



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

CERTIFICATION TEST REPORT

FOR

ECHOSTAR MODEL A95

MODEL NUMBER: A95

FCC ID: DKN-601CR

IC ID: 1707A-601CR

REPORT NUMBER: 15U22257-E1V1

ISSUE DATE: 5/3/2016

Prepared for

**Echostar Technologies, LLC
90 Inverness Circle East
Englewood, CO 80112, U.S.A**

Prepared by

**UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888**



NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	5/3/16	Initial Issue	C. Vergonio

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	5
4.1. MEASURING INSTRUMENT CALIBRATION	5
4.2. SAMPLE CALCULATION	5
4.3. MEASUREMENT UNCERTAINTY.....	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	7
5.4. WORST-CASE CONFIGURATION AND MODE.....	7
5.5. DESCRIPTION OF TEST SETUP.....	8
6. TEST AND MEASUREMENT EQUIPMENT	10
7. SUMMARY TABLE	11
8. ANTENNA PORT TEST RESULTS	12
8.1. ON TIME, DUTY CYCLE	12
8.2. 6 dB BANDWIDTH.....	13
8.2.1. 6 dB BANDWIDTH PLOTS AND TABLE.....	14
8.3. 99% BANDWIDTH.....	15
8.3.1. 99% BANDWIDTH PLOTS AND TABLE.....	16
8.4. OUTPUT POWER.....	17
8.4.1. OUTPUT POWER PLOTS.....	18
8.5. AVERAGE POWER	19
8.6. POWER SPECTRAL DENSITY	20
8.6.1. POWER SPECTRAL DENSITY PLOTS AND TABLE	21
8.7. CONDUCTED SPURIOUS EMISSIONS.....	22
8.7.1. BANEDGE AND SPURIOUS EMISSIONS PLOTS.....	23
9. RADIATED TEST RESULTS.....	24
9.1. TRANSMITTER ABOVE 1 GHz	25
9.2. WORST-CASE BELOW 1 GHz.....	39
10. AC POWER LINE CONDUCTED EMISSIONS	41
11. SETUP PHOTOS	44

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Echostar Technologies LLC
EUT DESCRIPTION: ZIGBEE BEEPER REPEATER
MODEL: A95
SERIAL NUMBER: 2318478 (Conducted), 2318477 (Radiated)
DATE TESTED: May 2 - 6, 2016

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

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

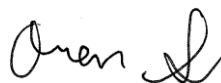
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revision section.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

Approved & Released For
UL Verification Services Inc. By:



CHARLES VERGONIO
CONSUMER TECHNOLOGY DIVISION
WISE ENGINEER
UL VERIFICATION SERVICES INC

Tested By:



OREN STOELTING
CONSUMER TECHNOLOGY DIVISION
WISE LAB EMC TECHNICIAN
UL VERIFICATION SERVICES INC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☒ Chamber C	☐ Chamber F
	☐ Chamber G
	☐ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 9KHz to 30 MHz	2.14 dB
Radiated Disturbance, 30 to 1000 MHz	4.98 dB
Radiated Disturbance, 1000 to 6000 MHz	3.86 dB
Radiated Disturbance, 6000 to 18000 MHz	4.23 dB
Radiated Disturbance, 18000 to 26000 MHz	5.30 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Zigbee Beeper Repeater. Device will be plugged into a wall outlet and allow for Zigbee mesh network signal repeating. Device will also act as an extension for a doorbell tone and upon the doorbell of the home being pressed and sensed by the automation system will beep with the doorbell tone.

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)
2405-2480	ZIGBEE	20.42	110.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an Chip Type antenna, with a maximum gain of 0.5dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Support Laptop	HP	EliteBook 8470p	N/A	N/A
Communication Dongle	ECHOSTAR	N/A	N/A	N/A

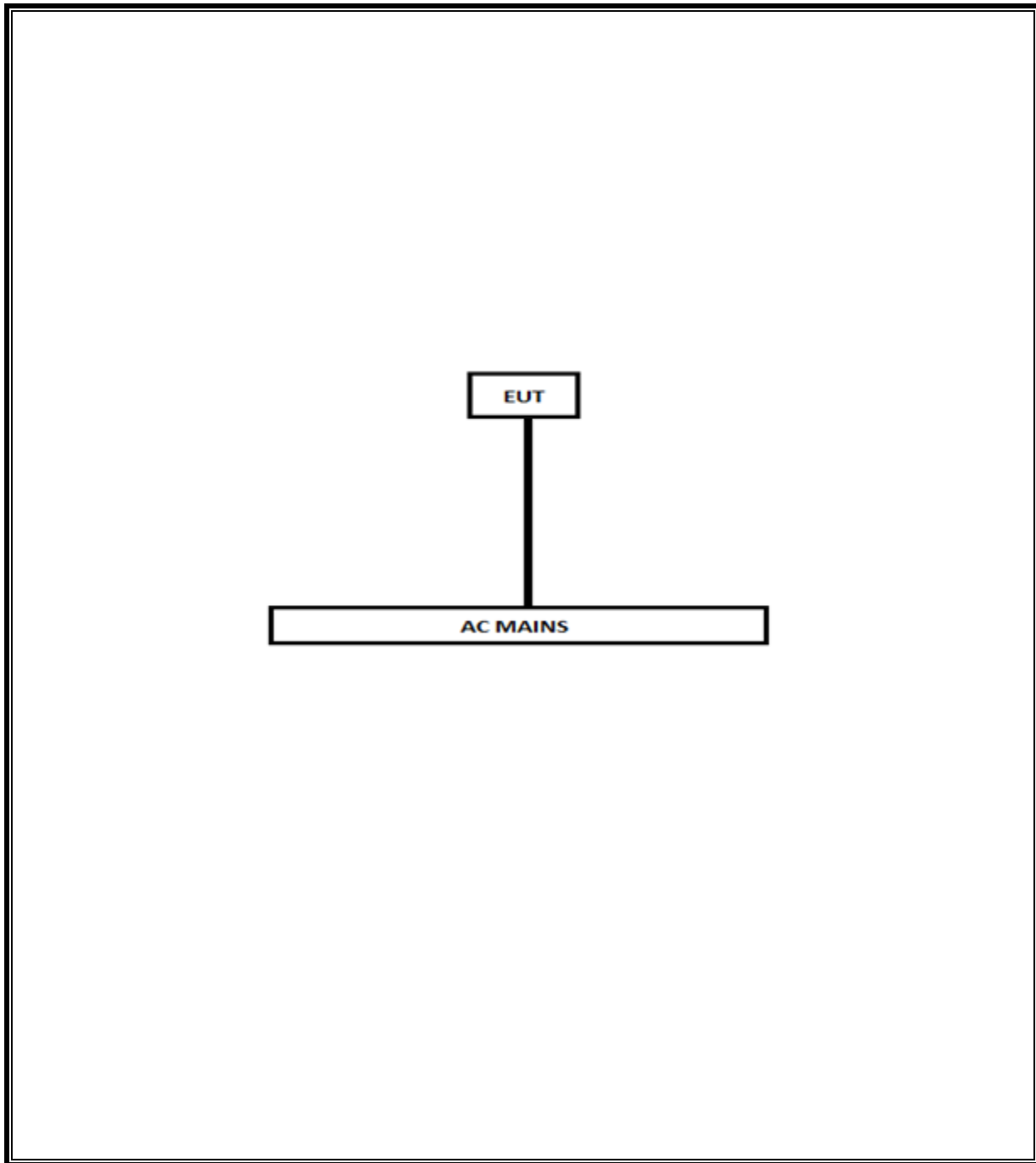
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-Prong	N/A	1.2	N/A

TEST SETUP

EUT was controlled with laptop software via Echostar Dongle to enable ZIGBEE communications. The laptop and dongle were not present during testing.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	Manufacturer	Model	T Number	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	130	09/01/16
Antenna, Horn, 18GHz	ETS Lindgren	3117	119	02/04/17
Antenna, Horn, 18GHz	ETS Lindgren	3117	345	03/07/17
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	447	05/12/16
EMI Test Receiver, 9 KHz to 7 GHz	Rohde & Schwarz	ECSI7	1436	12/15/16
High Pass Filter 3GHz	Micro-Tronics	HPS17543	897	04/29/17
High Pass Filter 6GHz	Micro-Tronics	HPS17542	484	04/29/17
LISN, 30 MHz	FCC	FCC-LISN-50/250-25-2	1310	2/9/2017
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	417	04/29/17
Peak / Average Power Sensor	Keysight	8481A	224	01/05/17
Peak Power Meter	Agilent / HP	N1914A	254	06/08/16
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	160	CNR
RF Preamplifier, 1GHz - 18GHz	Miteq	00101800-25-S-42	T931	04/29/17
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	404	06/29/16
Spectrum Analyzer, 44 GHz	Agilent	E4440A	189	05/06/17
Spectrum Analyzer, PXA, 3 Hz to 44 GHz	Keysight	N9030A	906	02/03/17

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 4.7, Apr 28, 2016

7. SUMMARY TABLE

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

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE

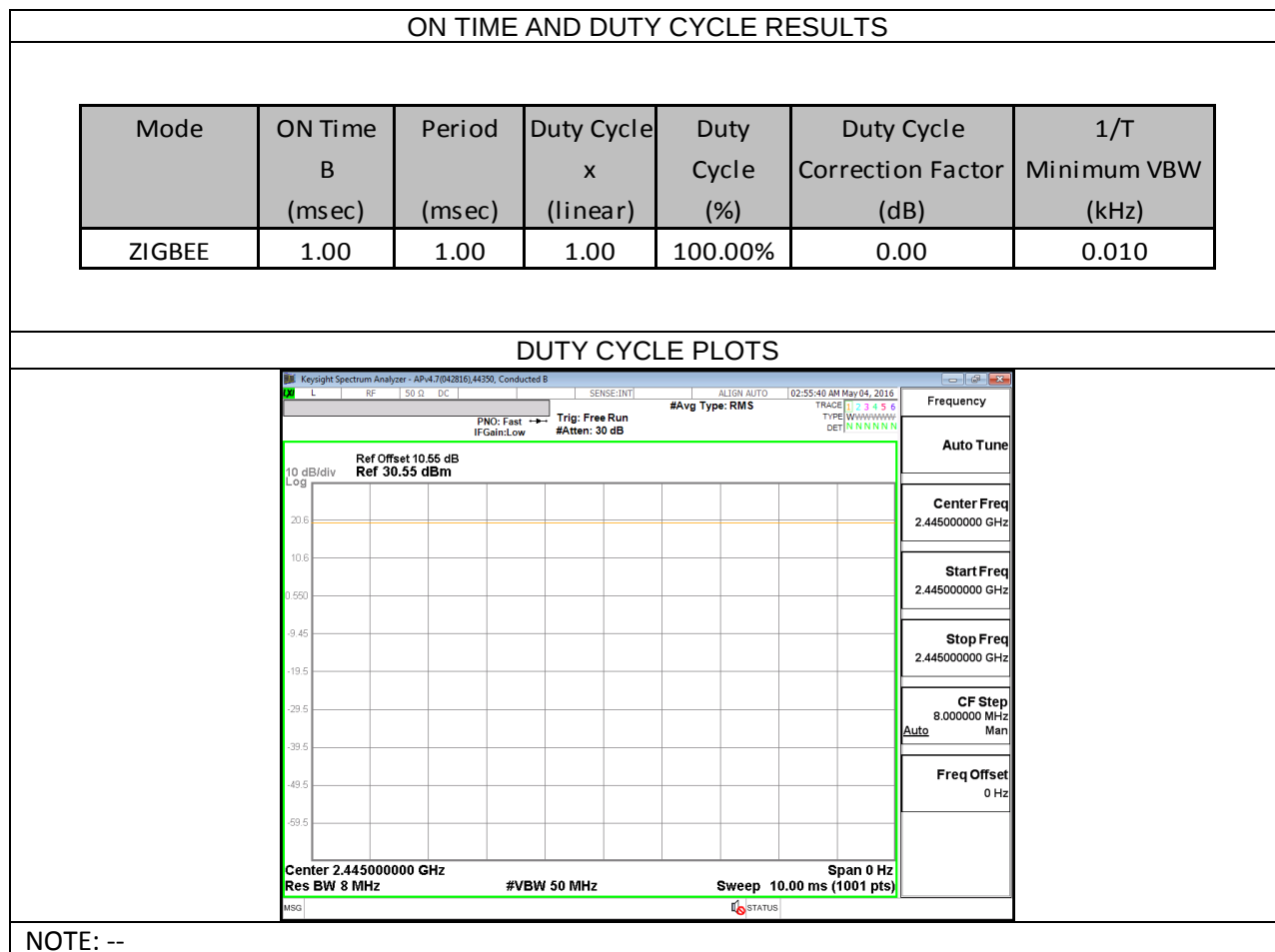
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

