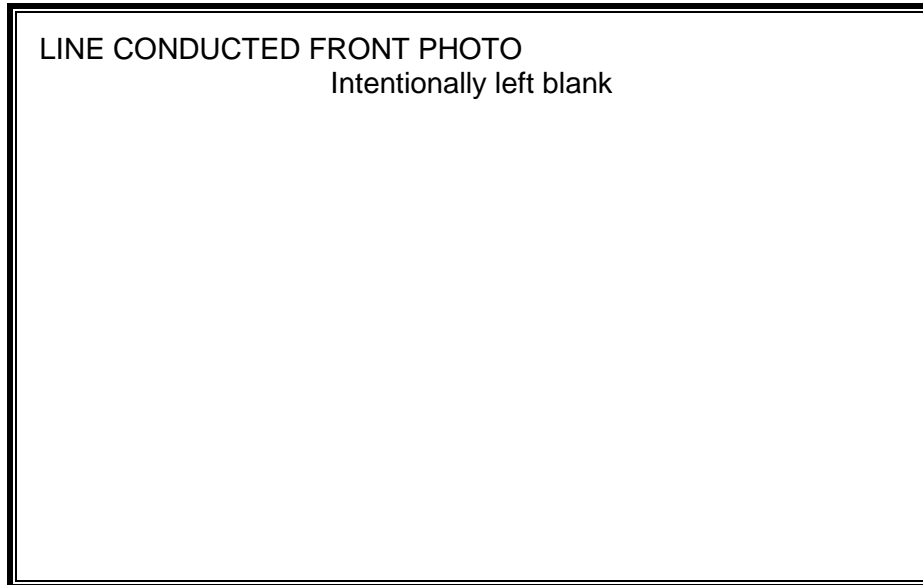


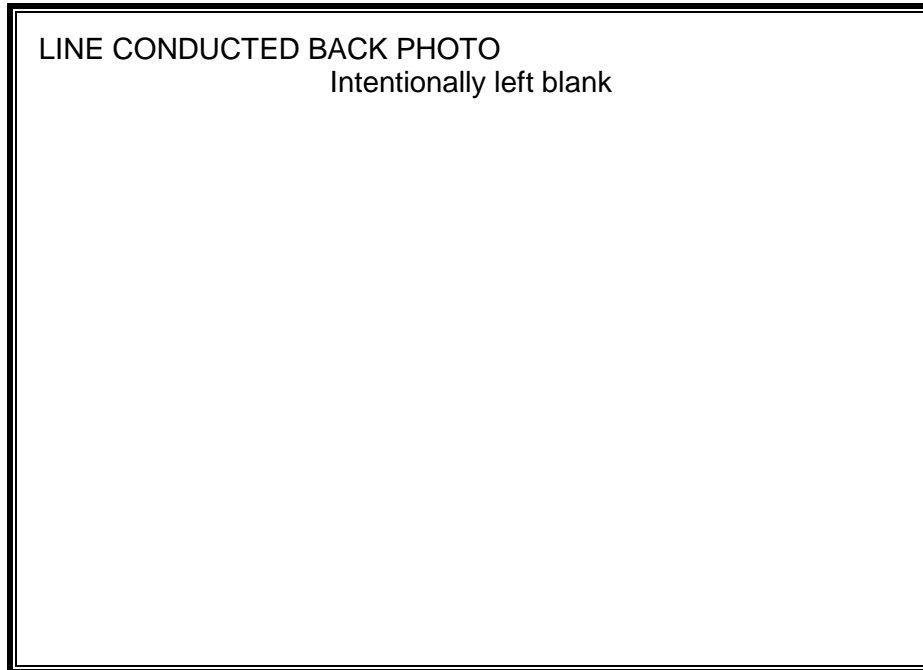
10. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

