



FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

SET TOP BOX 071 WITH 2.4 GHz TRANSCEIVER

MODEL NUMBER: ID:071 (XiP110CR)

FCC ID: DKN74Z

REPORT NUMBER: R10475492-RF

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ECHOSTAR TECHNOLOGIES LLC
90 INVERNESS CIRCLE EAST
ENGLEWOOD
CO, 80112, USA

EUT DESCRIPTION: SET TOP BOX 071 WITH 2.4 GHz TRANSCEIVER

MODEL: ID:071 (XiP110CR)

SERIAL NUMBER: SN – E4EXFZ02421K, E4EXFZ02422K

DATE TESTED: 2014-11-06 through 2014-11-22

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. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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

Approved & Released
For UL LLC By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, 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 12 Laboratory Dr., Research Triangle Park, NC 27709, USA.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2002460.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:

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

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	± 2.37 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.84 dB (10m)
Radiated Disturbance, 1 to 6 GHz	± 5.96 dB
Radiated Disturbance, 6 to 18 GHz	± 6.10 dB
Radiated Disturbance, 18 to 26 GHz	± 6.81 dB
Radiated Disturbance, 26 to 40 GHz	± 6.81 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The ID:071 is a set-top box that is intended to be connected to any secondary television in a consumer's home. Using a Home Network (MoCA) it will decode and output high definition TV2 programming from an Echostar client STB. The ID:071 uses an on board 802.15.4 2.4GHz RF4CE solution to interface to a remote. The EUT operates at 2425 MHz, 2450 MHz and 2475 MHz, only.

The radio is an onboard device, designed by EchoStar. The radio circuit contains a radio chip, RF4CE silicon solution from Texas Instruments and is TI's CC2533 IEEE 802.15.4 Transceiver BGA.

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	RF4CE (O-QPSK)	3.29	2.13

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was TI_Agency_Build_2010_2014.

The test utility software used during testing was D471_Agency.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, with and without the mounting stand plate (Note - with and without mounting plate stand is X, Y only. Z requires the mounting stand) and it was determined that the X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Note – The mounting stand made no significant difference in the measurements. Therefore, all measurements were made without the mounting stand. Additionally, different configurations were evaluated during the fundamental investigation to determine if populating the host's ports would yield more severe emissions (e.g. RCA ports, HDMI, etc). The worst-case configuration was determined to be no ports populated.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Power Supply - Used to power the ID: 071 device	Delta Electronics	ADP-18DW BA (EchoStar P/N 191202)	DZZD2AU732851	NA
Remote Control - Used to change the radio channel on the EUT	EchoStar Technolo	180552	NA	Not available

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC Inlet	Unshielded	-	Direct plug in power supply for EUT.
2	DC	1	DC	Unshielded	NA	Output of Direct plug-in power supply to EUT

Note – Different configurations were evaluated during the fundamental testing to determine if populating the host's ports would yield more severe emissions (e.g. RCA ports, HDMI, USB, etc.). The worst-case configuration was determined to be no ports populated.

TEST SETUP

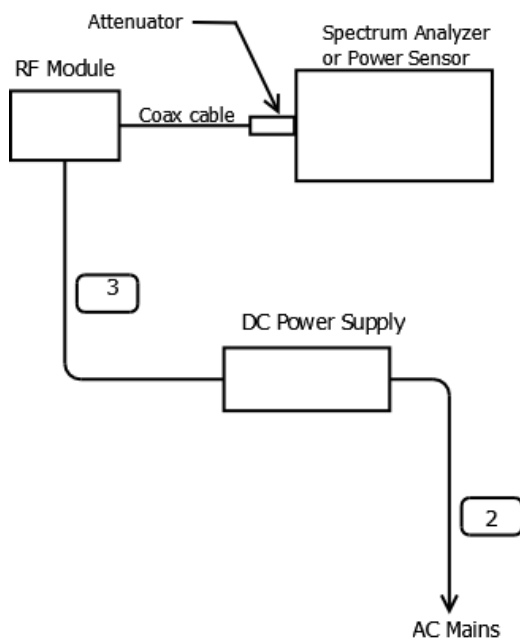
The EUT was setup as a table top device in the worst-case orientation. One unit was provided for Radiated Emissions and one unit was provided for Conducted Emissions.

SETUP DIAGRAM FOR TESTS

Radiated & Line Conducted Setup



Antenna Port Conducted Setup



6. TEST AND MEASUREMENT EQUIPMENT

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

Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
SA0016	Spectrum Analyzer	Agilent Technologies	N9030A	2014-09-03	2015-09-30
PAR005	Power Meter, DC to 40GHz	Rohde & Schwarz	NRVD	2014-09-03	2015-09-30
PAR006	Power Sensor, DC to 18GHz	Rohde & Schwarz	NRV-Z51	2014-09-03	2015-09-30
PSENSOR001	RF Power Meter Sensor Head	Rohde & Schwartz	NRP-Z81 (w/ NRP-Z3 USB adapter)	2014-09-03	2015-09-30
MM0150	Digital Multimeter, 4½ Digit (True RMS AC, AC+DC measurement)	Agilent	U1252A	2014-09-04	2016-09-30
MM0151	Digital Multimeter, 4½ Digit (True RMS AC, AC+DC measurement)	Agilent	U1252A	2014-09-04	2016-09-30
EC0214	Environmental Chamber	Thermotron	SE1200	2014-02-06	2015-02-28
HI0041	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2014-02-19	2015-02-28

Radiated Disturbance Emissions (E-field) – 1 to 26 GHz, Chamber A

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0062	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2014-07-22	2015-07-31
	18-40 GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2014-07-23	2015-07-31
	Gain-Loss Chains				
SAC_E_HORN	Gain-Loss string for horn antenna at 3m	Various	Various	2014-07-17	2015-07-31
	Receiver & Software				
SAR003	Spectrum Analyzer / Receiver	Rohde & Schwarz	ESIB40 (1088.7490.40)	2014-07-14	2015-07-31
SA0016	Spectrum Analyzer	Agilent	N9030A	2014-09-03	2015-09-30
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	RF Amp (>1GHz)				
AMP011	RF Amp, 1-20GHz	Miteq	AMF-6D-01002000-22-10P	2014-07-18	2015-07-31
AMP012	RF Amp, 18-40GHz	Miteq	JS44-18004000-33-8P	2014-07-18	2015-07-31
AMP013	RF Amp, 18-40GHz	Miteq	JS44-18004000-33-8P	2014-07-18	2015-07-31
BRF003	2.4GHz Band-reject Filter	Microtronics	BRM50702	2014-09-03	2015-09-30
	Additional Equipment used				
HI0034	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2014-02-19	2015-02-28

Radiated Disturbance Emissions (E-field) – 30 to 1000 MHz, Chamber C

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	30-1000 MHz Range				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2014-07-10	2015-07-31
	Gain-Loss Chains				
SAC_G (Hybrid)	Gain-Loss string for Hybrid antenna at 3m	Various	Various	2014-11-10	2015-11-30
	Receiver & Software				
SA0018	Spectrum Analyzer	Agilent	N9030A	2014-06-24	2015-06-30
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Additional Equipment used				
HI0034	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2014-02-19	2015-02-28

Conducted Disturbance Emissions - Voltage

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Equipment – Ground Plane E				
SA0015	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2014-09-03	2015-09-30
ATA509	Coaxial cable, 20 ft., BNC -male to BNC-male	UL	RG-223	2014-09-15	2015-07-31
HI0069	Temp/Humid/Pressure Meter	Cole-Parmer	99760-00	2014-06-27	2015-06-30
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
	Transient Limiter				
ATA508	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2014-09-03	2015-09-30
	LISN				
LISN002	LISN, 50-ohm/50-uH, 2-conductor, 50A	Fischer Custom Com.	FCC-LISN-50-50-2-02-550V	2014-09-04	2015-09-30

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

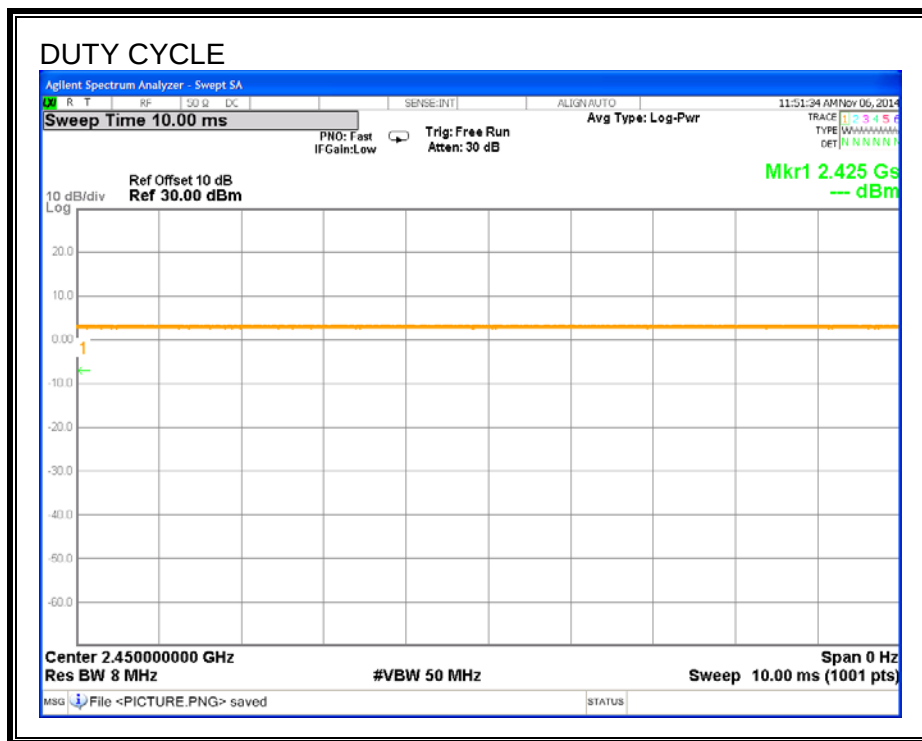
KDB 558074 Zero-Span Spectrum Analyzer Method.

7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.15.4 (RF4CE) MODE	100.000	100.000	1.000	100.00%	0.00	0.010

7.1. DUTY CYCLE PLOTS

2.4 GHz BAND



7.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r02, Section 8.1.

Output Power: KDB 558074 D01 v03r02, Section 9.1.1.

Power Spectral Density: KDB 558074 D01 v03r02, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r02, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r02, Section 12.1.

8. ANTENNA PORT TEST RESULTS

8.1. 802.15.4 (RF4CE) MODE IN THE 2.4 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

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

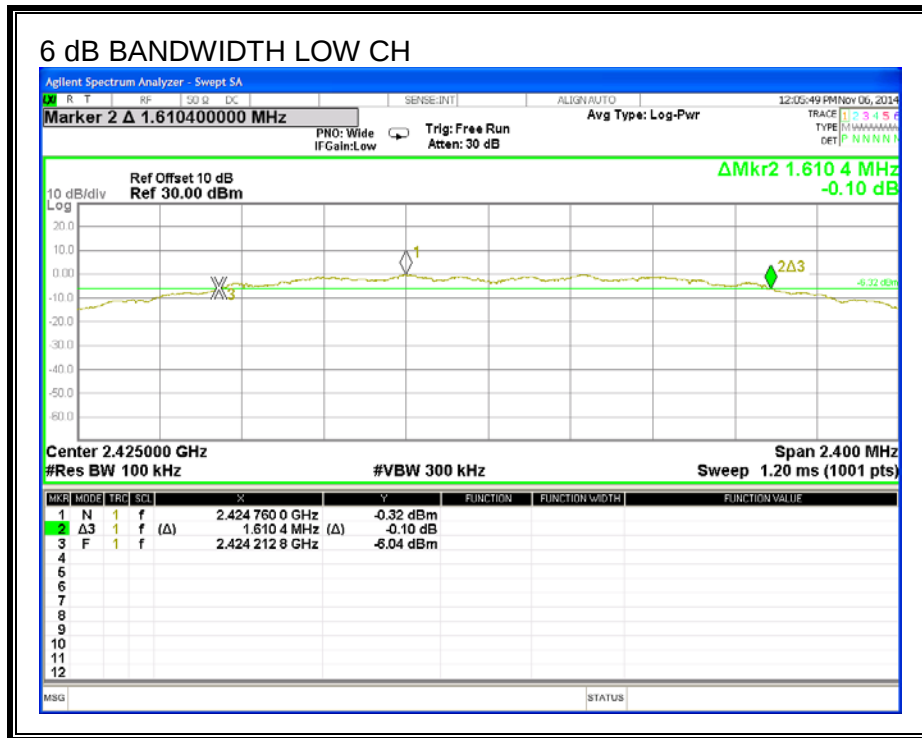
TEST PROCEDURE

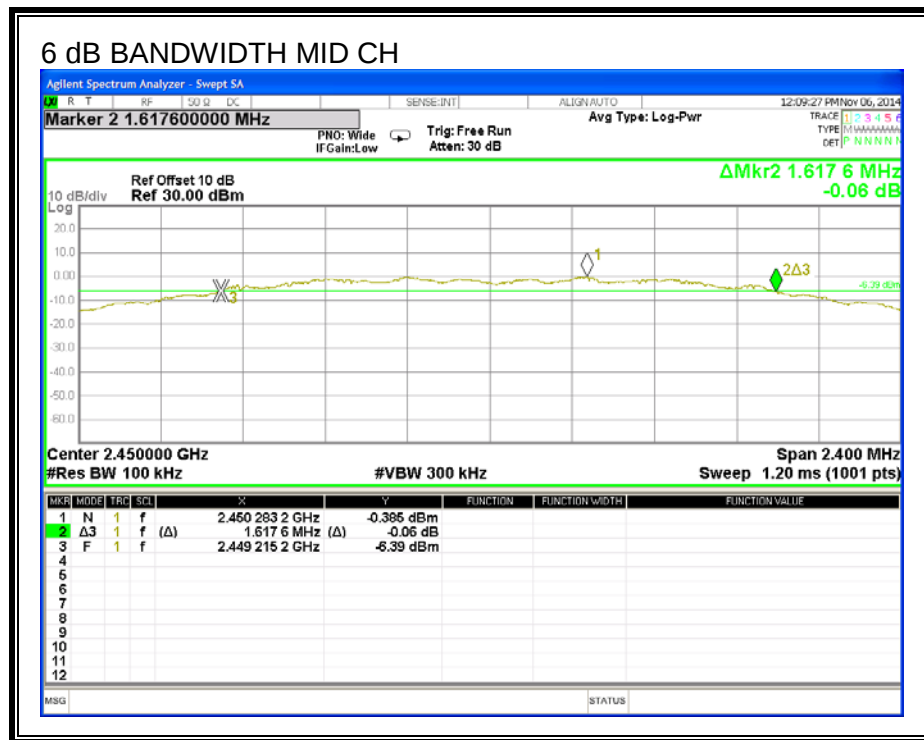
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

