



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

BLE WEARABLE

MODEL NUMBER: THY1000

FCC ID: 2AELZ-1000

IC: 20142-1000

REPORT NUMBER: 15U20631-E2 REVISION B

ISSUE DATE: MAY 21, 2015

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Issue			
Rev.	Date	Revisions	Revised By
--	5/7/15	Initial Issue	P. Zhang
A	5/20/15	Update section 2 and section 9 to document FCC and IC test procedure; summary table	P. Zhang
B	5/21/15	Updated antenna type	P. Zhang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Thync, Inc.
EUT DESCRIPTION: BLE WEARABLE
MODEL: THY1000
SERIAL NUMBER: PREDVT151500057(Conducted),PREDVT151500025(Radiated)
DATE TESTED: APR 22 – MAY 7, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	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:



PENG ZHANG
PROJECT LEAD
UL Verification Services Inc.

Tested By:



JONATHAN HSU
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, RSS-GEN Issue 4, and RSS-210 Issue 8; ANSI C63.10-2013 for IC & ANSI C63.10-2009 for FCC.

Deviation -Radiated spurious emission above 1GHz EUT height is 1.5m not 0.8m.

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
<input checked="" type="checkbox"/> Chamber A(IC: 2324B-1)	<input type="checkbox"/> Chamber D(IC: 2324B-4)
<input type="checkbox"/> Chamber B(IC: 2324B-2)	<input type="checkbox"/> Chamber E(IC: 2324B-5)
<input type="checkbox"/> Chamber C(IC: 2324B-3)	<input type="checkbox"/> Chamber F(IC: 2324B-6)
	<input type="checkbox"/> Chamber G(IC: 2324B-7)
	<input type="checkbox"/> 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:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

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 BLE Wearable

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)
2402-2480	BLE	-2.83	0.52

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an chip antenna, with a maximum gain of 2.2dBi.

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
LAPTOP	LENOVO	T430	N/A	N/A

I/O CABLES

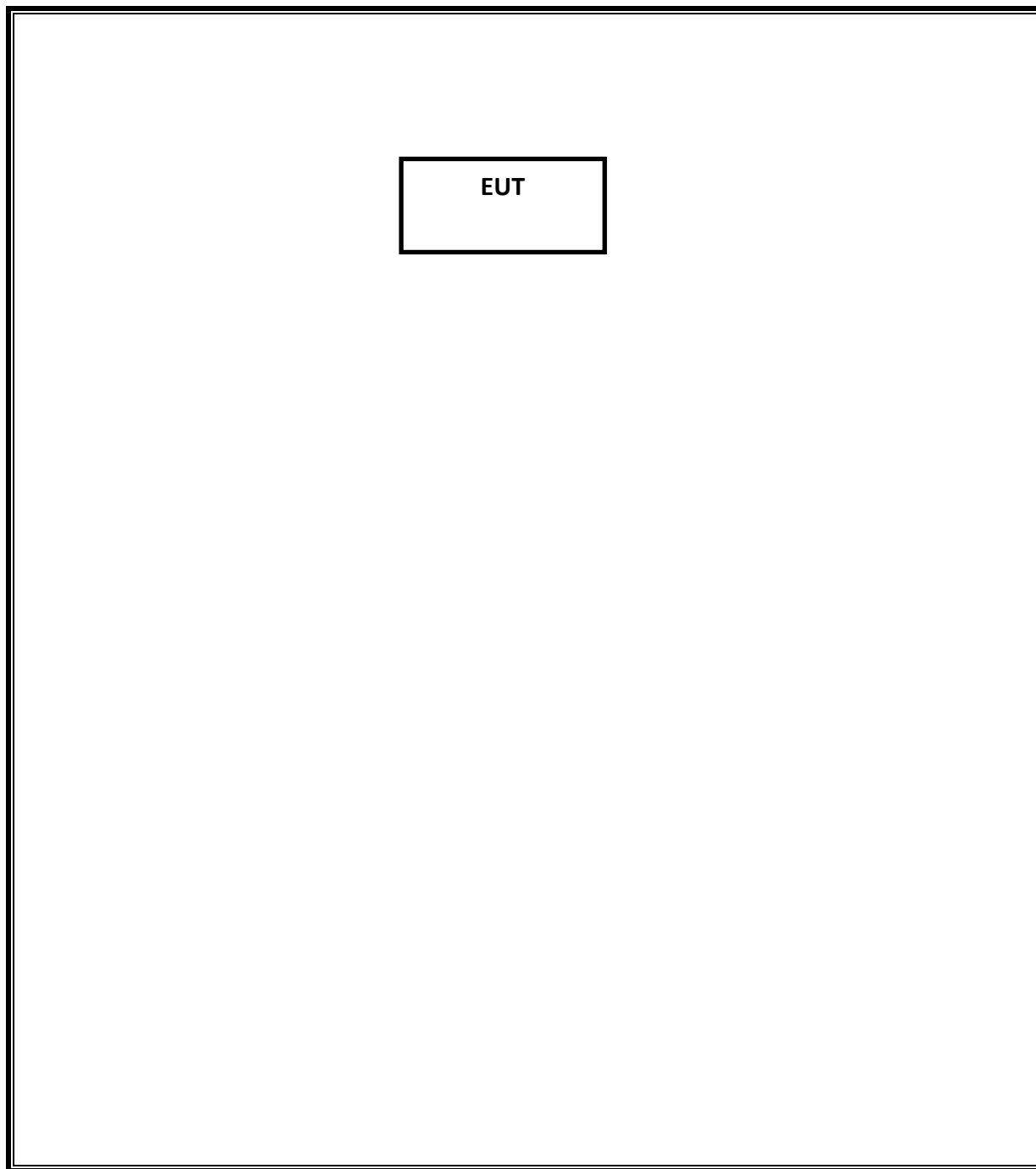
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A

TEST SETUP

The EUT is continuously transmitted during the tests.

EUT was set in the Hidden menu mode to enable BLE communications.

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	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	4/1/2016
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	2/26/2016
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	8/8/2015
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	5/8/2015
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/2015
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	N/A	3/6/2016
Antenna, Horn, 18 GHz	ETS	3117	C01022	2/21/2016
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/2015
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/2015
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/2015
LISN, 30 MHz	FCC	50/250-25-2	C00626	1/14/2016

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Version 9.5, 07/22/14
Conducted Software	UL	UL EMC	Version 9.5, 05/17/14
CLT Software	UL	UL RF	Version 1.0, 02/02/15
Antenna Port Software	UL	UL RF	Version 2.1.1.1, 1/20/15

7. SUMMARY

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-210 A8.2(a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	0.666 MHz
2.1051, 15.247 (d)	RSS-210 A8.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-36.38 dBm
15.247	RSS-210 A8.4	TX conducted output power	<30dBm		Pass	-2.831 dBm
15.247	RSS-210 A8.2	PSD	<8dBm		Pass	-15.20 dBm
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Radiated	Pass	64.01dBuV(PK)
15.205, 15.209	RSS-Gen 8.9, RSS-Gen 7	Radiated Spurious Emission	< 54dBuV/m		Pass	49.26 dBuV/m

ANTENNA PORT TEST RESULTS

8.1. 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

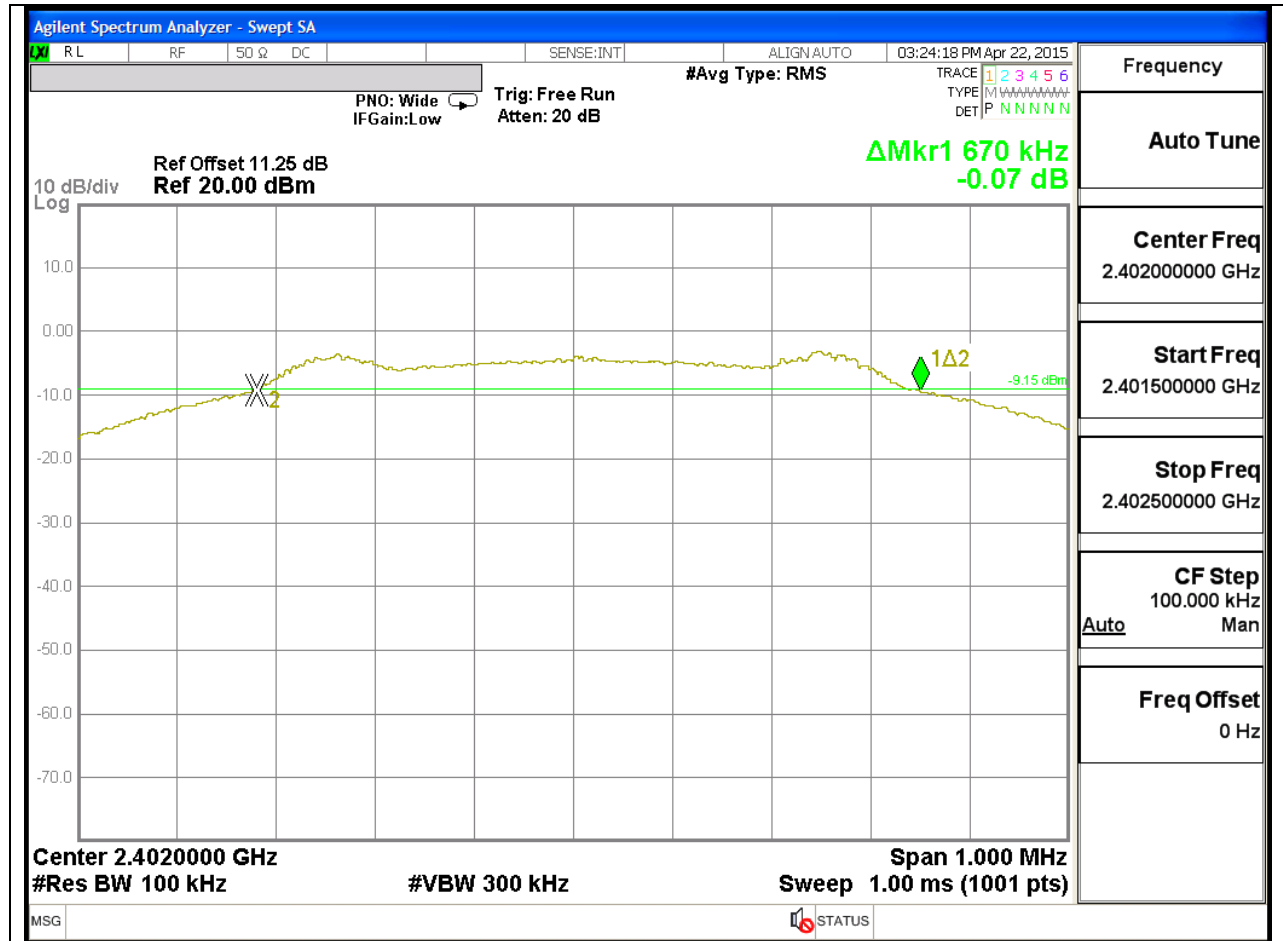
The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