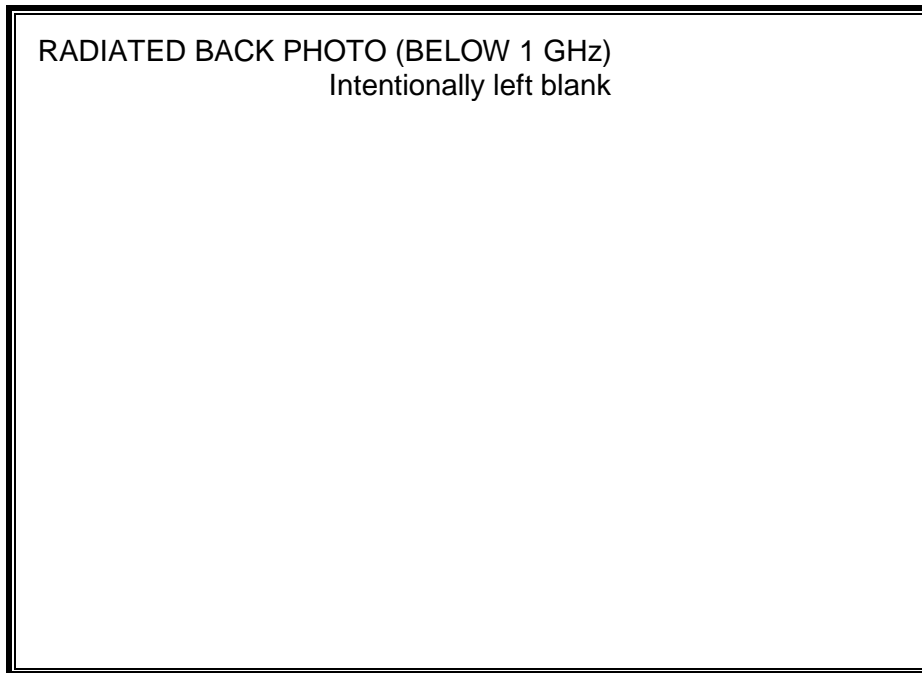
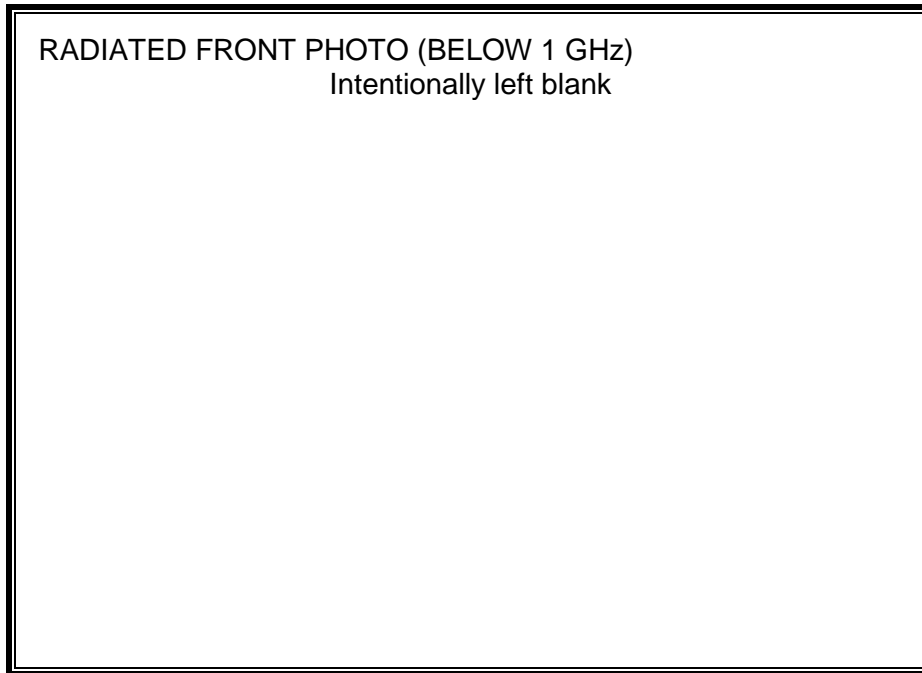


POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

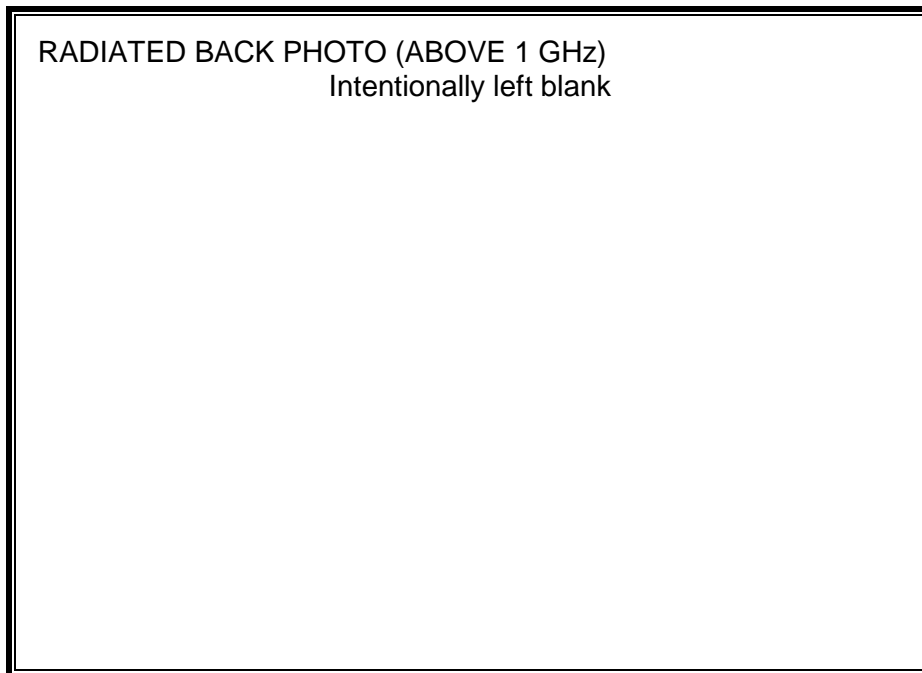
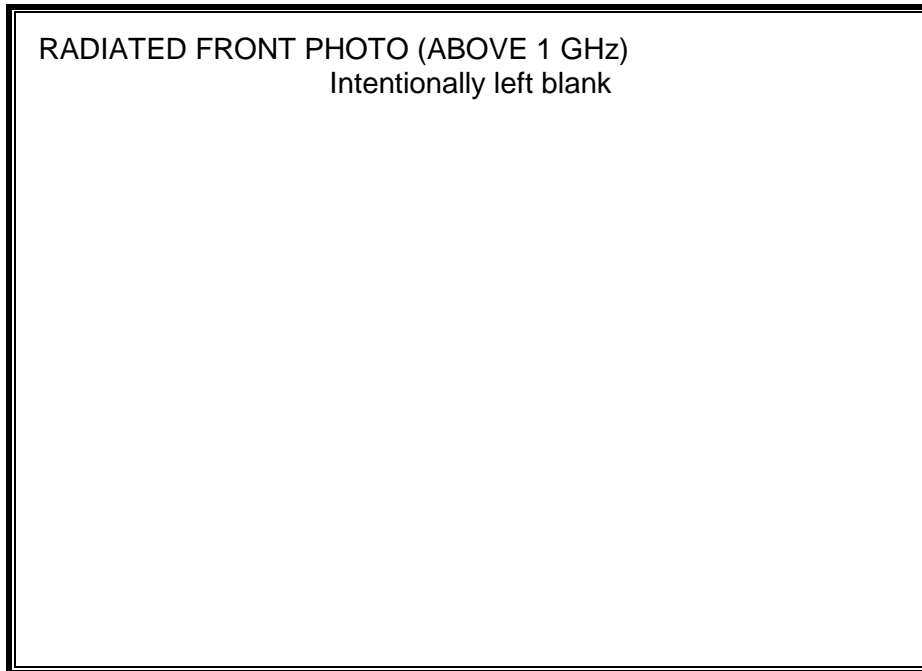




RADIATED RF MEASUREMENT SETUP (BELOW 1 GHz)



RADIATED RF MEASUREMENT SETUP (ABOVE 1 GHz)



END OF REPORT