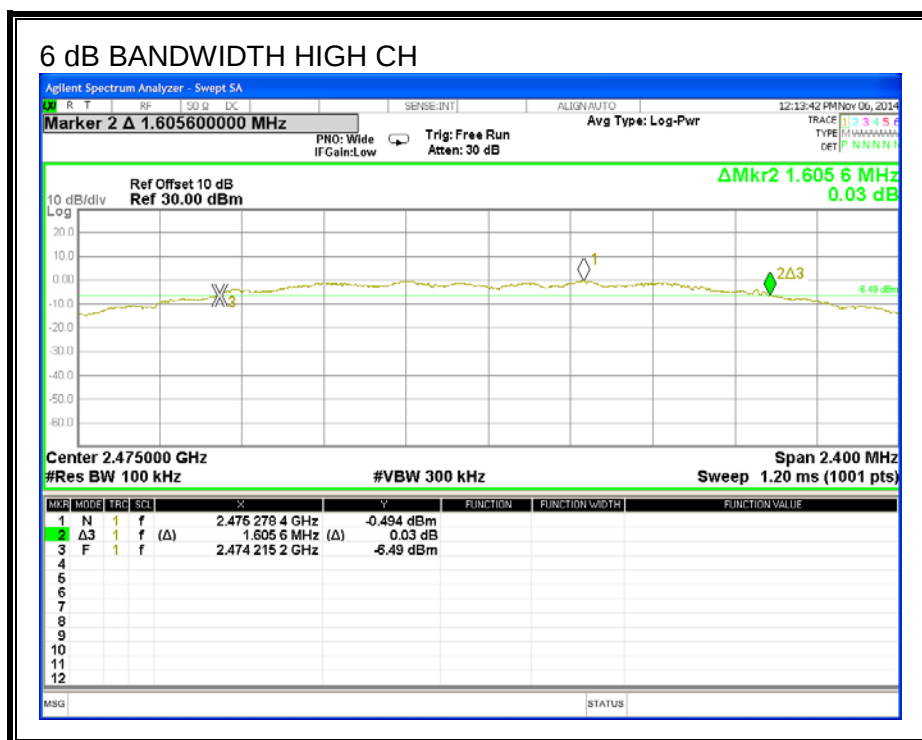
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2425	1.61	0.5
Middle	2450	1.62	0.5
High	2475	1.61	0.5

6 dB BANDWIDTH







8.1.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

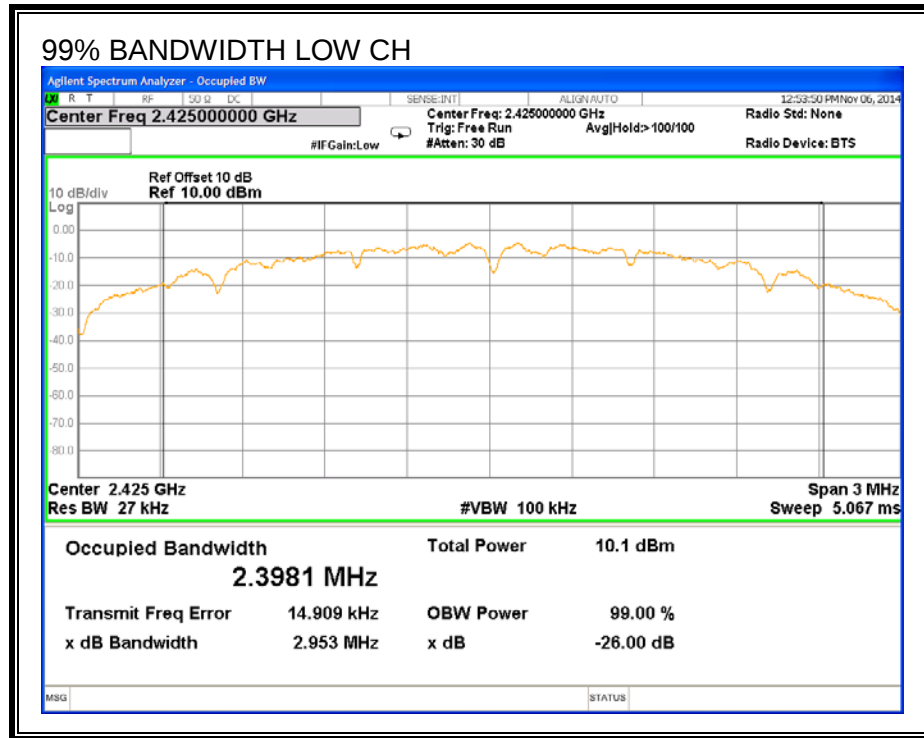
TEST PROCEDURE

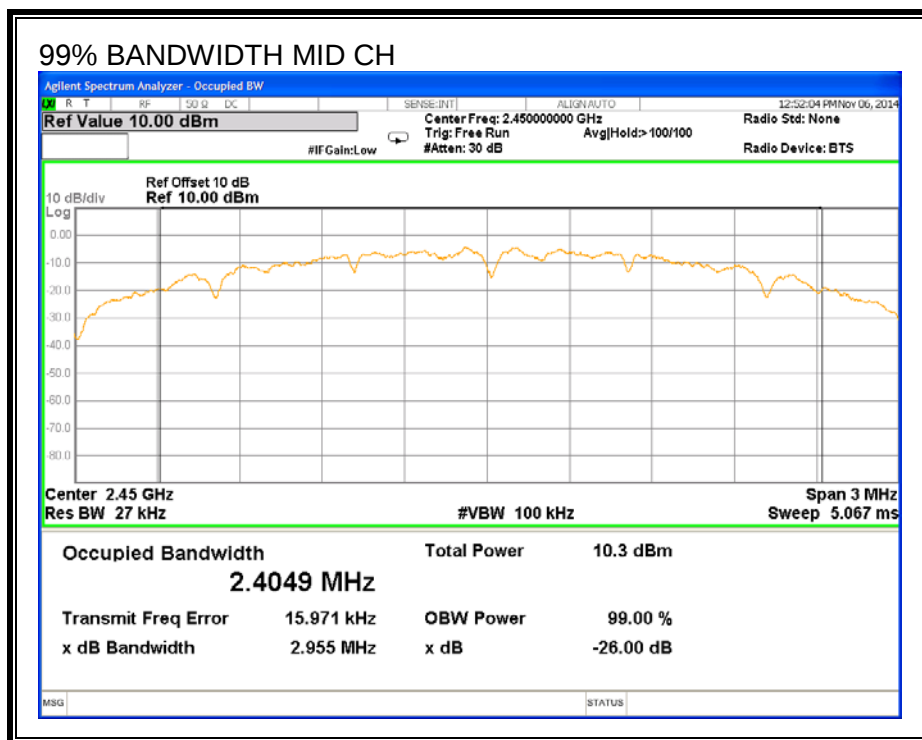
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

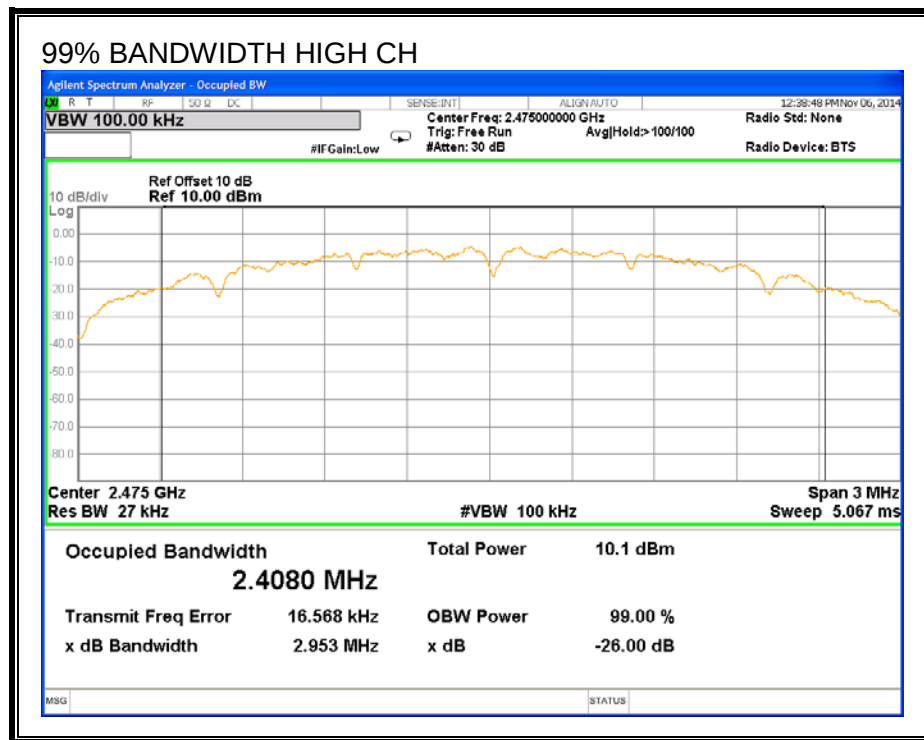
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2425	2.398
Middle	2450	2.405
High	2475	2.408

99% BANDWIDTH







8.1.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi (0 dBi), therefore the limit is 30 dBm.