RESULTS



8.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
IC RSS-247 5.2.1

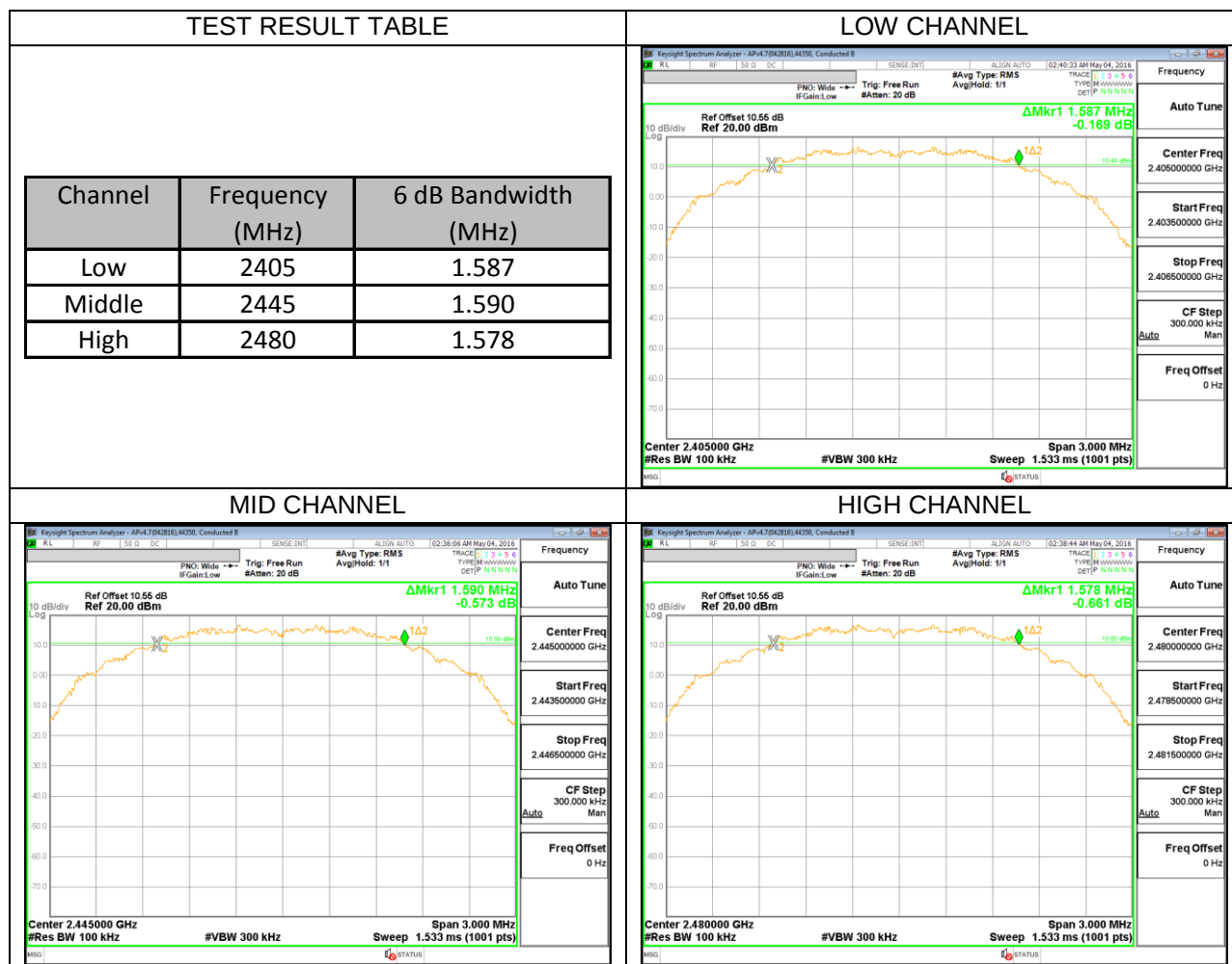
The minimum 6 dB bandwidth shall be at least 500 kHz.

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

8.2.1. 6 dB BANDWIDTH PLOTS AND TABLE



8.3. 99% BANDWIDTH

LIMITS

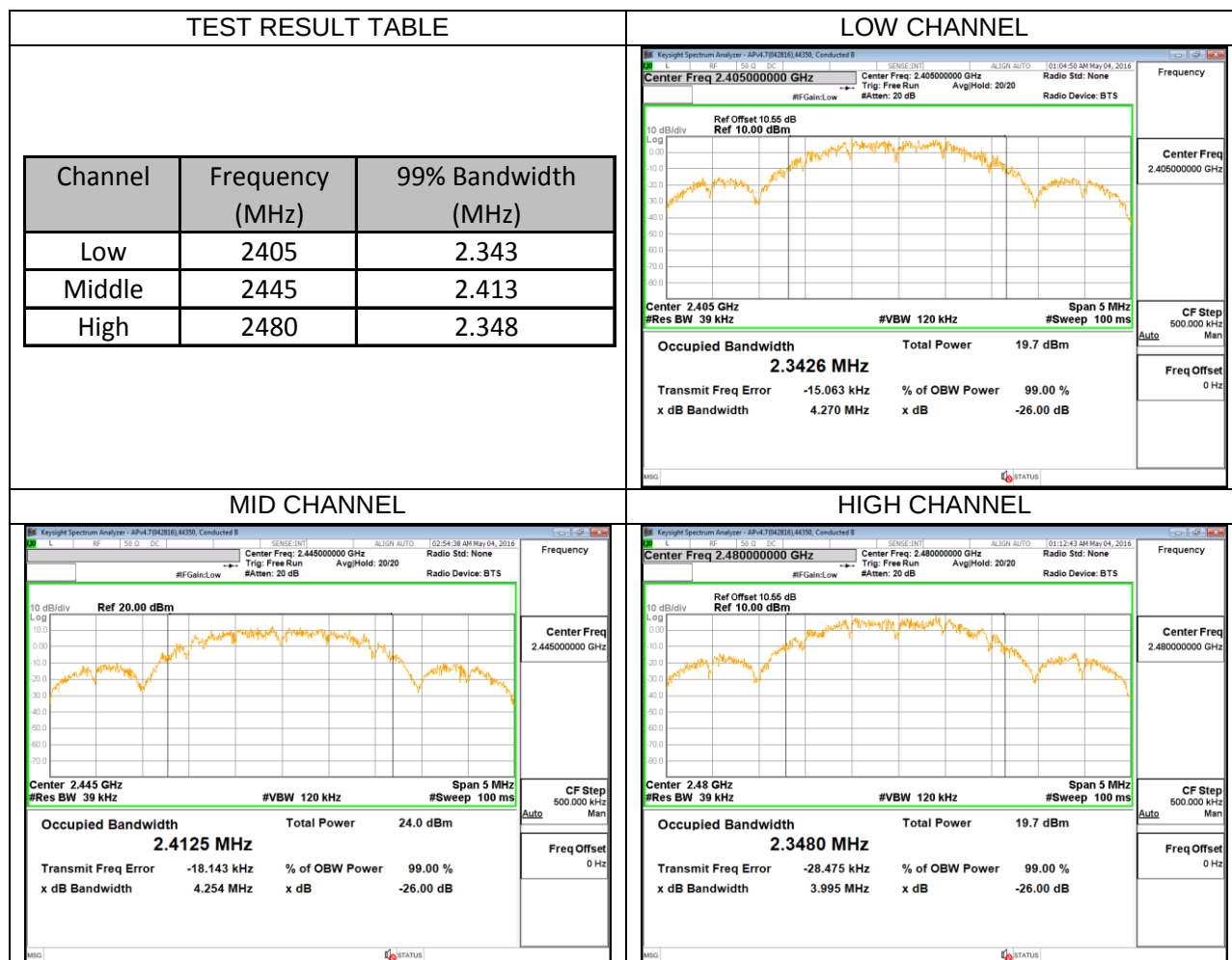
None; for reporting purposes only.

TEST PROCEDURE

Refer to KDB558074 D01 DTS Meas Guidance v03r04: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

8.3.1. 99% BANDWIDTH PLOTS AND TABLE



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b)
IC RSS-247 5.4.4

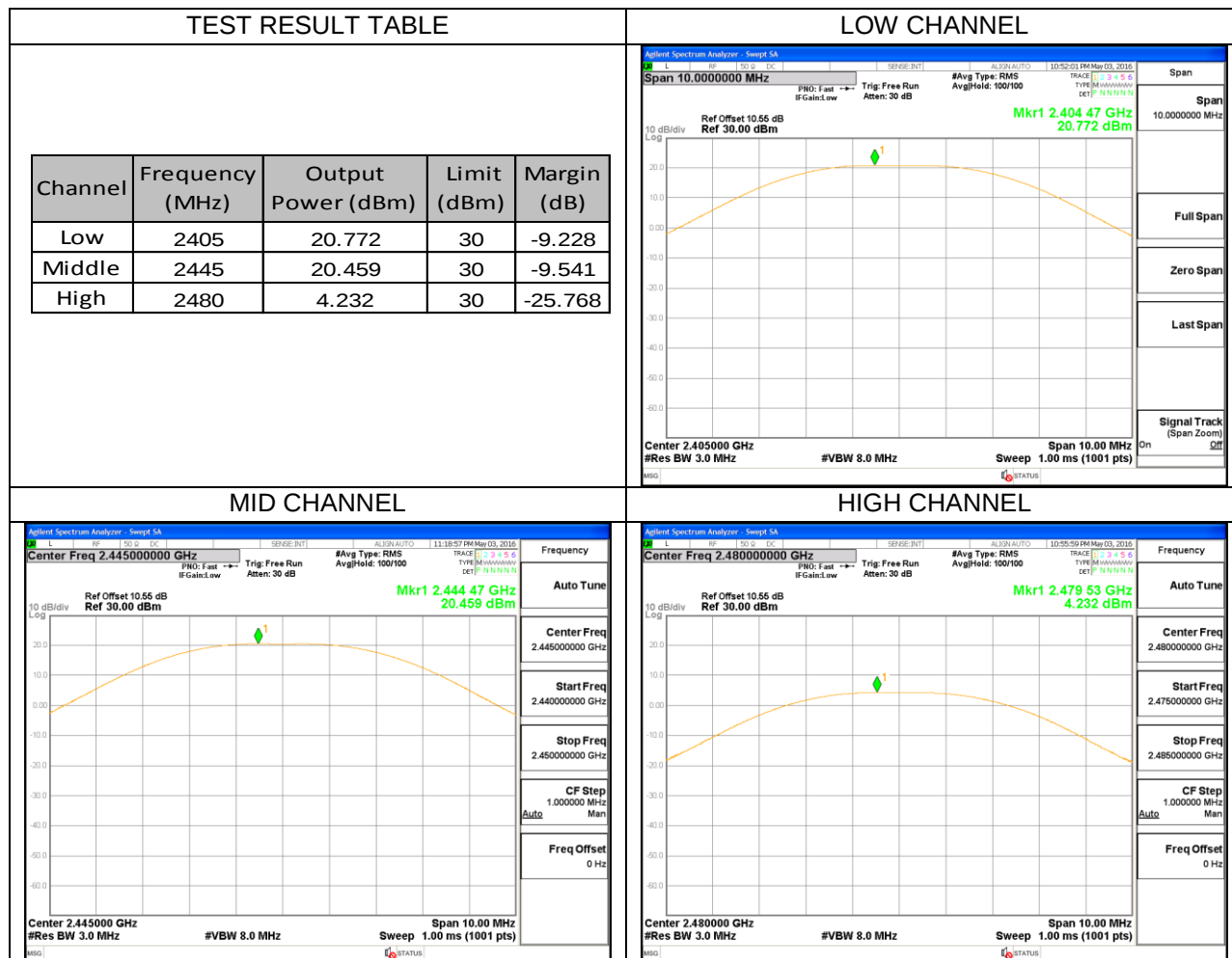
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r04 spectrum analyzer.

