



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

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

BT + BLE + NORDIC and WLAN DTS/UNII a/b/g/n/ac

**MODEL NUMBER: 1003
FCC ID: 2AES41003
IC ID: 20207-1003**

**REPORT NUMBER: 15U21133-E1 REVISION A
ISSUE DATE: AUG 18, 2015**

Prepared for
**Valve Corporation
10900 NE 4TH ST, SUITE 500
BELLEVUE, WA 98004, 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
--	07/20/15	Initial Issue	P. ZHANG
A	8/18/15	Update section 5.2	P. ZHANG

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
TEST METHODOLOGY	5
2. FACILITIES AND ACCREDITATION	5
3. CALIBRATION AND UNCERTAINTY	6
3.1. MEASURING INSTRUMENT CALIBRATION	6
3.2. SAMPLE CALCULATION	6
3.3. MEASUREMENT UNCERTAINTY.....	6
4. EQUIPMENT UNDER TEST	7
4.1. DESCRIPTION OF EUT	7
4.2. MAXIMUM OUTPUT POWER.....	7
4.3. DESCRIPTION OF AVAILABLE ANTENNAS	7
4.4. WORST-CASE CONFIGURATION AND MODE	7
4.5. DESCRIPTION OF TEST SETUP.....	8
5. TEST AND MEASUREMENT EQUIPMENT	10
6. SUMMARY	11
7. ANTENNA PORT TEST RESULTS	11
7.1. 6 dB BANDWIDTH.....	12
7.2. 99% BANDWIDTH.....	16
7.3. OUTPUT POWER.....	20
7.4. AVERAGE POWER.....	24
7.5. POWER SPECTRAL DENSITY	25
7.6. CONDUCTED SPURIOUS EMISSIONS.....	29
8. RADIATED TEST RESULTS.....	36
8.1. LIMITS AND PROCEDURE	36
8.2. TRANSMITTER ABOVE 1 GHz	37
8.3. WORST-CASE BELOW 1 GHz.....	50
9. AC POWER LINE CONDUCTED EMISSIONS.....	53
10. SETUP PHOTOS	58
END OF REPORT	59

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: VALVE

EUT DESCRIPTION: BT+BLE+NORDIC and WLAN DTS/UNII a/b/g/n/ac

MODEL: 1003

SERIAL NUMBER: FL524000A0 (Conducted); FL524000E3 (Radiated)

DATE TESTED: JULY 1-15, 2015

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 revisions 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:

Tested By:



PENG ZHANG
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL Verification Services Inc.



CHARLES VERGONIO
CONSUMER TECHNOLOGY DIVISION
WISE LAB ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2009 for FCC and ANSI C63.10-2013 for IC, RSS-GEN Issue 4, RSS-247 Issue 1.

Testing for radiated emissions above 1GHz was performed with the EUT elevated at 1.5m instead of 0.8m. 1.5m is the required height in ANSI C63.10:2013 as referenced by RSS GEN issue 4. This test height has been permitted by FCC as discussed in FCC/TCB conference call in December 2014.

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(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.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	3.52 dB
Radiated Disturbance, 30 to 18000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a BT+BLE+NORDIC and WLAN DTS/UNII a/b/g/n/ac.

5.2. MAXIMUM OUTPUT POWER

Note: Power declared in the report are the worst case power & that production unit will not carry higher power listed in the report.

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402-2480	BLE	7.49	5.61

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an embedded antenna, with a maximum gain of 2.1 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

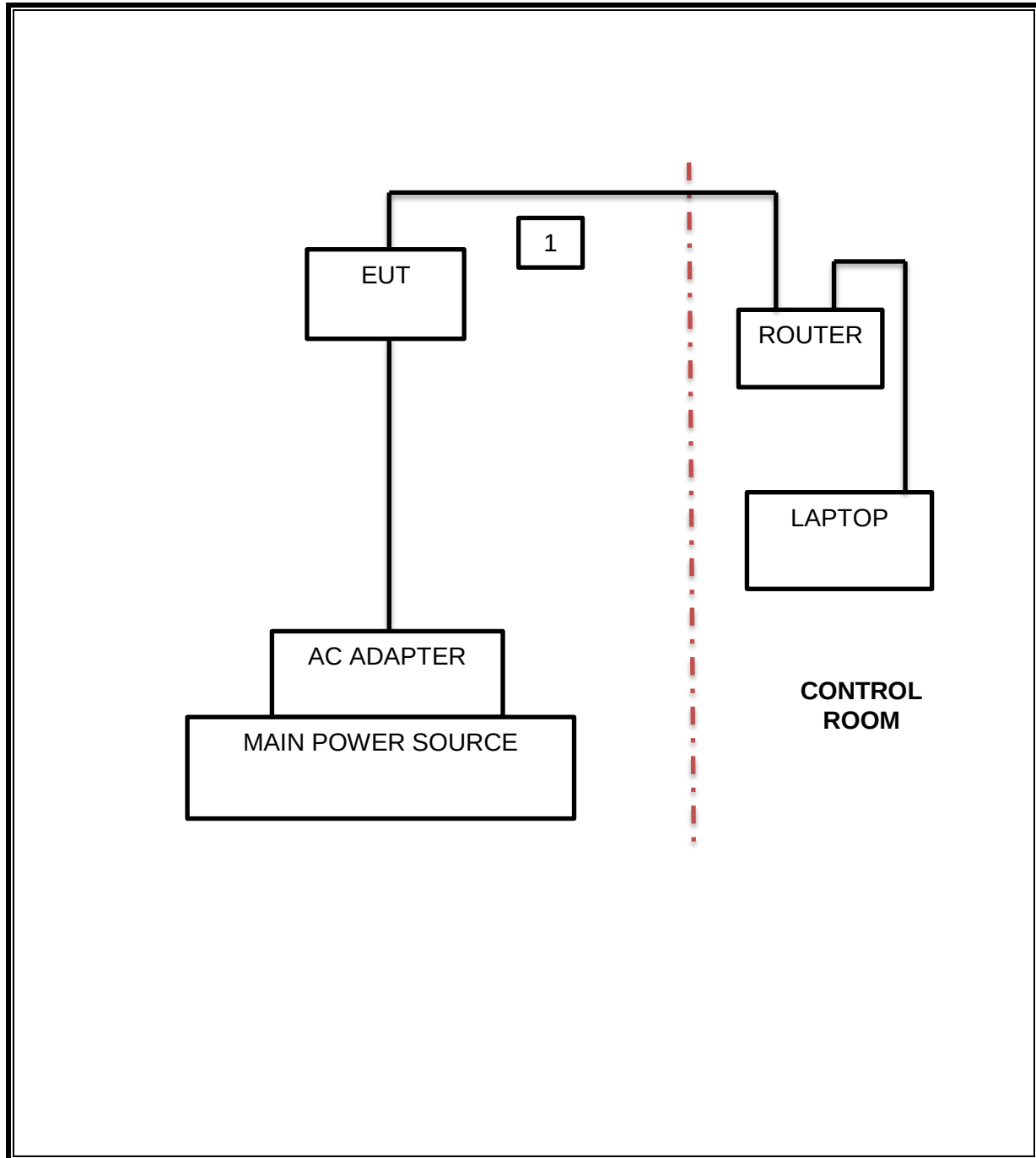
Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC ADAPTER	CHICONY	A15-012N1A	N/A	N/A
LAPTOP	DELL	N/A	N/A	N/A
LAPTOP	DELL	N/A	N/A	N/A
ROUTER	NETGEAR	N600	N/A	N/A
ROUTER	D-LINK	DIR-655B1	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Ethernet	1	RJ-45	Unshielded	5m	N/A

TEST SETUP

The EUT is setup as a stand-alone device.



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	Asset	Cal Due
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01171	02/13/16
Antenna, Horn, 18GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00980	11/14/15
RF Preamplifier, 100KHz -> 1300MHz	HP	8447D	T10	01/06/16
RF Preamplifier, 1GHz - 18GHz	Miteq	NSP4000-SP2	924343	03/23/16
RF Preamplifier, 1GHz - 26.5GHz	HP	8449B	F00351	06/27/16
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/15
CBT Bluetooth Tester	R & S	CBT	None	07/12/16
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/15
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/15
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/16
Reject Filter, 2.4GHz	Micro-Tronics	BRM50702	N02684	CNR
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012	
CLT Software	UL	UL RF	Ver 1.0, Feb 2 2015	
Antenna Port Software	UL	UL RF	Ver 2.1.1.1, Jan 20 2015	

7. SUMMARY

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-247 5.2 (1)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	0.715 MHz
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-38.502 dBm
15.247	RSS-247 5.4 (4)	TX conducted output power	<30dBm		Pass	7.49dBm
15.247	RSS-247 5.2 (2)	PSD	<8dBm		Pass	5.81dBm
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass	52.59dBuV
15.205, 15.209	RSS-GEN 8.9	Radiated Spurious Emission	< 54dBuV/m		Pass	48.22dBuV/m

8. ANTENNA PORT TEST RESULTS

8.1. 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.

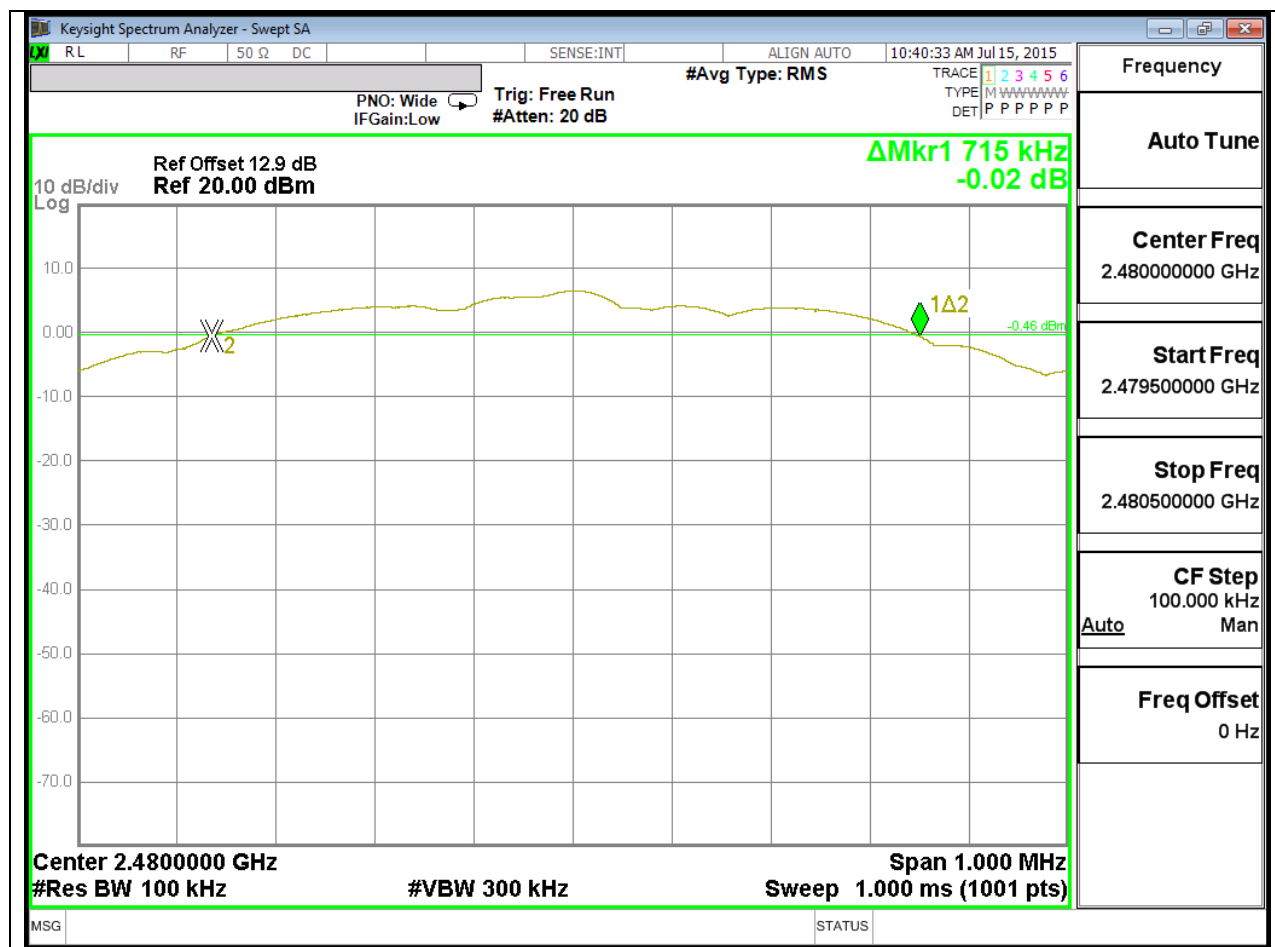
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.7320	0.5
Middle	2440	0.7340	0.5
High	2480	0.7150	0.5

MID CHANNEL



HIGH CHANNEL



8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

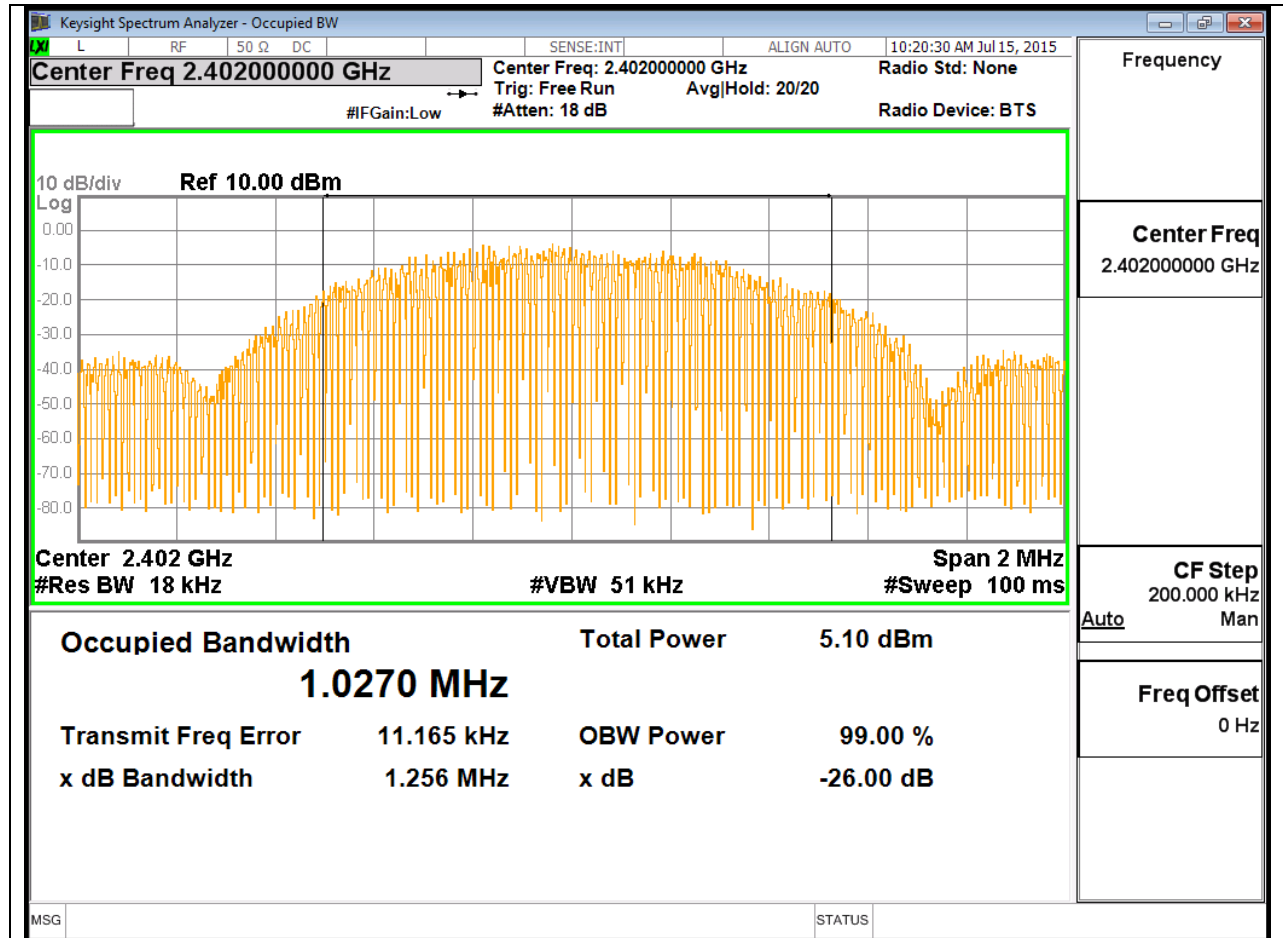
Reference to KDB558074 D01 DTS Meas Guidance v03r03: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