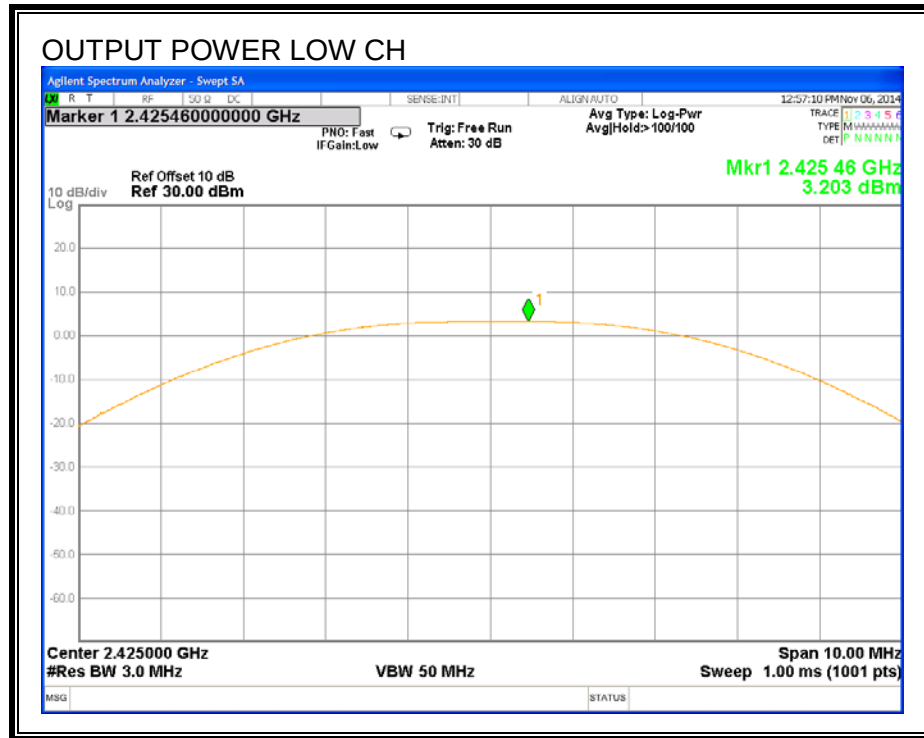
TEST PROCEDURE

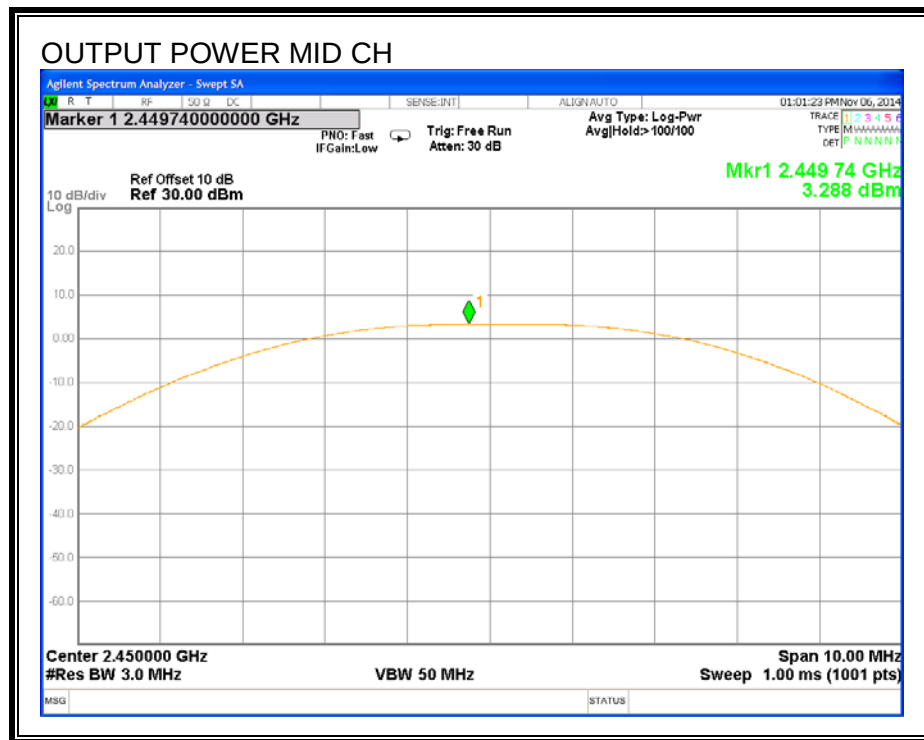
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 99% bandwidth of the EUT.

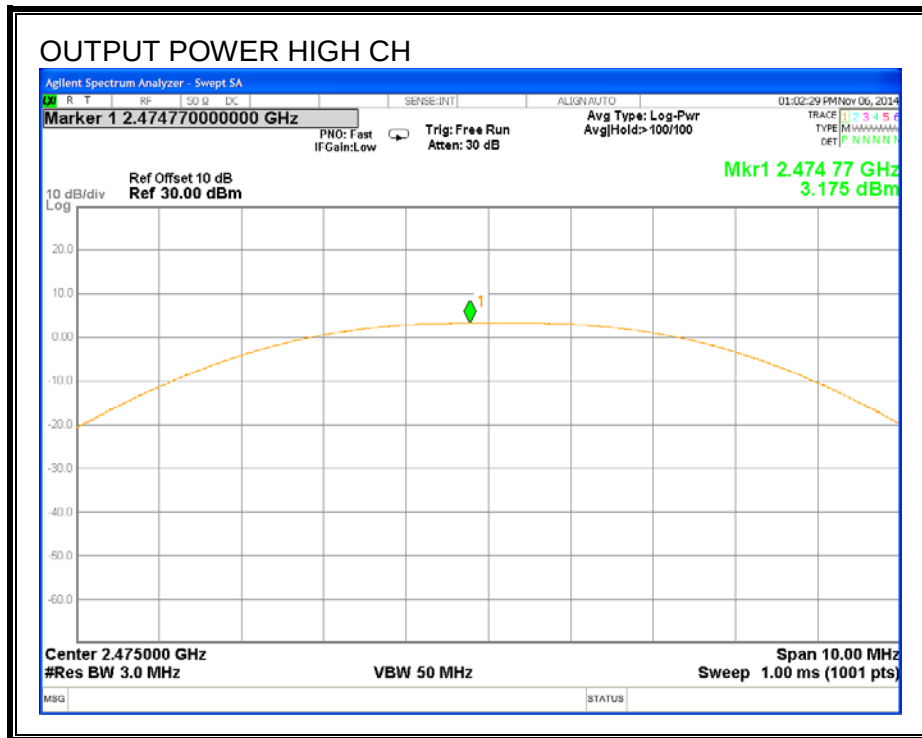
RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2425	3.20	30	-26.80
Middle	2450	3.29	30	-26.71
High	2475	3.18	30	-26.83

OUTPUT POWER







8.1.4. 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 10.68 dB (including 10 dB pad and 0.68 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	3.25
Middle	2450	3.29
High	2475	3.24

8.1.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

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", June 2014.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2425	-11.98	8	-19.98
Middle	2450	-12.37	8	-20.37
High	2475	-12.00	8	-20.00

POWER SPECTRAL DENSITY







8.1.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

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

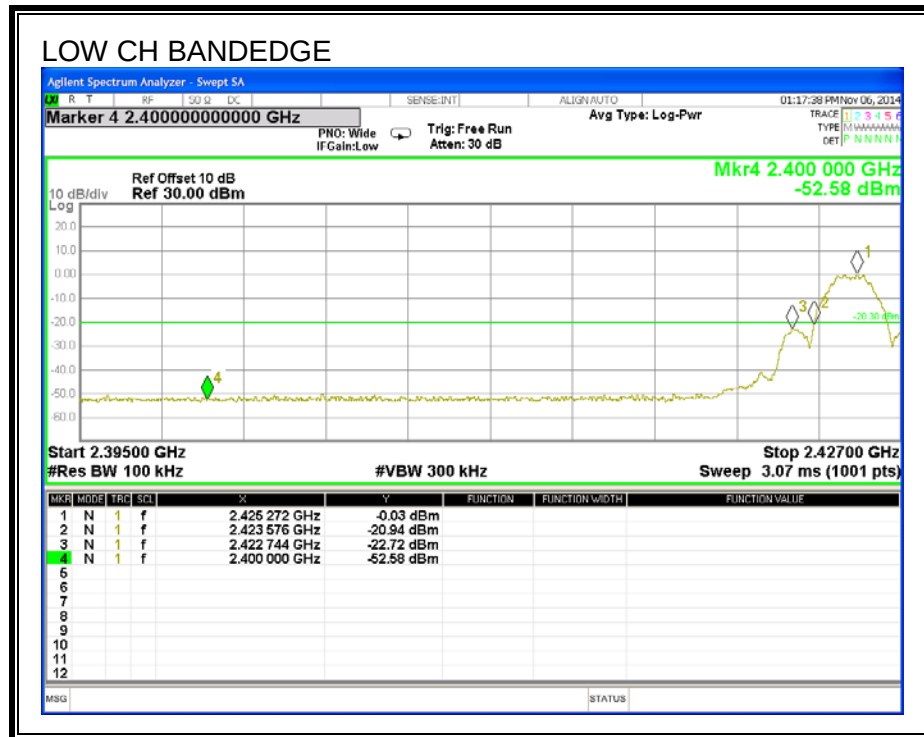
TEST PROCEDURE

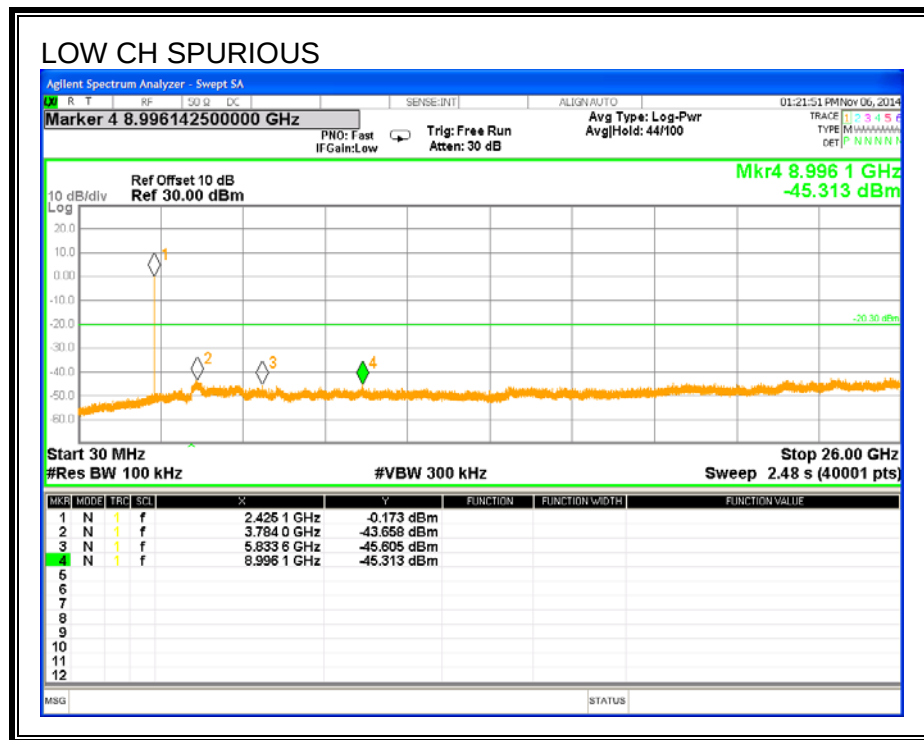
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