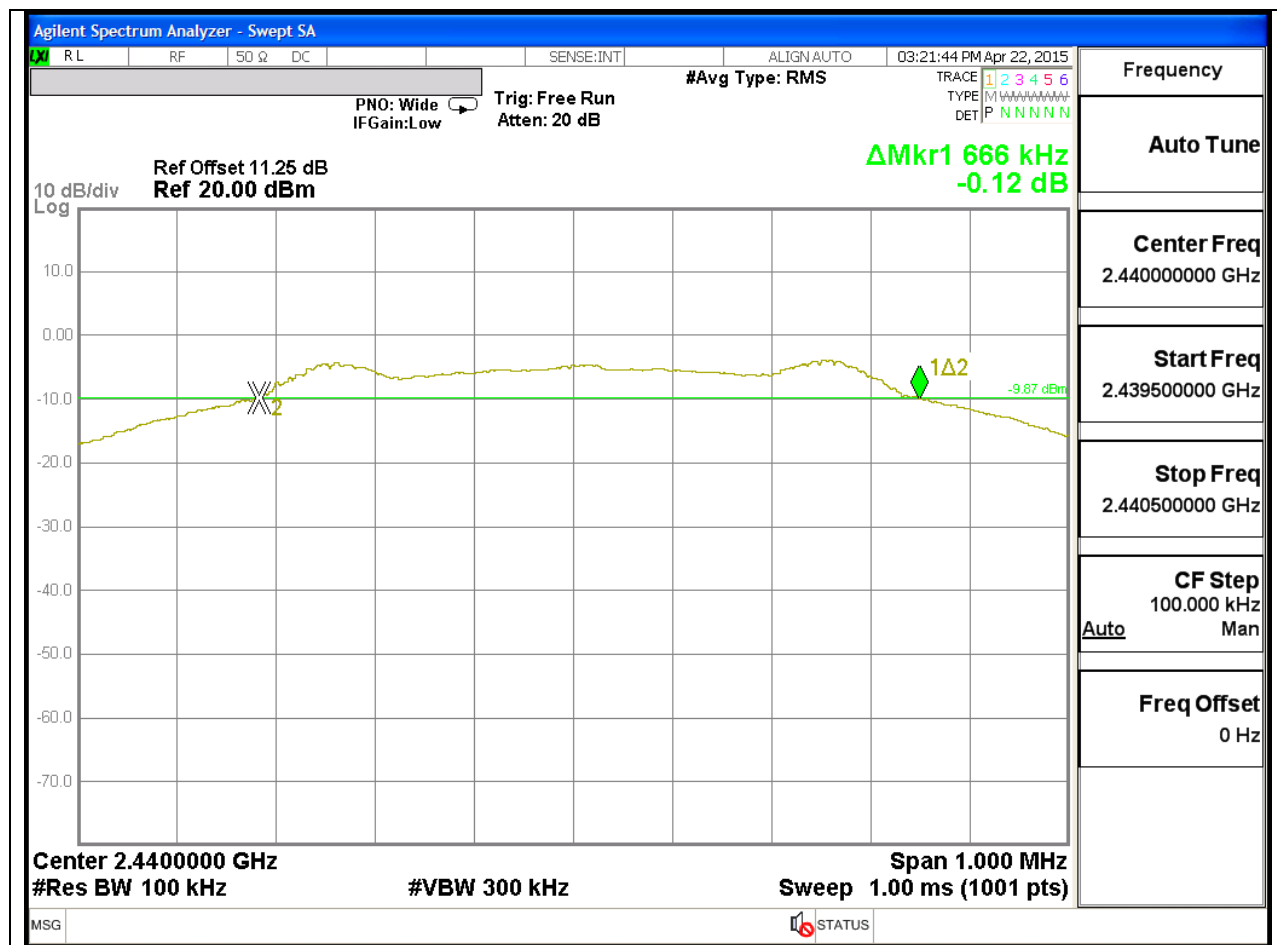
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6700	0.5
Middle	2440	0.6660	0.5
High	2480	0.6670	0.5

6 dB BANDWIDTH PLOTS

LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

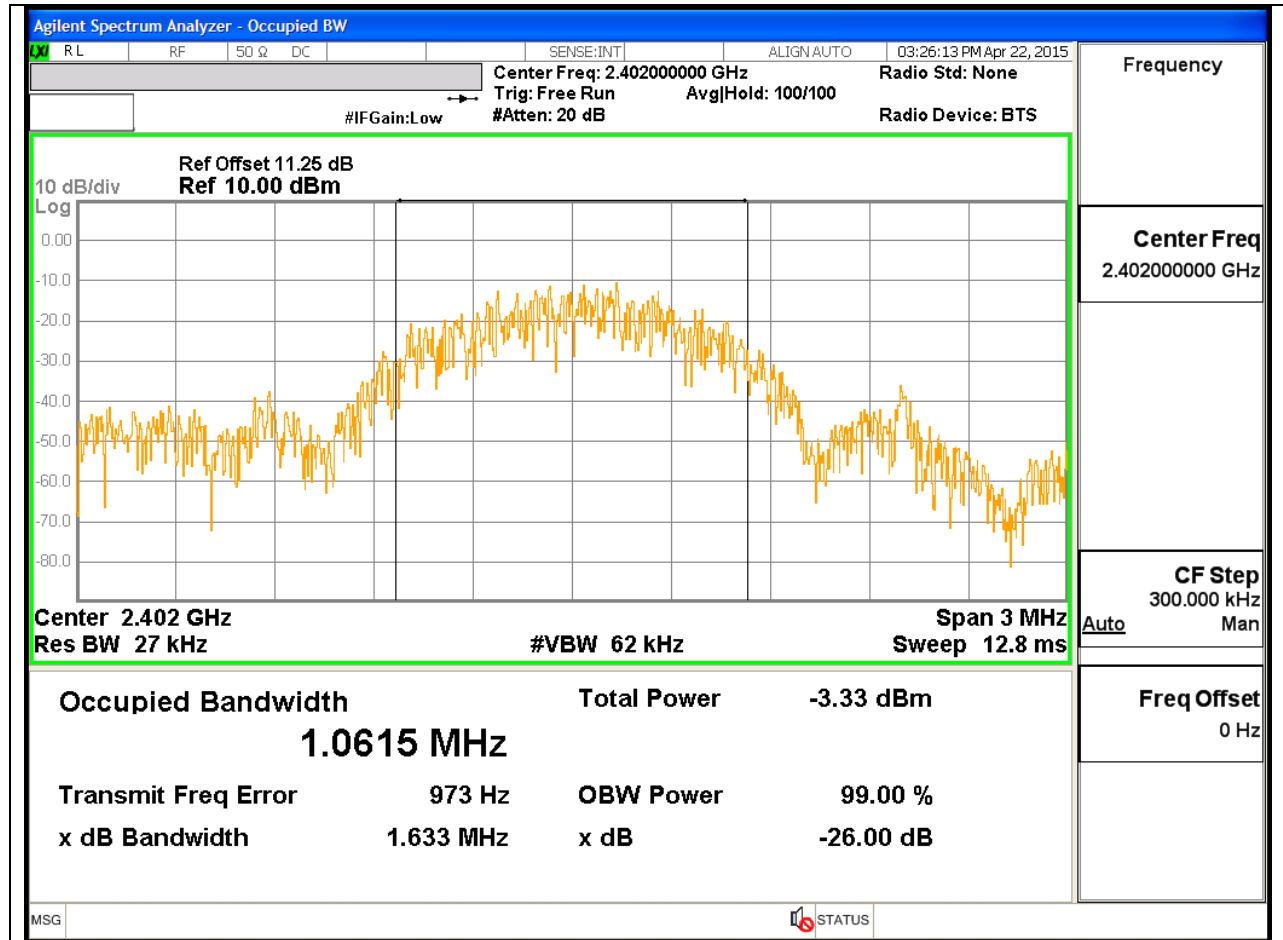
Reference to KDB558074 D01 DTS Meas Guidance v03r02: The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

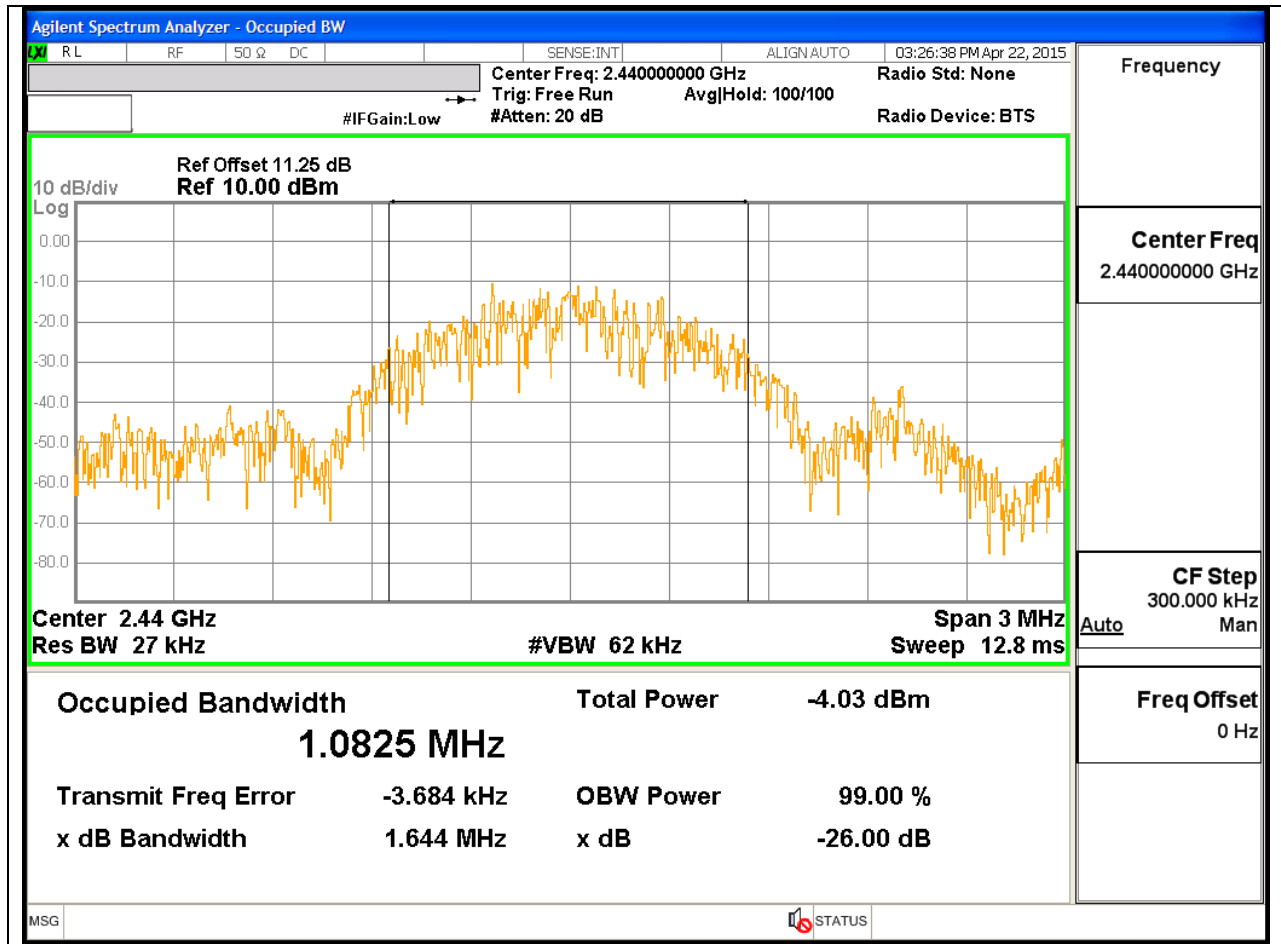
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0615
Middle	2440	1.0825
High	2480	1.0533

99% BANDWIDTH PLOTS

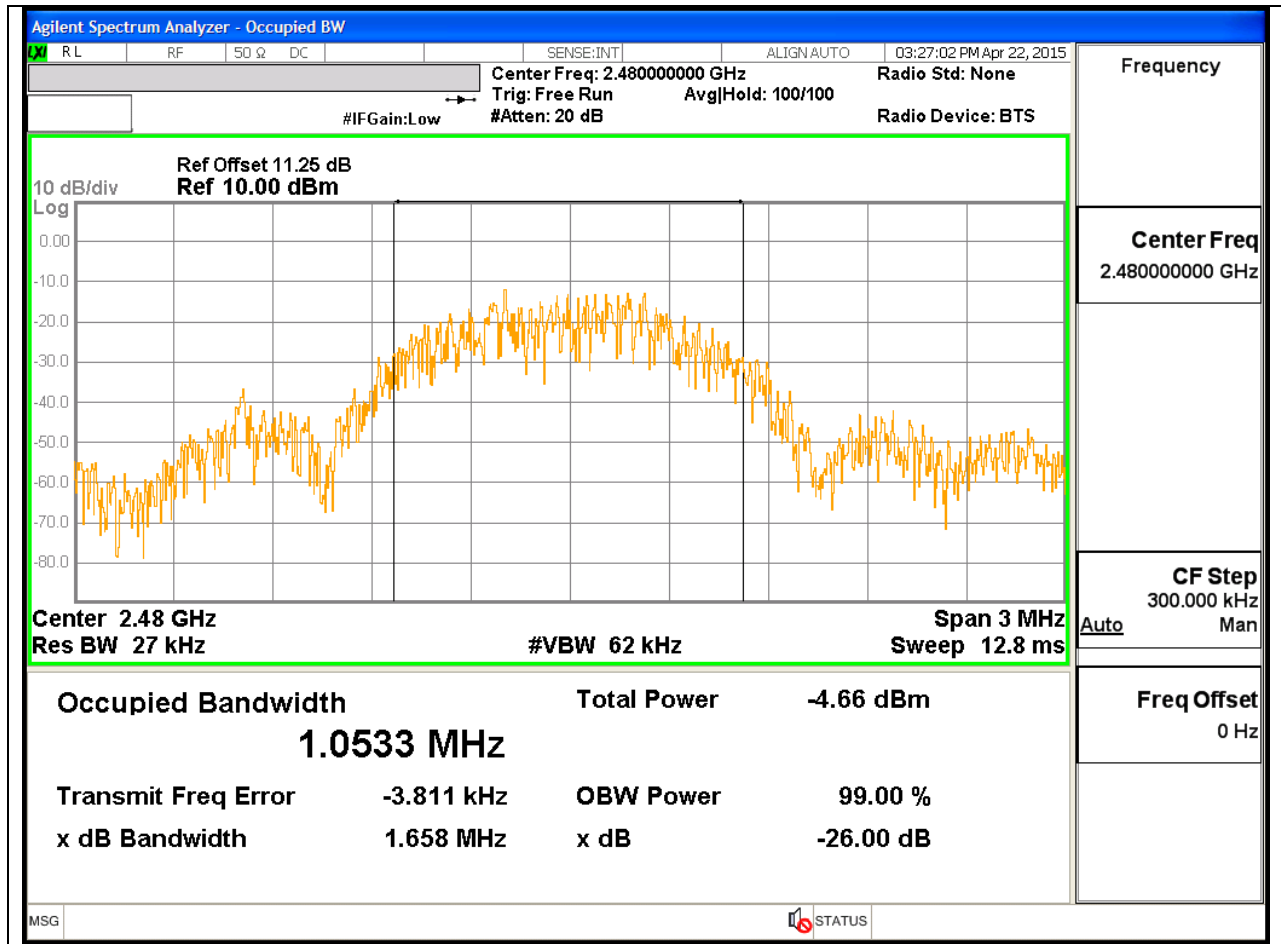
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