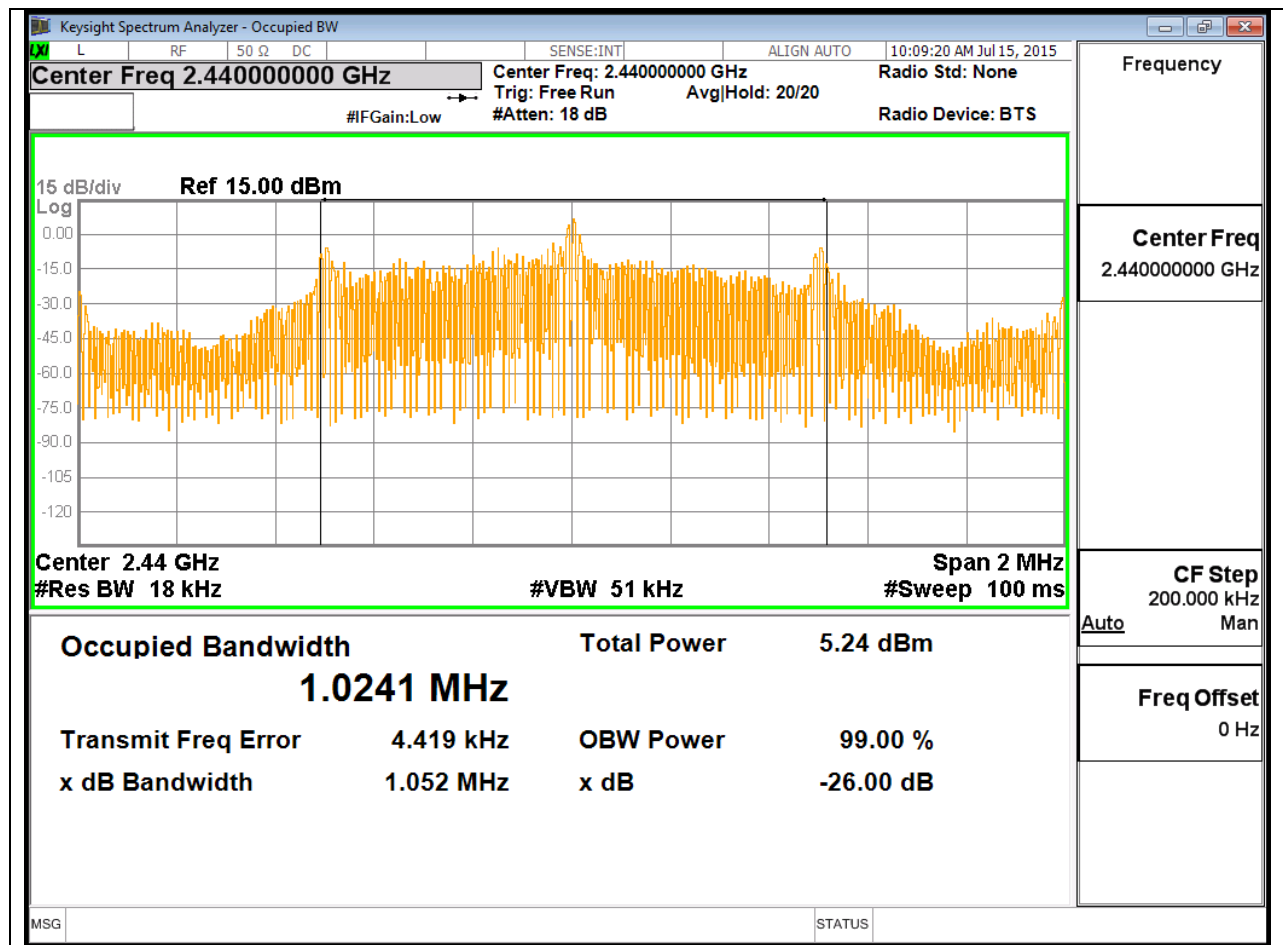
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0270
Middle	2440	1.0241
High	2480	1.0244

99% BANDWIDTH PLOTS

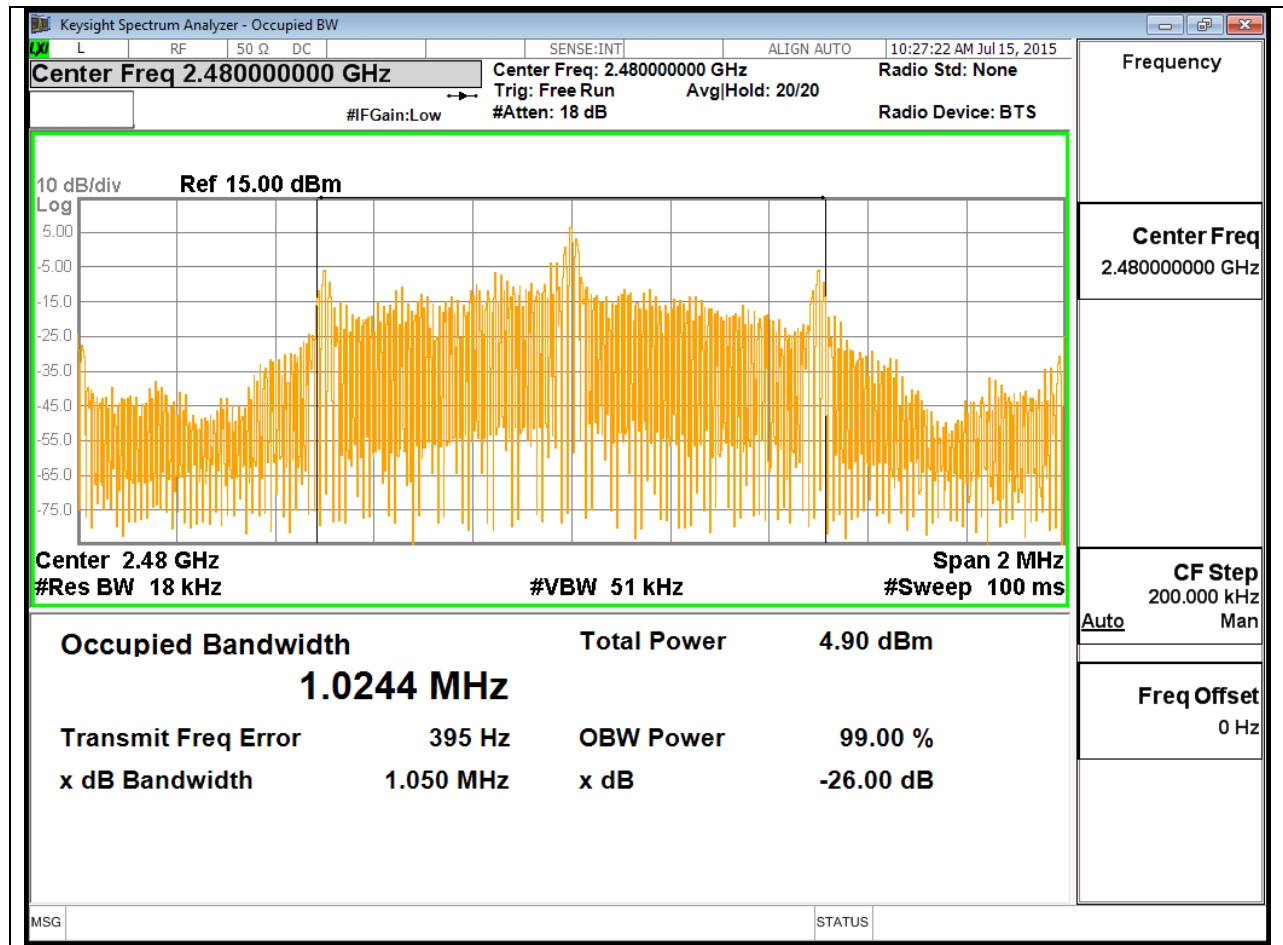
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.3. 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

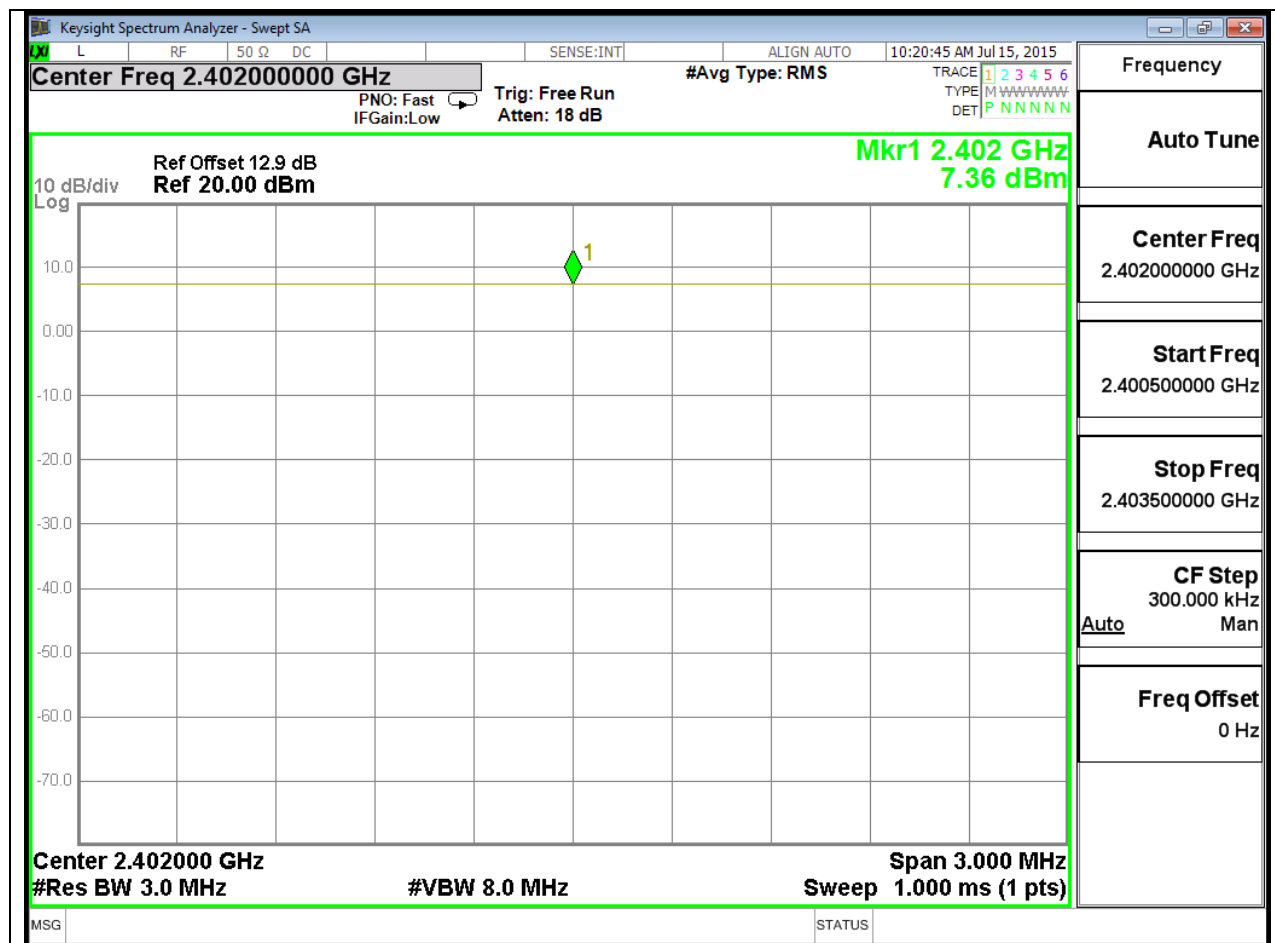
Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r03 utilizing spectrum analyzer.