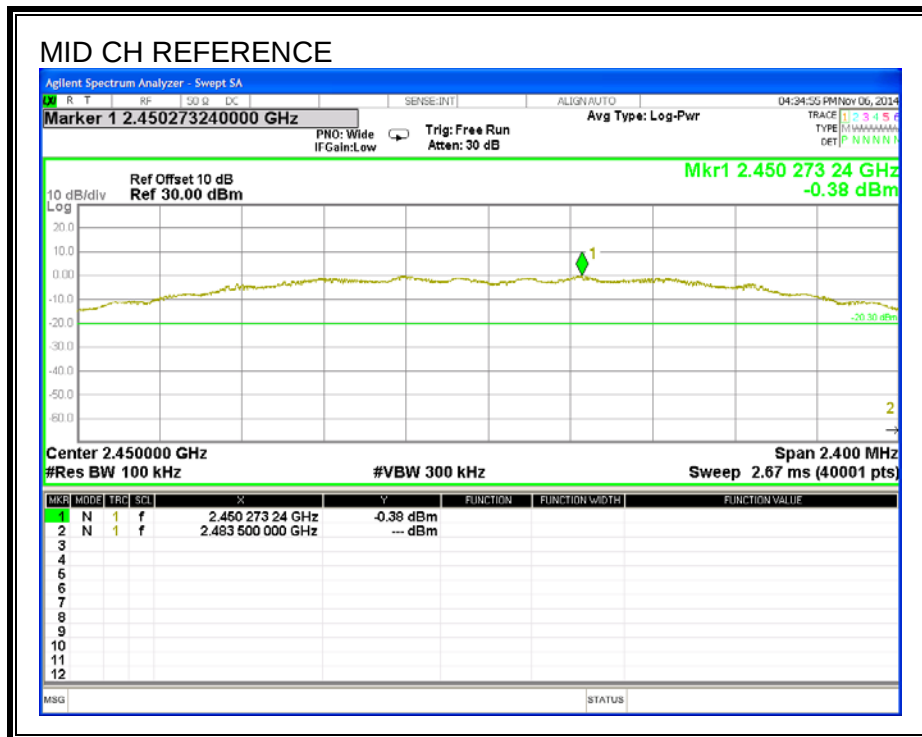
RESULTS

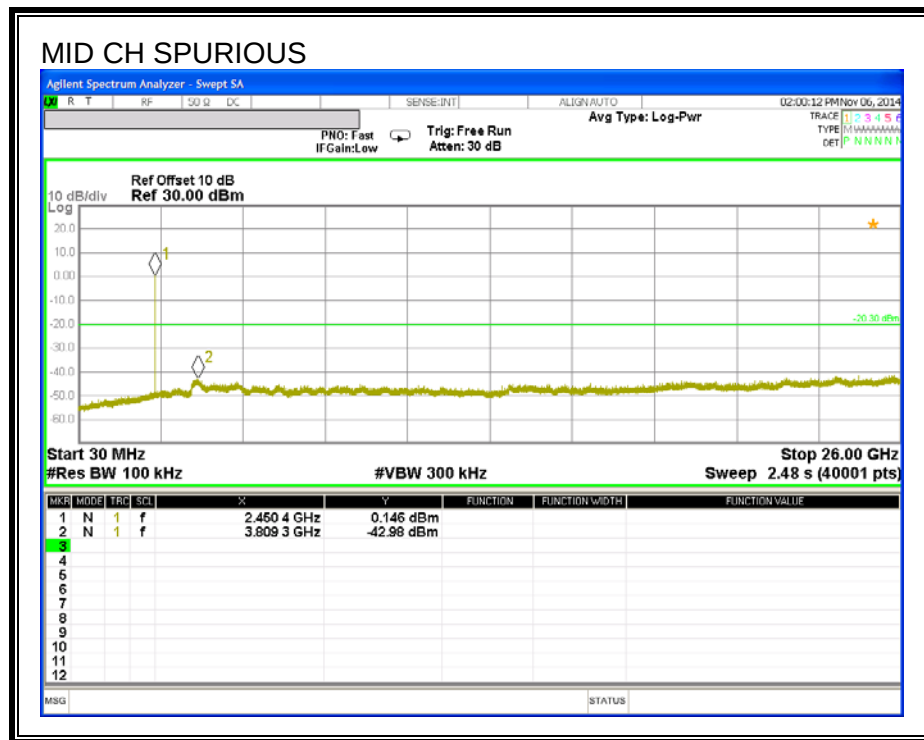
SPURIOUS EMISSIONS, LOW CHANNEL





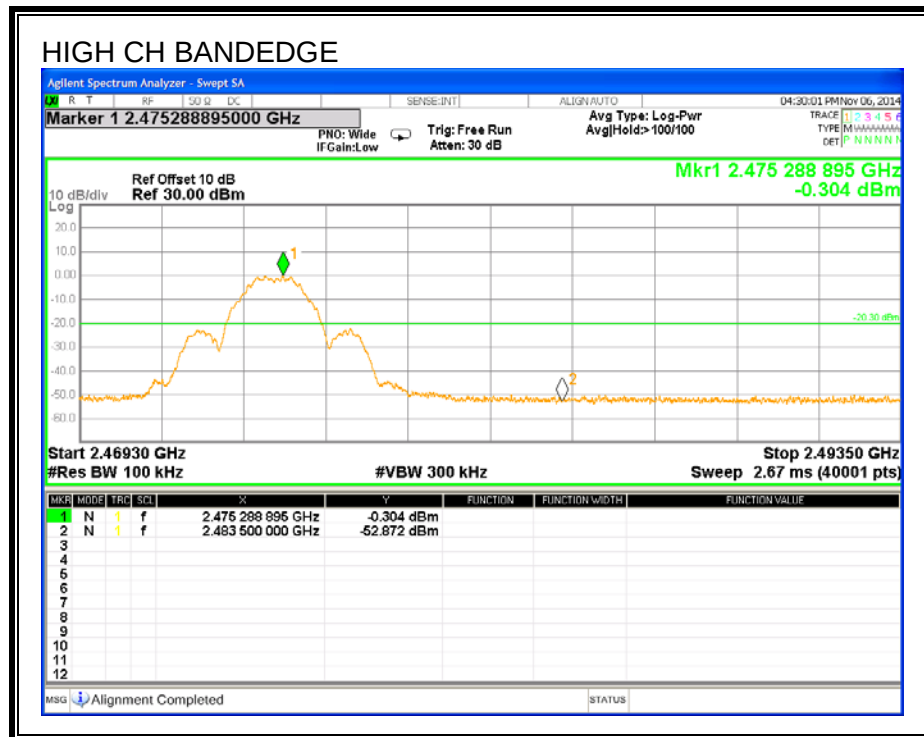
SPURIOUS EMISSIONS, MID CHANNEL

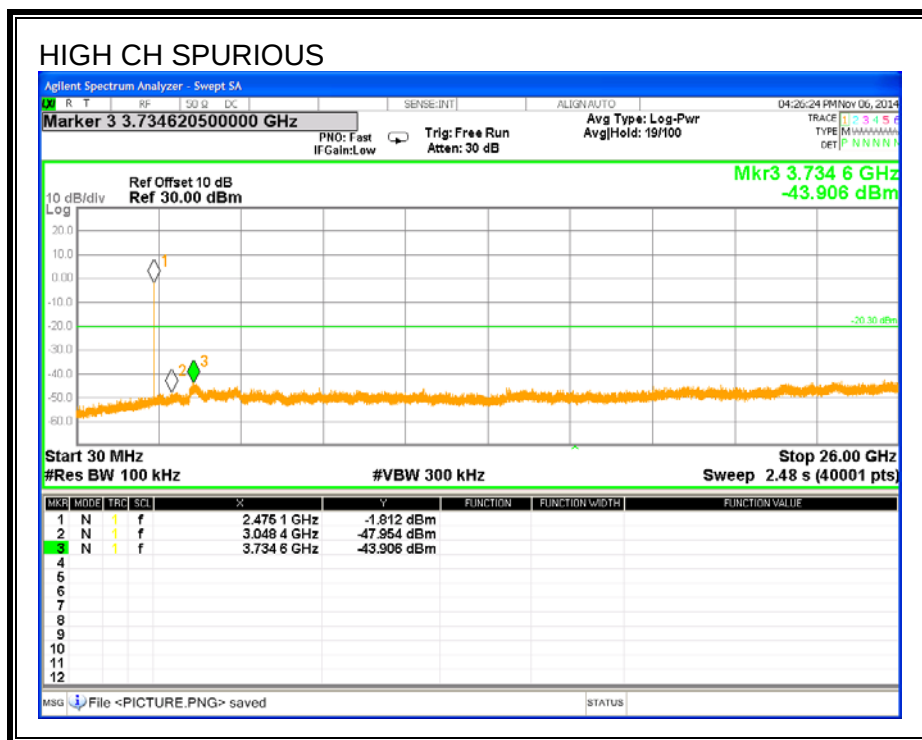




Note – No other measurable emissions other than what was reported above.

SPURIOUS EMISSIONS, HIGH CHANNEL





Note – No other measurable emissions other than what was reported above.

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

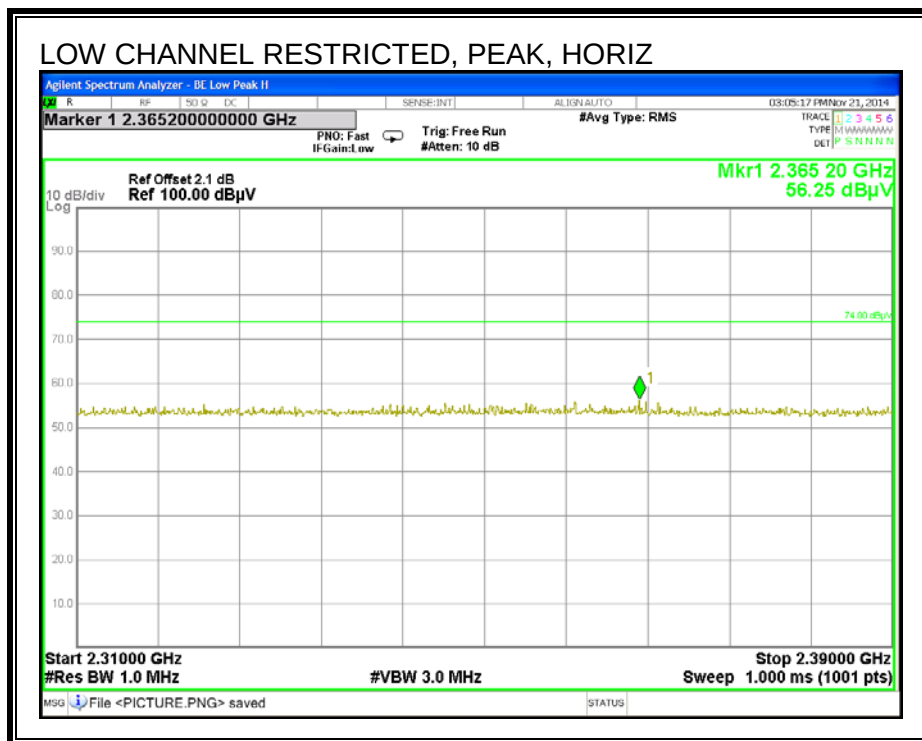
IC RSS-GEN Clause 6 (Receiver)

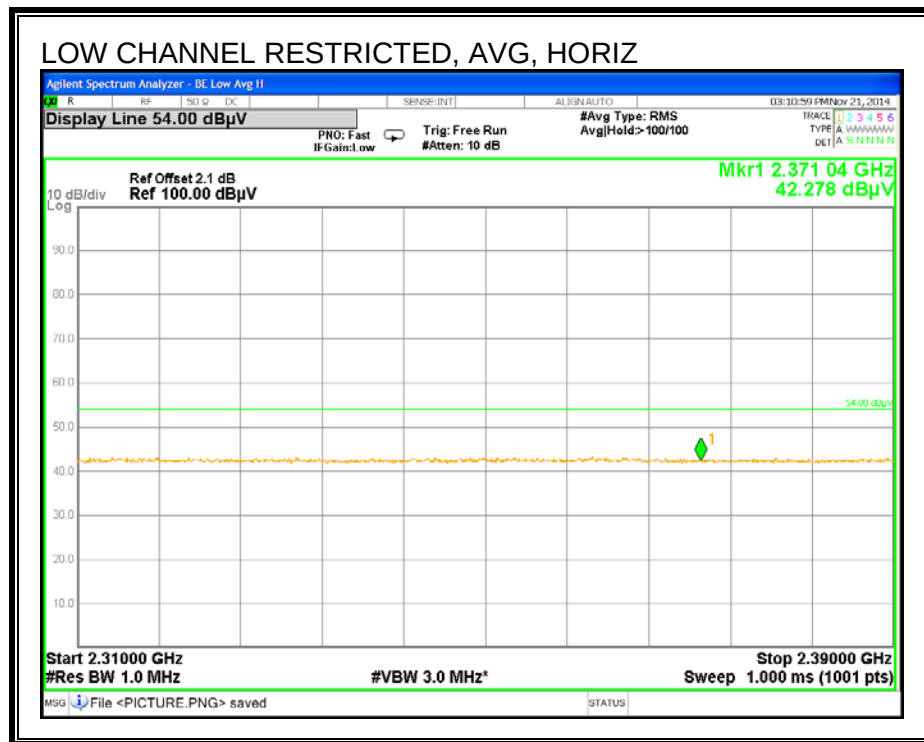
Frequency Range (MHz)	Field Strength Limit ($\mu\text{V}/\text{m}$) at 3 m	Field Strength Limit ($\text{dB}\mu\text{V}/\text{m}$) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

9.2. TRANSMITTER ABOVE 1 GHz

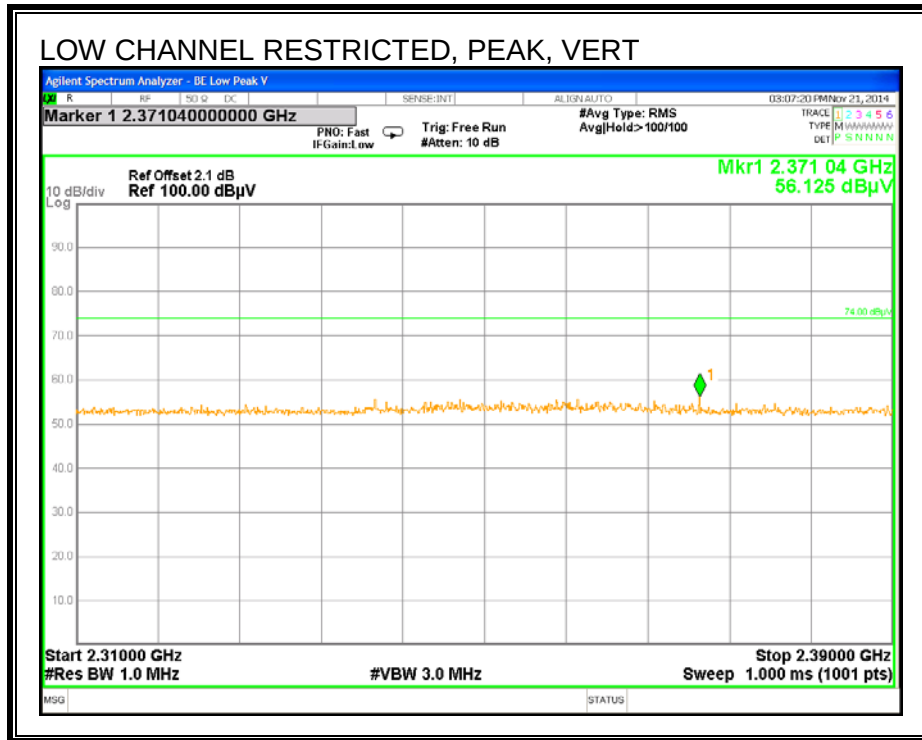
9.2.1. TX ABOVE 1 GHz FOR 802.15.4 ((RF4CE) MODE IN THE 2.4 GHz BAND