8.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

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

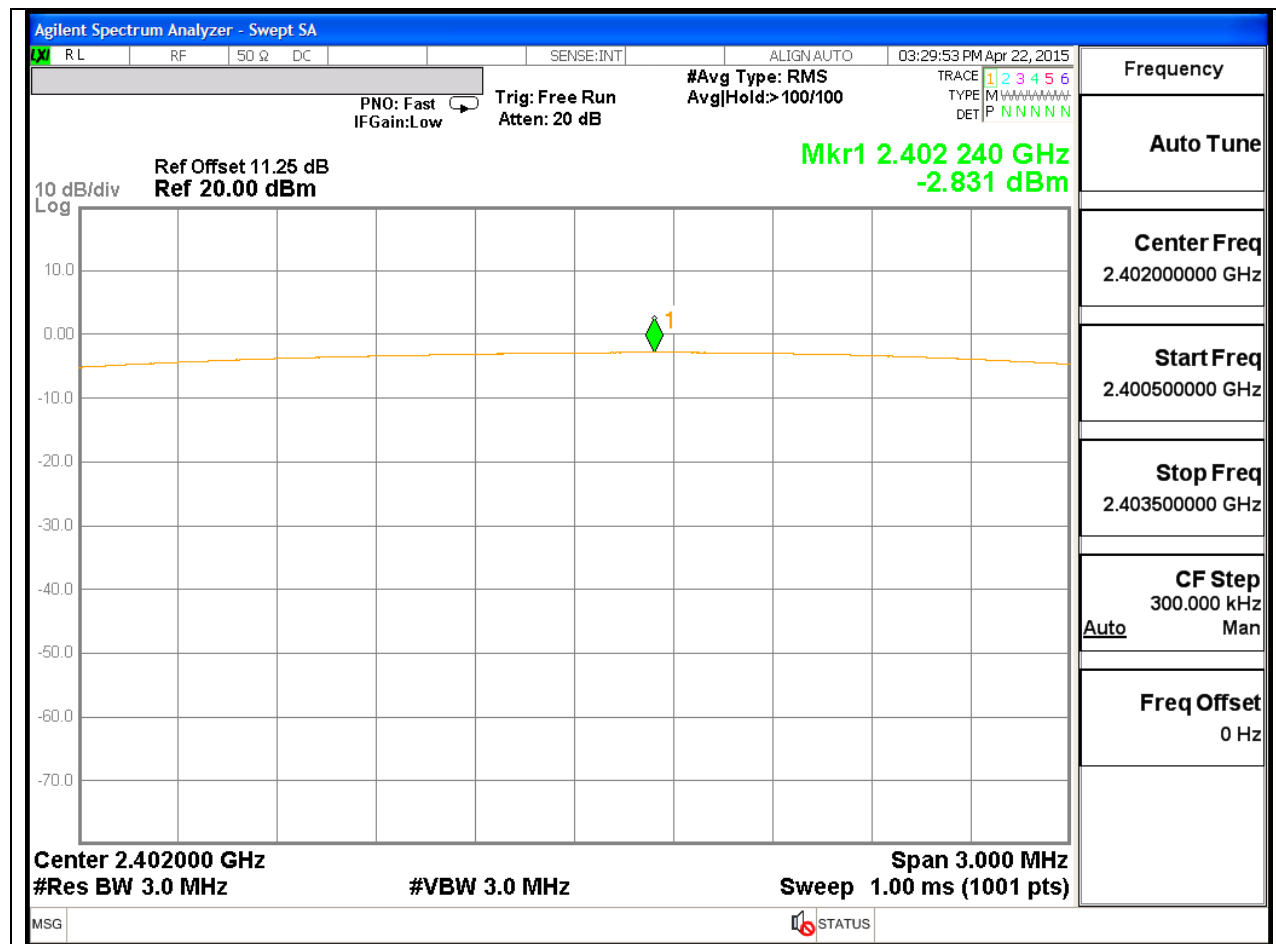
TEST PROCEDURE

Peak power is measured using KDB558074 D01 DTS Meas Guidance v03r02 under section 9.1.1 utilizing spectrum analyzer.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-2.831	30	-32.831
Middle	2440	-3.584	30	-33.584
High	2480	-4.075	30	-34.075

LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN: AUTO 03:30:16 PM Apr 22, 2015

PNO: Fast IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg|Hold: >100/100

TRACE 1 2 3 4 5 6 TYPE: M N N N N N N N DET: P N N N N N N

Ref Offset 11.25 dB Ref 20.00 dB

10 dB/div Log

Mkr1 2.440 195 GHz -3.584 dBm

Center 2.440000 GHz Span 3.000 MHz
#Res BW 3.0 MHz #VBW 3.0 MHz Sweep 1.00 ms (1001 pts)

MSG STATUS

Frequency

Auto Tune

Center Freq
2.440000000 GHz

Start Freq
2.438500000 GHz

Stop Freq
2.441500000 GHz

CF Step
300.000 kHz
Auto Man

Freq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 03:28:42 PM Apr 22, 2015

PN0: Fast IF Gain:Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg|Hold:>100/100 TRACE 1 2 3 4 5 6 TYPE M N N N N N N N DET P N N N N N N

Ref Offset 11.25 dB Ref 20.00 dB Mkr1 2.479 700 GHz -4.075 dBm

10 dB/div Log

The spectrum plot shows a single peak at 2.4797 GHz with a magnitude of -4.075 dBm. The y-axis is labeled '10 dB/div Log' and ranges from -70.0 to 10.0. The x-axis is labeled 'Center 2.480000 GHz' and ranges from 2.478500000 GHz to 2.481500000 GHz. The peak is marked with a green diamond and the number '1'.

Center 2.480000 GHz #Res BW 3.0 MHz Span 3.000 MHz Sweep 1.00 ms (1001 pts)

MSG STATUS

Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.478500000 GHz
Stop Freq 2.481500000 GHz
CF Step 300.000 kHz Auto Man
Freq Offset 0 Hz

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 11 dB (including 10 dB pad and 1 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	-3.92
Middle	2440	-3.95
High	2480	-4.12

8.5. 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

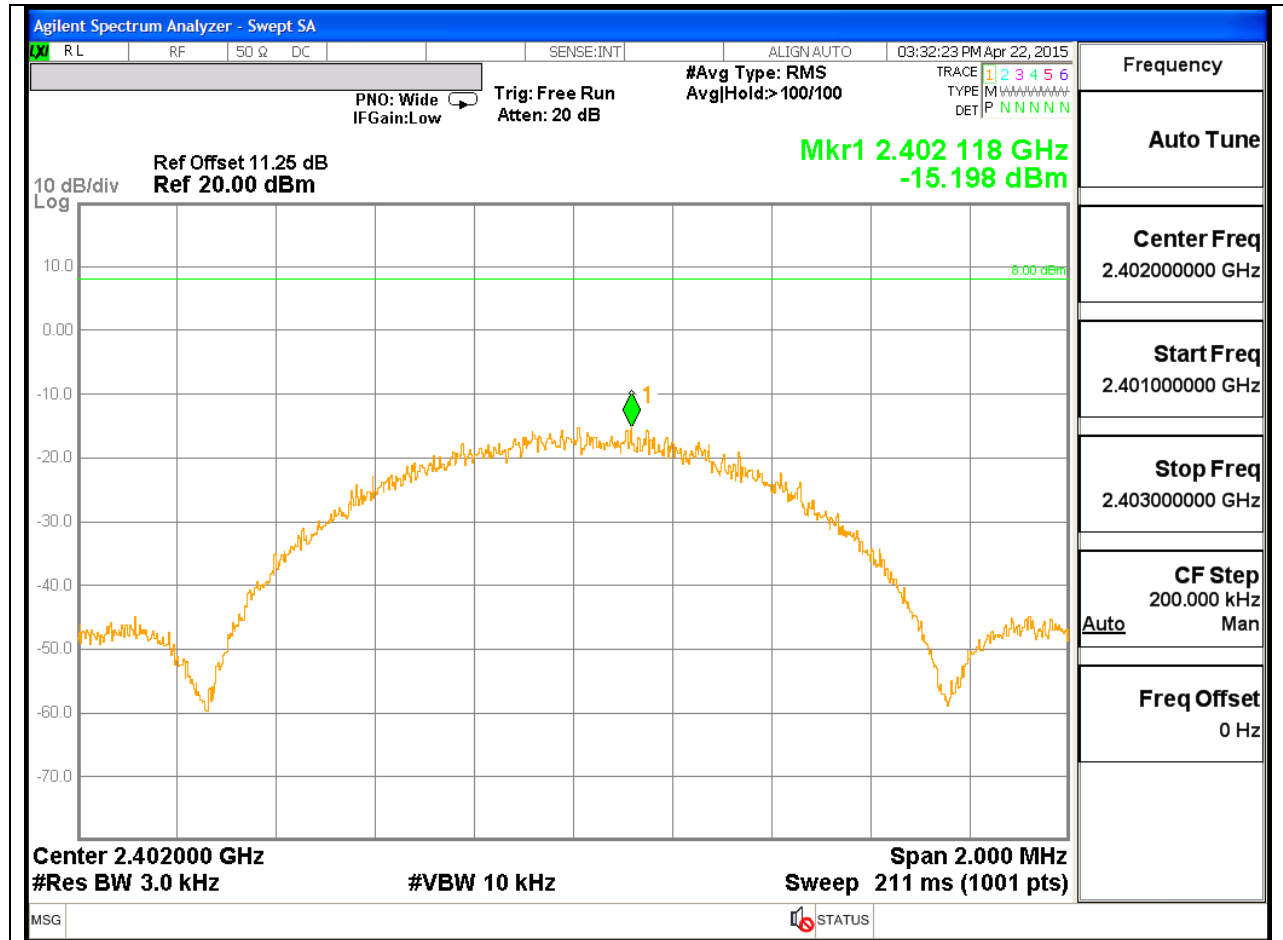
Power Spectral Density was performed utilizing the "Method PKPSD (Peak PSD)" under KDB558074 D01 DTS Meas Guidance v03r02

RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-15.20	8	-23.20
Middle	2440	-16.29	8	-24.29
High	2480	-16.66	8	-24.66

POWER SPECTRAL DENSITY PLOTS

LOW CHANNEL



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 03:31:08 PM Apr 22, 2015

PN0: Wide IF Gain: Low Trig: Free Run Atten: 20 dB #Avg Type: RMS Avg/Hold: 71/100 TRACE 1 2 3 4 5 6 TYPE [M] N N N N N N DET [P] N N N N N N

Ref Offset 11.25 dB Ref 20.00 dB Mkr1 2.439 964 GHz -16.288 dBm

10 dB/div Log

The spectrum analyzer display shows a swept signal with a peak at 2.439964 GHz. The y-axis represents power in dBm, ranging from -70.0 to 10.0. The x-axis represents frequency in GHz, ranging from 2.435 to 2.445. The signal is noisy and has a broad peak. A green diamond marker is placed on the peak at 2.439964 GHz. The peak power is -16.288 dBm. The reference level is 20.00 dBm. The offset is 11.25 dB. The span is 2.000 MHz. The resolution bandwidth is 3.0 kHz. The video bandwidth is 10 kHz. The sweep time is 211 ms (1001 pts). The center frequency is 2.440000 GHz. The frequency offset is 0 Hz. The CF step is 200.000 kHz. The auto tune is enabled. The start frequency is 2.439000000 GHz. The stop frequency is 2.441000000 GHz. The center frequency is 2.440000000 GHz. The frequency offset is 0 Hz. The CF step is 200.000 kHz. The auto tune is enabled. The start frequency is 2.439000000 GHz. The stop frequency is 2.441000000 GHz.