RESULTS

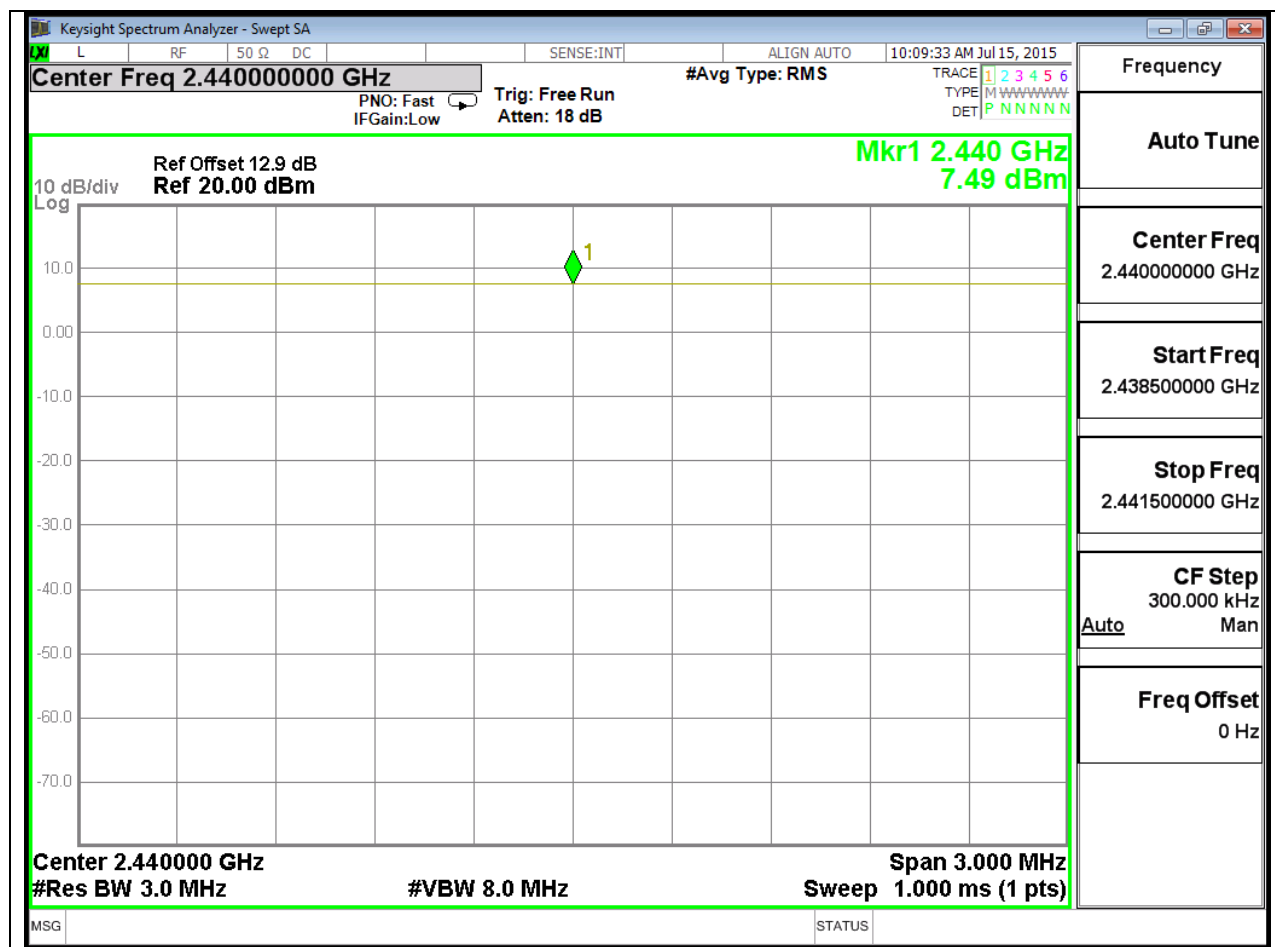
Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.360	30	-22.640
Middle	2440	7.490	30	-22.510
High	2480	7.160	30	-22.840

OUTPUT POWER PLOTS

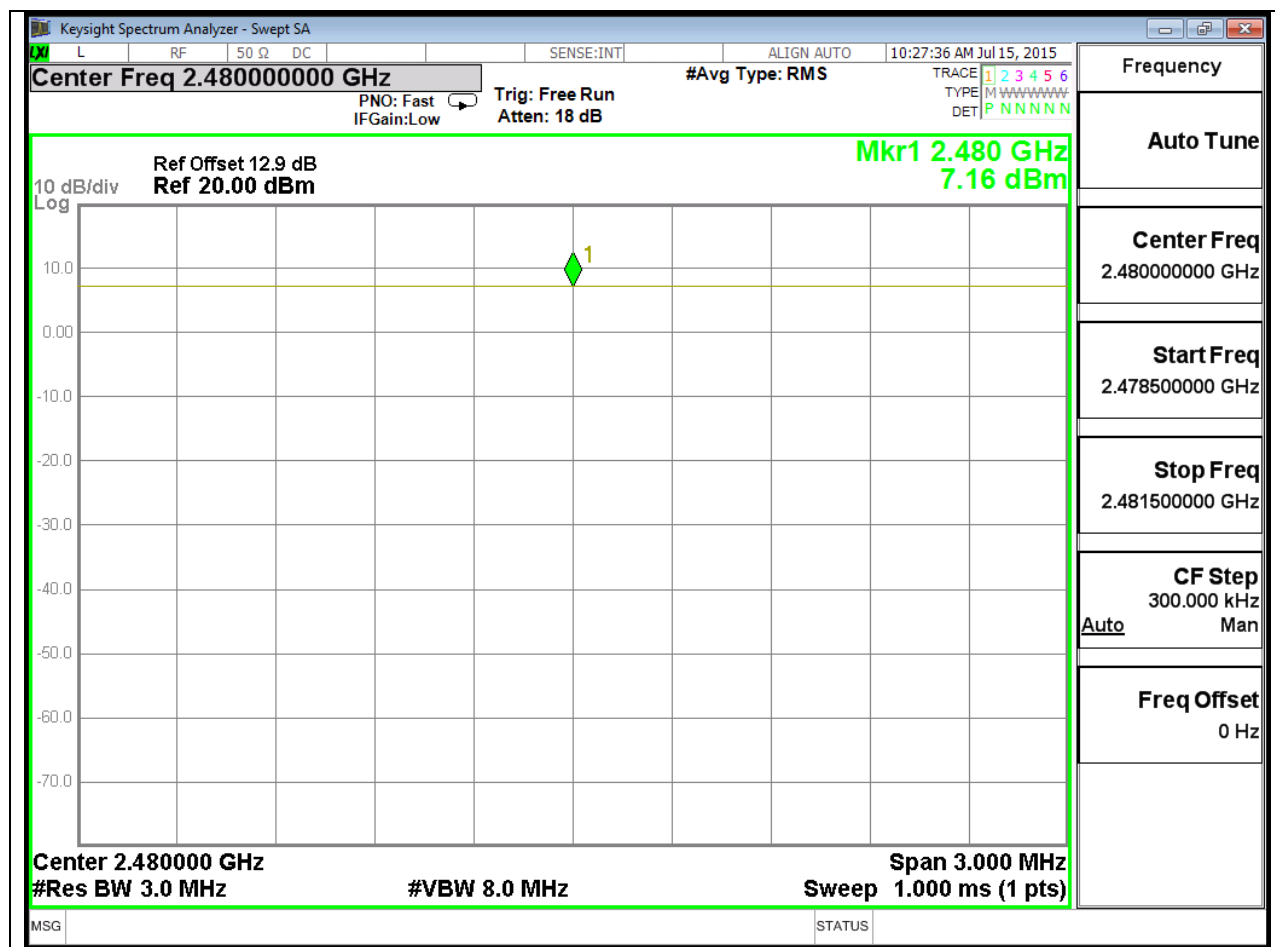
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.4. 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 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.16
Middle	2440	7.15
High	2480	7.04

8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-247 5.2.2

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

TEST PROCEDURE

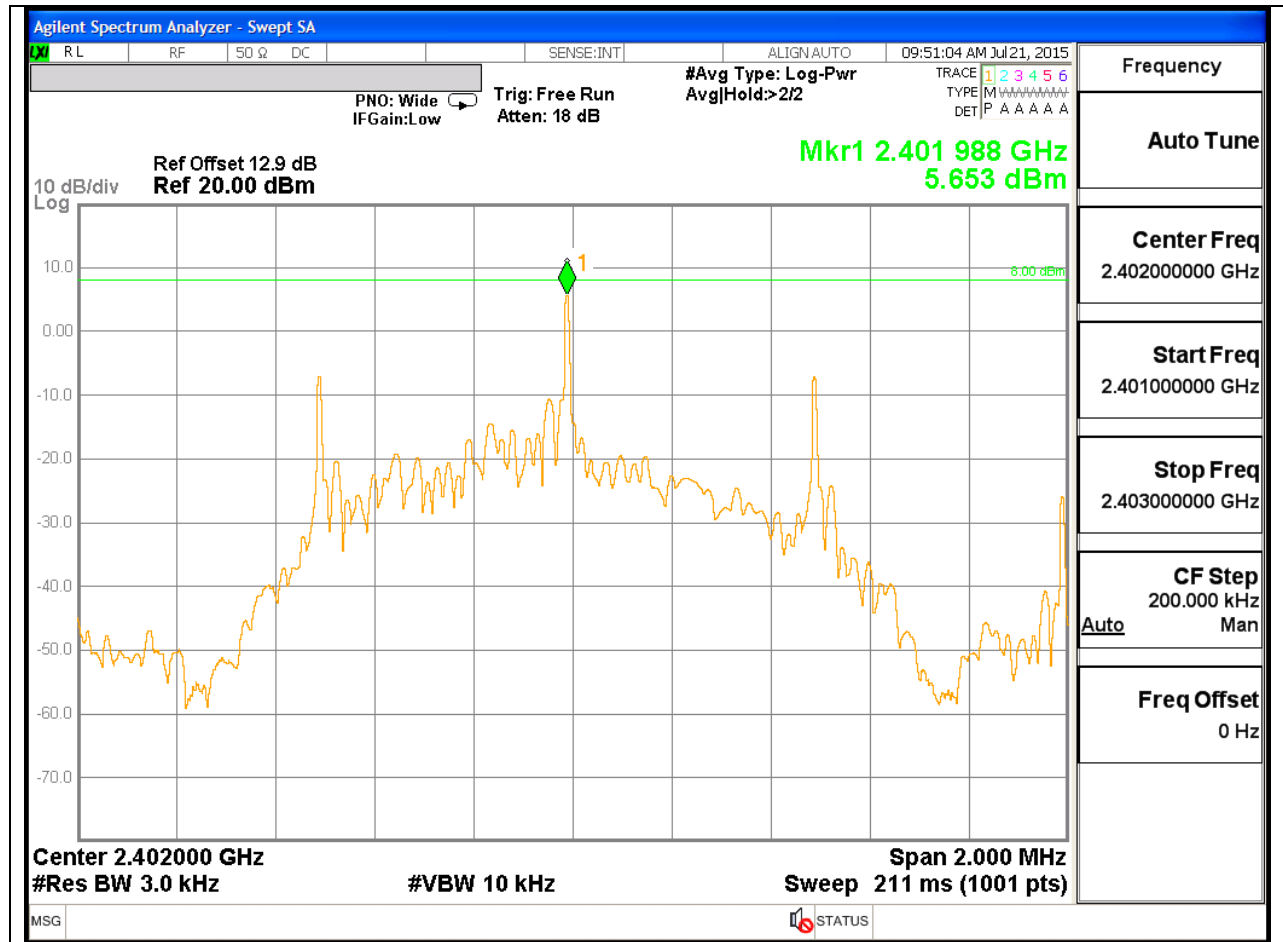
Power Spectral Density was performed utilizing the “Method PKPSD (Peak PSD)” under KDB558074 D01 DTS Meas Guidance v03r03.

RESULTS

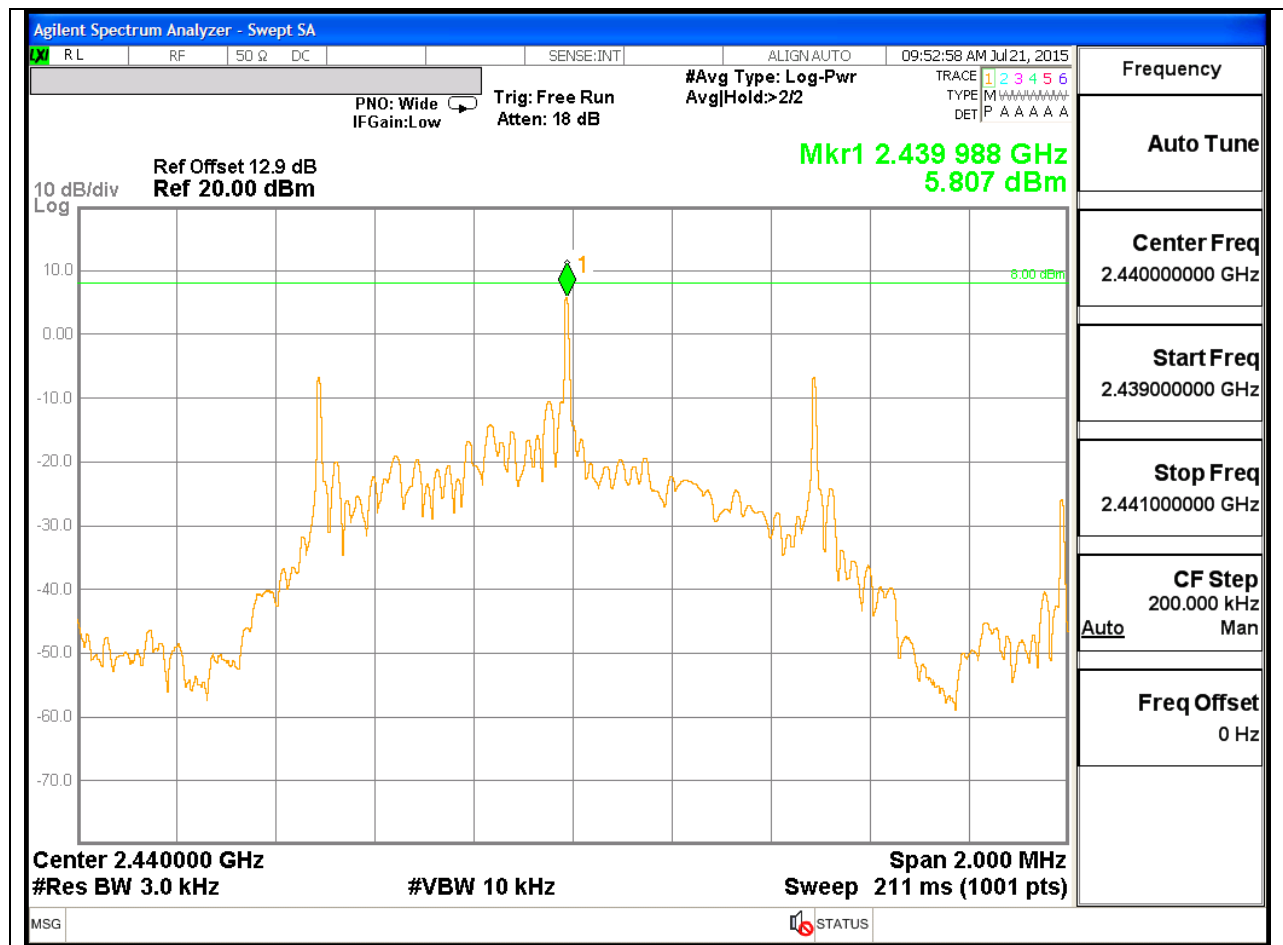
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	5.65	8	-2.35
Middle	2440	5.81	8	-2.19
High	2480	5.64	8	-2.36