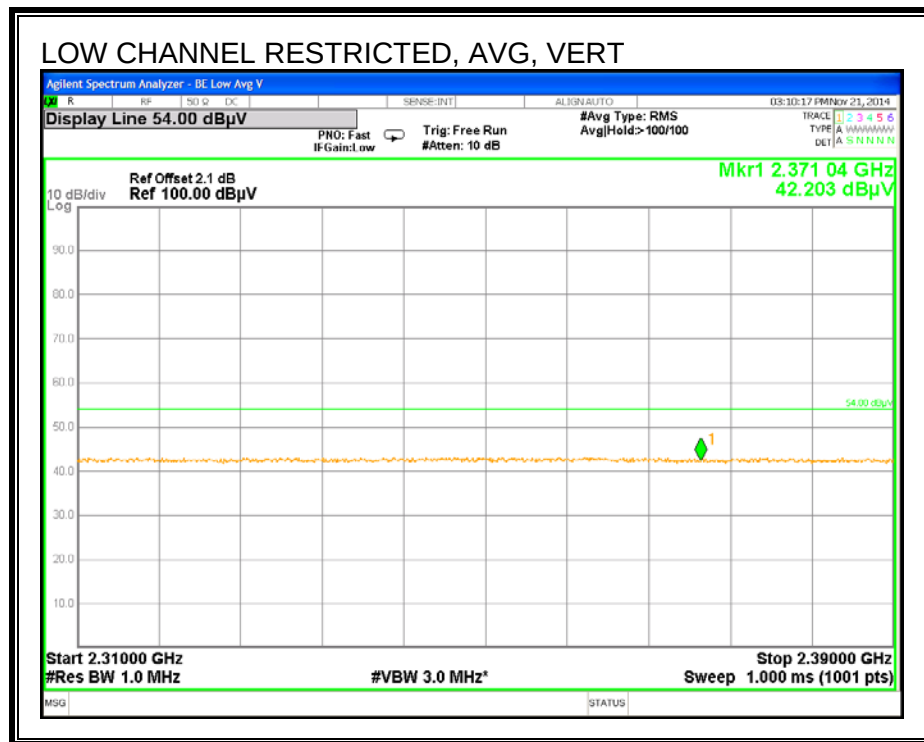
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



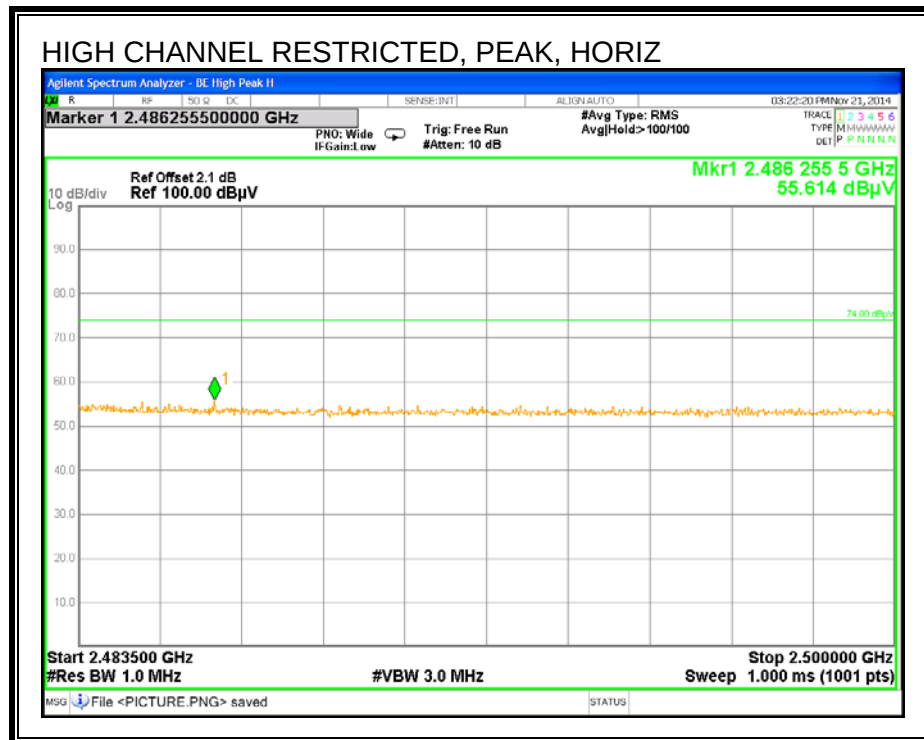


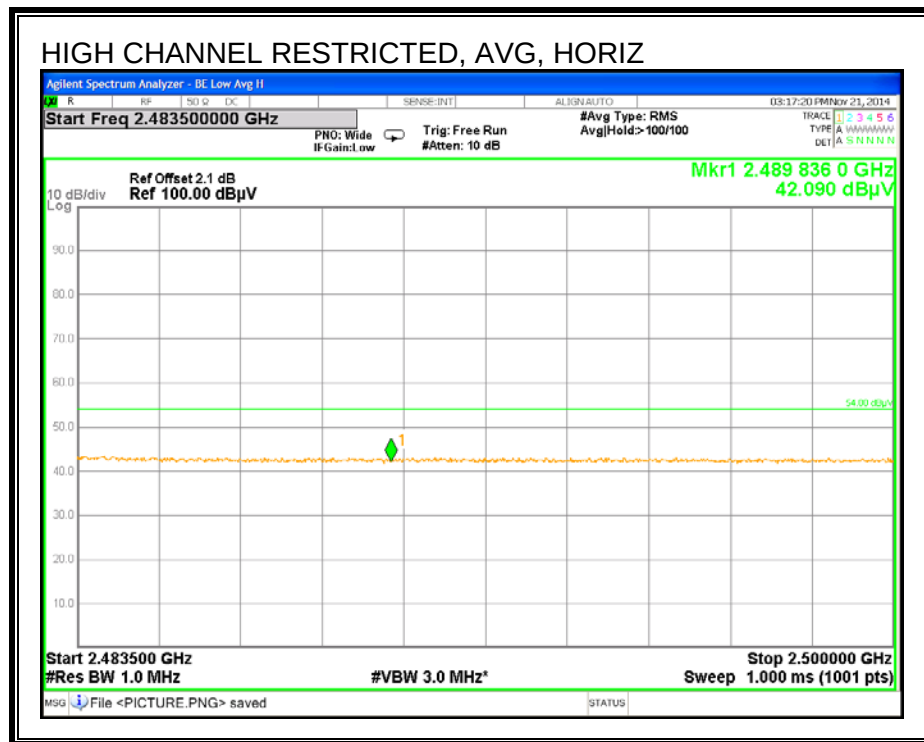
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



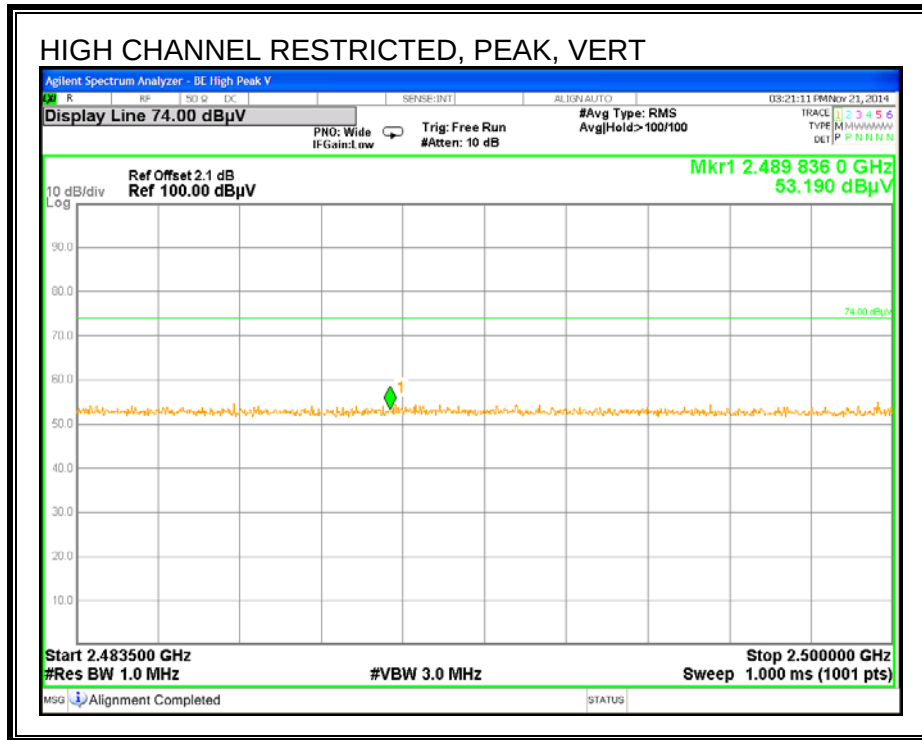


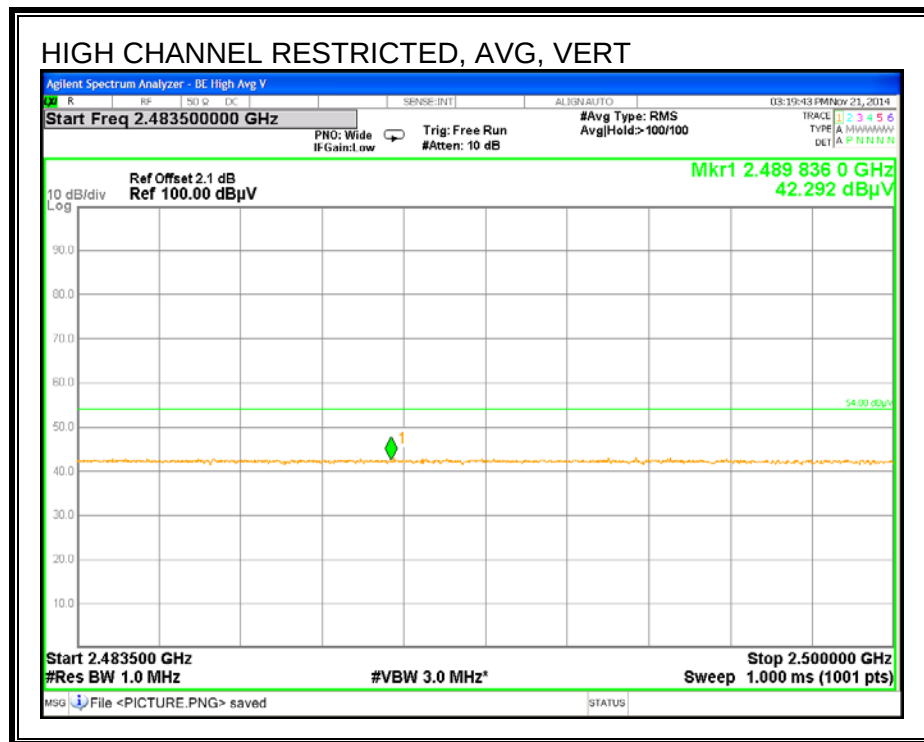
RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)