Center 2.440000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 2.000 MHz Sweep 211 ms (1001 pts)

MSG STATUS

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 03:31:39 PM Apr 22, 2015

PN0: Wide IFGain:Low Trig: Free Run Atten: 20 dB #Avg Type: RMS AvgHold: 67/100

TRACE 1 2 3 4 5 6 TYPE M N N N N N N N DET P N N N N N N

Ref Offset 11.25 dB Ref 20.00 dB Mkr1 2.479 910 GHz -16.664 dBm

10 dB/div Log

Center 2.480000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 2.000 MHz Sweep 211 ms (1001 pts)

Frequency

Auto Tune

Center Freq 2.480000000 GHz

Start Freq 2.479000000 GHz

Stop Freq 2.481000000 GHz

CF Step 200.000 kHz Man

Freq Offset 0 Hz

MSG STATUS

8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

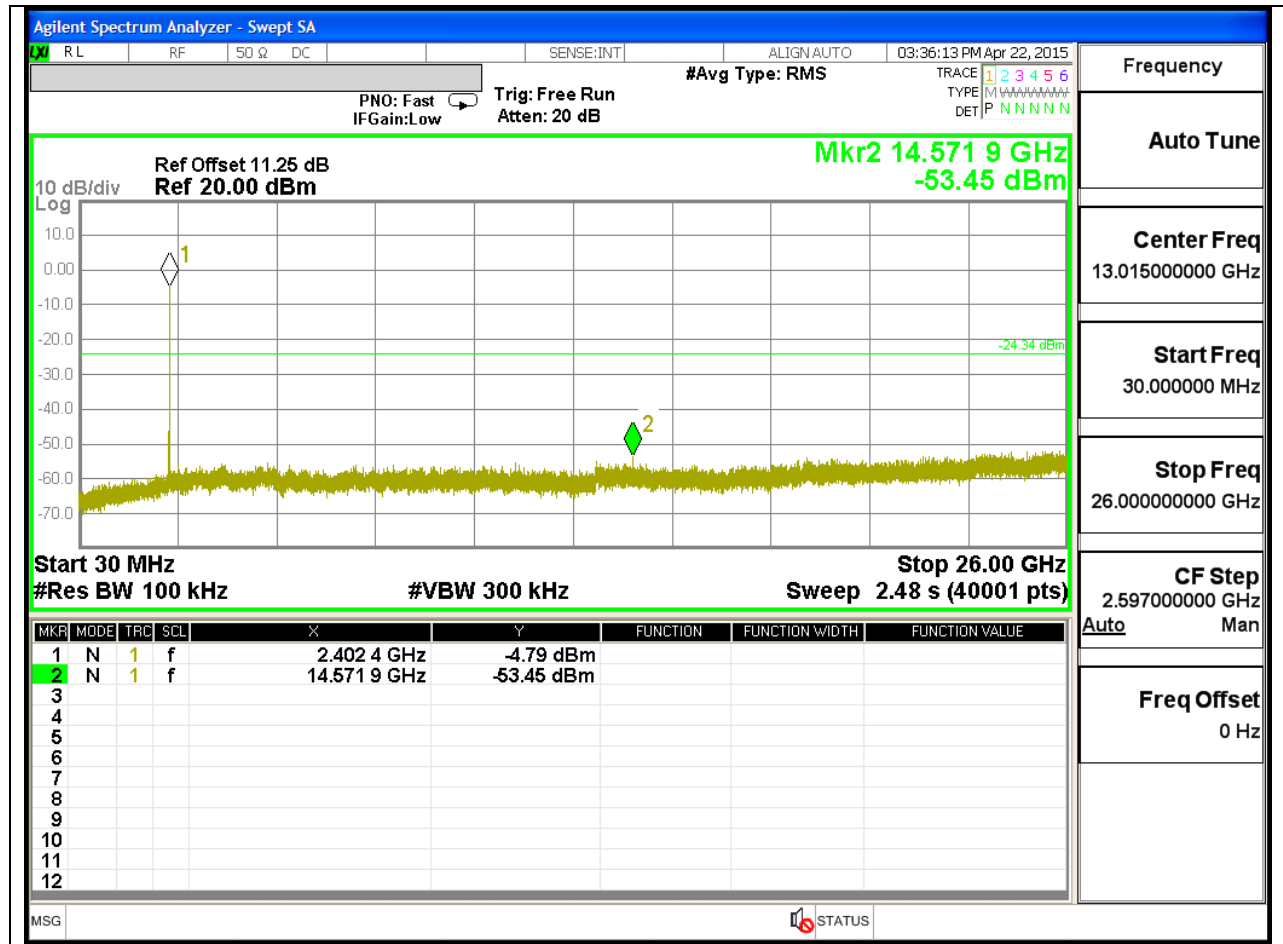
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

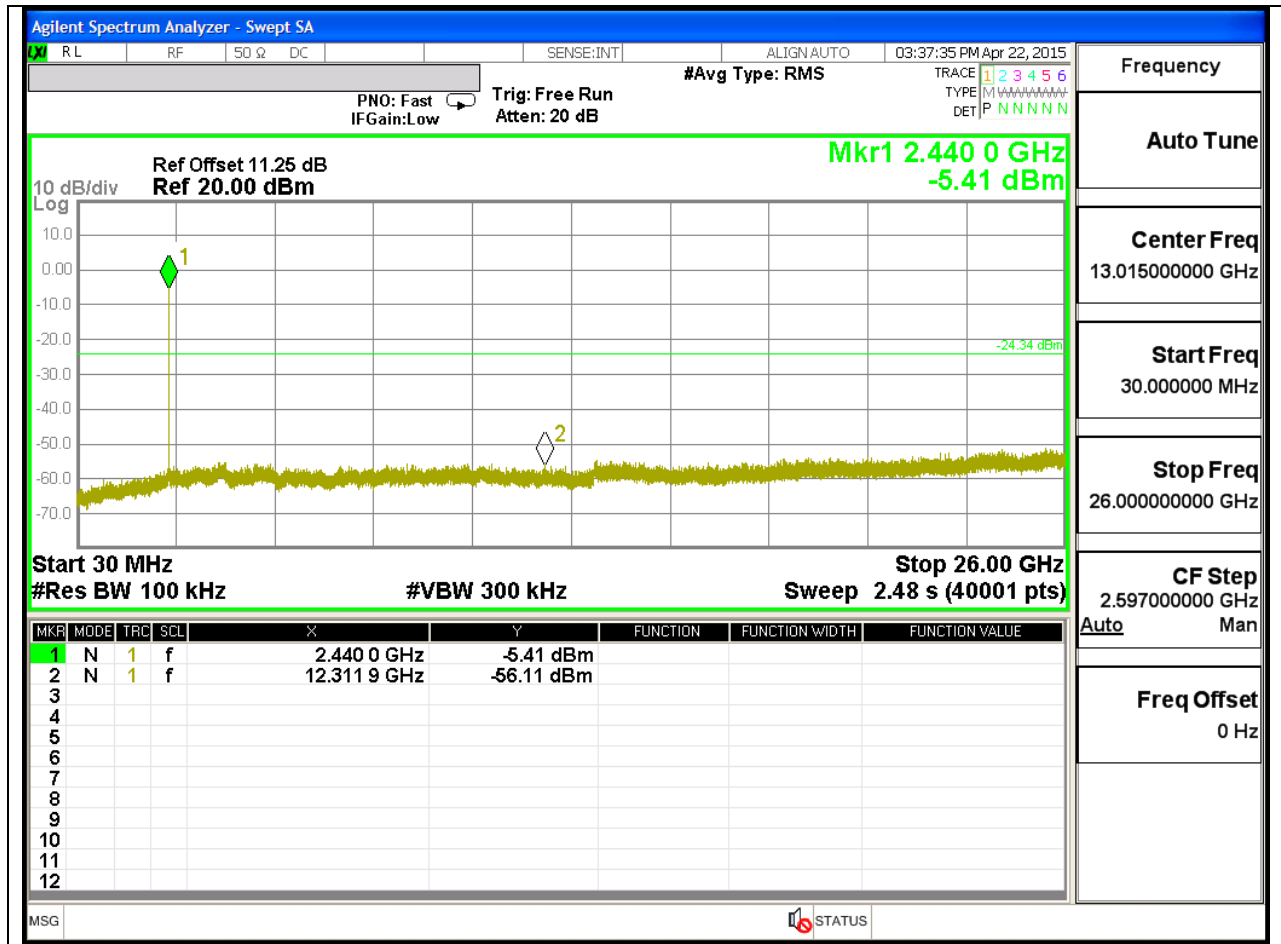
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

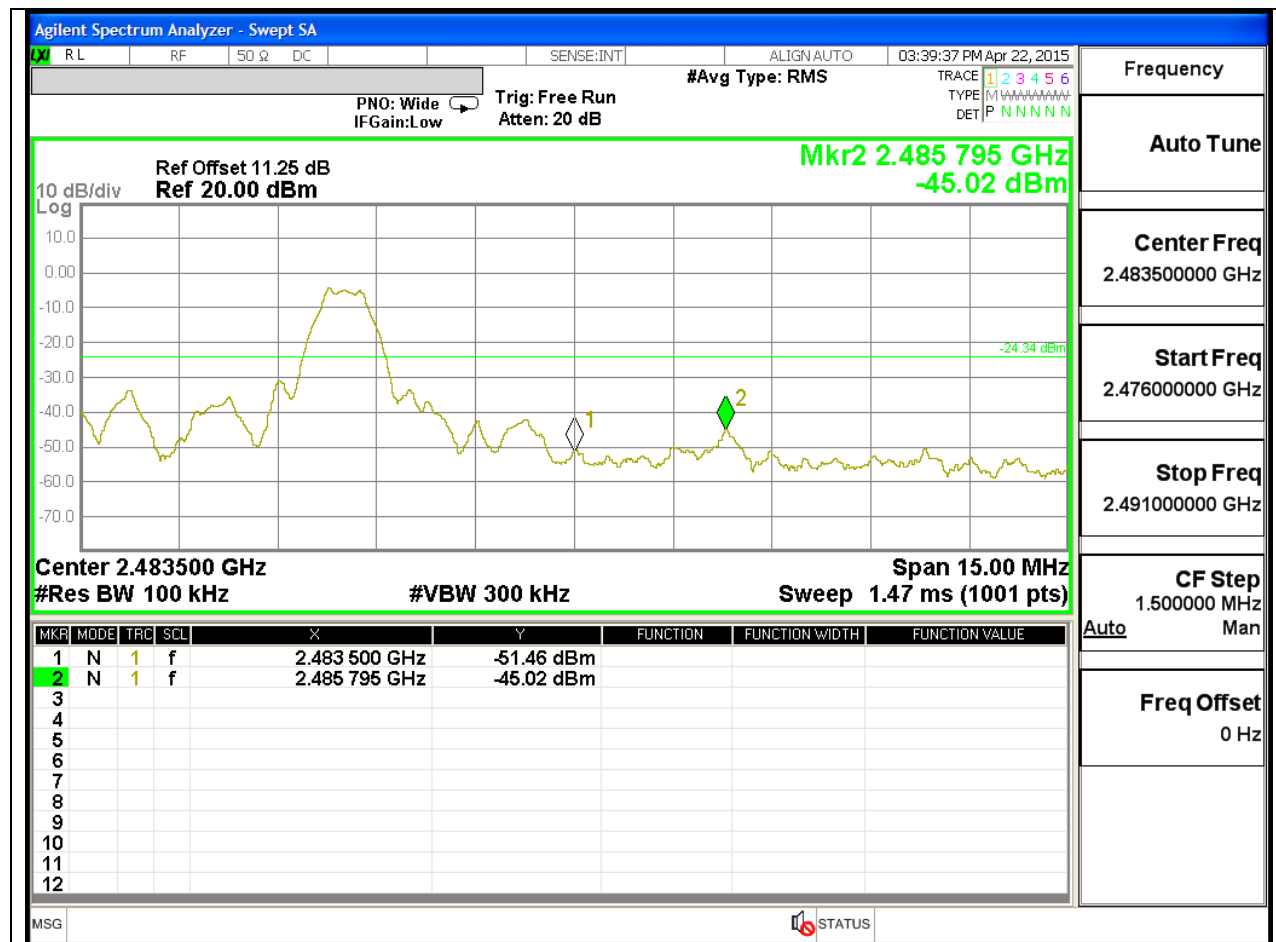
LOW CHANNEL SPURIOUS



MID CHANNEL SPURIOUS



HIGH CHANNEL BANDEDGE



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω DC SENSE:INT ALIGN AUTO 03:38:14 PM Apr 22, 2015

#Avg Type: RMS

TRAC 1 2 3 4 5 6
TYPE M W W W W W W W
DET P N N N N N N

PNO: Fast IF Gain: Low Trig: Free Run Atten: 20 dB

Ref Offset 11.25 dB
Ref 20.00 dBm

Mkr2 10.590 1 GHz
-54.93 dBm

10 dB/div
Log

Start 30 MHz
#Res BW 100 kHz

#VBW 300 kHz

Stop 26.00 GHz
Sweep 2.48 s (40001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 3 GHz	-6.63 dBm			
2	N	1	f	10.590 1 GHz	-54.93 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

MSG STATUS

Frequency

Auto Tune

Center Freq
13.015000000 GHz

Start Freq
30.000000 MHz

Stop Freq
26.000000000 GHz

CF Step
2.597000000 GHz
Auto Man

Freq Offset
0 Hz

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 ($\mu\text{V}/\text{m}$) at 3 m	Field Strength Limit (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

TEST PROCEDURE

IC test procedure:

The EUT is placed on a non-conducting table 150 cm above the ground plane for above 1GHz and 80 cm for below 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.