POWER SPECTRAL DENSITY PLOTS

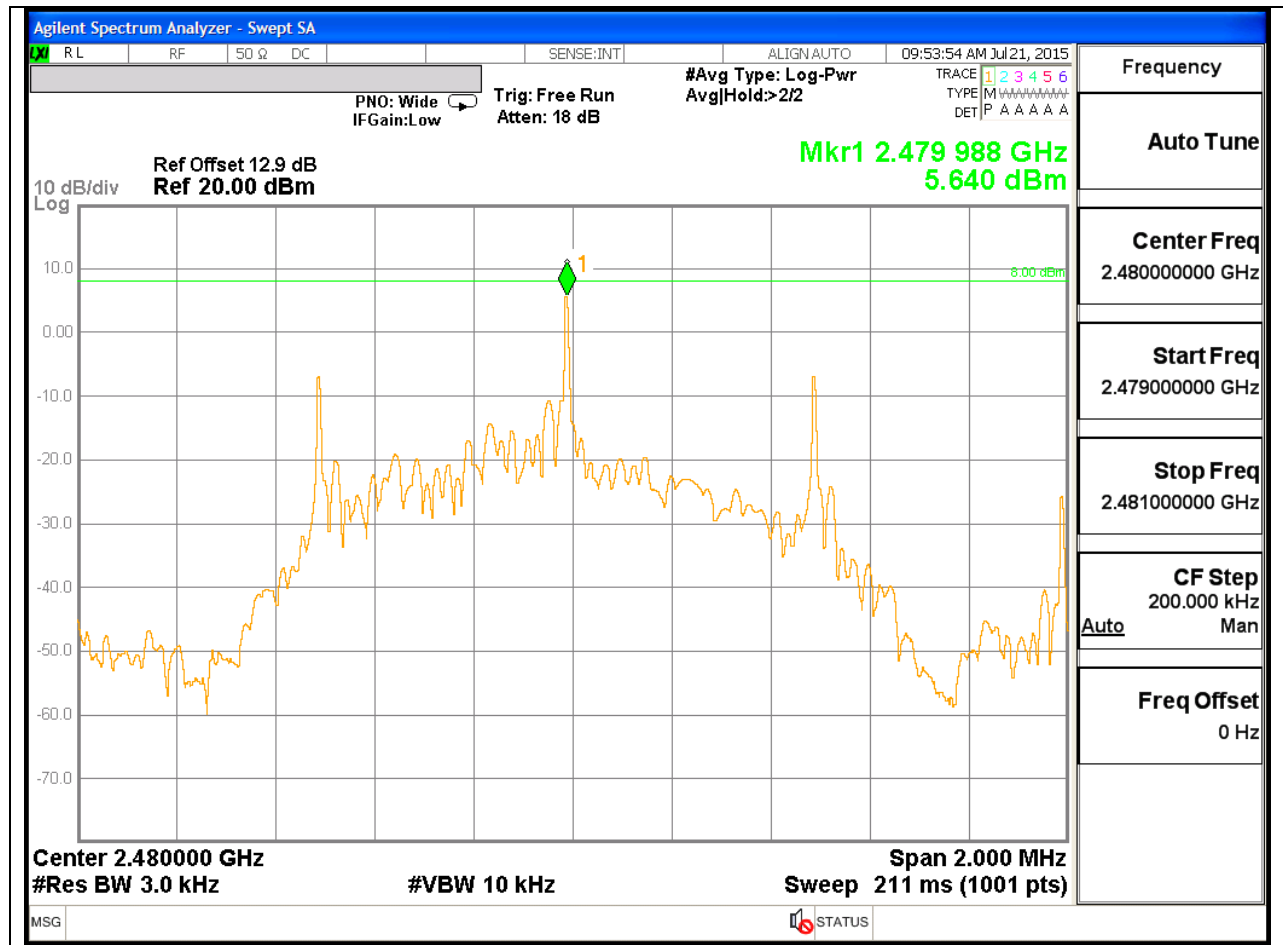
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-247 5.5

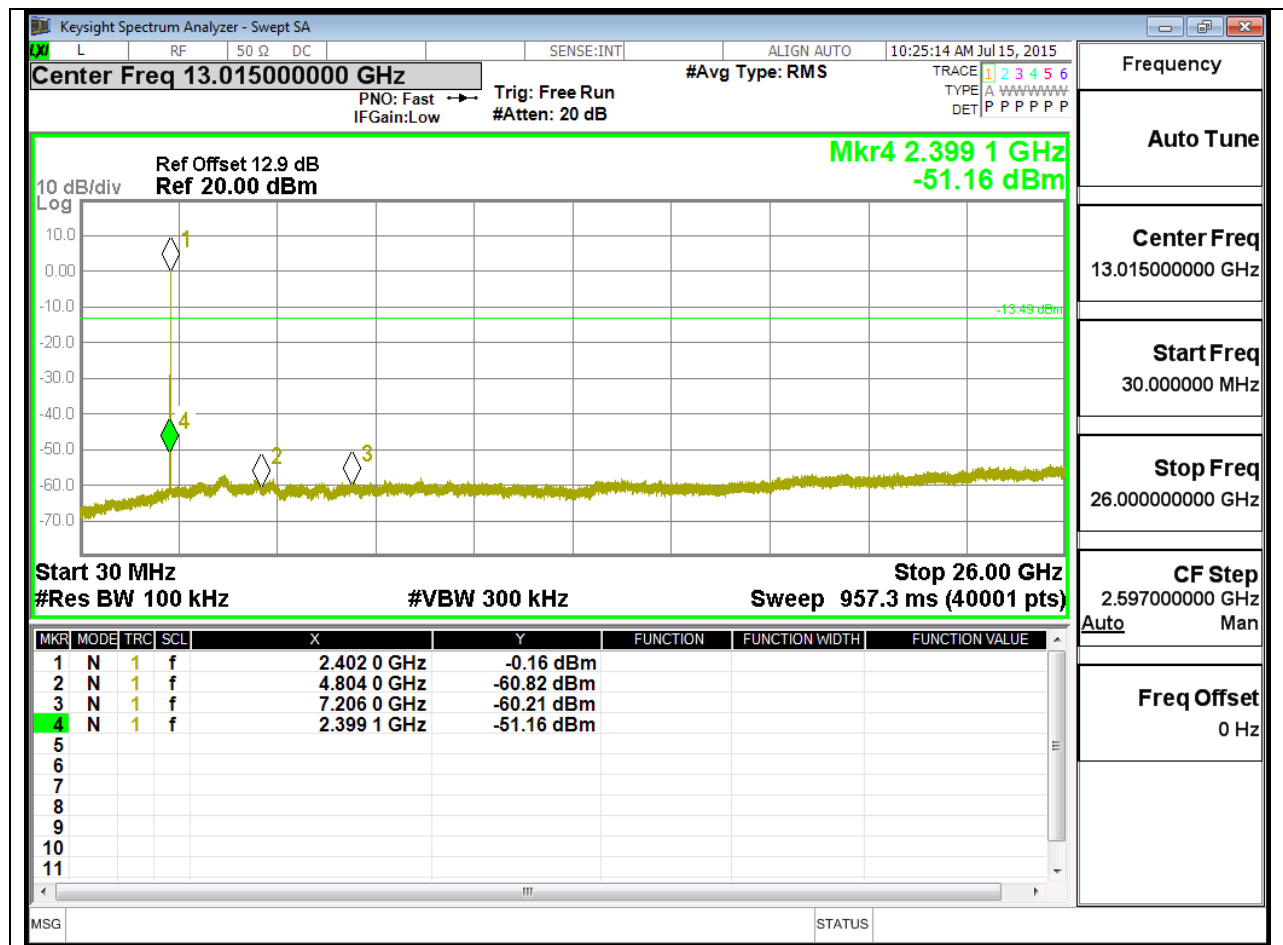
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST 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.

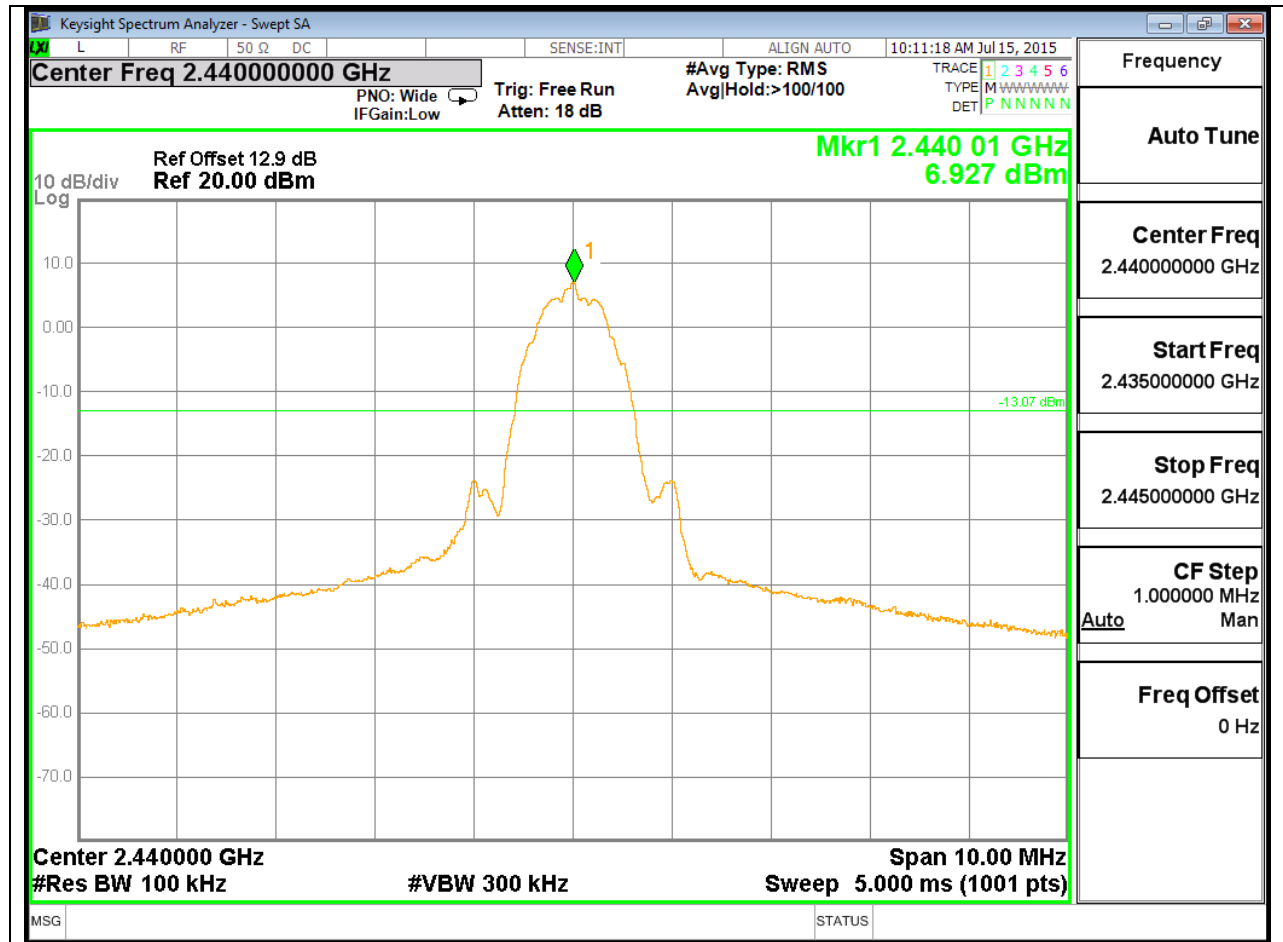
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