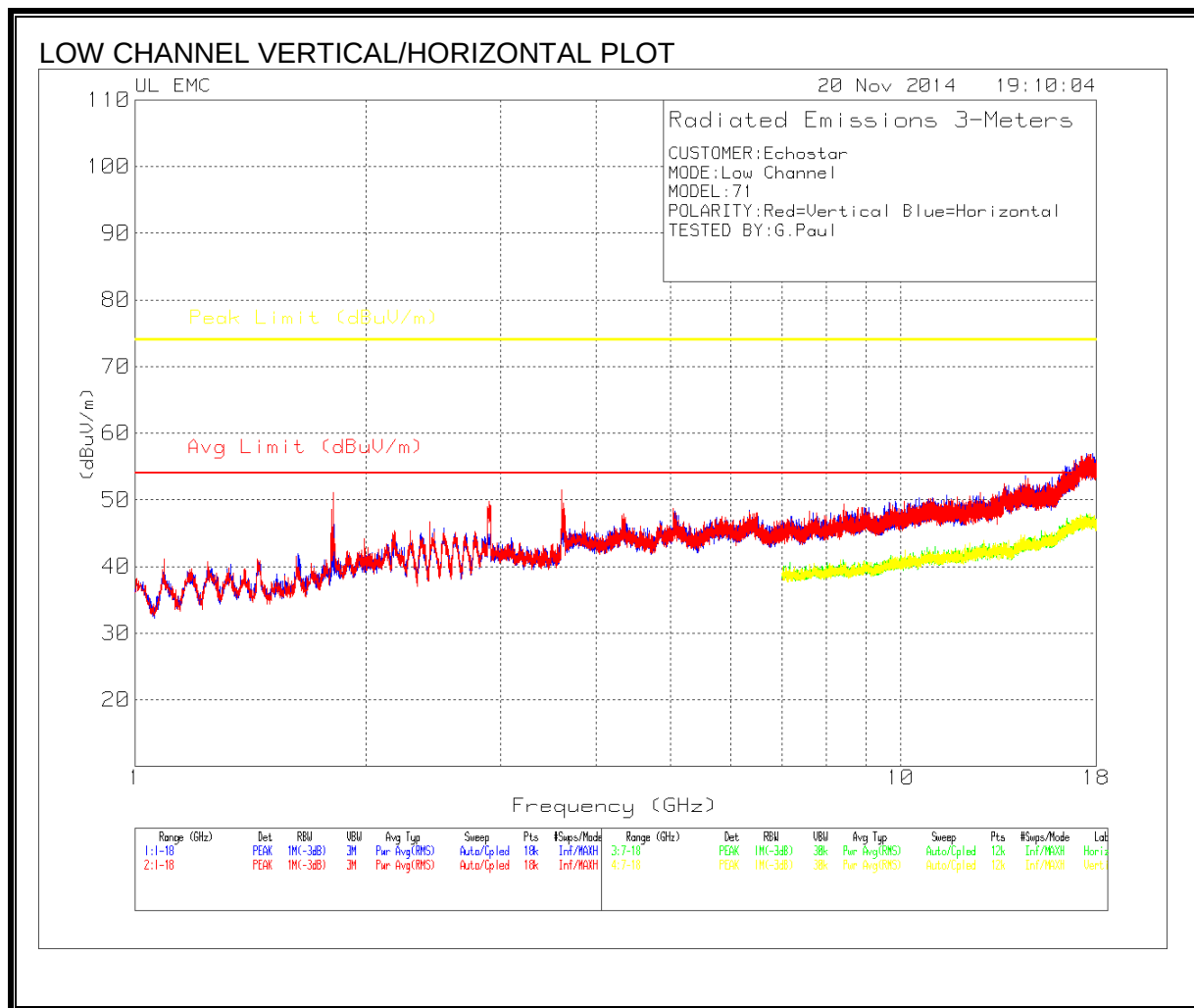


RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS: 1-18 GHz



LOW CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: Low Channel

MODEL: 71

POLARITY: Red=Vertical, Blue=Horizontal

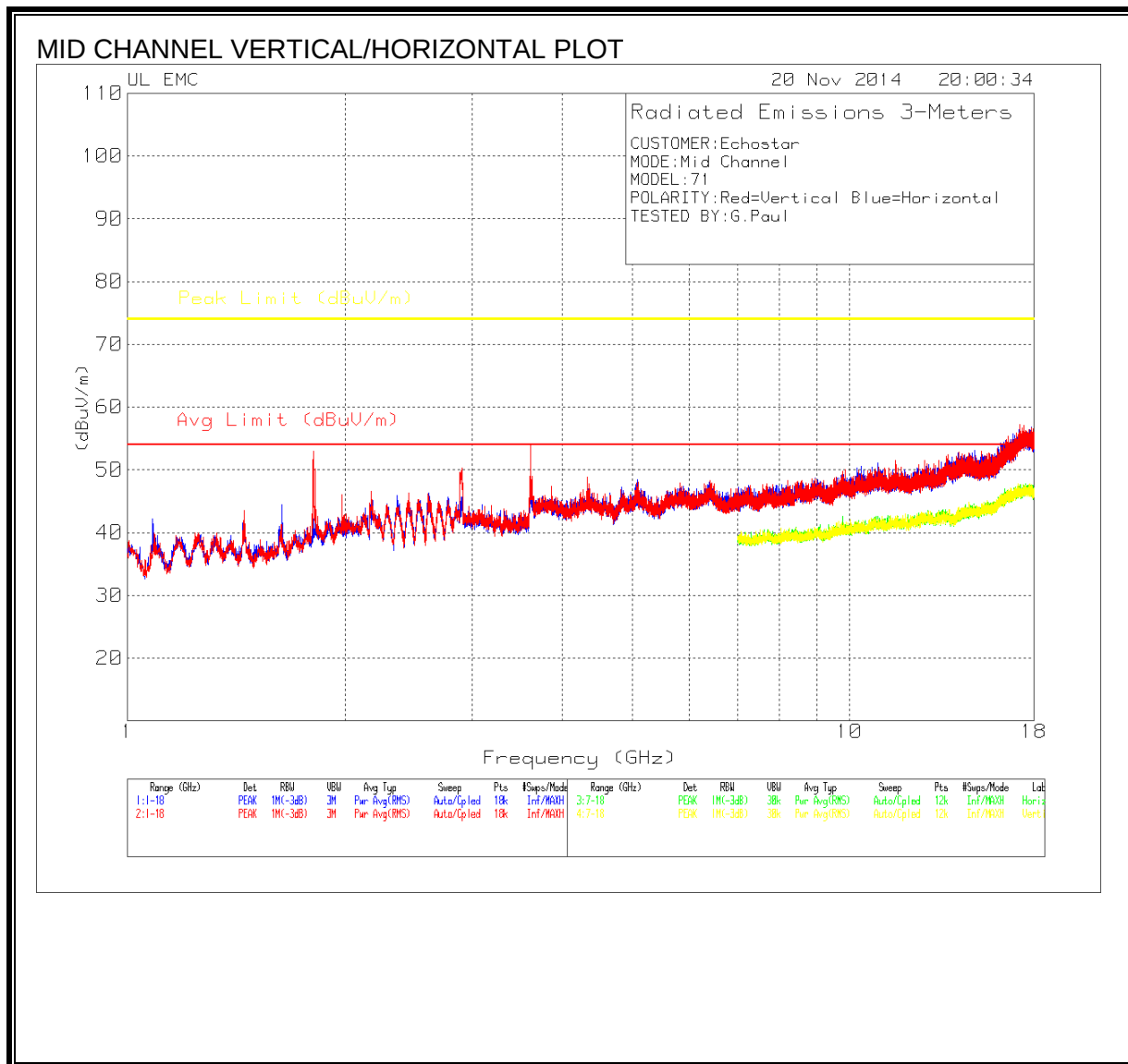
TESTED BY: G. Paul

Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
2.898	53.6	PK2	32.5	-35.5	50.6	-	-	74.0	-23.3	V	Y
2.894	39.2	MAV1	32.5	-35.5	36.2	54.0	-17.8	-	-	V	Y
3.637	57.2	PK2	33.2	-36.1	54.3	-	-	74.0	-19.7	V	Y
3.629	38.8	MAV1	33.2	-36.1	35.9	54.0	-18.0	-	-	V	Y

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

Note - No additional emissions detected above the system noise floor within the restricted bands.



MID CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: Mid Channel

MODEL: 71

POLARITY: Red=Vertical, Blue=Horizontal

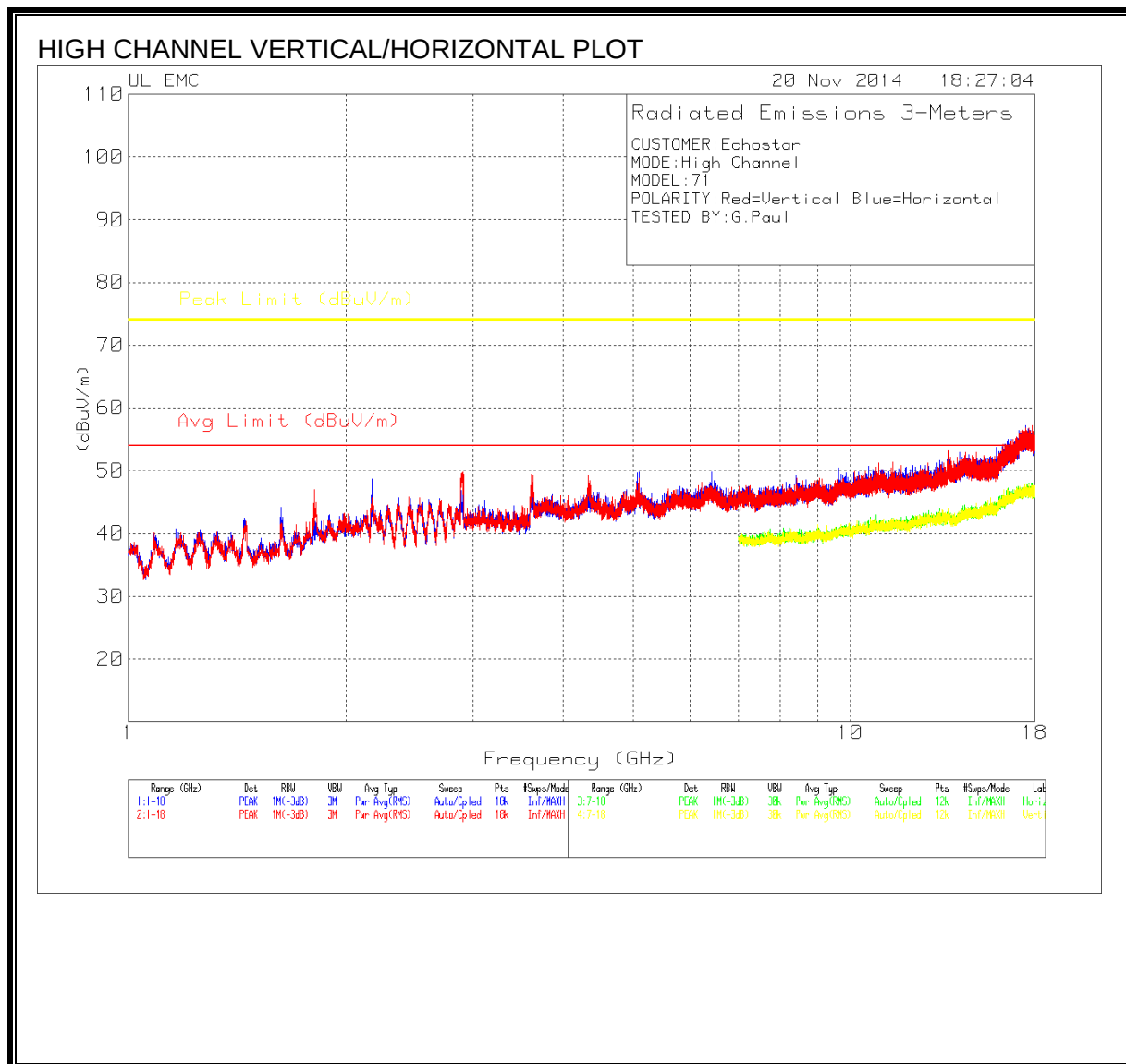
TESTED BY: G.Paul

Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
2.895	54.4	PK2	32.5	-35.6	51.3	-	-	74.0	-22.7	V	Y
2.895	39.7	MAV1	32.5	-35.6	36.6	54.0	-17.4	-	-	V	Y
3.634	59.4	PK2	33.2	-36.1	56.5	-	-	74.0	-17.5	V	Y
3.636	38.1	MAV1	33.2	-36.1	35.2	54.0	-18.8	-	-	V	Y
4.324	52.3	PK2	33.6	-36.0	49.9	-	-	74.0	-24.1	V	Y
4.320	38.7	MAV1	33.6	-36.0	36.3	54.0	-17.7	-	-	V	Y

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

Note - No additional emissions detected above the system noise floor within the restricted bands.



HIGH CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: High Channel

MODEL: 71

POLARITY: Red=Vertical, Blue=Horizontal

TESTED BY: G.Paul

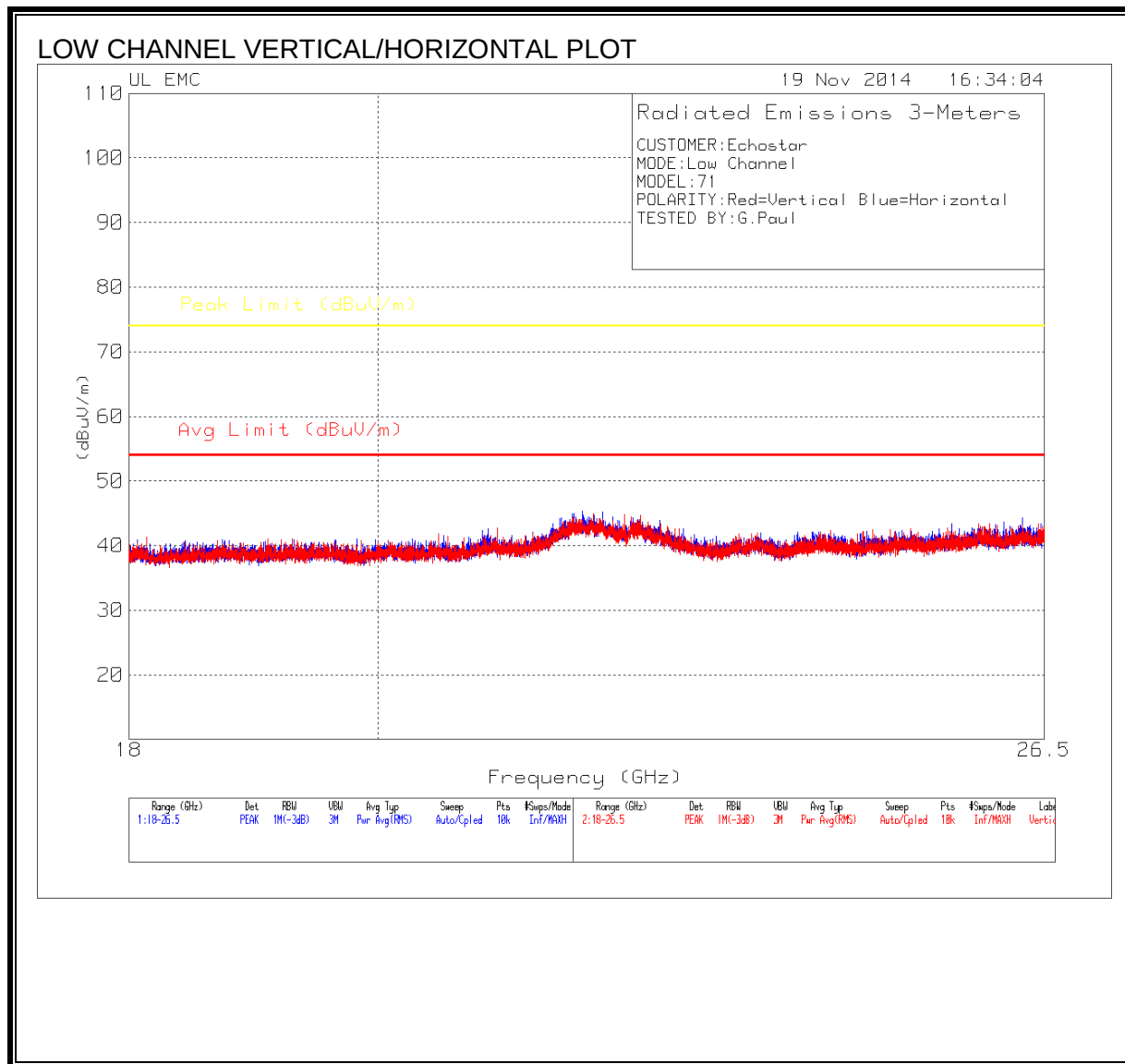
Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
3.623	57.0	PK2	33.1	-36.1	54.0	-	-	74.0	-19.9	V	Y
3.636	40.4	MAv1	33.2	-36.1	37.5	54.0	-16.5	-	-	V	Y
4.329	52.8	PK2	33.6	-36.0	50.4	-	-	74.0	-23.6	V	Y
4.320	39.6	MAv1	33.6	-36.0	37.2	54.0	-16.8	-	-	V	Y
5.090	49.8	PK2	34.2	-34.9	49.1	-	-	74.0	-24.9	H	Y
5.048	37.2	MAv1	34.1	-34.9	36.4	54.0	-17.5	-	-	H	Y

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

Note - No additional emissions detected above the system noise floor within the restricted bands.