FCC test procedure:

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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 measurements and add duty cycle factor for average measurements. Duty cycle factor = $10 \log (1/x)$. For this sample: DCF = $10\log(1/1) = 0$ dB.

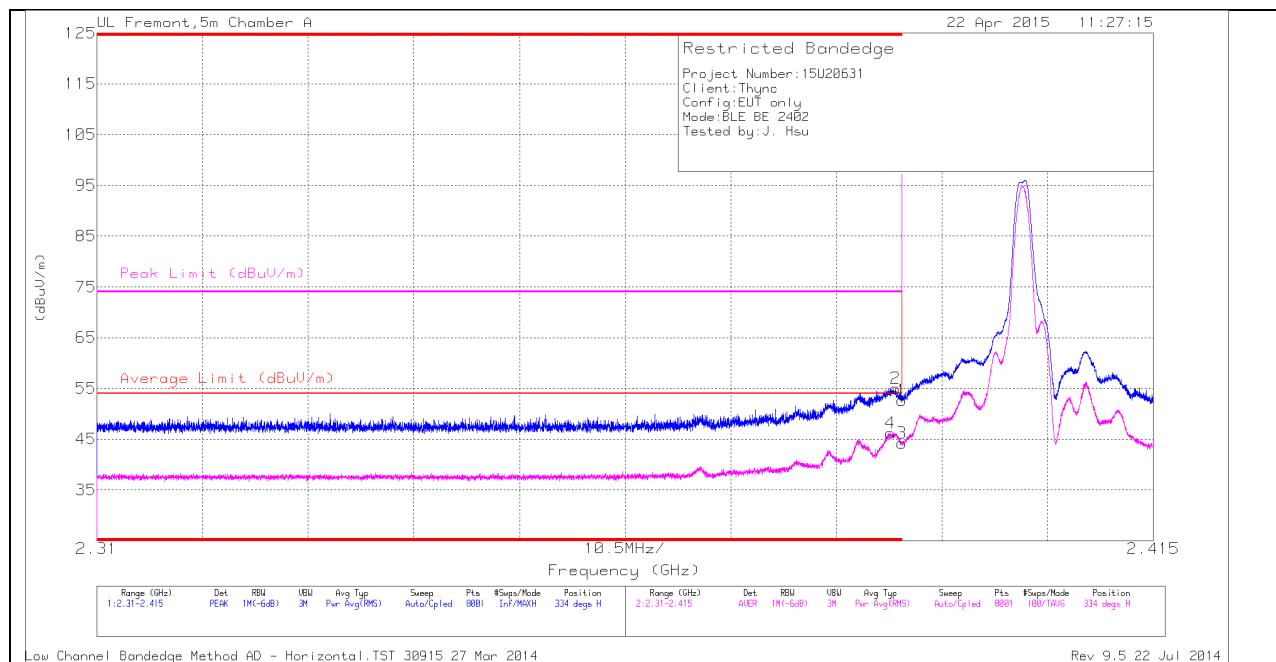
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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)

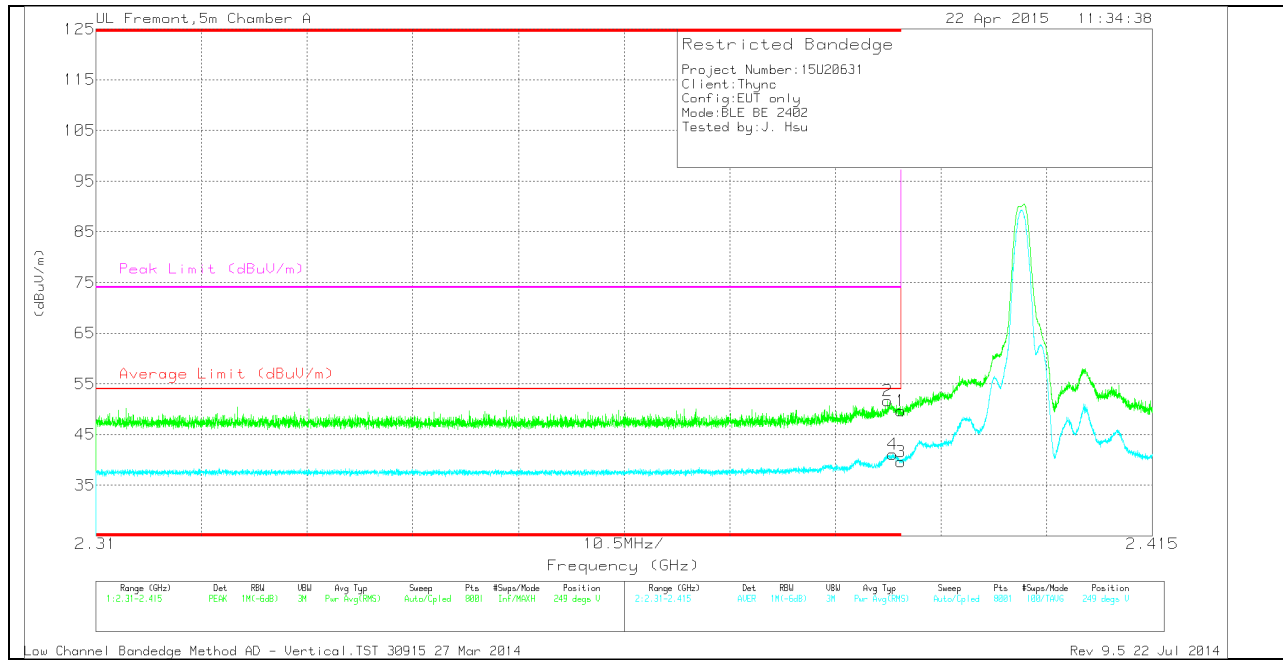
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/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	* 2.39	45.57	PK	32	-24.9	52.67	-	-	74	-21.33	334	371	H
2	* 2.389	47.89	PK	32	-24.9	54.99	-	-	74	-19.01	334	371	H
3	* 2.39	37.11	RMS	32	-24.9	44.21	54	-9.79	-	-	334	371	H
4	* 2.389	39.15	RMS	32	-24.9	46.25	54	-7.75	-	-	334	371	H

VERTICAL PEAK AND AVERAGE PLOT

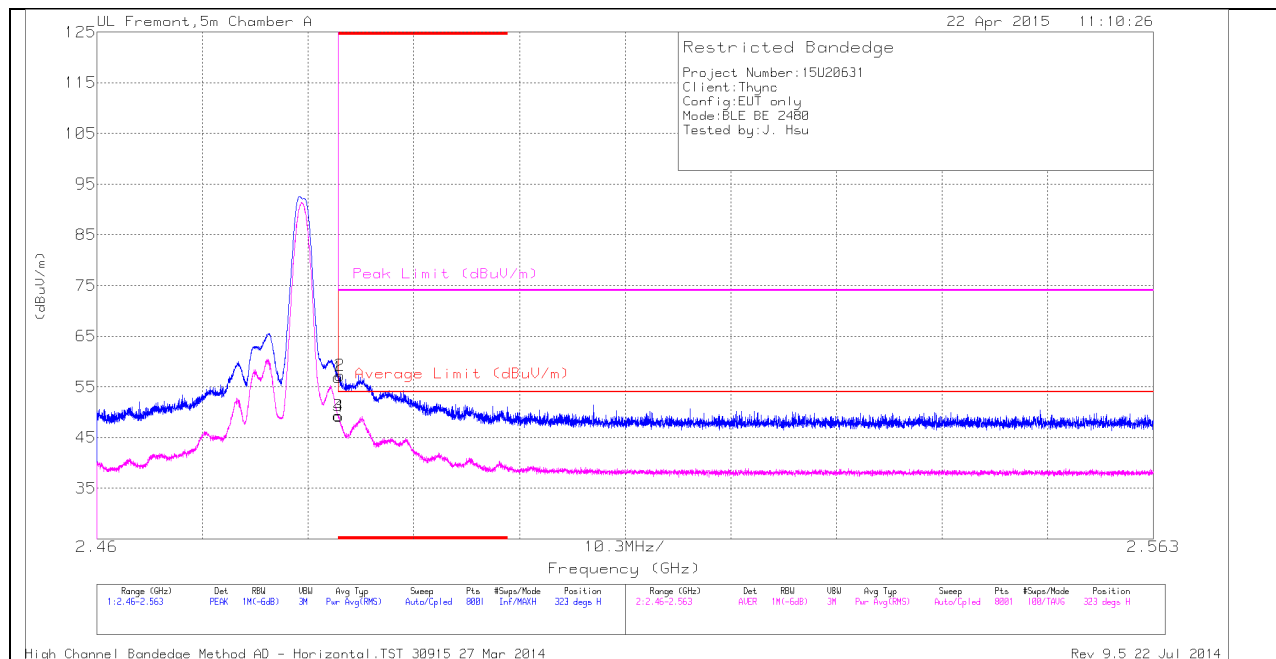


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/ Ftr/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	* 2.39	42.6	PK	32	-24.9	49.7	-	-	74	-24.3	249	362	V
2	* 2.389	44.58	PK	32	-24.9	51.68	-	-	74	-22.32	249	362	V
3	* 2.39	32.5	RMS	32	-24.9	39.6	54	-14.4	-	-	249	362	V
4	* 2.389	34	RMS	32	-24.9	41.1	54	-12.9	-	-	249	362	V

AUTHORIZED BANDEDGE (HIGH CHANNEL)