RESULTS

8.4.1. OUTPUT POWER PLOTS



8.5. 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 10.55 dB (including 10 dB pad and 0.55 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2405	20.150
Middle	2445	20.420
24	2470	20.250
25	2475	13.870
26	2480	2.990

NOTE: --

8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

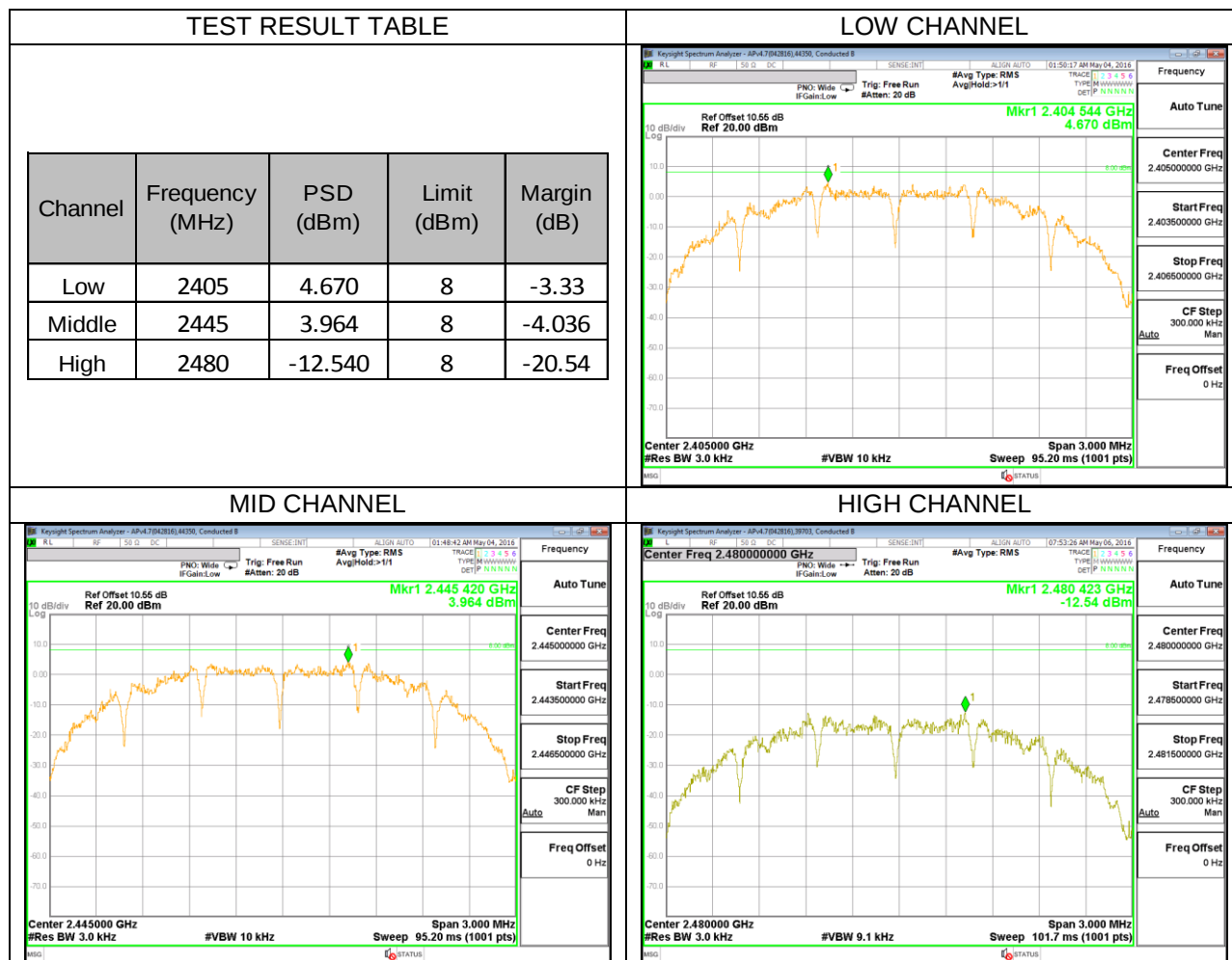
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the “Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v03r04.

RESULTS

8.6.1. POWER SPECTRAL DENSITY PLOTS AND TABLE



8.7. 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.

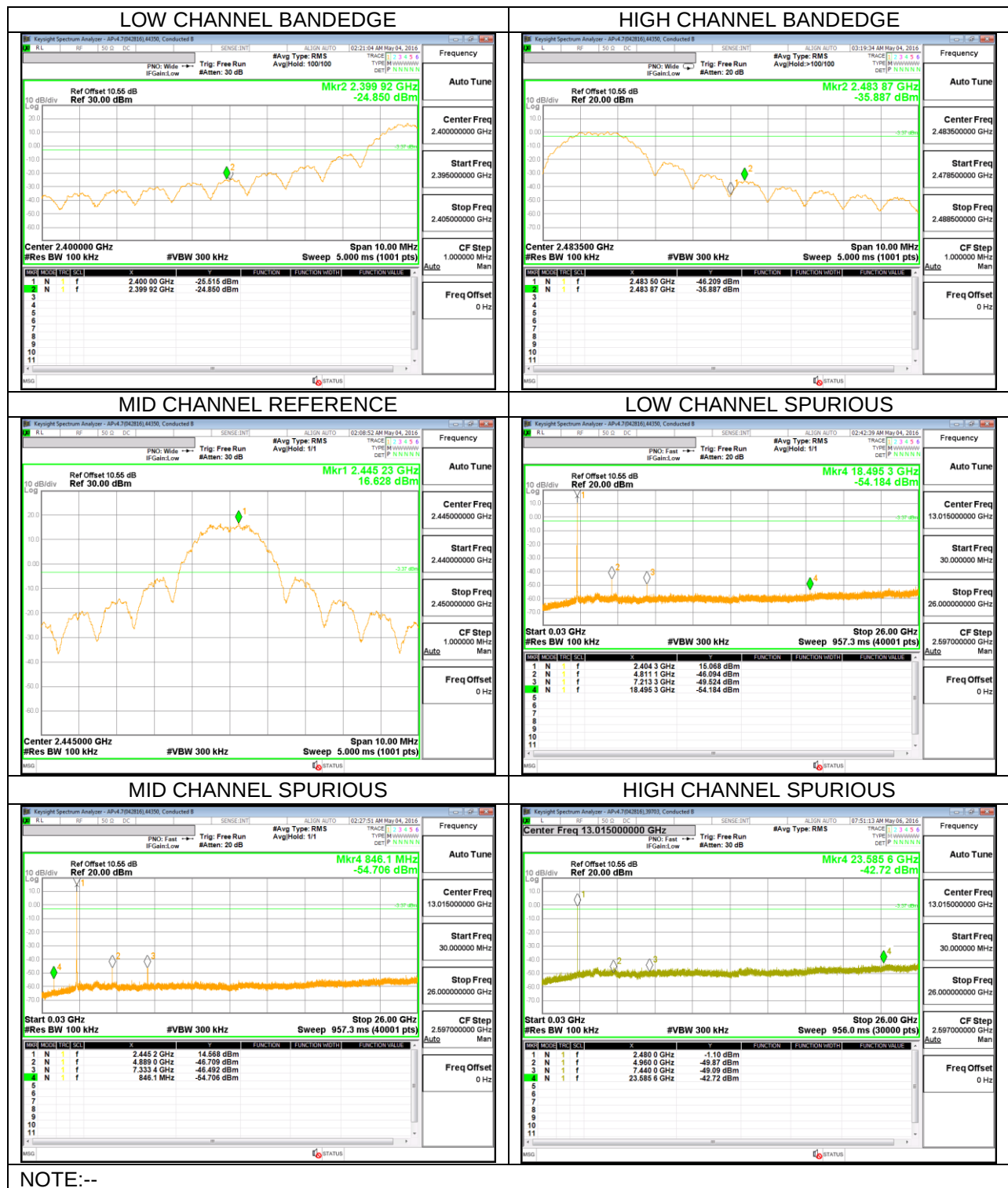
TEST PROCEDURE

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

8.7.1. BANDEDGE AND SPURIOUS EMISSIONS PLOTS



9. RADIATED TEST RESULTS

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 for below 1GHz and 150cm for above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak and 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.

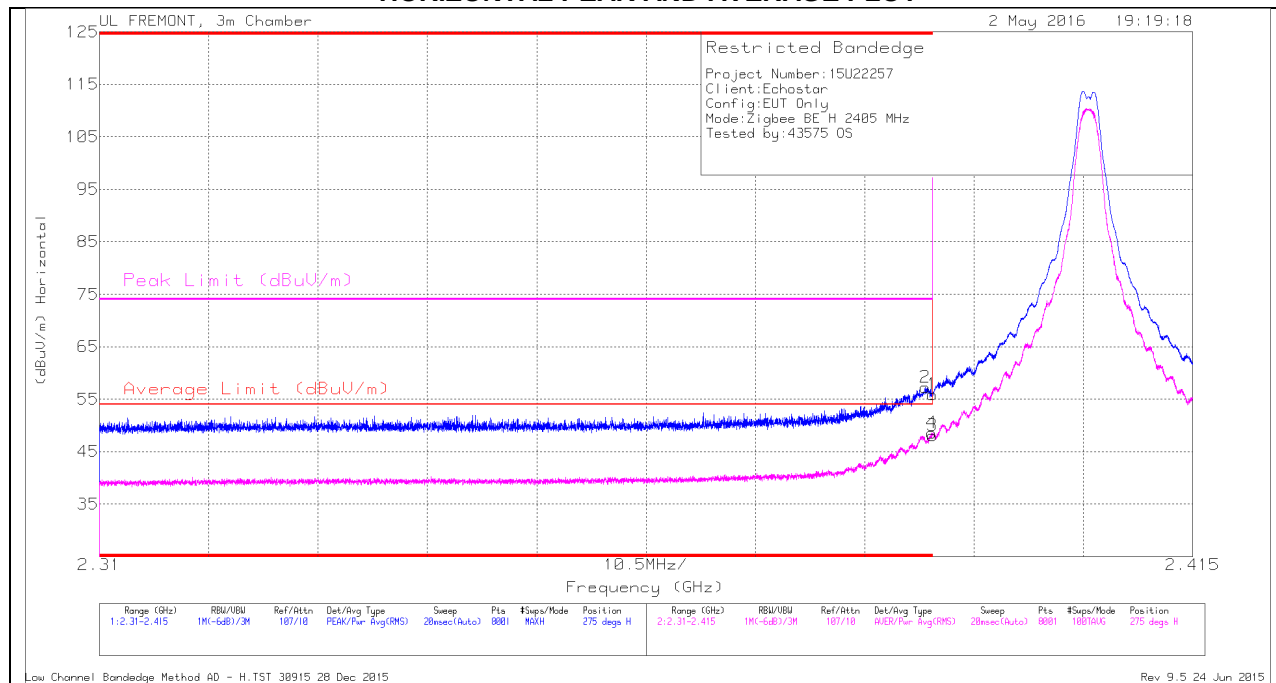
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