HARMONICS AND SPURIOUS EMISSIONS: 18-26GHz



LOW CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: Low Channel

MODEL: 71

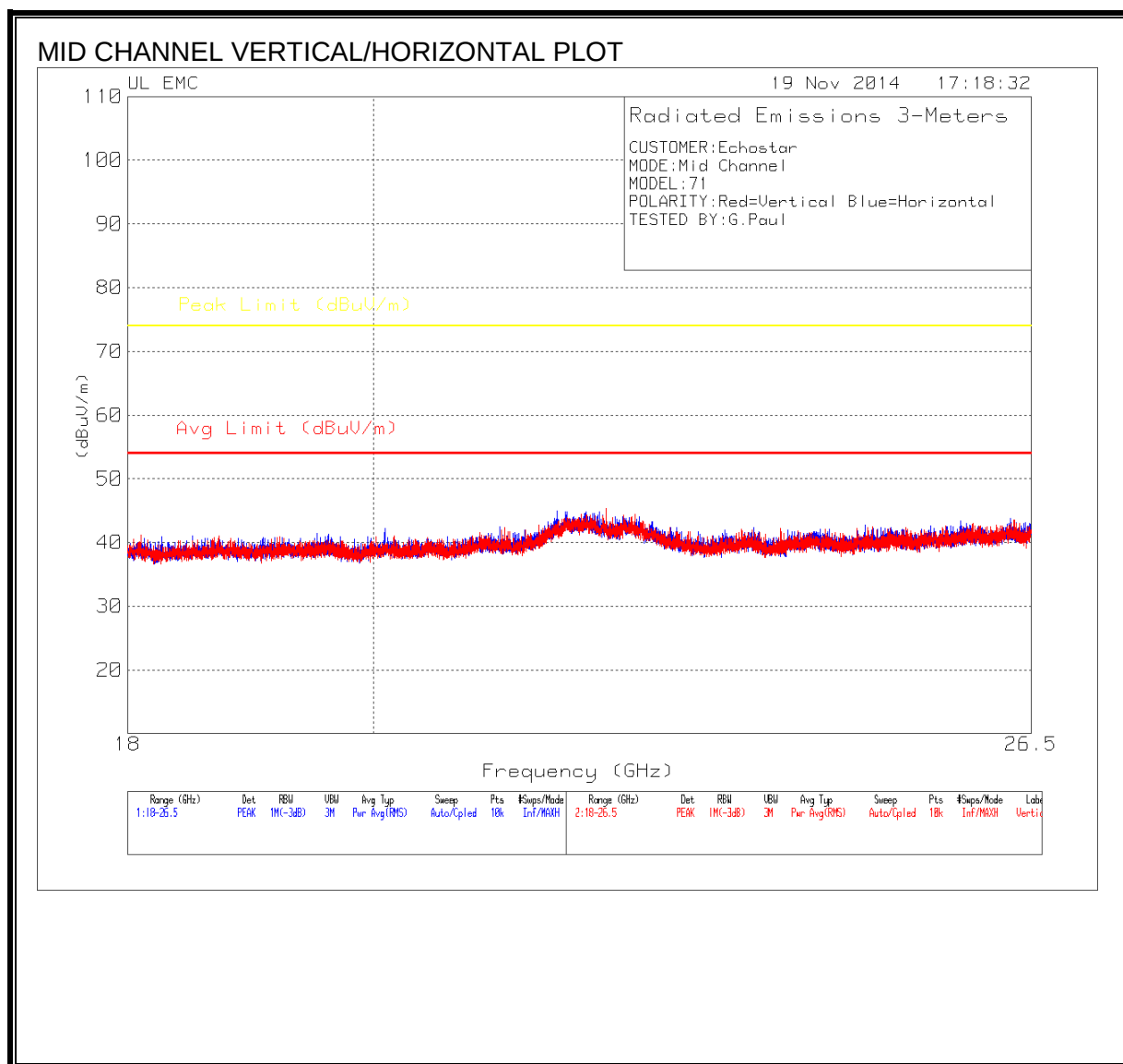
POLARITY Blue=Horizontal

TESTED BY: G. Paul

Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
18.703	46.4	PK	32.2	-38.8	39.8	54.0	-14.1	74.0	-34.1	H	Y
21.875	46.0	PK	36.7	-38.3	44.4	54.0	-9.6	74.0	-29.6	H	N
25.813	44.5	PK	34.1	-35.7	42.9	54.0	-11.1	74.0	-31.1	H	N

PK - Peak

Note - No emissions detected above the system noise floor within the restricted bands. The above is for reporting purposes, only.



MID CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: Mid Channel

MODEL: 71

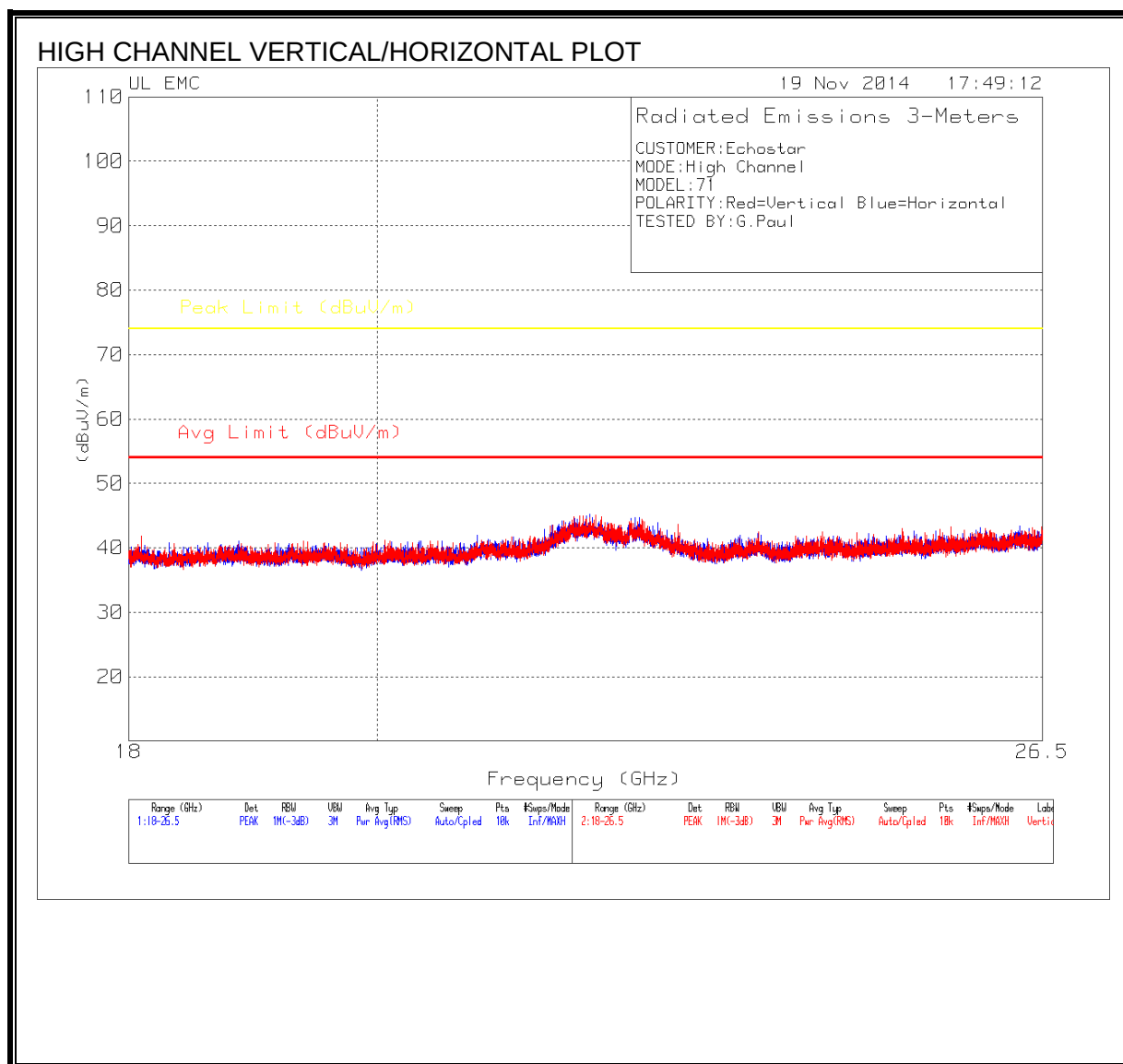
POLARITY: Red=Vertical, Blue=Horizontal

TESTED BY: G. Paul

Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
18.871	47.0	PK	32.5	-38.8	40.7	54.0	-13.3	74.0	-33.3	H	Y
22.106	44.2	PK	36.8	-38.2	42.8	54.0	-11.2	74.0	-31.2	H	Y
26.215	43.7	PK	34.2	-35.5	42.4	54.0	-11.6	74.0	-31.6	H	N

PK - Peak

Note - No emissions detected above the system noise floor within the restricted bands. The above is for reporting purposes, only.



HIGH CHANNEL VERTICAL/HORIZONTAL DATA

CUSTOMER: Echostar

MODE: Hig Channel

MODEL: 71

POLARITY Blue=Horizontal

TESTED BY: G. Paul

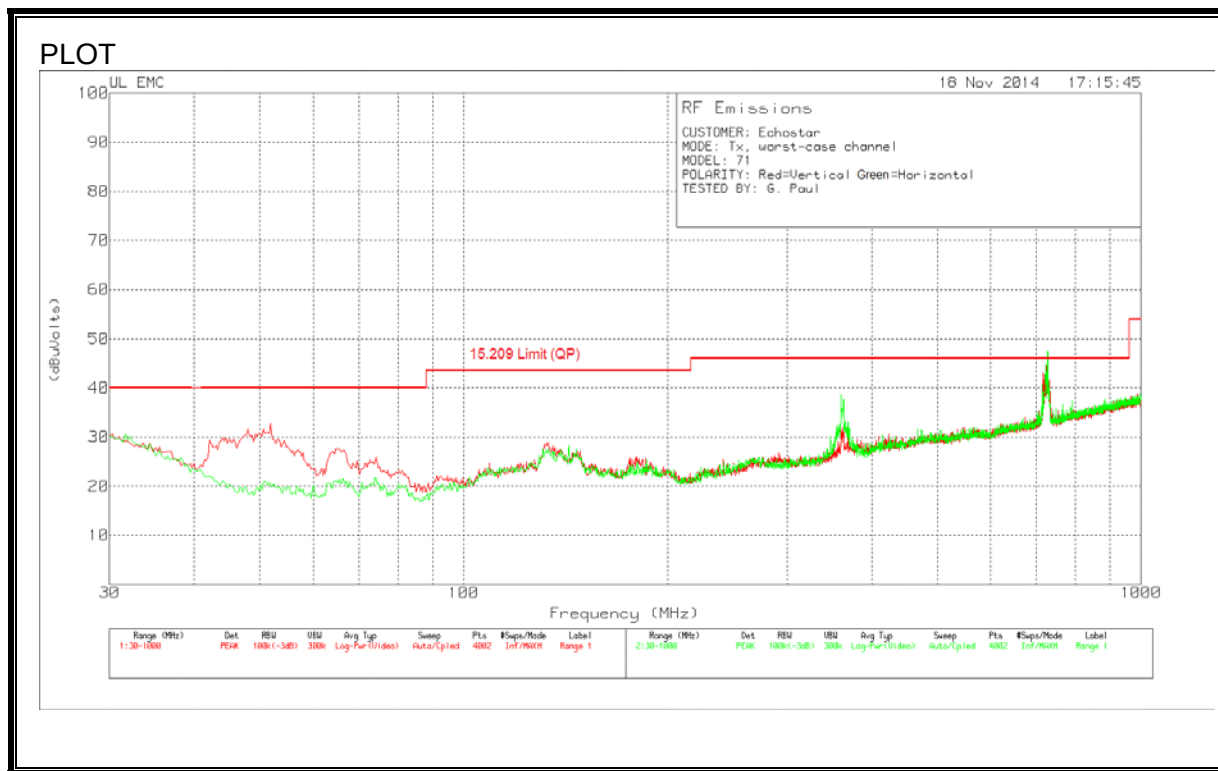
Freq (GHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Peak Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
18.085	46.8	PK	32.3	-38.9	40.2	54.0	-13.8	74.0	-33.8	H	Y
21.851	46.7	PK	36.6	-38.3	45.0	54.0	-9.0	74.0	-29.0	H	N
24.981	43.8	PK	33.9	-36.4	41.3	54.0	-12.7	74.0	-32.7	H	N

PK - Peak

Note - No emissions detected above the system noise floor within the restricted bands. The above is for reporting purposes, only.