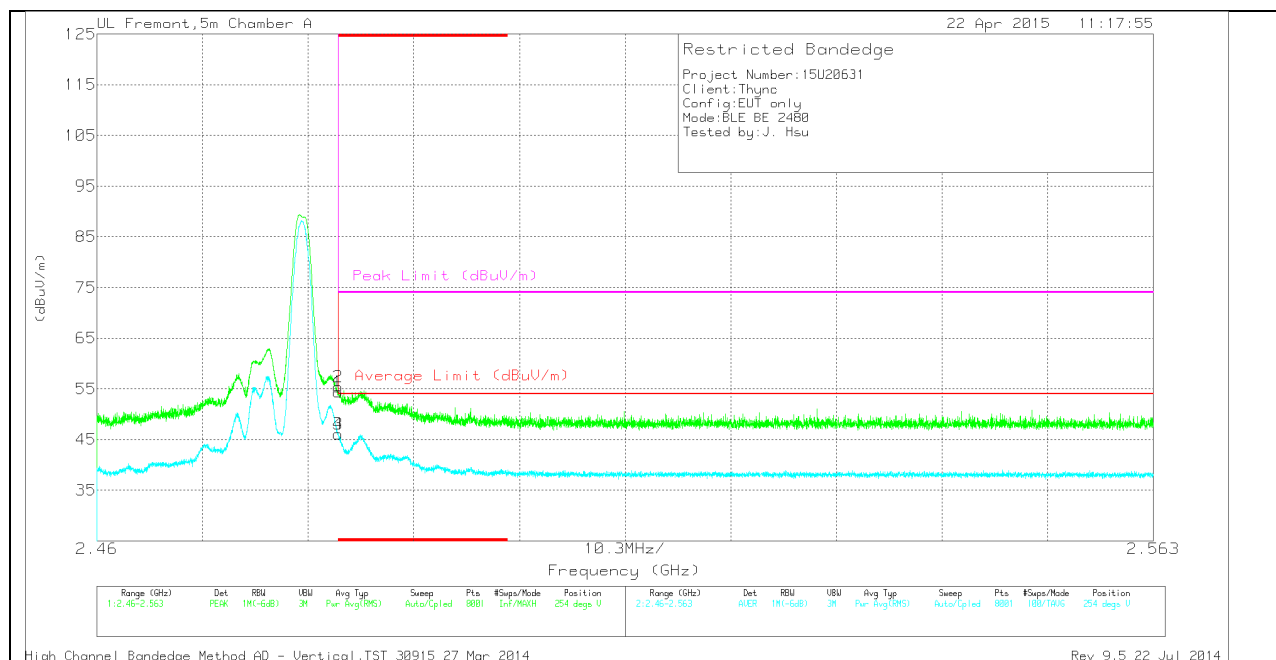
HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/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	49.56	PK	32.1	-24.8	56.86	-	-	74	-17.14	323	338	H
2	* 2.484	49.91	PK	32.1	-24.8	57.21	-	-	74	-16.79	323	338	H
3	* 2.484	41.96	RMS	32.1	-24.8	49.26	54	-4.74	-	-	323	338	H
4	* 2.484	41.92	RMS	32.1	-24.8	49.22	54	-4.78	-	-	323	338	H

VERTICAL PEAK AND AVERAGE PLOT

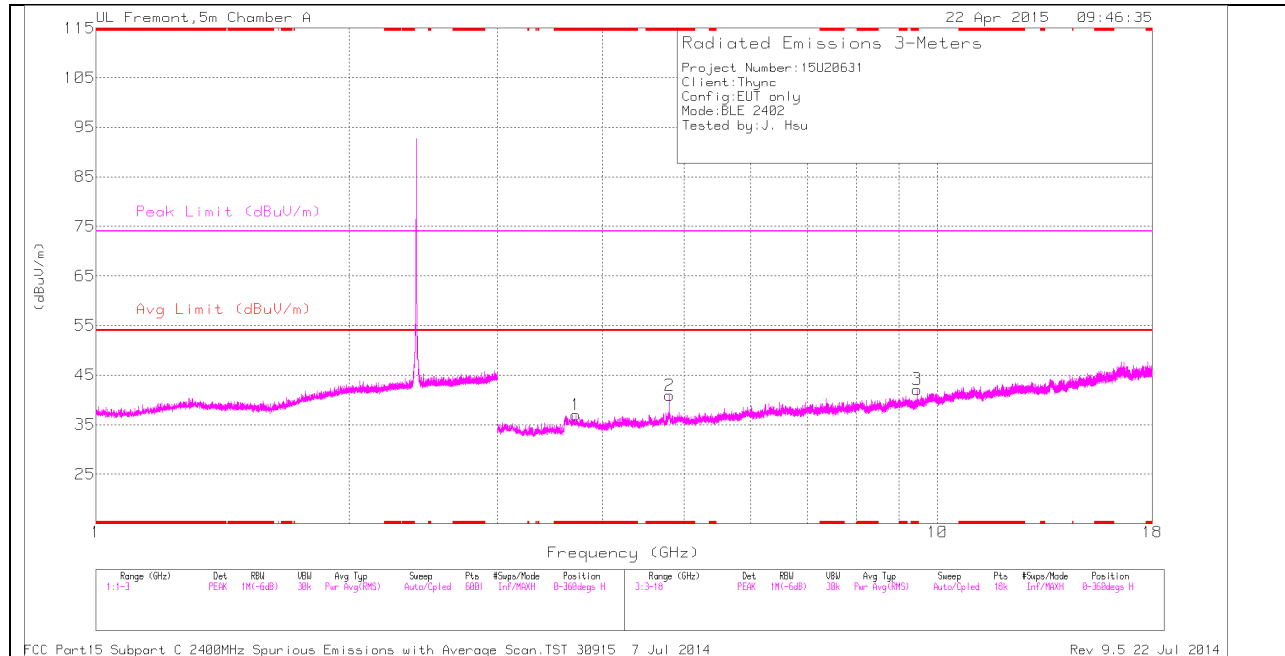


VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/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	47.09	PK	32.1	-24.8	54.39	-	-	74	-19.61	254	346	V
2	* 2.484	48.11	PK	32.1	-24.8	55.41	-	-	74	-18.59	254	346	V
3	* 2.484	38.75	RMS	32.1	-24.8	46.05	54	-7.95	-	-	254	346	V
4	* 2.484	38.81	RMS	32.1	-24.8	46.11	54	-7.89	-	-	254	346	V

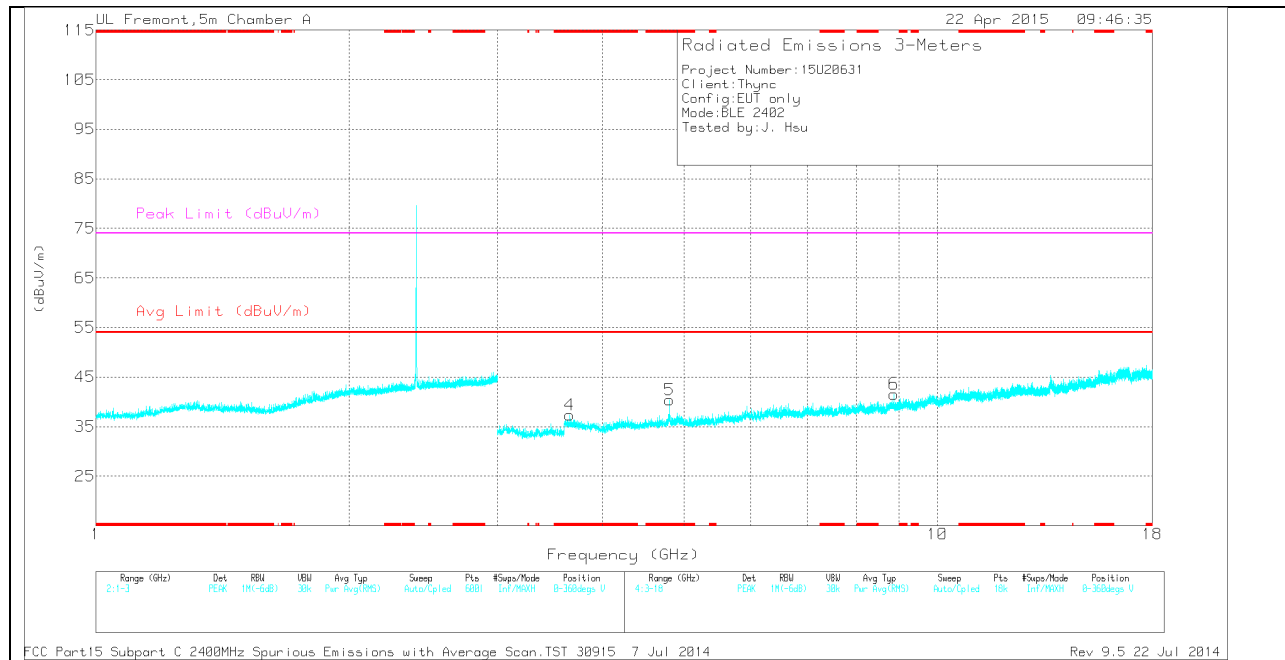
HARMONICS AND SPURIOUS EMISSIONS

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 T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.718	36.11	PK	33.3	-32.4	37.01	-	-	74	-36.99	0-360	201	H
2	* 4.806	38.06	PK	34	-31.1	40.96	-	-	74	-33.04	0-360	201	H
3	* 9.465	30.11	PK	36.5	-24.5	42.11	-	-	74	-31.89	0-360	201	H
4	* 3.656	36.55	PK	33.2	-32.4	37.35	-	-	74	-36.65	0-360	100	V
5	* 4.806	37.52	PK	34	-31.1	40.42	-	-	74	-33.58	0-360	201	V
6	8.872	30	PK	36	-24.4	41.6	-	-	-	-	0-360	100	V

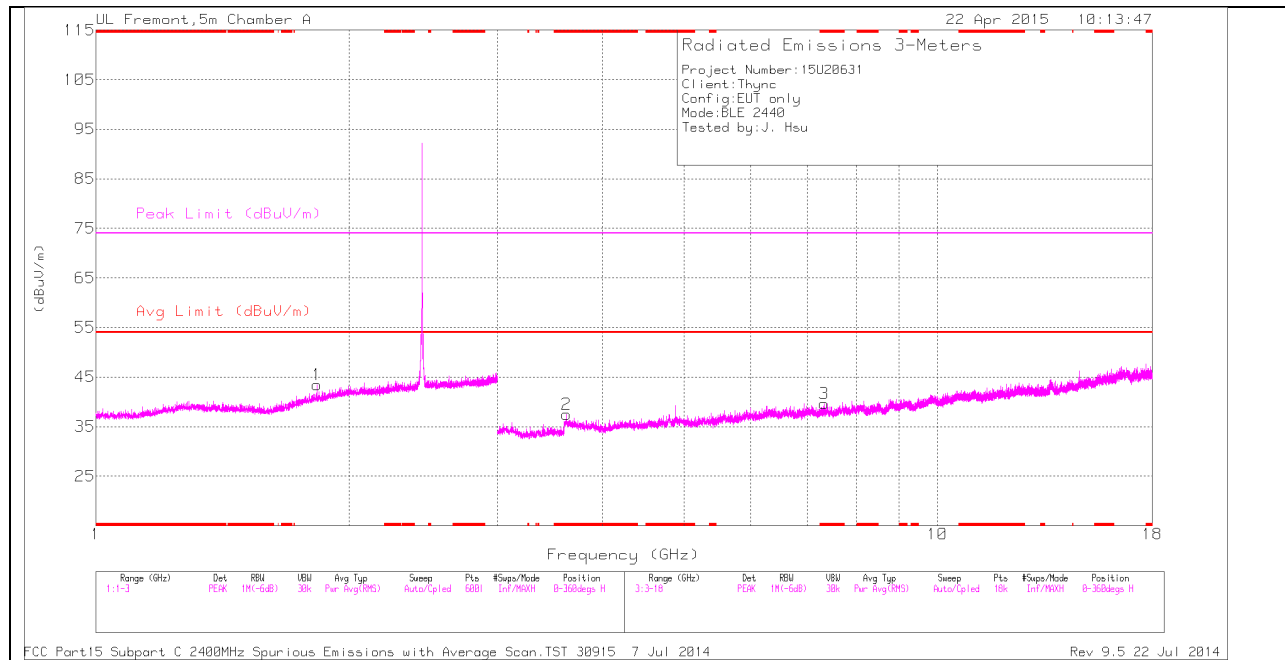
PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.806	45.55	PK2	34	-31.1	48.45	-	-	74	-25.55	76	315	H
* 4.806	37.79	MAV1	34	-31.1	40.69	54	-13.31	-	-	76	315	H

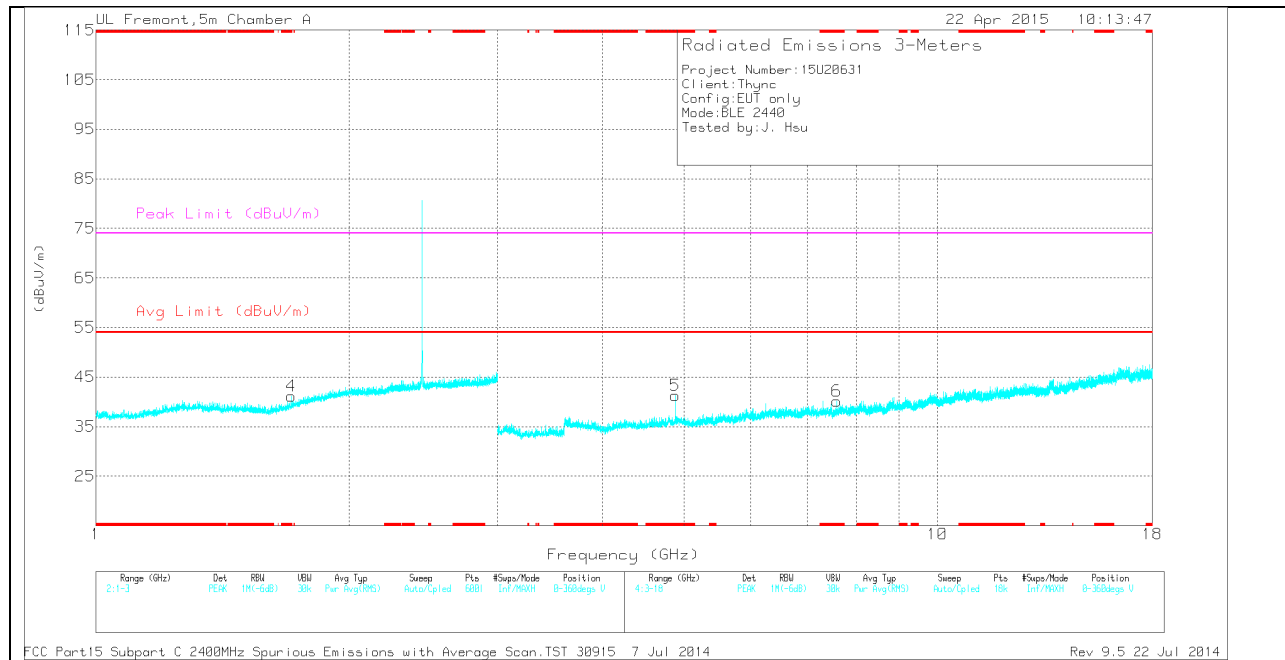
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