9.1. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

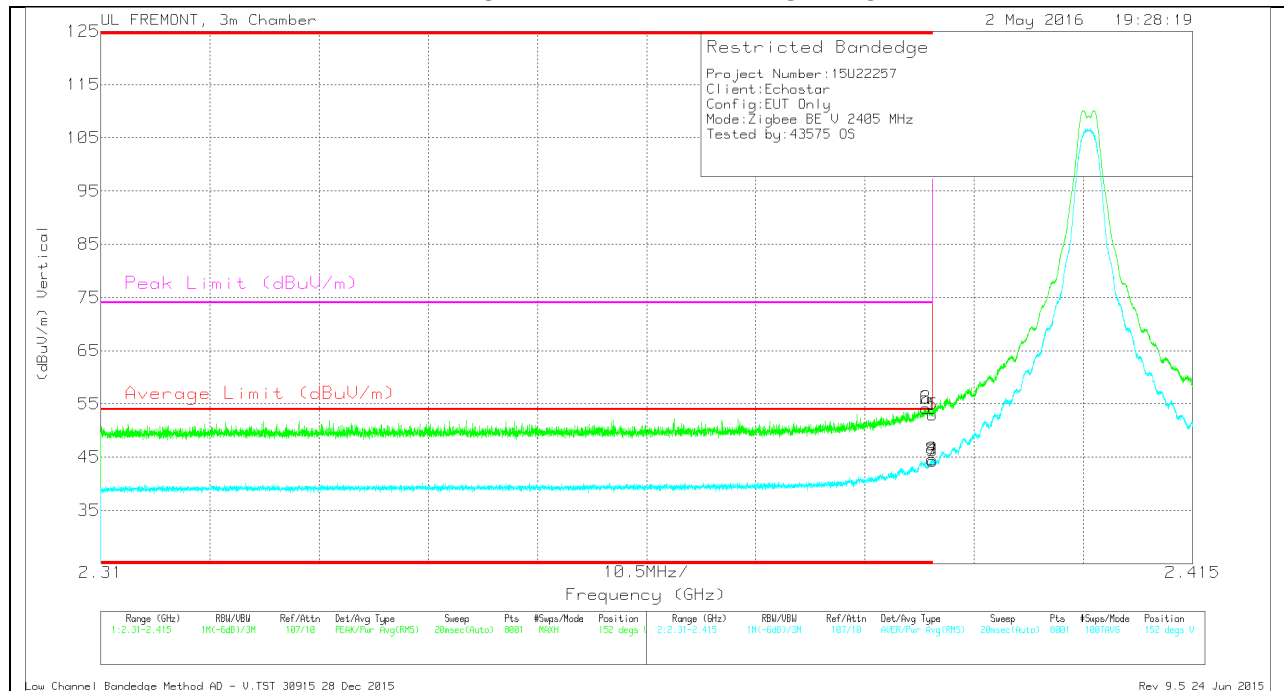
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	43.93	Pk	32.1	-20.2	0	55.83	-	-	74	-18.17	275	244	H
2	* 2.389	45.29	Pk	32.1	-20.2	0	57.19	-	-	74	-16.81	275	244	H
3	* 2.39	36.21	RMS	32.1	-20.2	0	48.11	54	-5.89	-	-	275	244	H
4	* 2.39	36.69	RMS	32.1	-20.2	0	48.59	54	-5.41	-	-	275	244	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	42.32	Pk	32.1	-20.2	0	54.22	-	-	74	-19.78	152	382	V
1	* 2.39	41.03	Pk	32.1	-20.2	0	52.93	-	-	74	-21.07	152	382	V
3	* 2.39	32.37	RMS	32.1	-20.2	0	44.27	54	-9.73	-	-	152	382	V
4	* 2.39	32.69	RMS	32.1	-20.2	0	44.59	54	-9.41	-	-	152	382	V

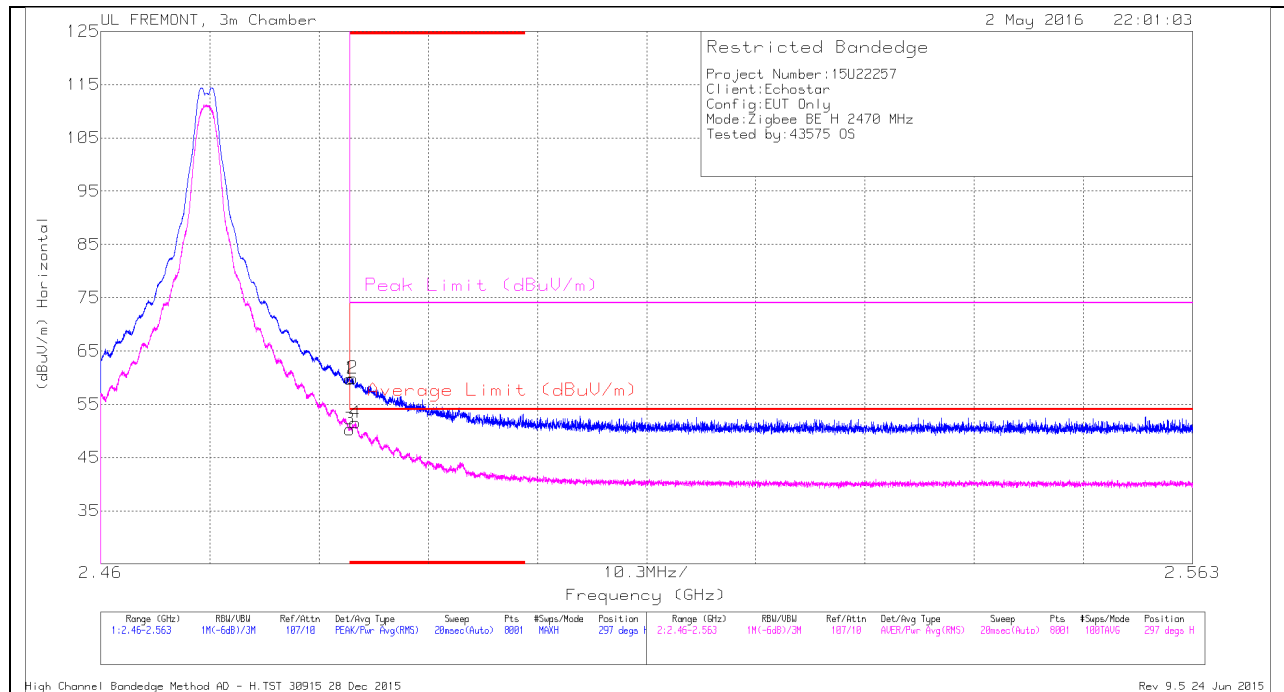
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL 2470MHz)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

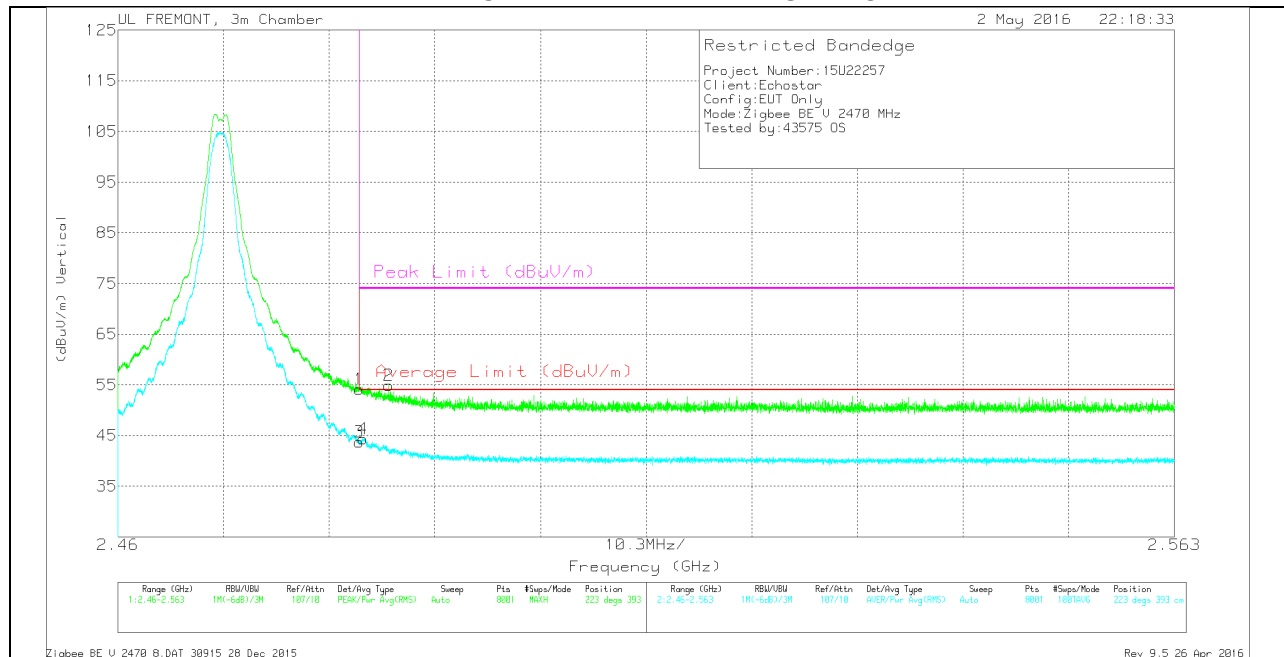
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	47.43	Pk	32.4	-20.1	0	59.73	-	-	74	-14.27	297	352	H
2	* 2.484	47.58	Pk	32.4	-20.1	0	59.88	-	-	74	-14.12	297	352	H
3	* 2.484	37.97	RMS	32.4	-20.1	0	50.27	54	-3.73	-	-	297	352	H
4	* 2.484	39.25	RMS	32.4	-20.1	0	51.55	54	-2.45	-	-	297	352	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT119 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.484	41.8	Pk	32.4	-20.1	54.1	-	-	74	-19.9	223	393	V
3	2.484	31.42	RMS	32.4	-20.1	43.72	54	-10.28	-	-	223	393	V
4	2.484	32.07	RMS	32.4	-20.1	44.37	54	-9.63	-	-	223	393	V
2	2.486	42.57	Pk	32.4	-20.1	54.87	-	-	74	-19.13	223	393	V

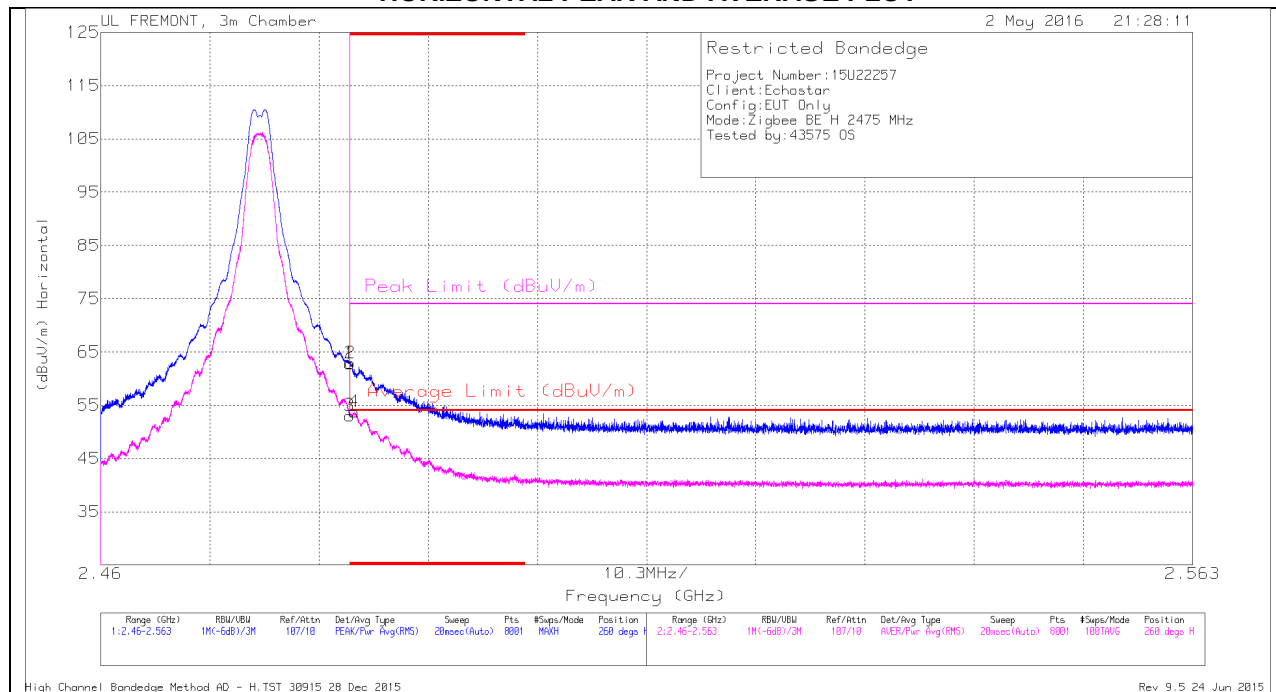
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL 2475MHz)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