LOW CHANNEL SPURIOUS

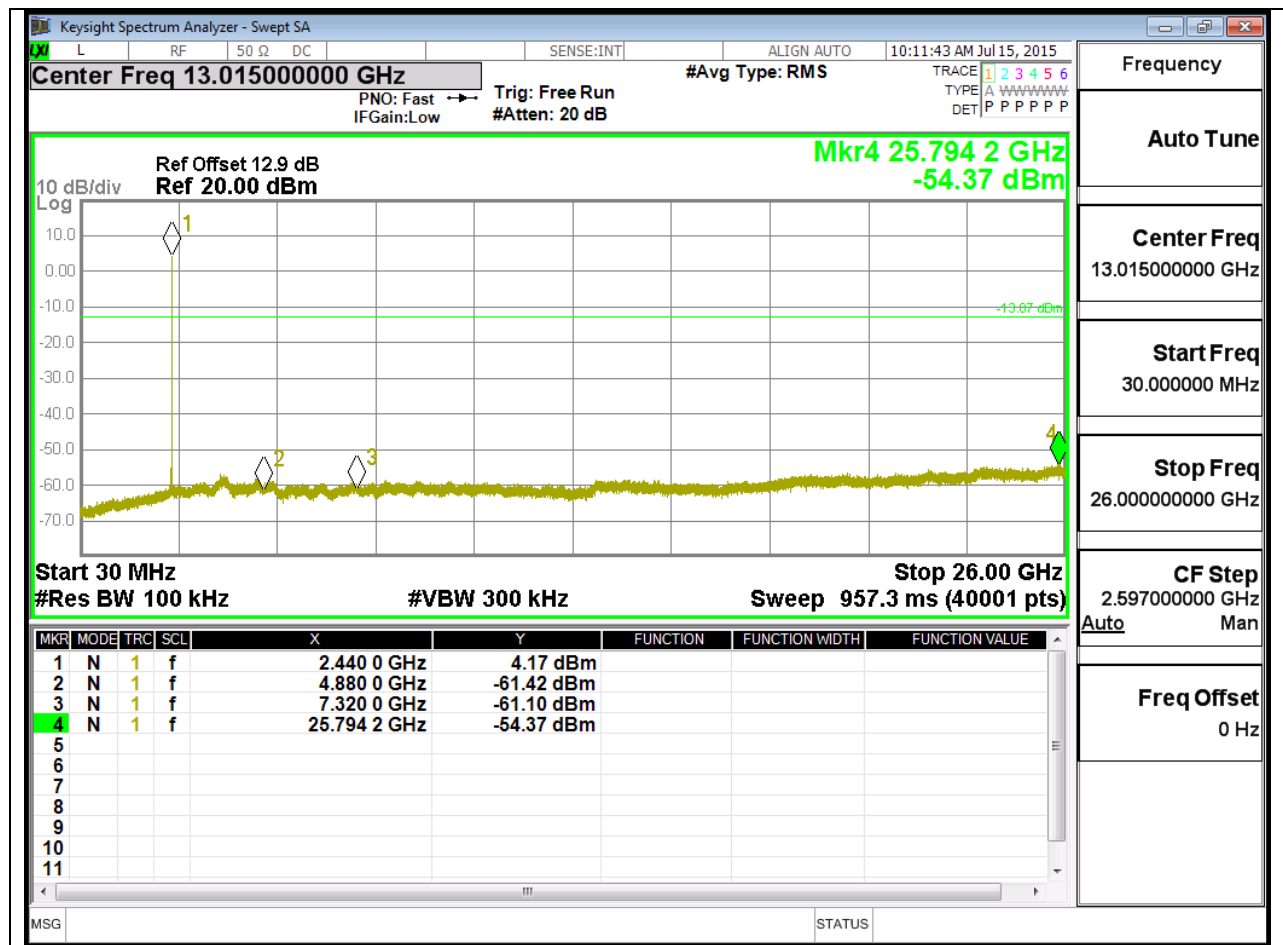


SPURIOUS EMISSIONS, MID CHANNEL

MID CHANNEL REFERENCE

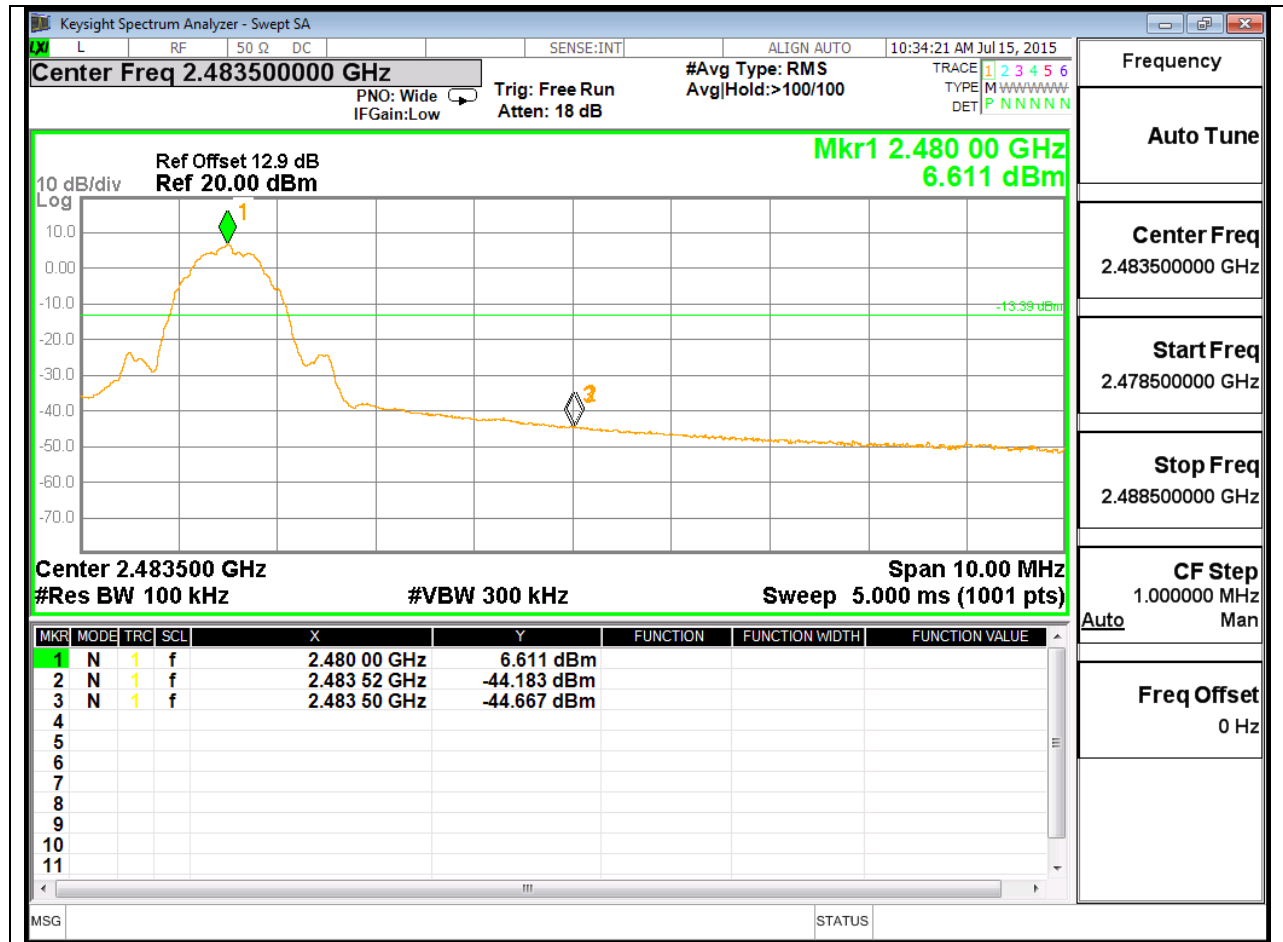


MID CHANNEL SPURIOUS

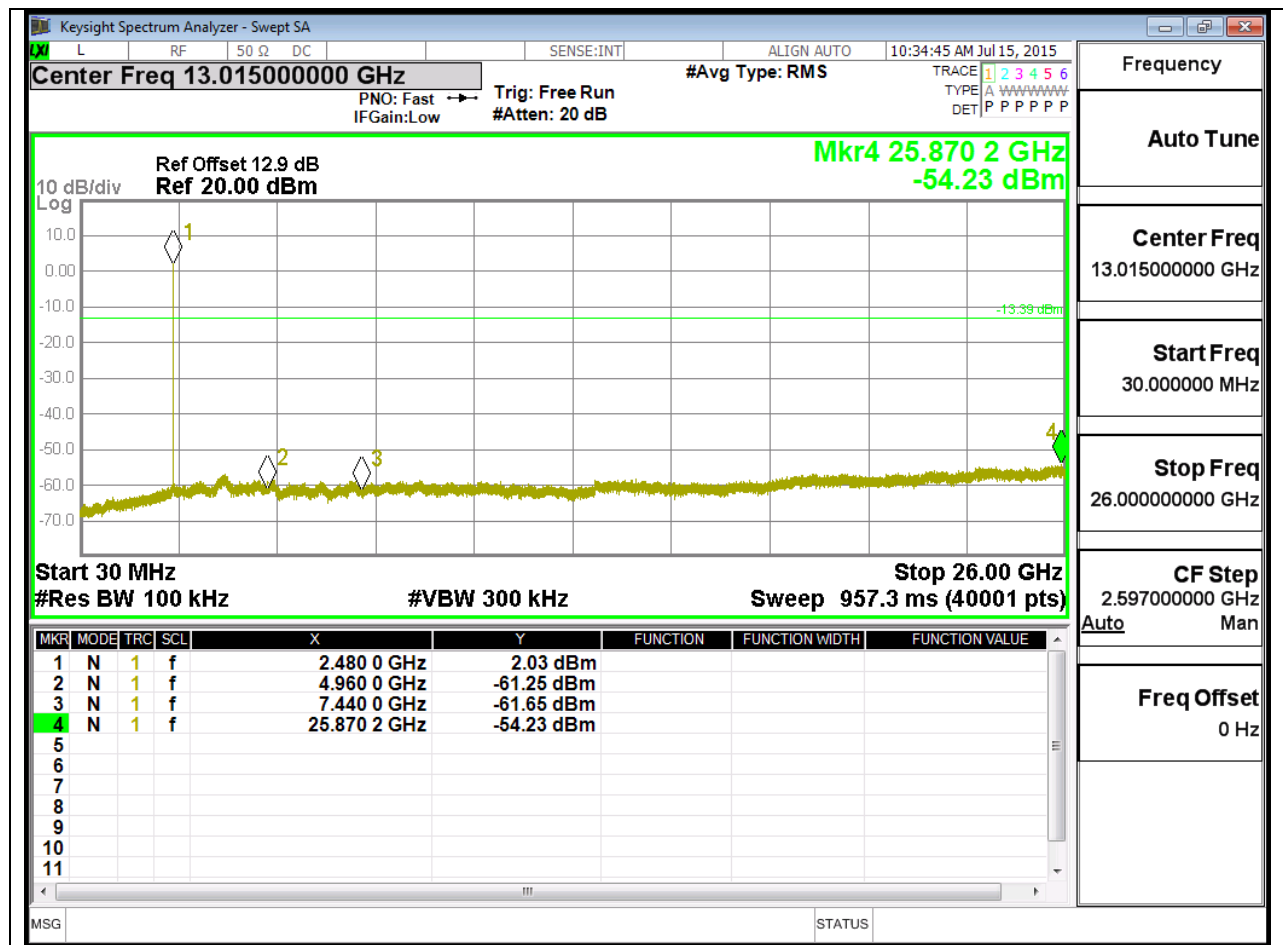


SPURIOUS EMISSIONS, HIGH CHANNEL

HIGH CHANNEL BANDEDGE



HIGH CHANNEL SPURIOUS



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

IC RSS-GEN Clause 7 (Receiver)

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 1 MHz for peak measurements and add duty cycle factor for average measurements. Duty cycle factor = $10 \log(1/x)$. For this sample: DCF = $10\log(1/0.615)=2.11\text{dB}$ (Spectrum Analyzer round it up to 2.1dB)

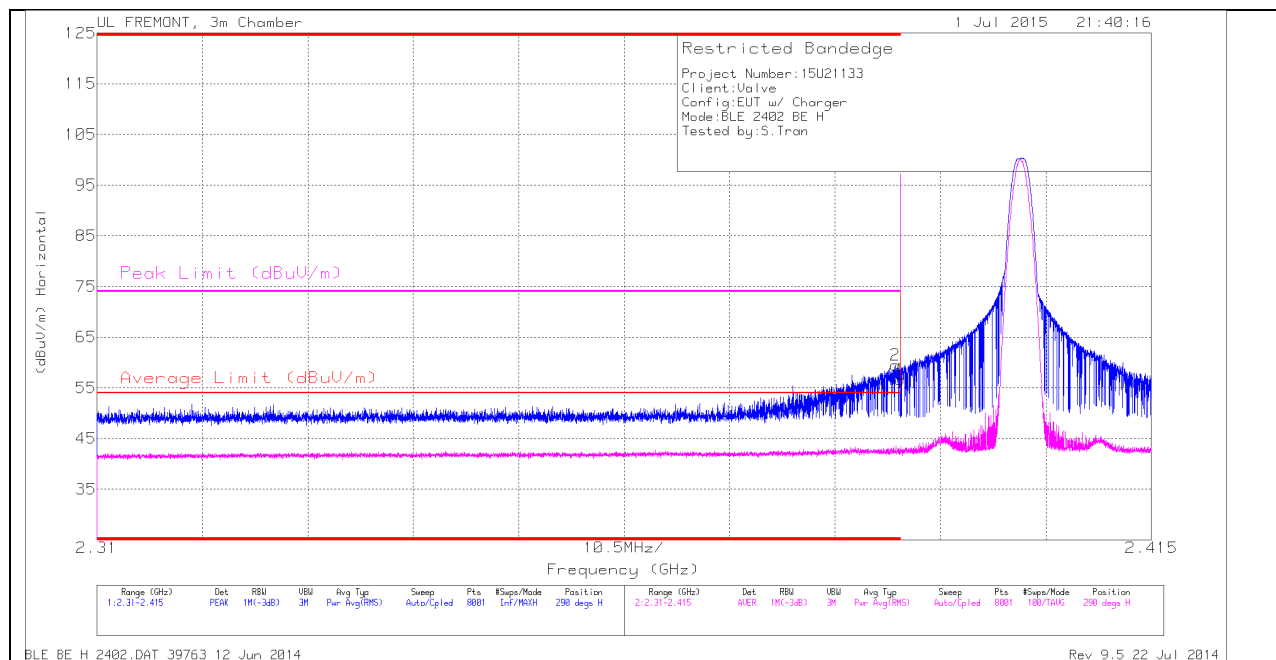
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

9.2. TRANSMITTER ABOVE 1 GHz RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



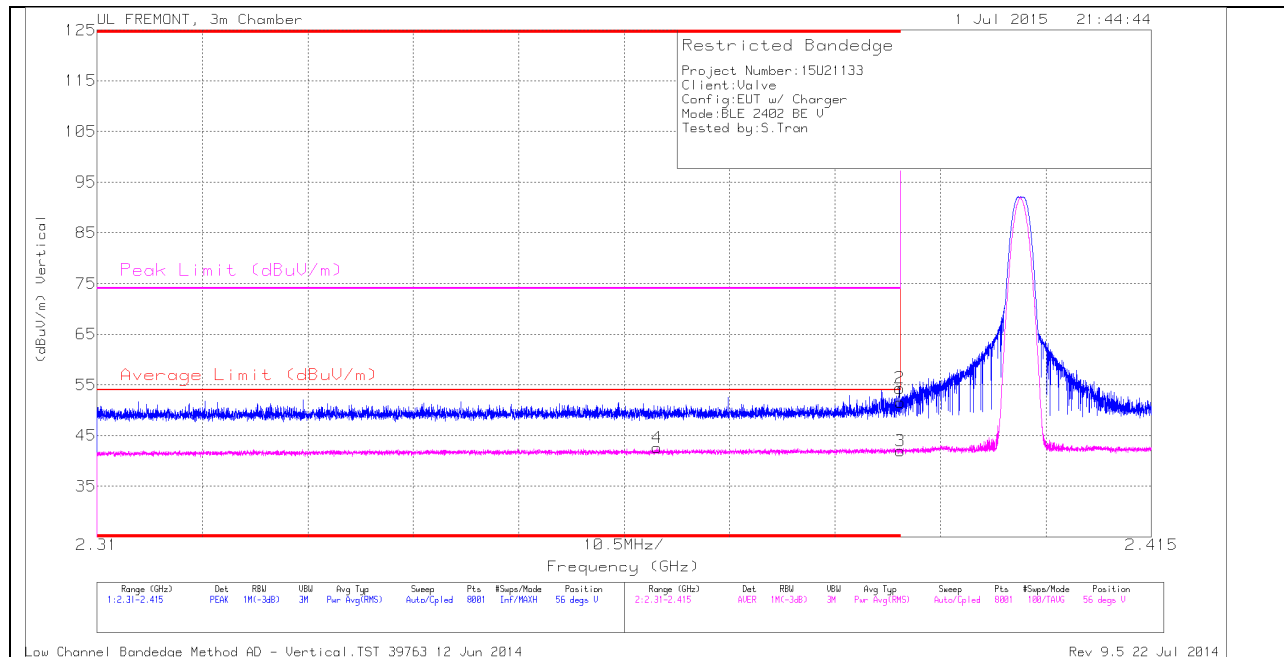
HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (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	47.06	PK	32	-22.4	0	56.66	-	-	74	-17.34	290	100	H
2	* 2.389	49.92	PK	32	-22.4	0	59.52	-	-	74	-14.48	290	100	H
3	* 2.39	31.07	RMS	32	-22.4	2.11	42.78	54	-11.22	-	-	290	100	H
4	* 2.39	31.87	RMS	32	-22.4	2.11	43.58	54	-10.42	-	-	290	100	H