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 T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 1.706	38.01	PK	28.7	-25.5	41.21	-	-	74	-32.79	0-360	100	V
2	* 3.626	36.96	PK	33.1	-32.6	37.46	-	-	74	-36.54	0-360	100	H
3	* 7.332	30.48	PK	35.5	-26.3	39.68	-	-	74	-34.32	0-360	100	H
5	* 4.882	37.42	PK	33.9	-30	41.32	-	-	74	-32.68	0-360	201	V
6	* 7.595	31.31	PK	35.6	-26.8	40.11	-	-	74	-33.89	0-360	100	V
1	1.83	38.69	PK	30.2	-25.5	43.39	-	-	-	-	0-360	100	H

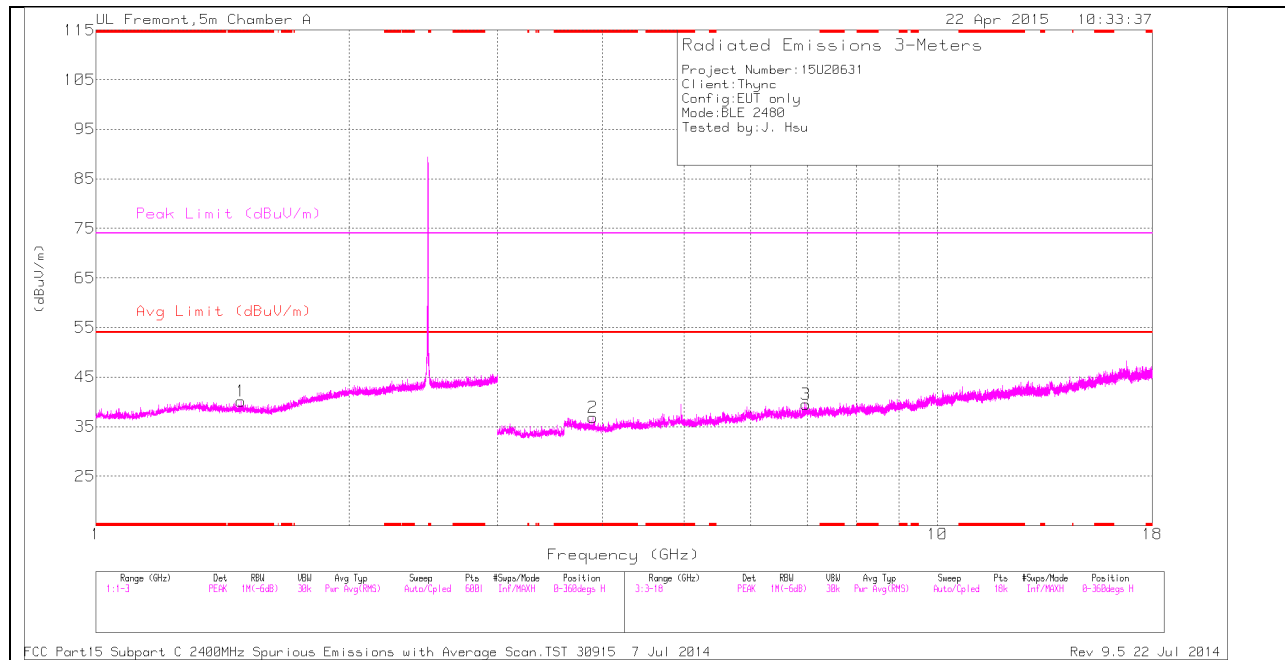
PK - Peak detector

RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	43.26	PK2	33.9	-30	47.16	-	-	74	-26.84	212	260	V
* 4.882	36.79	MAV1	33.9	-30	40.69	54	-13.31	-	-	212	260	V

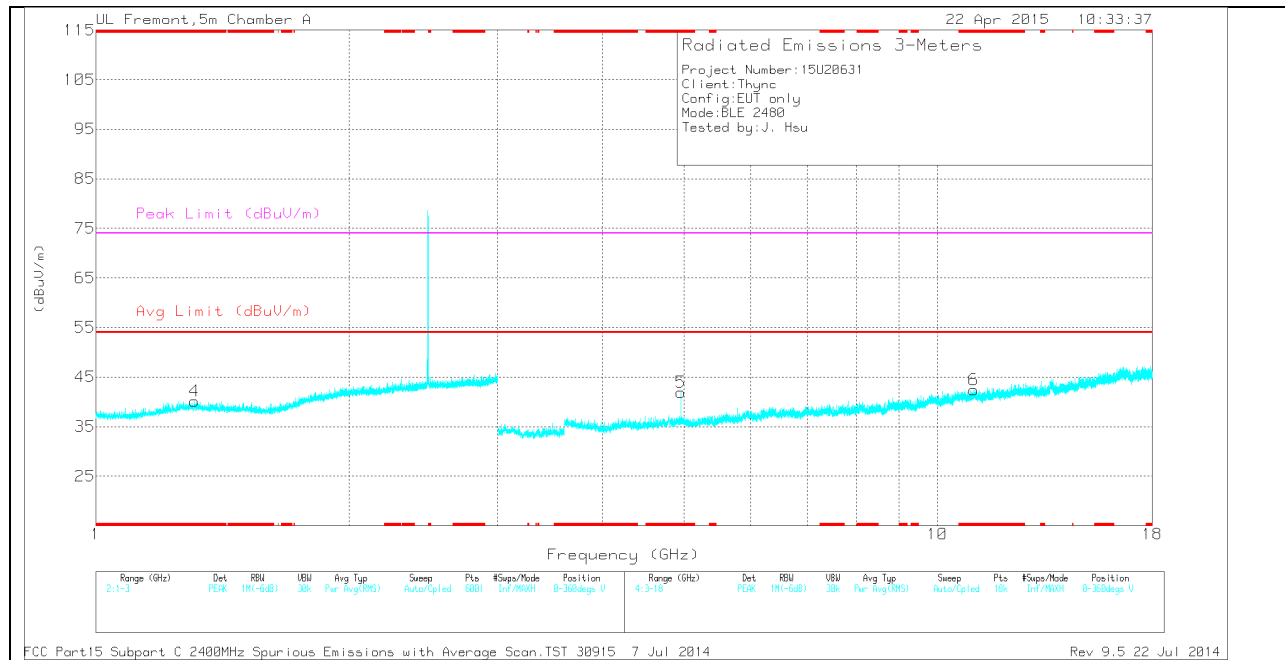
FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

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 T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.487	37.95	PK	28.1	-25.9	40.15	-	-	74	-33.85	0-360	100	H
4	* 1.309	37.47	PK	28.8	-26.1	40.17	-	-	74	-33.83	0-360	100	V
2	* 3.896	35.6	PK	33.5	-32.2	36.9	-	-	74	-37.1	0-360	201	H
5	* 4.958	37.93	PK	33.9	-29.9	41.93	-	-	74	-32.07	0-360	201	V
6	* 11.036	27.67	PK	37.9	-23.1	42.47	-	-	74	-31.53	0-360	201	V
3	6.977	30.93	PK	35.6	-27	39.53	-	-	-	-	0-360	100	H

PK - Peak detector

RADIATED EMISSIONS

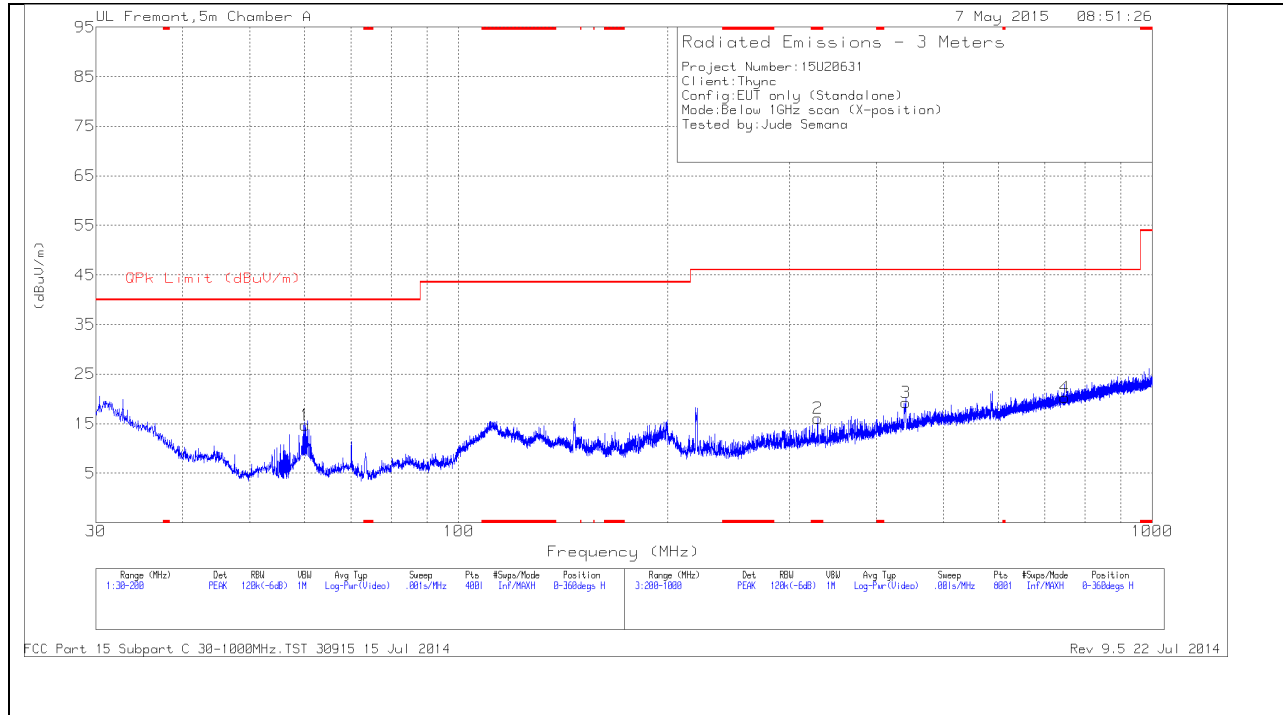
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.958	44.44	PK2	33.9	-29.9	48.44	-	-	74	-25.56	206	312	V
* 4.958	38.32	MAV1	33.9	-29.9	42.32	54	-11.68	-	-	206	312	V

FCC Part15 Subpart C T186 2400MHz Spurious Emissions.TST 12746Rev 9.5 12 Jun 2013