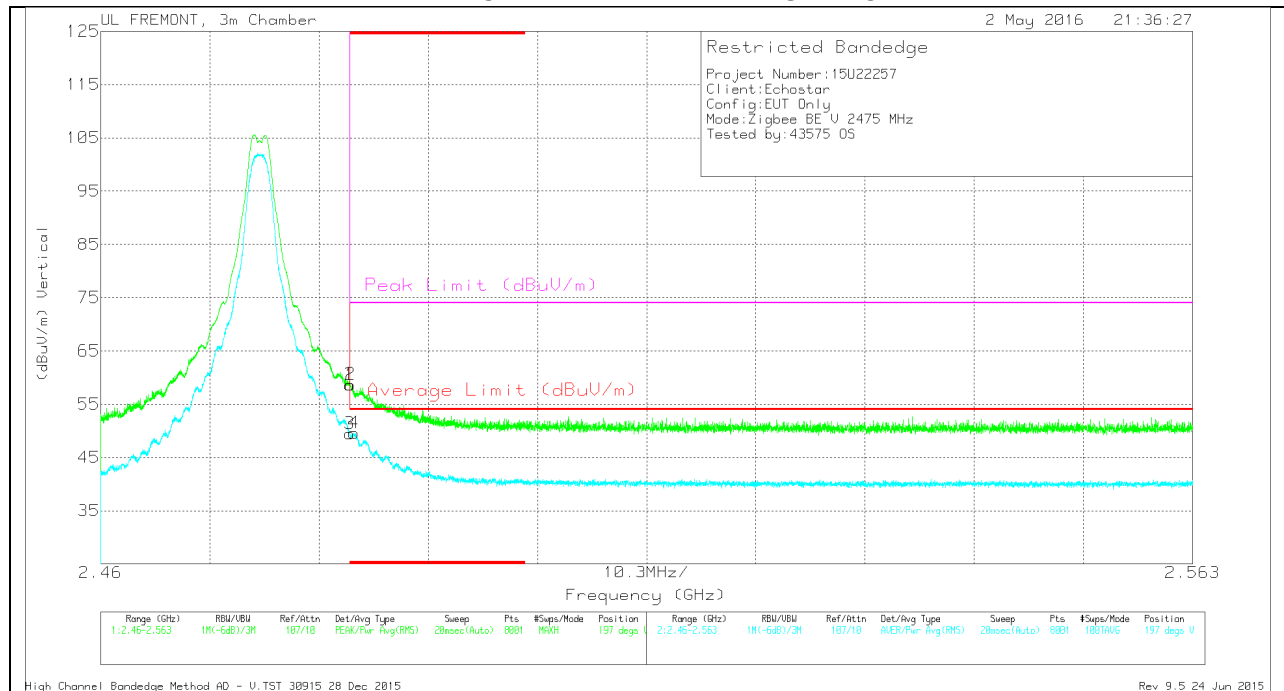
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	50.5	Pk	32.4	-20.1	0	62.8	-	-	74	-11.2	260	235	H
2	* 2.484	50.59	Pk	32.4	-20.1	0	62.89	-	-	74	-11.11	260	235	H
3	* 2.484	40.73	RMS	32.4	-20.1	0	53.03	54	-97	-	-	260	235	H
4	* 2.484	41.42	RMS	32.4	-20.1	0	53.72	54	-28	-	-	260	235	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.33	Pk	32.4	-20.1	0	58.63	-	-	74	-15.37	197	396	V
2	* 2.484	46.38	Pk	32.4	-20.1	0	58.68	-	-	74	-15.32	197	396	V
3	* 2.484	37.15	RMS	32.4	-20.1	0	49.45	54	-4.55	-	-	197	396	V
4	* 2.484	37.29	RMS	32.4	-20.1	0	49.59	54	-4.41	-	-	197	396	V

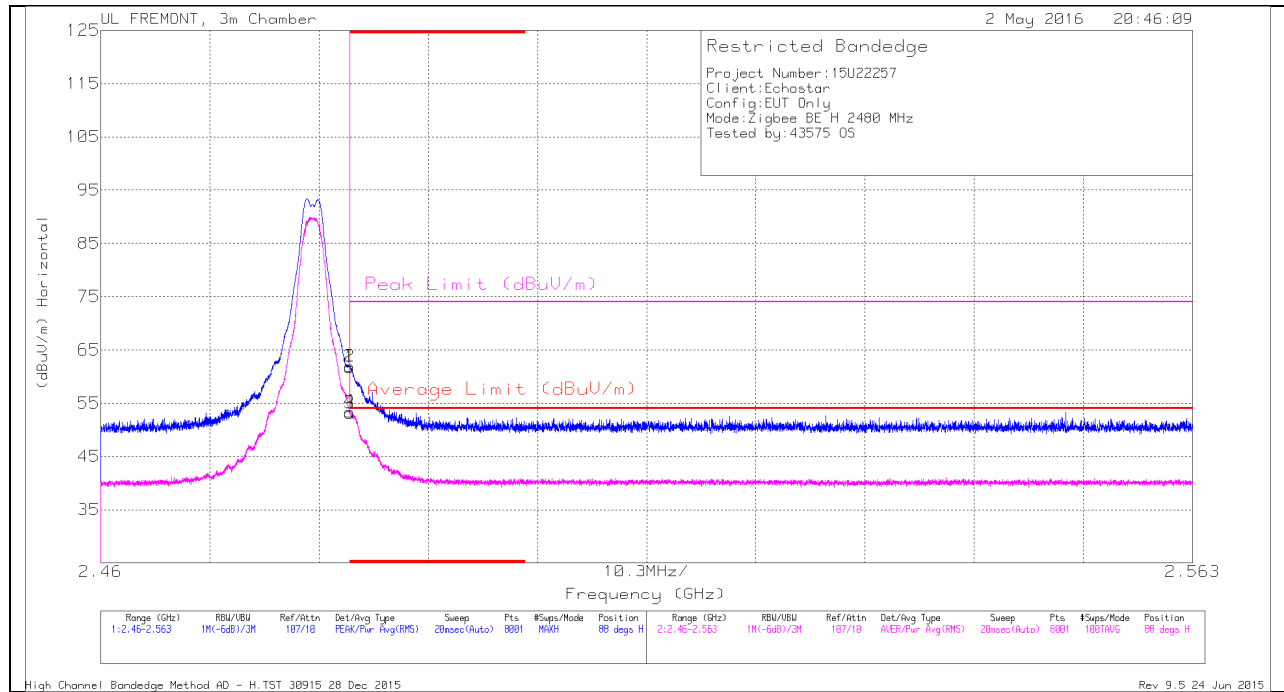
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL 2480MHz)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

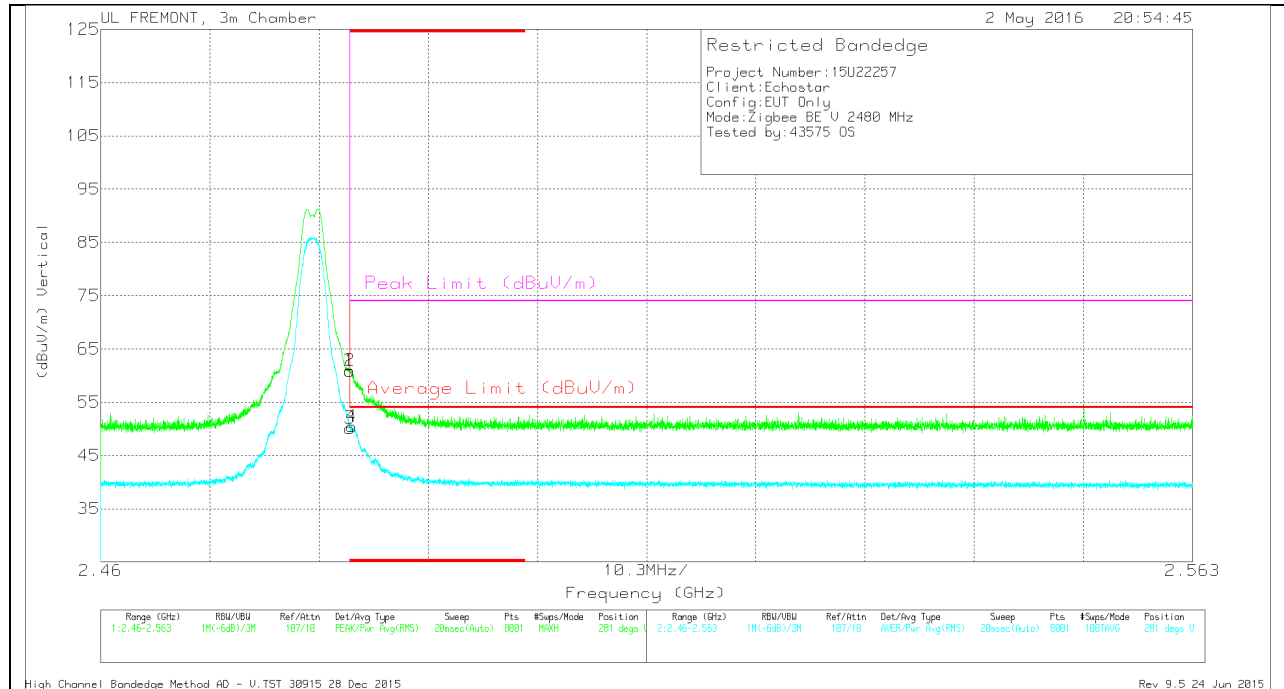
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.44	Pk	32.4	-20.1	0	61.74	-	-	74	-12.26	88	253	H
2	* 2.484	49.64	Pk	32.4	-20.1	0	61.94	-	-	74	-12.06	88	253	H
3	* 2.484	40.86	RMS	32.4	-20.1	0	53.16	54	-84	-	-	88	253	H
4	* 2.484	41.1	RMS	32.4	-20.1	0	53.4	54	-6	-	-	88	253	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