PK - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



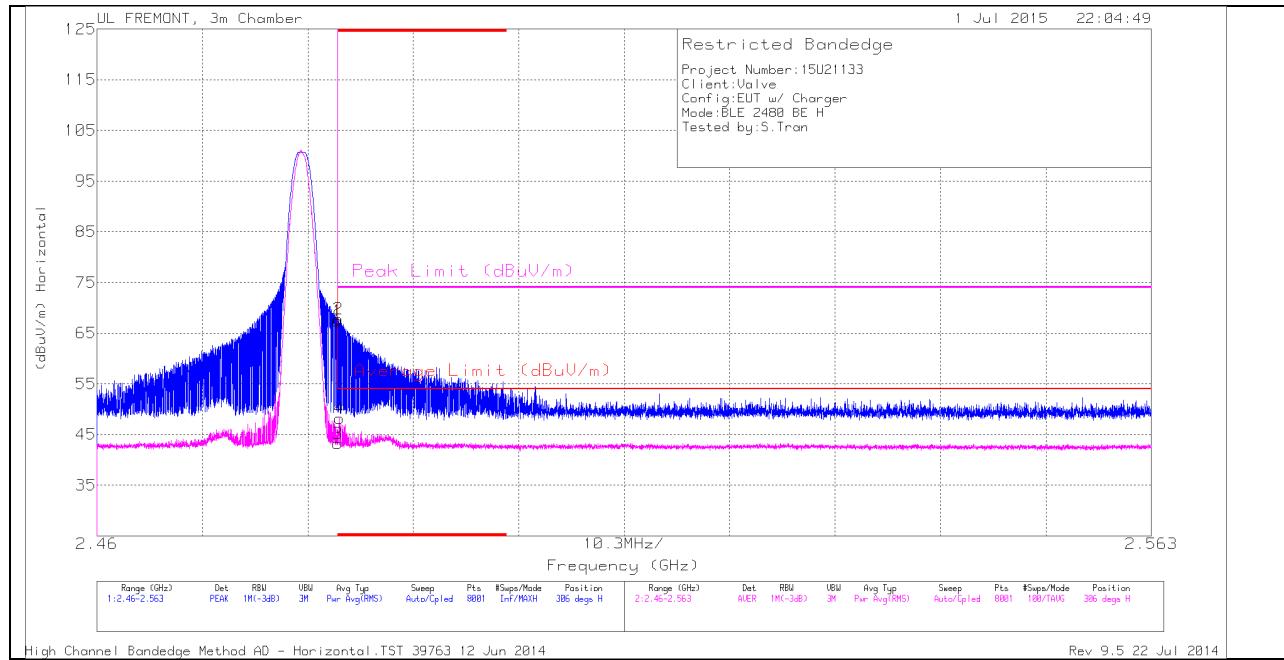
VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/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	* 2.39	41.93	PK	32	-22.4	0	51.53	-	-	74	-22.47	56	368	V
2	* 2.39	44.73	PK	32	-22.4	0	54.33	-	-	74	-19.67	56	368	V
3	* 2.39	30.31	RMS	32	-22.4	2.11	42.02	54	-11.98	-	-	56	368	V
4	* 2.366	31.03	RMS	31.9	-22.5	2.11	42.54	54	-11.46	-	-	56	368	V

PK - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



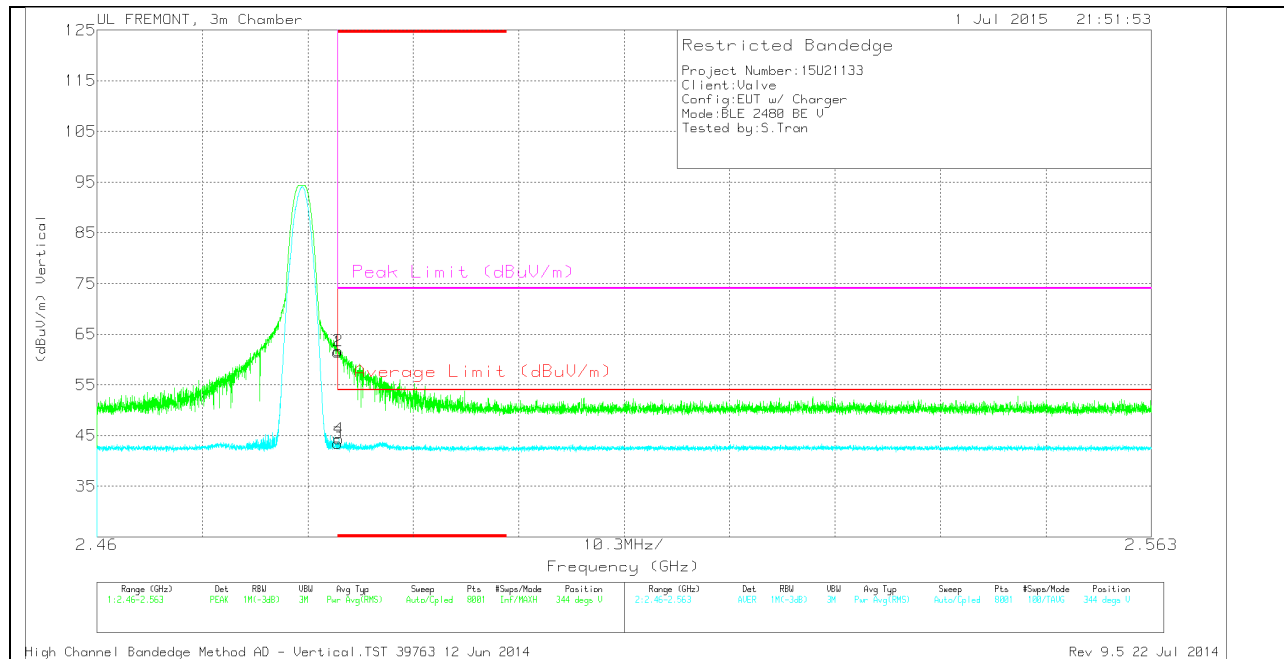
HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Filt r/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	57.19	PK	32.3	-22.1	0	67.39	-	-	74	-6.61	306	163	H
2	* 2.484	57.59	PK	32.3	-22.1	0	67.79	-	-	74	-6.21	306	163	H
3	* 2.484	30.93	RMS	32.3	-22.1	2.11	43.24	54	-10.76	-	-	306	163	H
4	* 2.484	35.91	RMS	32.3	-22.1	2.11	48.22	54	-5.78	-	-	306	163	H

PK - Peak detector

RMS - RMS detection

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

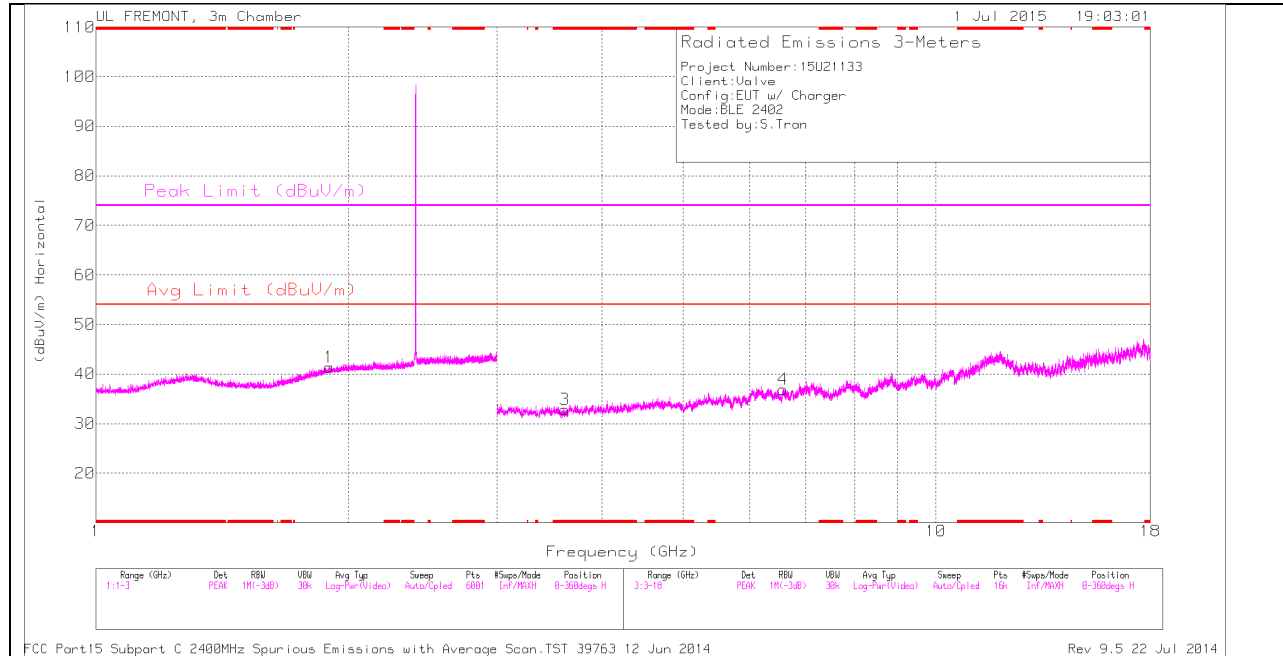
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Filter/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	51.32	PK	32.3	-22.1	0	61.52	-	-	74	-12.48	344	372	V
2	* 2.484	51.56	PK	32.3	-22.1	0	61.76	-	-	74	-12.24	344	372	V
3	* 2.484	31.16	RMS	32.3	-22.1	2.11	43.47	54	-10.53	-	-	344	372	V
4	* 2.484	32.03	RMS	32.3	-22.1	2.11	44.34	54	-9.66	-	-	344	372	V

PK - Peak detector

RMS - RMS detection

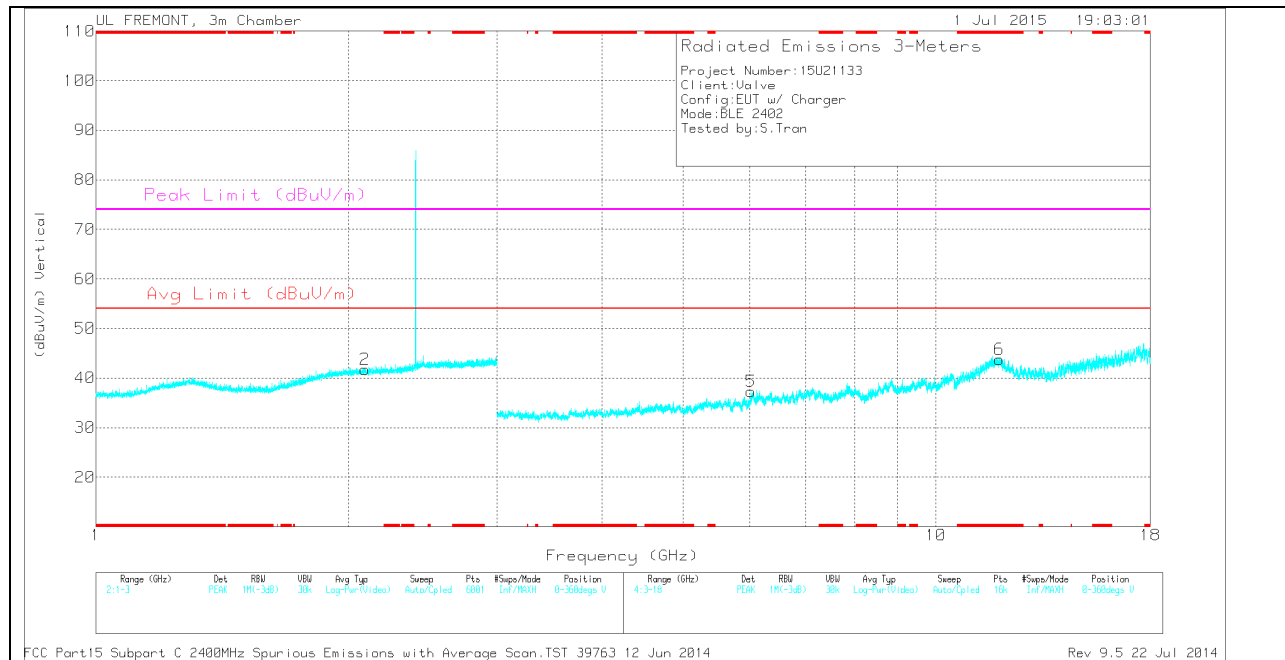
HARMONICS AND SPURIOUS EMISSIONS

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 T119 (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
3	* 3.615	30.74	PK	32.8	-30.7	0	32.84	-	-	74	-41.16	0-360	200	H
6	* 11.898	27.53	PK	39.1	-22.8	0	43.83	-	-	74	-30.17	0-360	200	V
1	1.894	32.81	PK	31.1	-22.6	0	41.31	-	-	-	-	0-360	200	H
2	2.089	32.66	PK	31.5	-22.4	0	41.76	-	-	-	-	0-360	200	V
5	6.019	31.28	PK	35.2	-29.2	0	37.28	-	-	-	-	0-360	200	V
4	6.574	29	PK	35.6	-27.7	0	36.9	-	-	-	-	0-360	200	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

Radiated Emissions

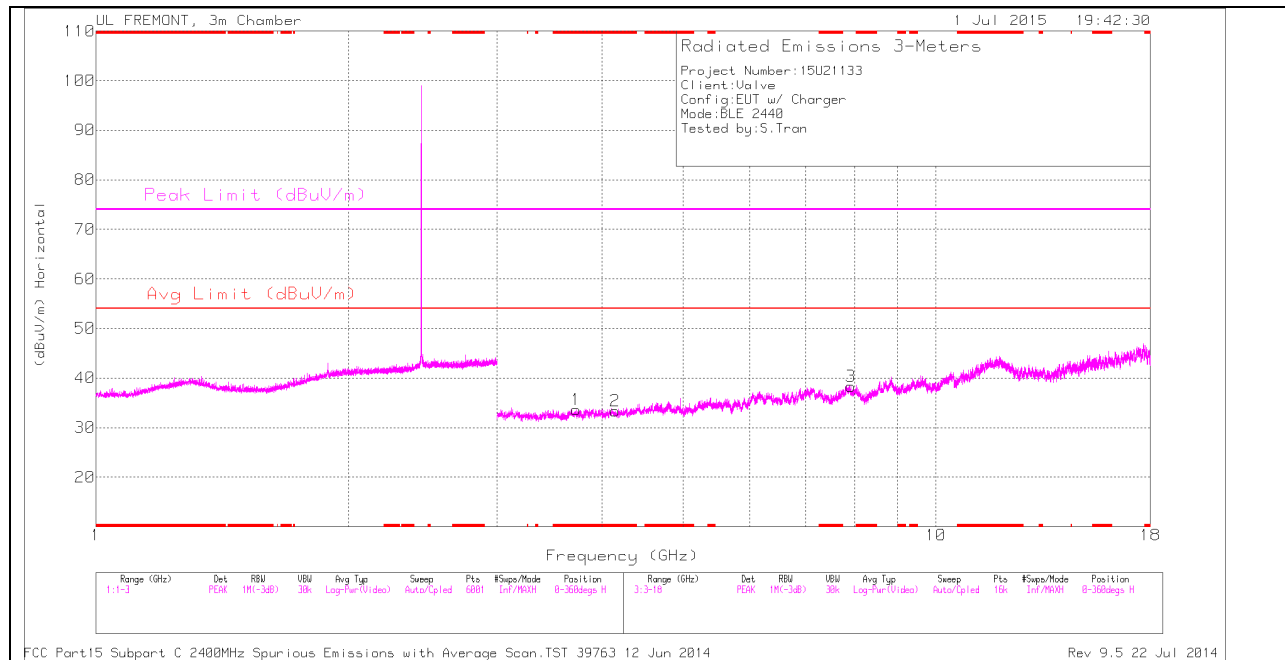
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.614	40.09	PK2	32.8	-30.7	0	42.19	-	-	74	-31.81	360	200	H
* 3.614	28.91	MAV1	32.8	-30.7	2.11	33.12	54	-20.88	-	-	360	200	H
1.894	30.78	MAV1	31.1	-22.6	2.11	41.39	-	-	-	-	360	200	H
1.895	42.19	PK2	31.1	-22.6	0	50.69	-	-	-	-	360	200	H
2.087	30.71	MAV1	31.5	-22.4	2.11	41.92	-	-	-	-	360	200	V
2.09	42.16	PK2	31.5	-22.4	0	51.26	-	-	-	-	360	200	V
6.018	39.45	PK2	35.2	-29.2	0	45.45	-	-	-	-	360	200	V
6.019	28.05	MAV1	35.2	-29.2	2.11	36.16	-	-	-	-	360	200	V
6.572	27.75	MAV1	35.6	-27.8	2.11	37.66	-	-	-	-	360	200	H
6.573	38.57	PK2	35.6	-27.7	0	46.47	-	-	-	-	360	200	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