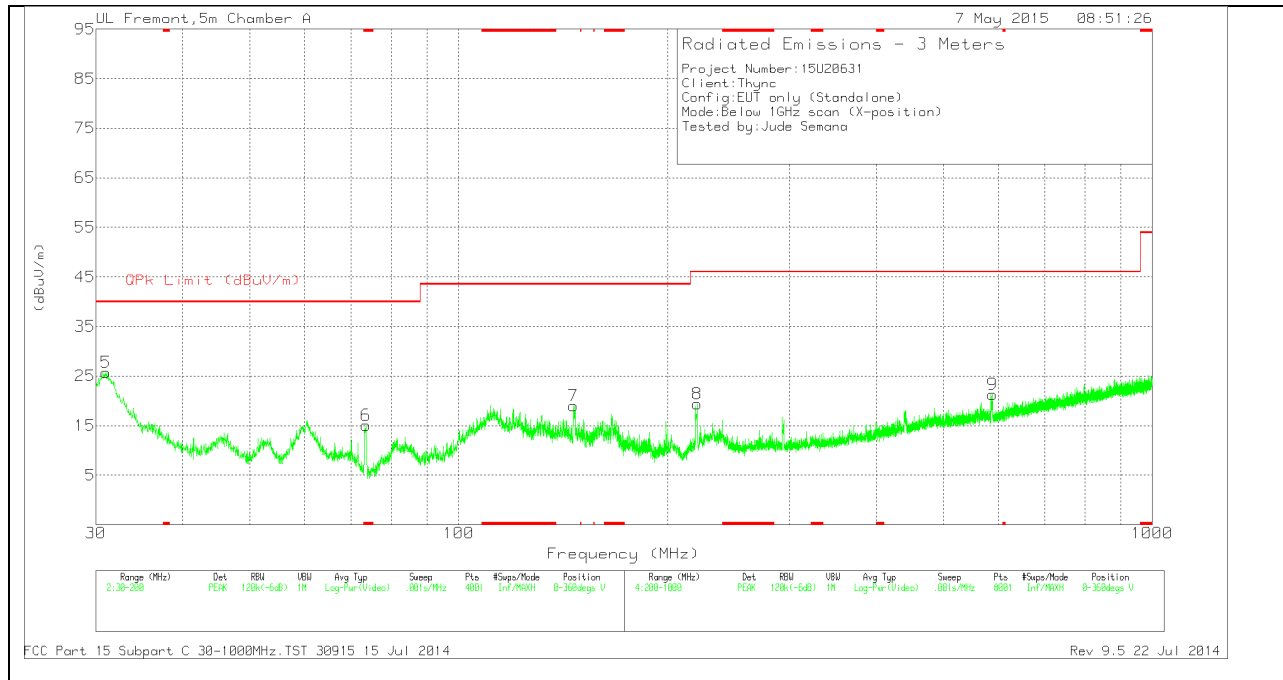
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 73.5625	37.95	PK	7.9	-30.8	15.05	40	-24.95	0-360	101	V
2	* 329.3	31.44	PK	13.9	-29.3	16.04	46.02	-29.98	0-360	200	H
5	31.02	36.57	PK	20.4	-31.2	25.77	40	-14.23	0-360	101	V
1	60.1325	37.97	PK	7.6	-30.9	14.67	40	-25.33	0-360	200	H
7	146.365	36.18	PK	13	-30.2	18.98	43.52	-24.54	0-360	101	V
8	220.7	38.47	PK	10.7	-29.8	19.37	46.02	-26.65	0-360	101	V
3	441.5	31.62	PK	16.5	-28.9	19.22	46.02	-26.8	0-360	400	H
9	588.7	31.37	PK	18.5	-28.6	21.27	46.02	-24.75	0-360	200	V
4	747.9	27.99	PK	20.6	-28.3	20.29	46.02	-25.73	0-360	300	H

* - indicates frequency in CFR 47, Part 15 and Industry Canada RSS-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

* Decreases with the logarithm of the frequency.

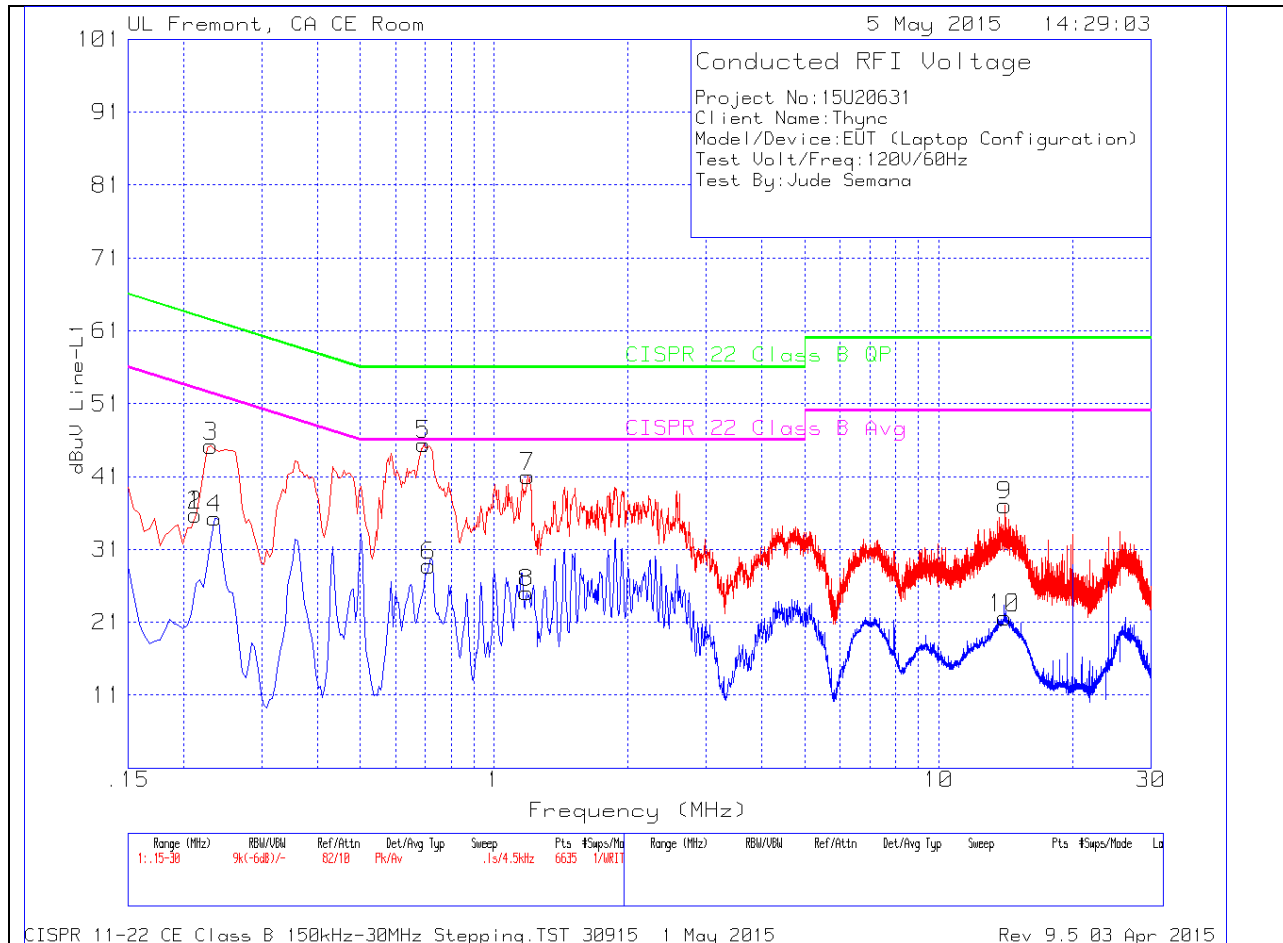
TEST PROCEDURE

ANSI C63.10

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT

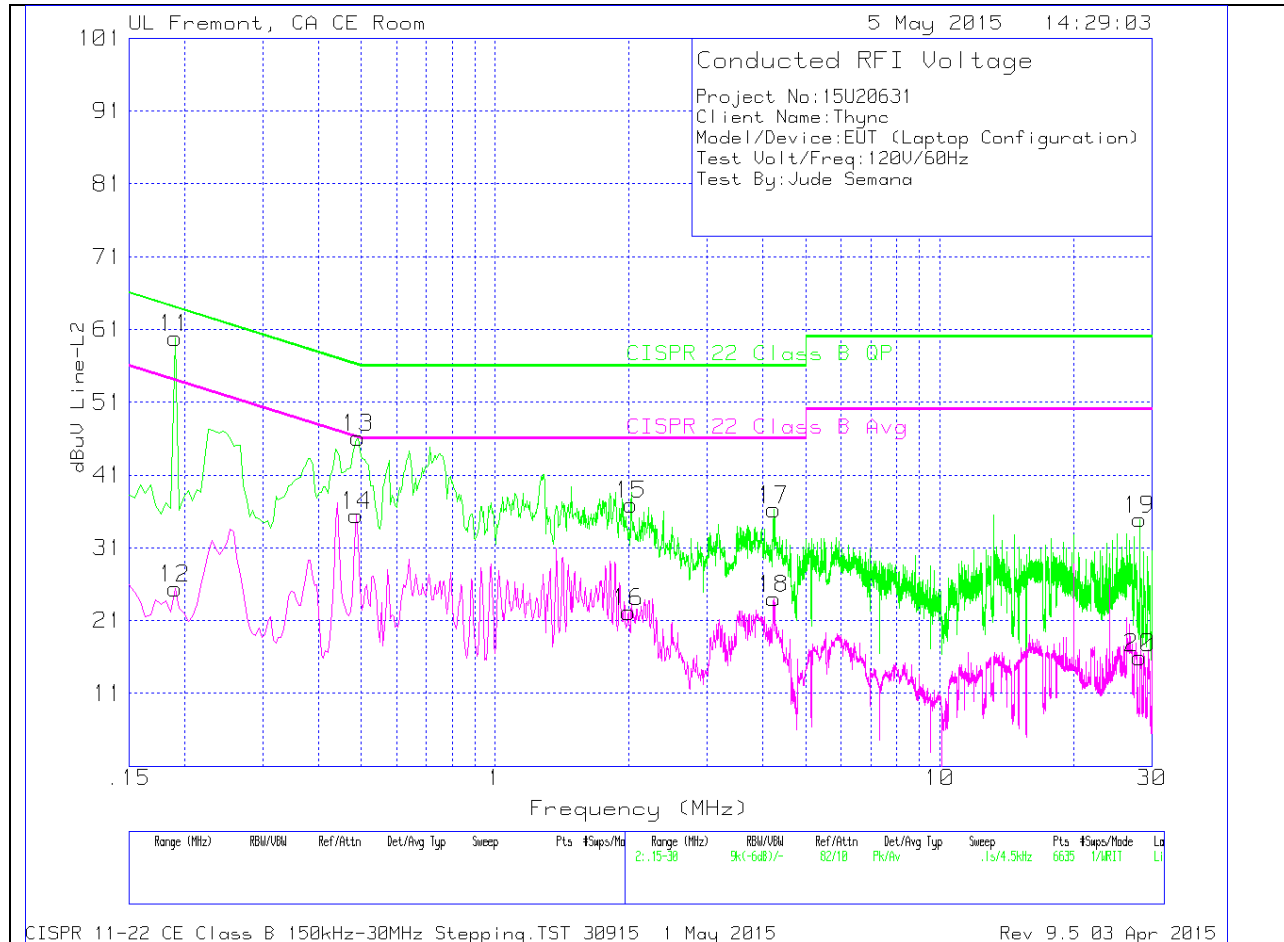


LINE 1 RESULTS

Range 1: Line-L1 .15 - 30MHz

Marker	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)
1	.213	34.82	Pk	.9	0	35.72	63.09	-27.37		
2	.213	34.82	Pk	.9	0	35.72	63.09	-27.37		
3	.231	44.38	Pk	.8	0	45.18	62.41	-17.23		
4	.2355	34.48	Av	.8	0	35.28	-	-	52.25	-16.97
5	.6945	45.11	Pk	.3	0	45.41	56	-10.59		
6	.7125	28.48	Av	.3	0	28.78	-	-	46	-17.22
7	1.1895	40.71	Pk	.2	.1	41.01	56	-14.99		
8	1.185	24.75	Av	.2	.1	25.05	-	-	46	-20.95
9	14.0595	36.67	Pk	.2	.2	37.07	60	-22.93		
10	14.073	21.21	Av	.2	.2	21.61	-	-	50	-28.39

LINE 2 PLOT



LINE 2 RESULTS

Range 2: Line-L2 .15 - 30MHz

Marker	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)
11	.1905	58.73	Pk	1.1	0	59.83	64.01	-4.18		
12	.1905	24.29	Av	1.1	0	25.39	-	-	54.01	-28.62
13	.492	45.74	Pk	.4	0	46.14	56.13	-9.99		
14	.4875	35.04	Av	.4	0	35.44	-	-	46.21	-10.77
15	2.022	36.64	Pk	.2	.1	36.94	56	-19.06		
16	1.995	21.85	Av	.2	.1	22.15	-	-	46	-23.85
17	4.2315	35.94	Pk	.2	.1	36.24	56	-19.76		
18	4.2315	23.72	Av	.2	.1	24.02	-	-	46	-21.98
19	28.1265	34.31	Pk	.3	.3	34.91	60	-25.09		
20	28.158	15.31	Av	.3	.3	15.91	-	-	50	-34.09