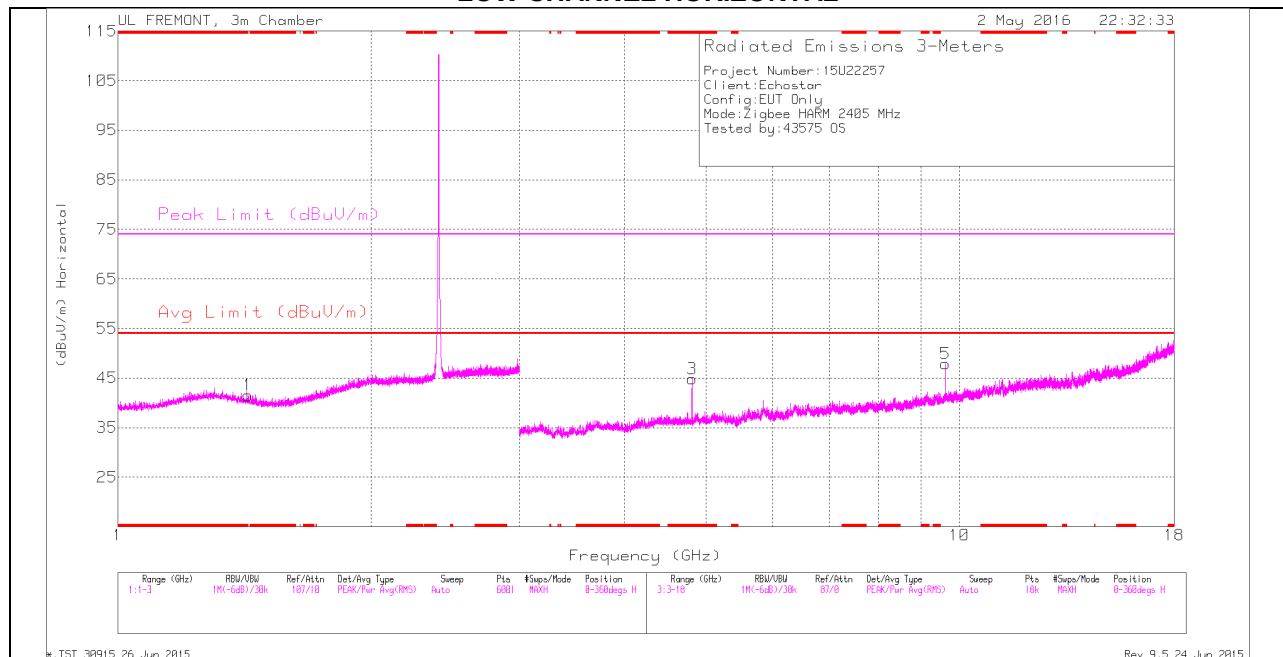
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filter (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	48.57	Pk	32.4	-20.1	0	60.87	-	-	74	-13.13	281	244	V
2	* 2.484	48.62	Pk	32.4	-20.1	0	60.92	-	-	74	-13.08	281	244	V
3	* 2.484	37.82	RMS	32.4	-20.1	0	50.12	54	-3.88	-	-	281	244	V
4	* 2.484	38.12	RMS	32.4	-20.1	0	50.42	54	-3.58	-	-	281	244	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

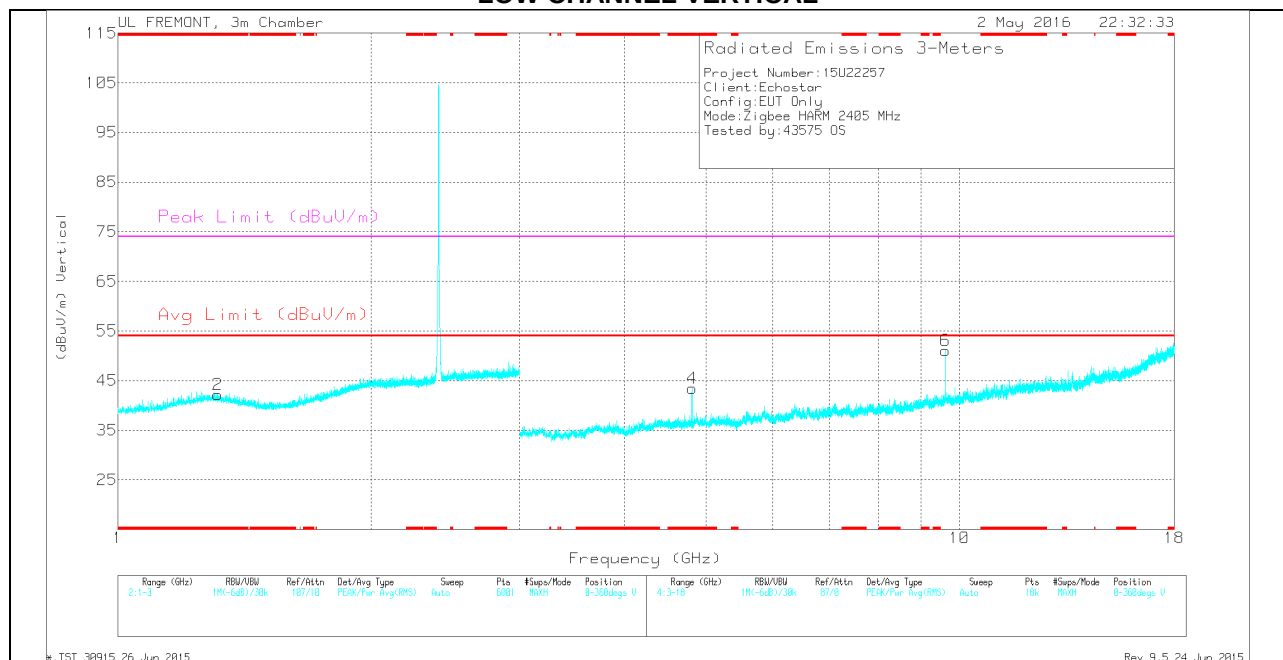
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS LOW CHANNEL HORIZONTAL



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

LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 1.314	33.64	Pk	29.8	-21.3	0	42.14	-	-	74	-31.86	0-360	100	V
1	* 1.427	33.98	Pk	28.6	-21.1	0	41.48	-	-	74	-32.52	0-360	100	H
3	* 4.811	38.29	Pk	34.2	-27.7	0	44.79	-	-	74	-29.21	0-360	100	H
4	* 4.811	36.97	Pk	34.2	-27.7	0	43.47	-	-	74	-30.53	0-360	100	V
6	9.618	35.71	Pk	36.7	-21.4	0	51.01	-	-	-	-	0-360	100	V
5	9.621	32.45	Pk	36.7	-21.3	0	47.85	-	-	-	-	0-360	100	H

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

Radiated Emissions

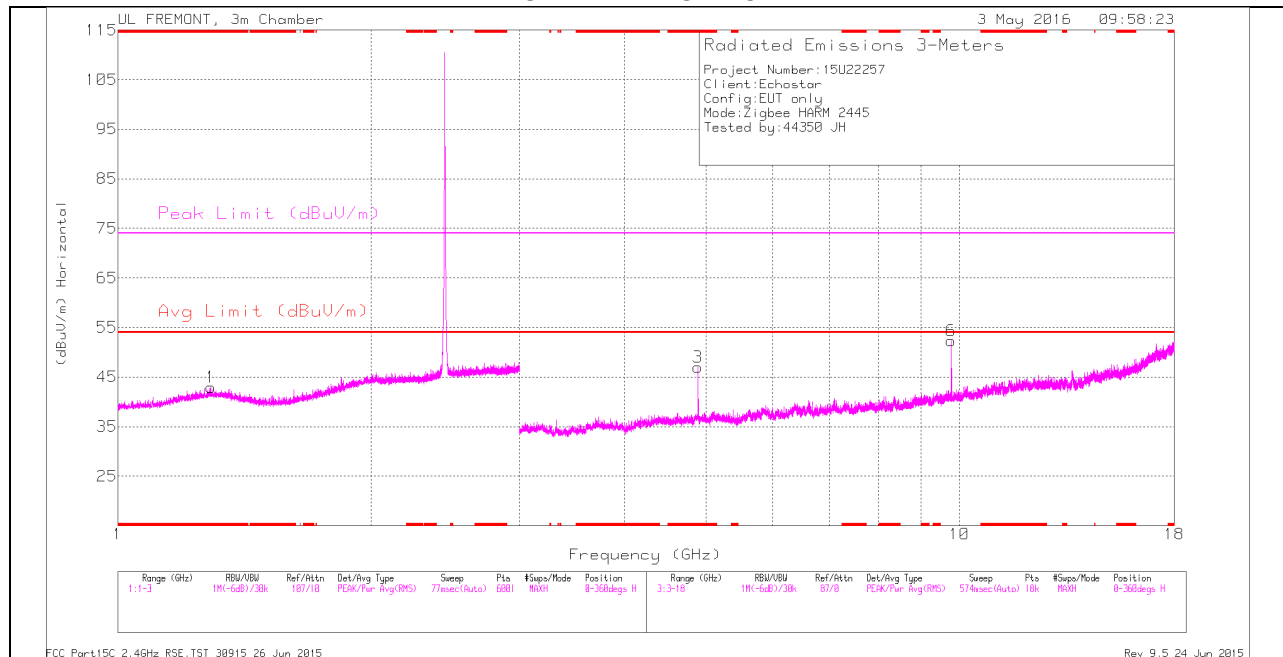
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.427	41.65	PK2	28.6	-21.1	0	49.15	-	-	74	-24.85	102	279	H
* 1.426	29.56	MAV1	28.6	-21.1	0	37.06	54	-16.94	-	-	102	279	H
* 1.315	41.69	PK2	29.8	-21.3	0	50.19	-	-	74	-23.81	11	139	V
* 1.316	29.74	MAV1	29.7	-21.3	0	38.14	54	-15.86	-	-	11	139	V
* 4.809	44.18	PK2	34.2	-27.6	0	50.78	-	-	74	-23.22	1	101	H
* 4.811	36.02	MAV1	34.2	-27.7	0	42.52	54	-11.48	-	-	1	101	H
* 4.811	43.55	PK2	34.2	-27.7	0	50.05	-	-	74	-23.95	141	100	V
* 4.811	35.44	MAV1	34.2	-27.7	0	41.94	54	-12.06	-	-	141	100	V
9.618	41.94	PK2	36.7	-21.4	0	57.24	-	-	74	-16.76	348	103	V
9.622	40.62	PK2	36.7	-21.3	0	56.02	-	-	74	-17.98	96	110	H

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

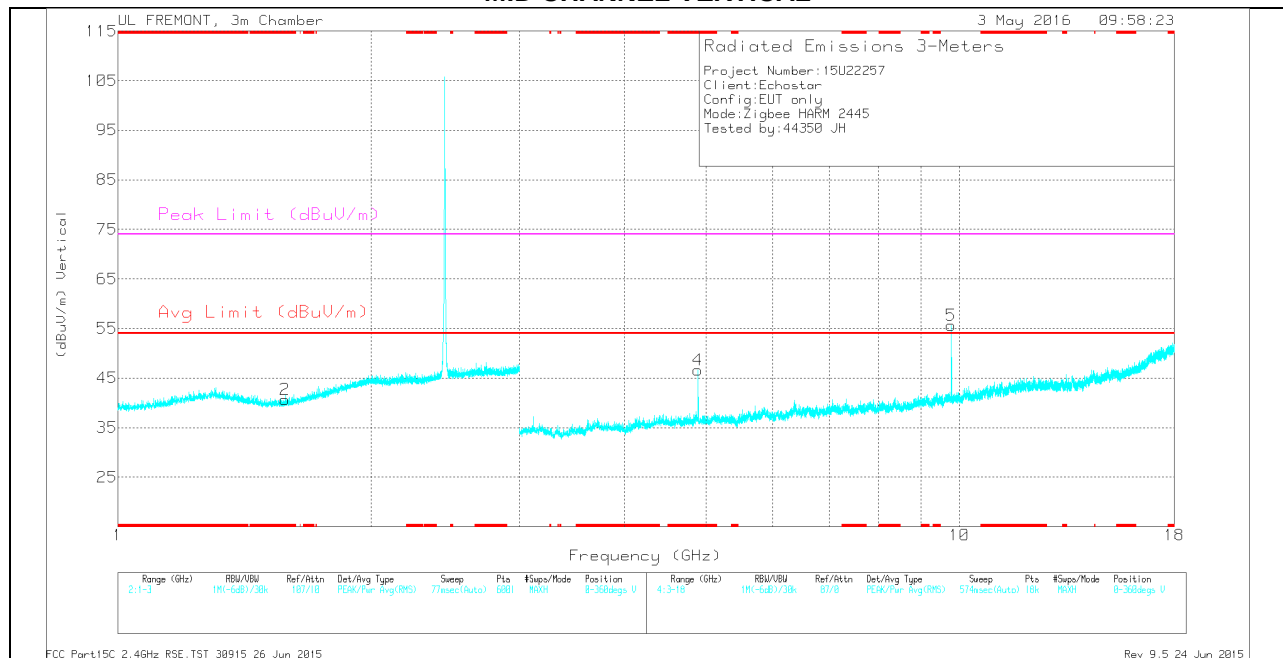
MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL



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

MID CHANNEL VERTICAL



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

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.289	34.41	Pk	29.8	-21.3	0	42.91	-	-	74	-31.09	0-360	101	H
2	* 1.58	33.57	Pk	27.9	-20.8	0	40.67	-	-	74	-33.33	0-360	100	V
3	* 4.891	39.96	Pk	34.2	-27.2	0	46.96	-	-	74	-27.04	0-360	100	H
4	* 4.891	39.58	Pk	34.2	-27.2	0	46.58	-	-	74	-27.42	0-360	200	V
5	9.778	41.13	Pk	36.8	-22.3	0	55.63	-	-	-	-	0-360	100	V
6	9.781	37.73	Pk	36.9	-22.3	0	52.33	-	-	-	-	0-360	100	H

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Pk - Peak detector

Radiated Emissions

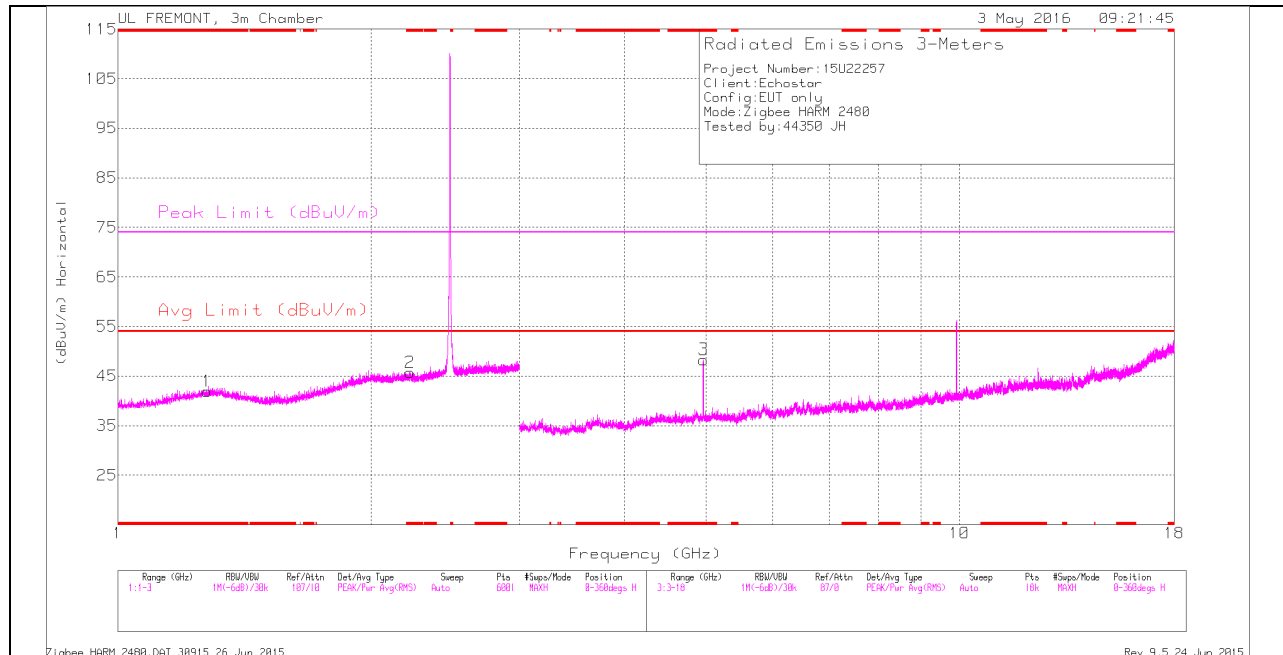
Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/ Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.287	41.85	PK2	29.8	-21.3	0	50.35	-	-	74	-23.65	134	102	H
* 1.289	30.17	MAv1	29.8	-21.3	0	38.67	54	-15.33	-	-	134	102	H
* 1.579	41.31	PK2	27.9	-20.8	0	48.41	-	-	74	-25.59	134	102	V
* 1.579	30.06	MAv1	27.9	-20.8	0	37.16	54	-16.84	-	-	134	102	V
* 4.889	45.13	PK2	34.2	-27.1	0	52.23	-	-	74	-21.77	219	101	H
* 4.891	38.43	MAv1	34.2	-27.2	0	45.43	54	-8.57	-	-	219	101	H
* 4.889	44.44	PK2	34.2	-27.1	0	51.54	-	-	74	-22.46	345	237	V
* 4.889	37.47	MAv1	34.2	-27.1	0	44.57	54	-9.43	-	-	345	237	V
9.782	43.08	PK2	36.9	-22.3	0	57.68	-	-	74	-16.32	284	112	H
9.782	44.21	PK2	36.9	-22.3	0	58.81	-	-	74	-15.19	134	102	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

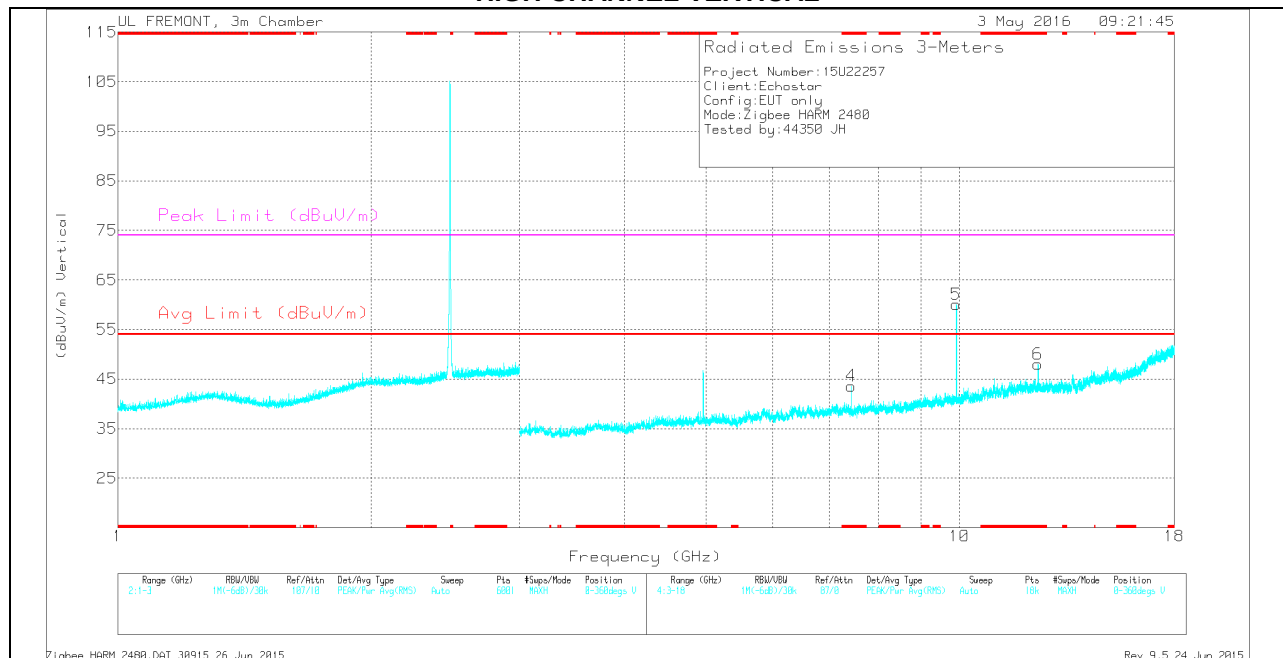
MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



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

HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.275	33.63	Pk	29.7	-21.4	0	41.93	-	-	74	-32.07	0-360	200	H
2	* 2.223	34.31	Pk	31.7	-20.3	0	45.71	-	-	74	-28.29	0-360	100	H
3	* 4.961	41.63	Pk	34.2	-27.5	0	48.33	-	-	74	-25.67	0-360	100	H
4	* 7.441	33.23	Pk	35.7	-25.3	0	43.63	-	-	74	-30.37	0-360	100	V
6	* 12.397	29.96	Pk	39.3	-21.3	0	47.96	-	-	74	-26.04	0-360	100	V
5	9.917	44.75	Pk	37	-21.7	0	60.05	-	-	-	-	0-360	100	V

* - indicates frequency in CFR15.205/IC 8.10 Restricted Band

Avg - Video bandwidth < Resolution bandwidth

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.277	41.64	PK2	29.7	-21.3	0	50.04	-	-	74	-23.96	307	101	H
* 1.274	30.25	MAV1	29.7	-21.4	0	38.55	54	-15.45	-	-	307	101	H
* 2.223	41.54	PK2	31.7	-20.3	0	52.94	-	-	74	-21.06	307	101	H
* 2.224	30.02	MAV1	31.7	-20.3	0	41.42	54	-12.58	-	-	307	101	H
* 4.959	48.15	PK2	34.2	-27.4	0	54.95	-	-	74	-19.05	120	332	H
* 4.959	41.94	MAV1	34.2	-27.4	0	48.74	54	-5.26	-	-	120	332	H
* 7.439	40.31	PK2	35.7	-25.4	0	50.61	-	-	74	-23.39	301	135	V
* 7.441	31.15	MAV1	35.7	-25.3	0	41.55	54	-12.45	-	-	301		V
9.922	48.15	PK2	37	-21.7	0	63.45	-	-	74	-10.55	149	100	V
* 12.397	37.2	PK2	39.3	-21.3	0	55.2	-	-	74	-18.8	307	101	V
* 12.397	27.91	MAV1	39.3	-21.3	0	45.91	54	-8.09	-	-	307	101	V