9.3. WORST-CASE BELOW 1 GHz

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



DATA

CUSTOMER Echostar

MODE: Tx, worst-case channel

MODEL: 71

POLARITY: Red=Vertical, Green=Horizontal

TESTED BY: G. Paul

Freq (MHz)	Meter Reading [dBuV]	Detector	Antenna Factor [dB/m]	Gain/ Loss [dB]	Field Strength [dBuV/m]	15.209 QP Limit [dBuV/m]	Margin [dB]	Antenna Polarity	In Restricted Band?
360.444	43.2	PK	14.6	-19.0	38.8	-	-	H	N
361.004	32.9	QP	14.6	-19.0	28.5	-	-	H	N
727.773	35.2	QP	20.5	-17.9	37.8	-	-	H	N
50.681	41.1	QP	7.6	-21.0	27.7	-	-	V	N
51.820	46.6	PK	7.3	-21.0	32.9	-	-	V	N
724.830	41.9	PK	20.5	-17.9	44.5	-	-	V	N

PK - Peak detector

QP - Quasi-peak detector

10. 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.

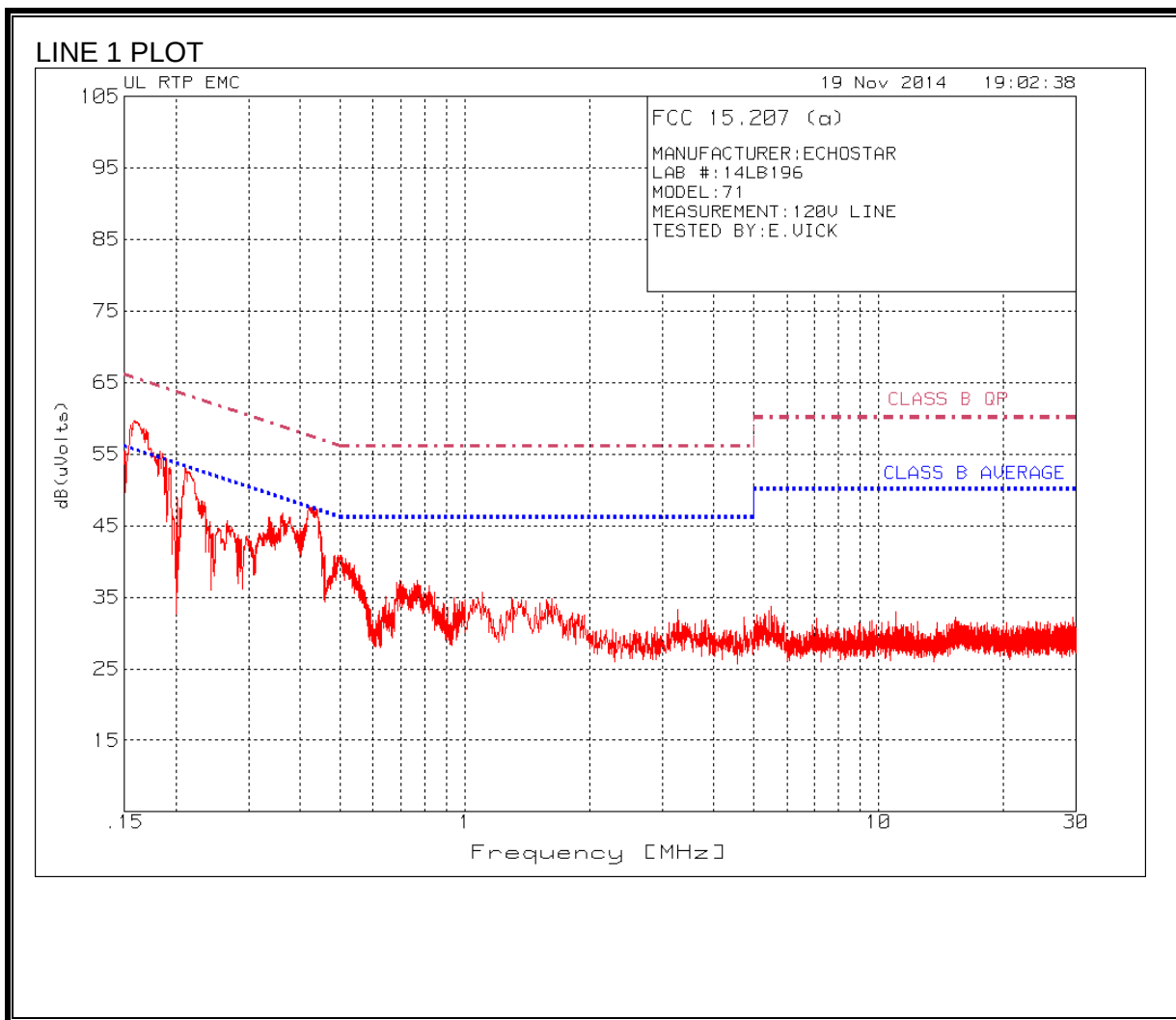
TEST PROCEDURE

ANSI C63.4

RESULTS

6 WORST EMISSIONS

LINE 1 RESULTS



LINE 1 DATA

MANUFACTURER:ECHOSTAR

LAB #:14LB196

MODEL:71

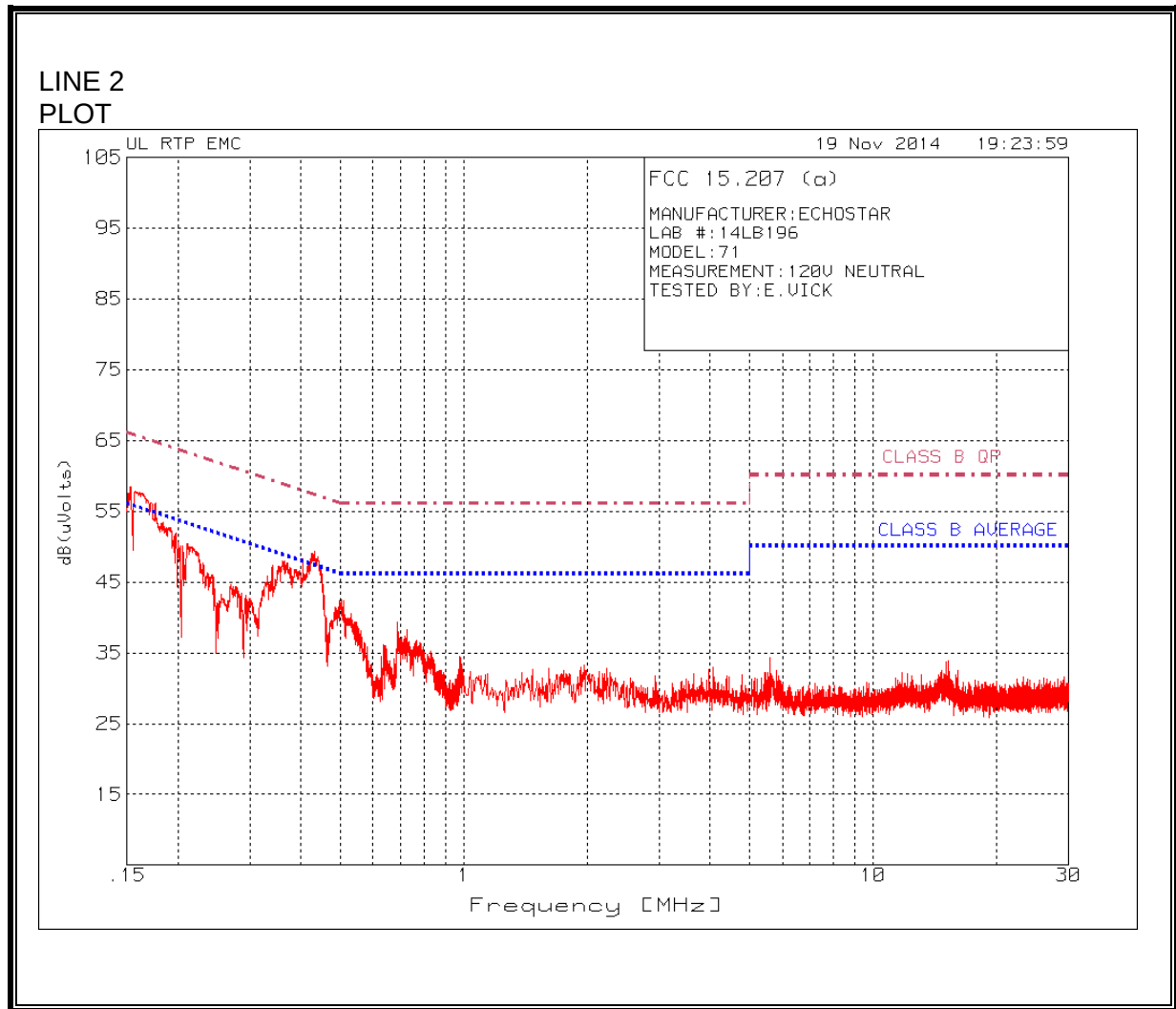
MEASUREMENT:120V LINE

TESTED BY:E.VICK

Test Frequency [MHz]	Meter Reading [dBuV]	Detector*	LISN [dB]	Cable Loss [dB]	RF Line Voltage [dBuV]	FCC 15.207 (QP) [dBuV]	Margin [dB]	FCC 15.207 (AV) [dBuV]	Margin [dB]
0.159	43.2	QP	0.3	9.8	53.3	65.5	-12.3	-	-
0.170	42.4	QP	0.3	9.8	52.5	65.0	-12.5	-	-
0.159	19.1	CAV	0.3	9.8	29.2	-	-	55.5	-26.3
0.169	27.4	CAV	0.3	9.8	37.5	-	-	55.0	-17.5
0.184	19.0	CAV	0.3	9.8	29.1	-	-	54.3	-25.2
0.211	23.0	CAV	0.2	9.8	33.0	-	-	53.2	-20.1
0.233	13.6	CAV	0.2	9.8	23.6	-	-	52.4	-28.8
0.266	13.6	CAV	0.2	9.8	23.6	-	-	51.2	-27.7
0.335	17.5	CAV	0.1	9.8	27.4	-	-	49.3	-21.9
0.362	17.6	CAV	0.1	9.8	27.5	-	-	48.7	-21.2
0.418	14.2	CAV	0.1	9.8	24.1	-	-	47.5	-23.4
0.495	15.2	CAV	0.1	9.8	25.1	-	-	46.1	-21.0

*PK = Peak, QP = Quasi-Peak, CAV = CISPR Average

LINE 2 RESULTS



LINE 2 DATA

MANUFACTURER:ECHOSTAR

LAB #:14LB196

MODEL:71

MEASUREMENT:120V NEUTRAL

TESTED BY:E.VICK

Test Frequency [MHz]	Meter Reading [dBuV]	Detector*	LISN [dB]	Cable Loss [dB]	RF Line Voltage [dBuV]	FCC 15.207 (QP) [dBuV]	Margin [dB]	FCC 15.207 (AV) [dBuV]	Margin [dB]
0.153	34.4	QP	0.4	9.8	44.6	65.8	-21.3	-	-
0.160	43.6	QP	0.3	9.8	53.7	65.4	-11.7	-	-
0.153	14.1	CAV	0.4	9.8	24.3	-	-	55.9	-31.5
0.160	16.2	CAV	0.3	9.8	26.3	-	-	55.5	-29.2
0.176	28.9	CAV	0.3	9.8	39.0	-	-	54.7	-15.7
0.198	10.2	CAV	0.2	9.8	20.2	-	-	53.7	-33.5
0.212	21.1	CAV	0.2	9.8	31.1	-	-	53.1	-22.1
0.241	7.6	CAV	0.2	9.8	17.6	-	-	52.1	-34.5
0.340	17.6	CAV	0.1	9.8	27.5	-	-	49.2	-21.7
0.364	15.7	CAV	0.1	9.8	25.6	-	-	48.6	-23.1
0.430	26.3	CAV	0.1	9.8	36.2	-	-	47.3	-11.0
0.497	12.1	CAV	0.1	9.8	22.0	-	-	46.1	-24.1

*PK = Peak, QP = Quasi-Peak, CAV = CISPR Average

END OF REPORT