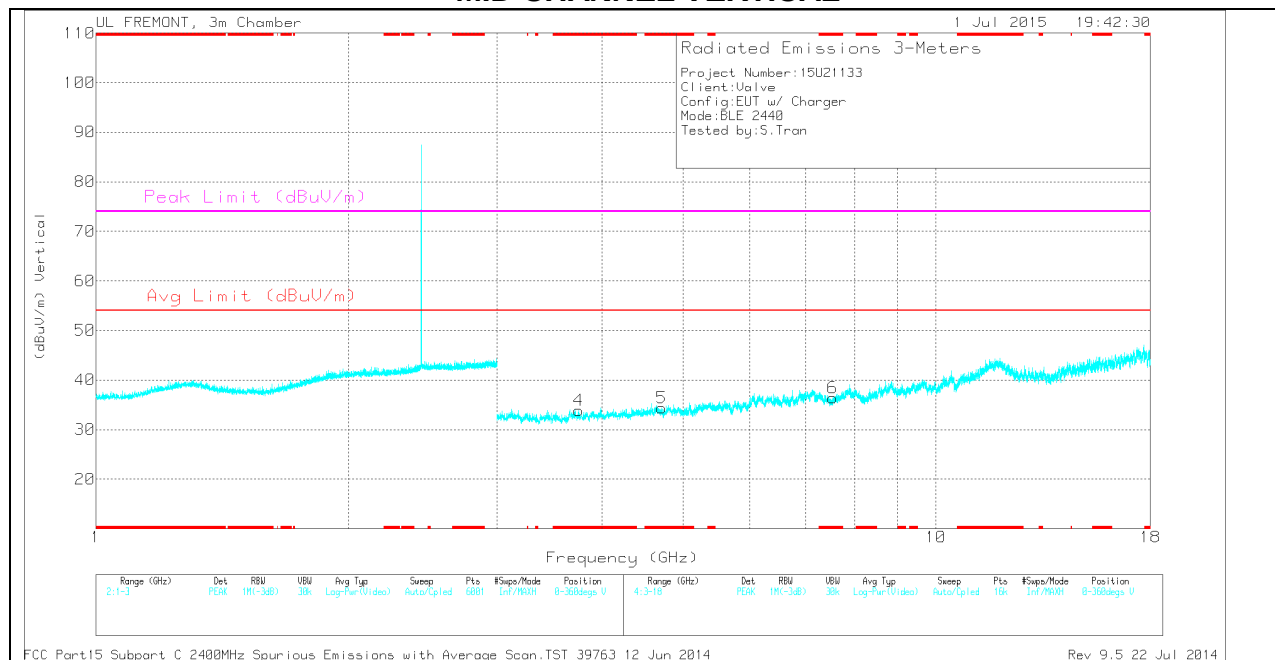
MAV1 - KDB558074 Option 1 Maximum RMS Average

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 T119 (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	* 3.731	30.72	PK	33	-30.1	0	33.62	-	-	74	-40.38	0-360	200	H
2	* 4.15	29.84	PK	33.3	-29.8	0	33.34	-	-	74	-40.66	0-360	100	H
4	* 3.758	31.26	PK	33.1	-30.5	0	33.86	-	-	74	-40.14	0-360	100	V
5	* 4.713	30.5	PK	34.1	-30.2	0	34.4	-	-	74	-39.6	0-360	100	V
6	* 7.533	28.35	PK	35.7	-27.6	0	36.45	-	-	74	-37.55	0-360	100	V
3	7.924	29.48	PK	35.8	-27	0	38.28	-	-	-	-	0-360	100	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

Radiated Emissions

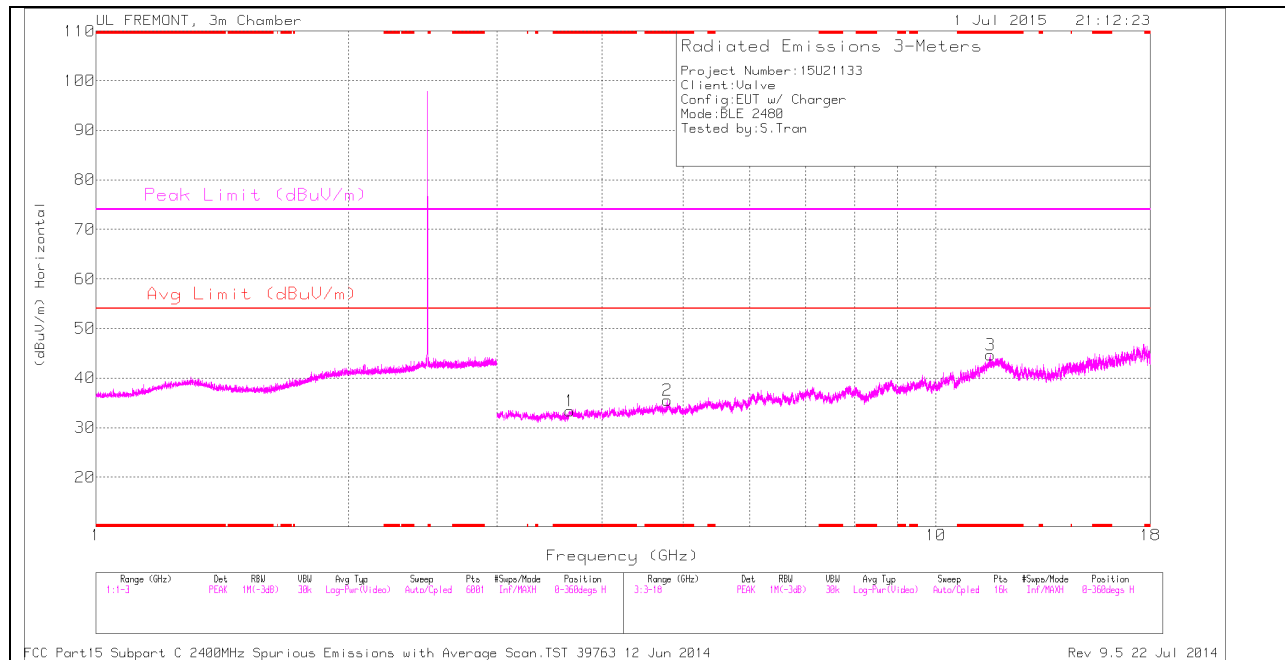
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Ftr /Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.73	40.38	PK2	33	-30.1	0	43.28	-	-	74	-30.72	360	200	H
* 3.73	28.37	MAV1	33	-30.1	2.11	33.38	54	-20.62	-	-	360	200	H
* 4.152	40.09	PK2	33.3	-29.7	0	43.69	-	-	74	-30.31	360	100	H
* 4.15	28.4	MAV1	33.3	-29.8	2.11	34.01	54	-19.99	-	-	360	100	H
* 3.759	40.51	PK2	33.1	-30.5	0	43.11	-	-	74	-30.89	360	100	V
* 3.76	28.72	MAV1	33.1	-30.5	2.11	33.43	54	-20.57	-	-	360	100	V
* 4.711	40.39	PK2	34.1	-30.2	0	44.29	-	-	74	-29.71	360	100	V
* 4.714	28.83	MAV1	34.1	-30.2	2.11	34.84	54	-19.16	-	-	360	100	V
* 7.531	39.25	PK2	35.7	-27.7	0	47.25	-	-	74	-26.75	360	100	V
* 7.531	27.39	MAV1	35.7	-27.7	2.11	37.5	54	-16.5	-	-	360	100	V
7.924	37.29	PK2	35.8	-27	0	46.09	-	-	-	-	360	100	H
7.926	26.22	MAV1	35.8	-27	2.11	37.13	-	-	-	-	360	100	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

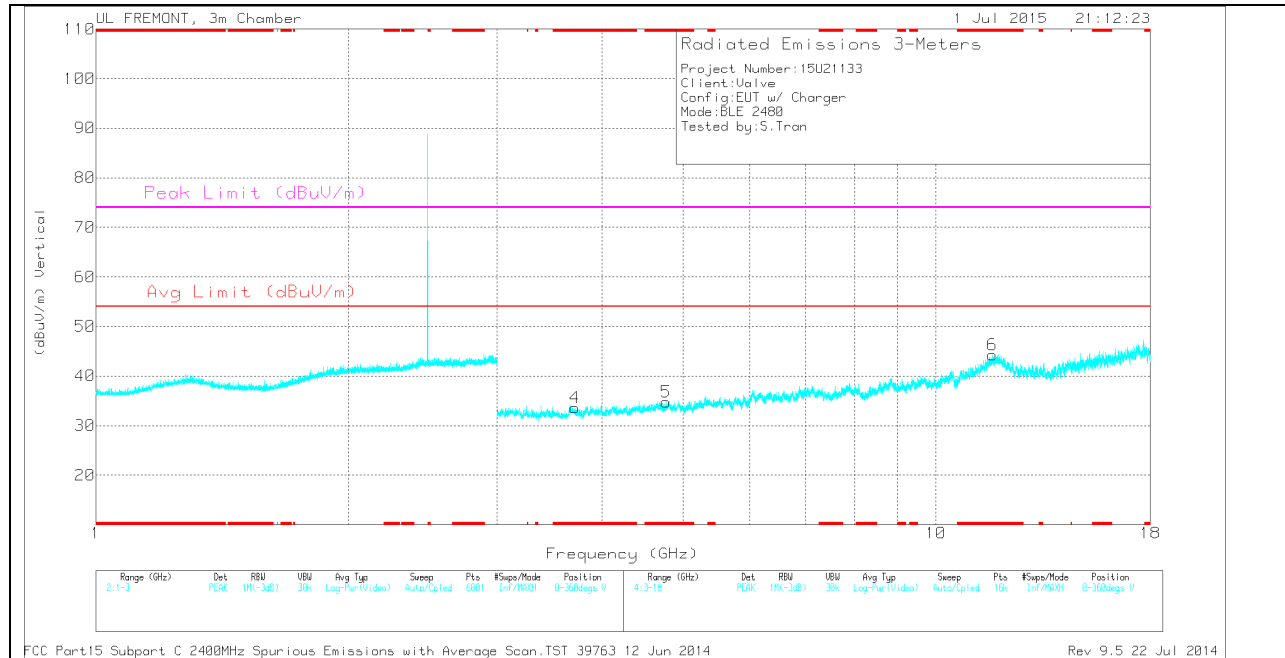
MAV1 - KDB558074 Option 1 Maximum RMS Average

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 T119 (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	* 3.667	30.48	PK	32.9	-30	0	33.38	-	-	74	-40.62	0-360	100	H
2	* 4.79	31.2	PK	34	-29.7	0	35.5	-	-	74	-38.5	0-360	100	H
3	* 11.619	28.21	PK	38.7	-22.3	0	44.61	-	-	74	-29.39	0-360	100	H
4	* 3.715	30.61	PK	33	-30	0	33.61	-	-	74	-40.39	0-360	100	V
5	* 4.775	30.63	PK	34	-29.9	0	34.73	-	-	74	-39.27	0-360	100	V
6	* 11.676	27.94	PK	38.8	-22.4	0	44.34	-	-	74	-29.66	0-360	100	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

Radiated Emissions

Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T119 (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
* 3.669	40.13	PK2	32.9	-30	0	43.03	-	-	74	-30.97	360	100	H
* 3.666	28.74	MAV1	32.9	-30	2.11	33.75	54	-20.25	-	-	360	100	H
* 4.79	39.83	PK2	34	-29.7	0	44.13	-	-	74	-29.87	360	100	H
* 4.791	28.33	MAV1	34	-29.7	2.11	34.74	54	-19.26	-	-	360	100	H
* 11.618	37.15	PK2	38.6	-22.3	0	53.45	-	-	74	-20.55	360	100	H
* 11.619	25.47	MAV1	38.7	-22.3	2.11	43.98	54	-10.02	-	-	360	100	H
* 3.714	39.78	PK2	33	-30	0	42.78	-	-	74	-31.22	360	100	V
* 3.717	28.54	MAV1	33	-29.9	2.11	33.75	54	-20.25	-	-	360	100	V
* 4.776	39.71	PK2	34	-30	0	43.71	-	-	74	-30.29	360	100	V
* 4.773	28.82	MAV1	34	-29.9	2.11	35.03	54	-18.97	-	-	360	100	V
* 11.676	37.16	PK2	38.8	-22.4	0	53.56	-	-	74	-20.44	360	100	V
* 11.675	25.66	MAV1	38.8	-22.4	2.11	44.17	54	-9.83	-	-	360	100	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

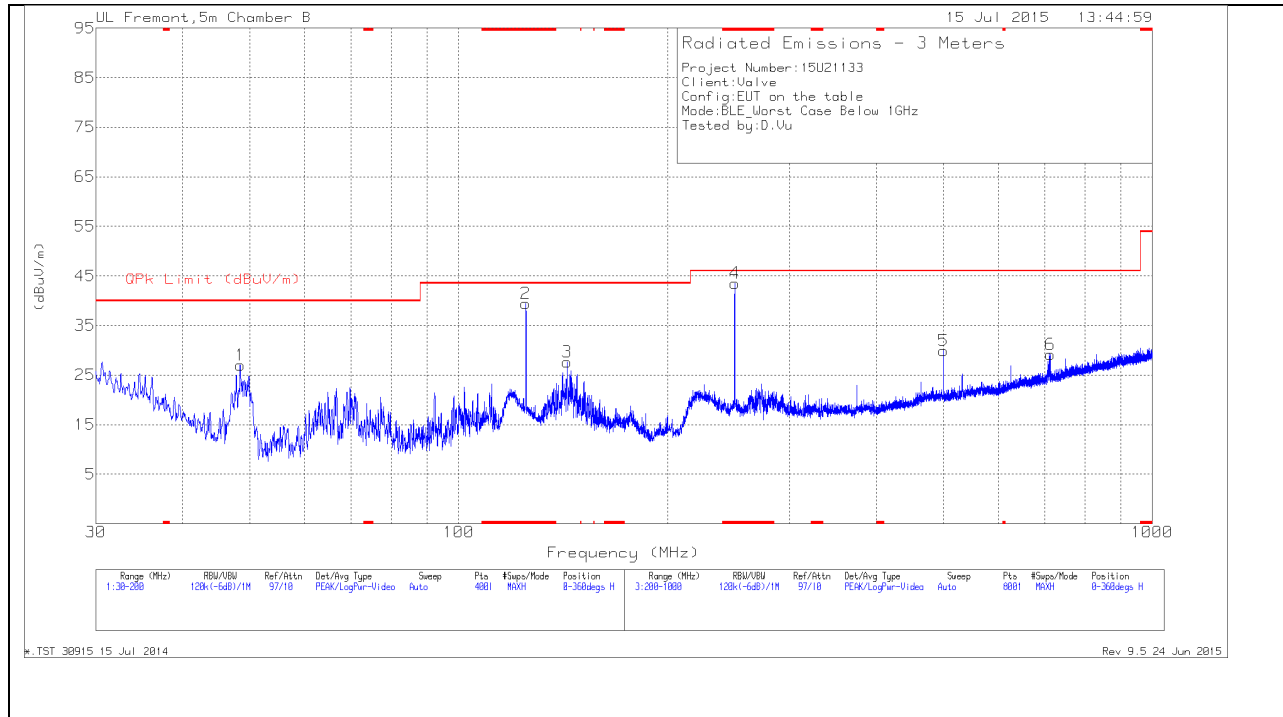
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