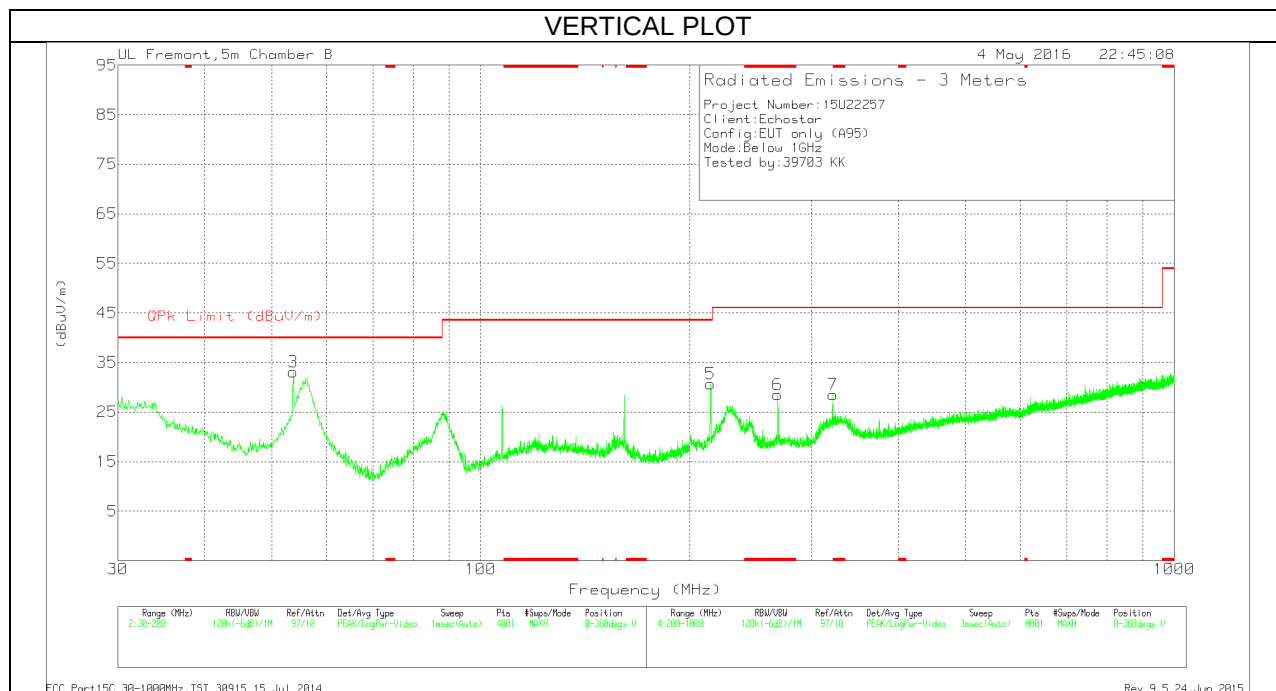
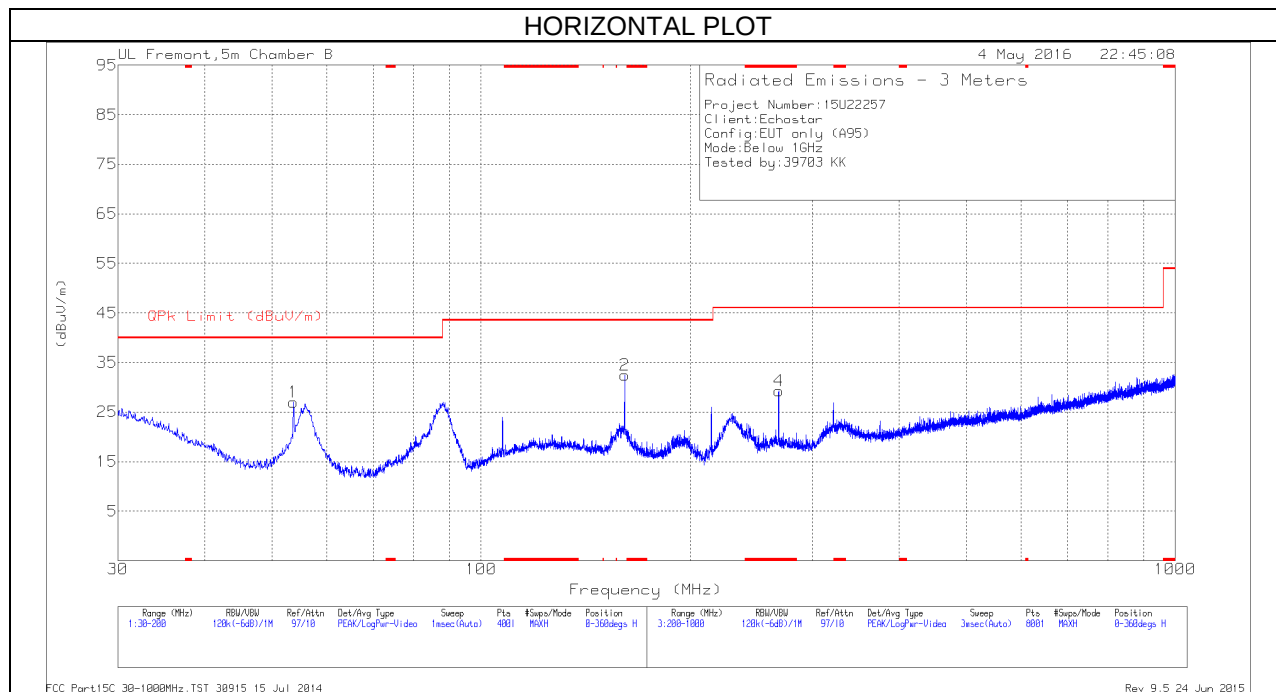
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

9.2. WORST-CASE BELOW 1 GHz

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



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 268.4	38.74	Pk	17	-26.4	29.34	46.02	-16.68	0-360	101	H
6	* 268.2	37.93	Pk	17	-26.4	28.53	46.02	-17.49	0-360	299	V
1	53.6725	44.55	Pk	11	-28.6	26.95	40	-13.05	0-360	299	H
3	53.6725	50.67	Pk	11	-28.6	33.07	40	-6.93	0-360	101	V
2	161.1125	43.81	Pk	16.1	-27.4	32.51	43.52	-11.01	0-360	100	H
5	214.6	43.08	Pk	14.5	-26.9	30.68	43.52	-12.84	0-360	199	V
7	321.9	36.63	Pk	18	-26.1	28.53	46.02	-17.49	0-360	101	V

* - indicates frequency in CFR15.205/IC8.10 Restricted Band

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
RSS-Gen 8.8

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

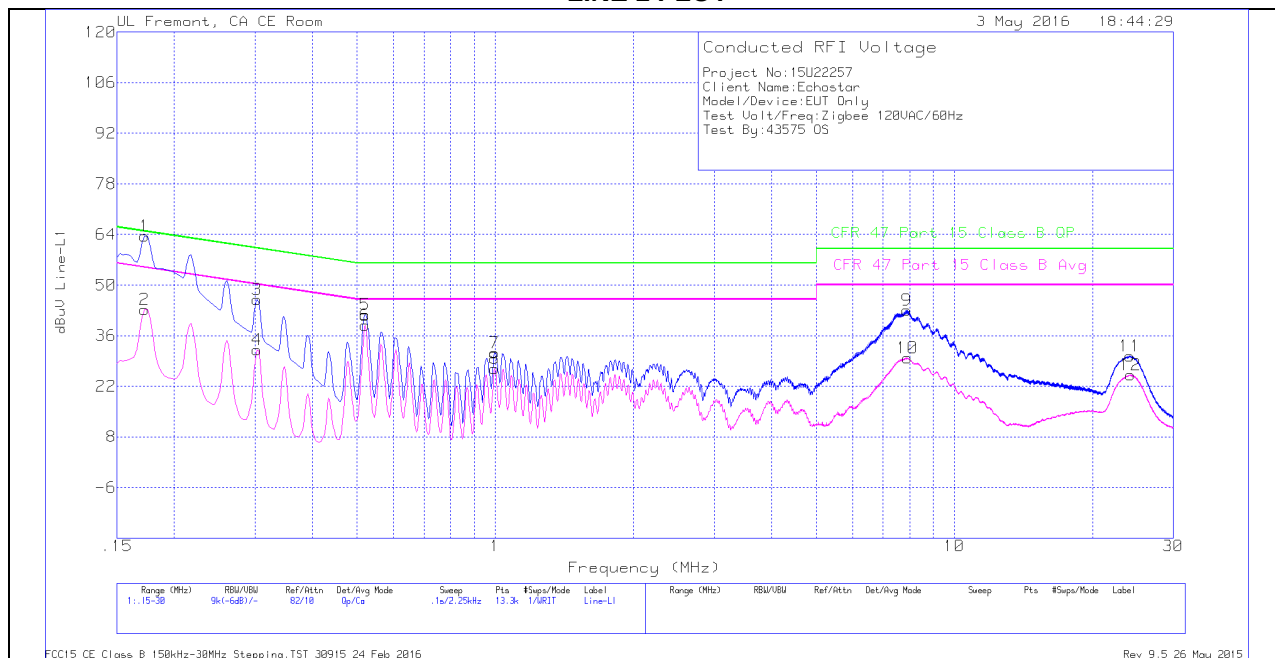
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

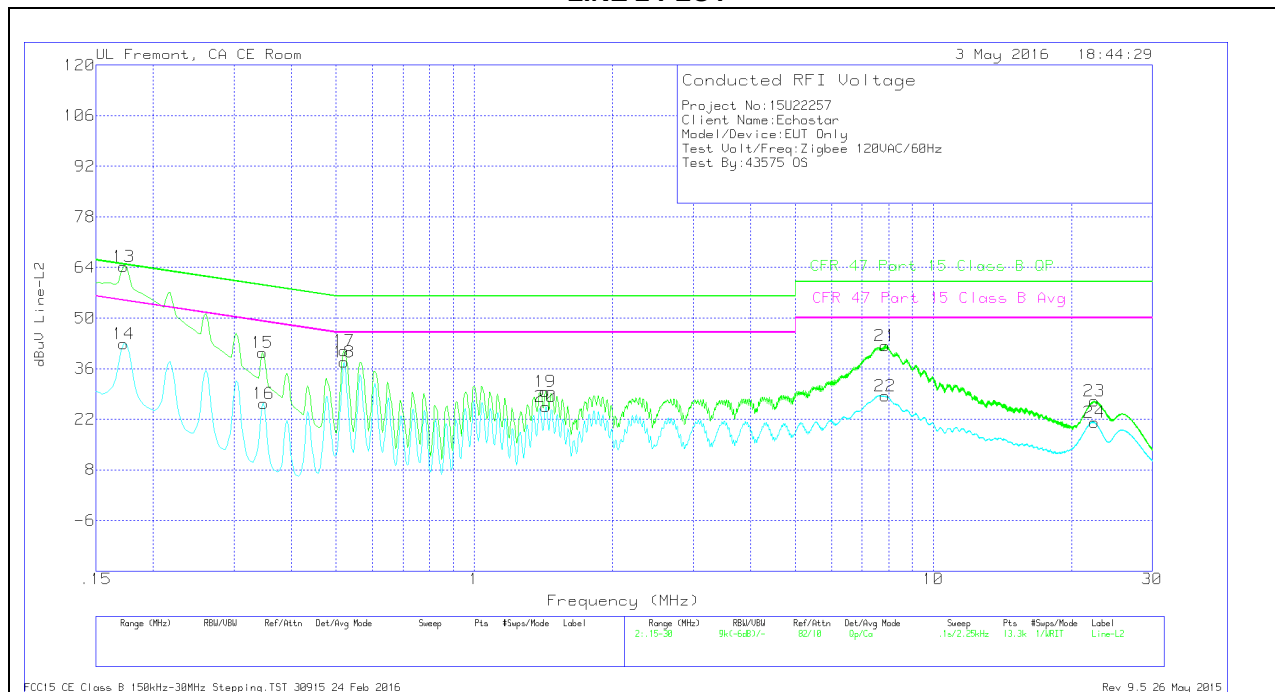
RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 2 PLOT



LINE 1 and 2 RESULT

Trace Markers

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L1	LC Cables 1&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.1725	52.32	Qp	1.2	0	10.1	63.62	64.84	-1.22	-	-
2	.1725	31.91	Ca	1.2	0	10.1	43.21	-	-	54.84	-11.63
3	.303	35.32	Qp	.6	0	10.1	46.02	60.16	-14.14	-	-
4	.303	21.39	Ca	.6	0	10.1	32.09	-	-	50.16	-18.07
5	.52125	31.4	Qp	.3	0	10.1	41.8	56	-14.2	-	-
6	.52125	28.48	Ca	.3	0	10.1	38.88	-	-	46	-7.12
7	.99825	20.82	Qp	.3	0	10.1	31.22	56	-24.78	-	-
8	.99825	16.53	Ca	.3	0	10.1	26.93	-	-	46	-19.07
9	7.86975	32.54	Qp	.2	.1	10.2	43.04	60	-16.96	-	-
10	7.91025	19.35	Ca	.2	.1	10.2	29.85	-	-	50	-20.15
11	24.10575	19.37	Qp	.3	.2	10.5	30.37	60	-29.63	-	-
12	24.1935	13.98	Ca	.3	.3	10.5	25.08	-	-	50	-24.92

Qp - Quasi-Peak detector

Ca - CISPR average detection

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T1310 IL L2	LC Cables 2&3	10dB Pad	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.1725	53.01	Qp	1.2	0	10.1	64.31	64.84	-.53	-	-
14	.1725	31.57	Ca	1.2	0	10.1	42.87	-	-	54.84	-11.97
15	.34575	29.83	Qp	.5	0	10.1	40.43	59.06	-18.63	-	-
16	.348	15.77	Ca	.5	0	10.1	26.37	-	-	49.01	-22.64
17	.52125	30.56	Qp	.3	0	10.1	40.96	56	-15.04	-	-
18	.52125	27.44	Ca	.3	0	10.1	37.84	-	-	46	-8.16
19	1.428	19.22	Qp	.2	.1	10.1	29.62	56	-26.38	-	-
20	1.4325	15.03	Ca	.2	.1	10.1	25.43	-	-	46	-20.57
21	7.845	31.81	Qp	.2	.1	10.2	42.31	60	-17.69	-	-
22	7.86075	17.88	Ca	.2	.1	10.2	28.38	-	-	50	-21.62
23	22.42613	16.15	Qp	.3	.2	10.4	27.05	60	-32.95	-	-
24	22.4385	10.25	Ca	.3	.2	10.4	21.15	-	-	50	-28.85

Qp - Quasi-Peak detector

Ca - CISPR average detection