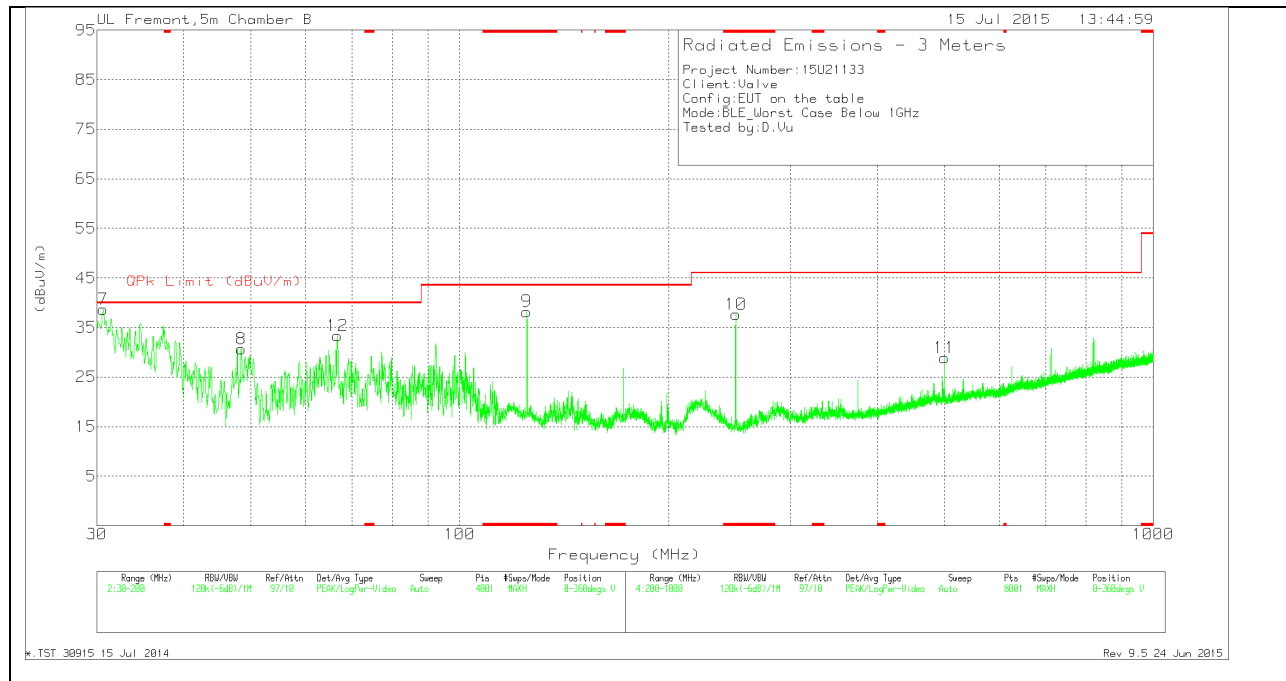
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 125.0088	52.99	Pk	14.2	-27.7	39.49	43.52	-4.03	0-360	199	H
9	* 125.03	51.73	Pk	14.2	-27.7	38.23	43.52	-5.29	0-360	101	V
4	* 250	58.26	Pk	11.6	-26.3	43.56	46.02	-2.46	0-360	101	H
10	* 250	52.33	Pk	11.6	-26.3	37.63	46.02	-8.39	0-360	101	V
7	30.595	47.14	Pk	20.3	-28.8	38.64	40	-1.36	0-360	101	V
1	48.4238	46.84	Pk	8.8	-28.6	27.04	40	-12.96	0-360	399	H
8	48.445	50.5	Pk	8.8	-28.6	30.7	40	-9.3	0-360	101	V
12	66.635	53.74	Pk	7.9	-28.3	33.34	40	-6.66	0-360	101	V
3	143.305	42.37	Pk	12.8	-27.5	27.67	43.52	-15.85	0-360	199	H
5	500	37.81	Pk	17.8	-25.7	29.91	46.02	-16.11	0-360	199	H
11	500	36.8	Pk	17.8	-25.7	28.9	46.02	-17.12	0-360	199	V
6	713	33.04	Pk	20.4	-24.3	29.14	46.02	-16.88	0-360	299	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 125.0032	52.23	Qp	14.2	-27.7	38.73	43.52	-4.79	2	197	H
* 125.0059	51.3	Qp	14.2	-27.7	37.8	43.52	-5.72	115	106	V
* 250.0108	58.21	Qp	11.6	-26.3	43.51	46.02	-2.51	31	124	H
30.6167	43.61	Qp	20.3	-28.8	35.11	40	-4.89	309	130	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Qp - Quasi-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

* Decreases with the logarithm of the frequency.

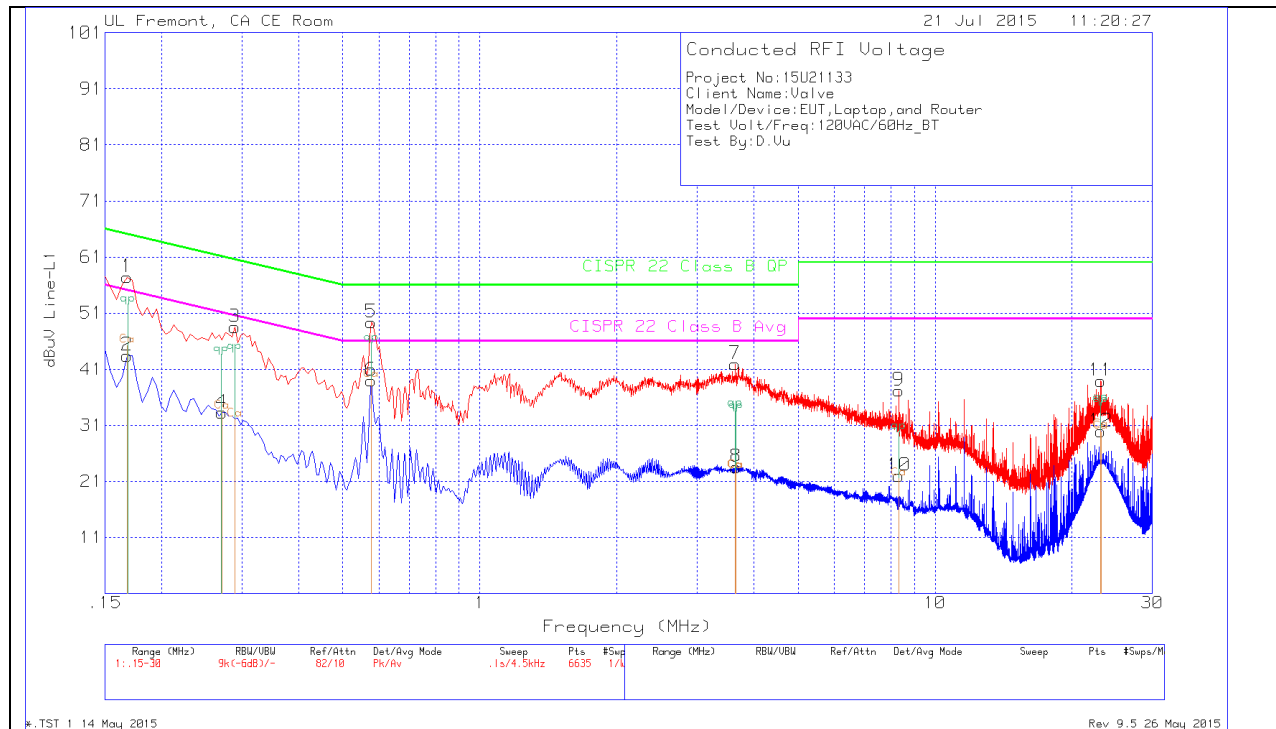
TEST PROCEDURE

ANSI C63.10

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

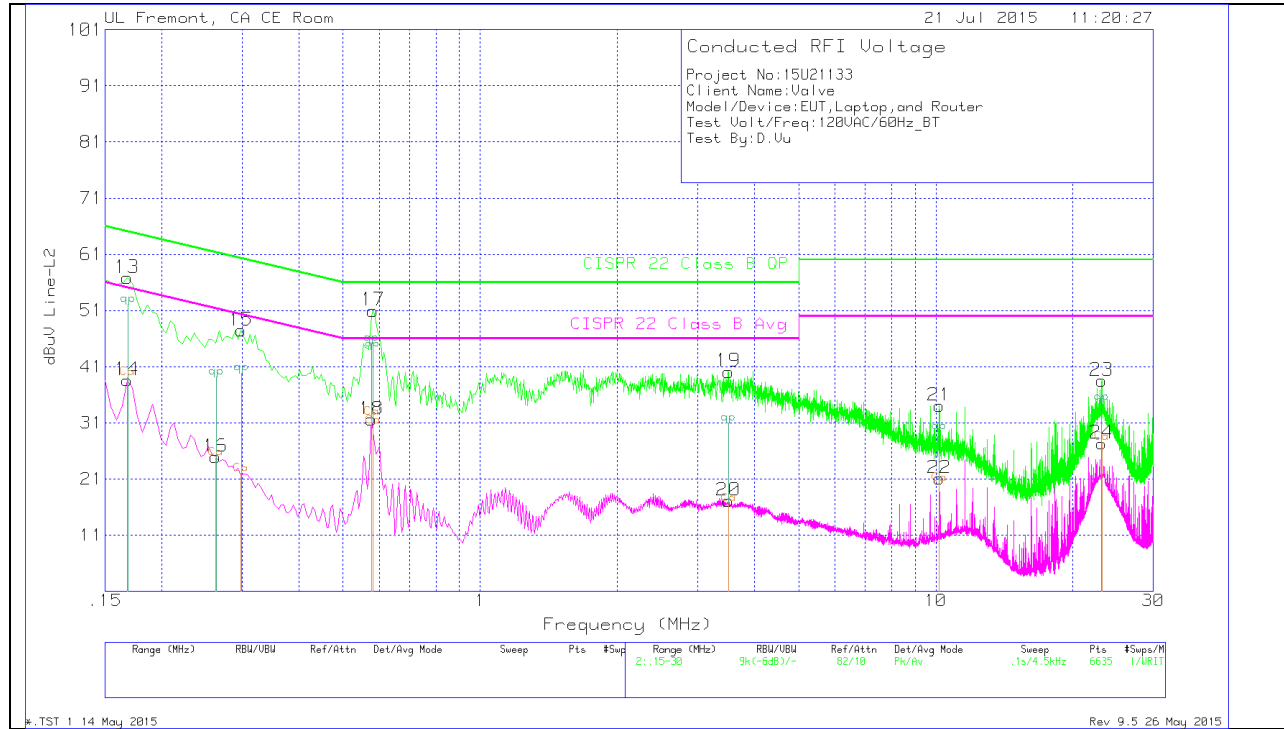
Range 1: Line-L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16868	44.05	Ca	1.2	0	45.25	-	-	55.03	-9.78
.28928	31.48	Ca	.6	0	32.08	-	-	50.55	-18.47
.27038	32.9	Ca	.6	0	33.5	-	-	51.11	-17.61
.57818	38.78	Ca	.3	0	39.08	-	-	46	-6.92
3.63863	22.64	Ca	.2	.1	22.94	-	-	46	-23.06
3.65618	22.58	Ca	.2	.1	22.88	-	-	46	-23.12
8.33168	21.2	Ca	.2	.1	21.5	-	-	50	-28.5
23.1281	29.65	Ca	.3	.2	30.15	-	-	50	-19.85
23.1304	29.32	Ca	.3	.2	29.82	-	-	50	-20.18

Range 1: Line-L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16868	51.39	Qp	1.2	0	52.59	65.03	-12.44	-	-
.28928	43.46	Qp	.6	0	44.06	60.55	-16.49	-	-
.27038	43.05	Qp	.6	0	43.65	61.11	-17.46	-	-
.57818	45.35	Qp	.3	0	45.65	56	-10.35	-	-
3.63863	33.65	Qp	.2	.1	33.95	56	-22.05	-	-
3.65618	33.22	Qp	.2	.1	33.52	56	-22.48	-	-
8.33168	29.54	Qp	.2	.1	29.84	60	-30.16	-	-
23.1281	34.53	Qp	.3	.2	35.03	60	-24.97	-	-
23.1304	34.13	Qp	.3	.2	34.63	60	-25.37	-	-

LINE 2 PLOT



LINE 2 RESULTS

Range 2: Line-L2 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16868	37.71	Ca	1.3	0	39.01	-	-	55.03	-16.02
.29918	21.27	Ca	.6	0	21.87	-	-	50.27	-28.4
.26363	24	Ca	.7	0	24.7	-	-	51.32	-26.62
.58088	30.09	Ca	.3	0	30.39	-	-	46	-15.61
.57728	31.62	Ca	.3	0	31.92	-	-	46	-14.08
3.50768	16.21	Ca	.2	.1	16.51	-	-	46	-29.49
10.1812	19.76	Ca	.2	.2	20.16	-	-	50	-29.84
23.1304	27	Ca	.3	.2	27.5	-	-	50	-22.5

Range 2: Line-L2 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CISPR 22 Class B QP	Margin (dB)	CISPR 22 Class B Avg	Margin (dB)
.16868	50.78	Qp	1.3	0	52.08	65.03	-12.95	-	-
.29918	39.26	Qp	.6	0	39.86	60.27	-20.41	-	-
.26363	38.44	Qp	.7	0	39.14	61.32	-22.18	-	-
.58088	43.72	Qp	.3	0	44.02	56	-11.98	-	-
.57728	44.8	Qp	.3	0	45.1	56	-10.9	-	-
3.50768	30.64	Qp	.2	.1	30.94	56	-25.06	-	-
10.1812	28.99	Qp	.2	.2	29.39	60	-30.61	-	-
23.1304	34.09	Qp	.3	.2	34.59	60	-25.41	-	-