Test Report

Curtis-Straus LLC, *a wholly owned subsidiary of BV CPS*

Report No	EN0030-1
Client	Osram Sylvania
Address	54 Cherry Hill Drive Danvers, MA 01923
Phone	(978) 750-2967
Items tested	**IQOSSYL**
FCC ID	DZO-IQOSSYL
IC ID	11099A-IQOSSYL
FRN	0003433364
Equipment Type	Digital transmission System
Equipment Code	DTS
Emission Designator	2M47D1D
FCC/IC Rule Parts	47 CFR Part 15.247, RSS-Gen Issue 3 and RSS-210 Issue 8
Test Dates	April 17 through June 24, 2013
Results	As detailed within this report
	Arik Zwimer
Authorized by	Mairaj Hussain – EMC Supervisor
Issue Date	6/25/13
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 41 of this report.

Contents

Form Final Report REV 7-20-07 (DW)

Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247, RSS GEN, and RSS-210. The product is the iQZigBee. It is a transmitter that operates in the range 2400-2483.5MHz

We found that the product met the above requirements without modification. The test sample was received in good condition on April 17th, 2013.

Test Methodology

Radiated emissions were performed according to the procedures specified in ANSI C63.4 (2009), FCC public notice regarding measurement procedure for DTS and RSS-GEN. Radiated Emissions were maximized by rotating the device around orthogonal axes as well as varying the test antenna's height and polarity. The device antenna was could not be maximized separately. AC mains conducted emissions were performed while eut was powered through a AC-DC supply.
The EUT operating voltage is 3v dc. Fresh batteries were used during testing.

Conducted emission at the antenna port was performed, as required by rule part.

The following bandwidths were used during radiated spurious and line conducted emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz

Four channels were tested.

Channel 11 = 2405MHz
Channel 18 = 2440MHz
Channel 25 = 2475MHz
Channel 26 = 2480MHz

Product Tested - Configuration Documentation

EUT Configuration

Work Order: N0030
Company: Osram Sylvania
Company Address: 54 Cherry Hill Drive
Danver MA, 01923
Contact: Sivakumar Thangavelu
Person Present: Sivakumar Thangavelu

	MN	SN
EUT:	iQZigBee	Sample 1

EUT Description: iQZigBee 2.4GHz RF Module
EUT Max Frequency: 2.4GHz

Support Equipment:	**MN**	**SN**
3Vdc Battery Pack (2xAA)		

EUT Ports:

Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
DC Power	Power DC	1	1	2-wire	No	No	10 cm	N/A	Indoor	
SMA	Radio	1	0							Only for Conducted Measurement

Software / Operating Mode Description:

Transmitting at Channels 11, 18 and 25 within 2400 - 2483.5 MHz frequency range.

Performance Criteria:

Statement of Conformity

The iQZigBee has been found to conform to the following parts of 47 CFR, RSS 210 and RSS GEN Issue 3 as detailed below:

RSS-GEN	RSS 210	Part 15	Comments
5.4		15.15(b)	There are no controls accessible to the user that varies the output power.
5.2		15.19	The label is shown in the label exhibit.
7.1.3 7.1.2		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
4.1		15.31	The EUT was tested in accordance with the measurement standards in this section.
		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
		15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
7.1.2		15.203	The antenna for this is hardwired to the board.
	2.5	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
7.2.4		15.207	EUT is battery powered. No AC mains emissions were tested.
	Annex 8	15.247	The unit complies with the requirements of 15.247
4.6.1			Occupied Bandwidth measurements were made.

Test Results

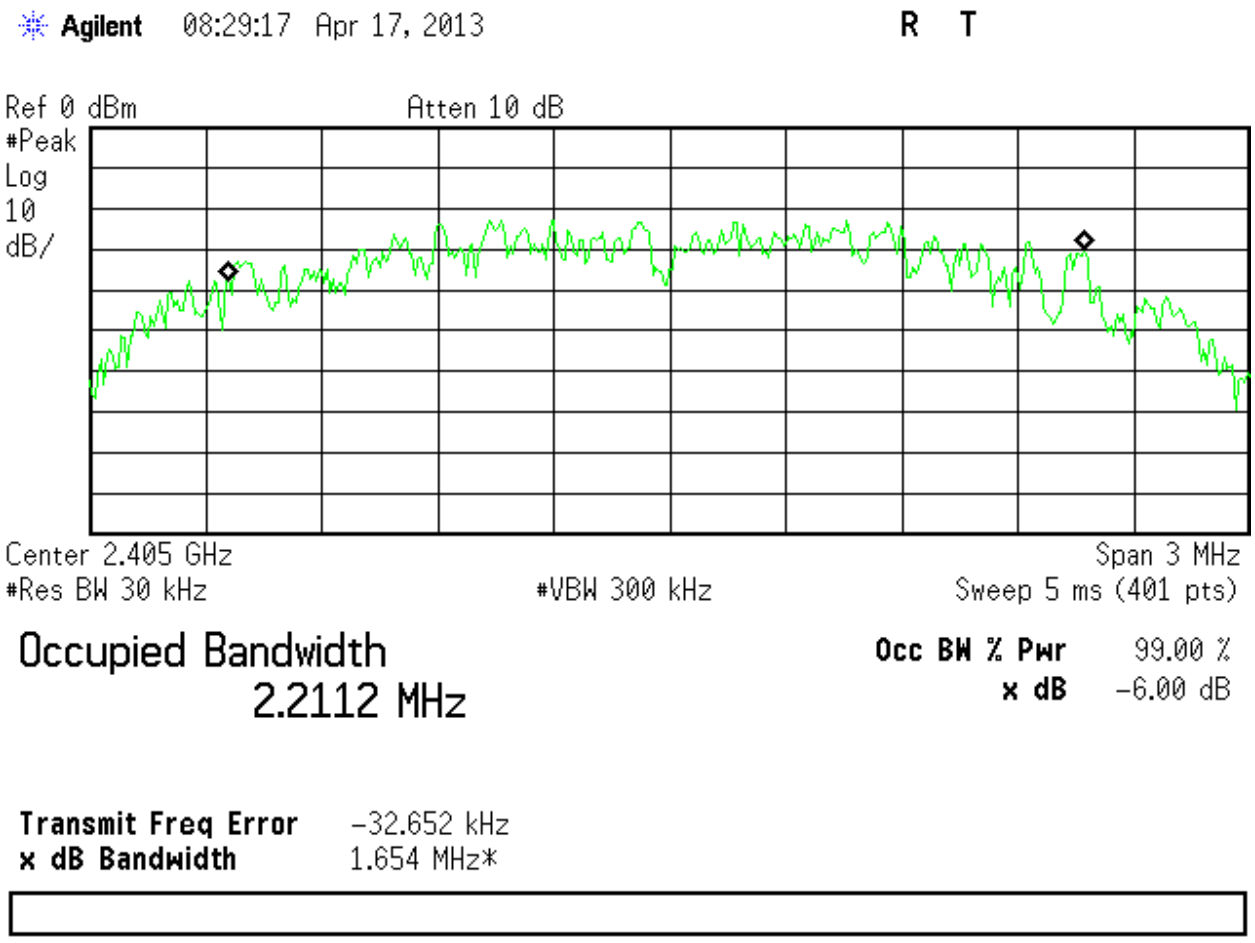
Bandwidth

Occupied

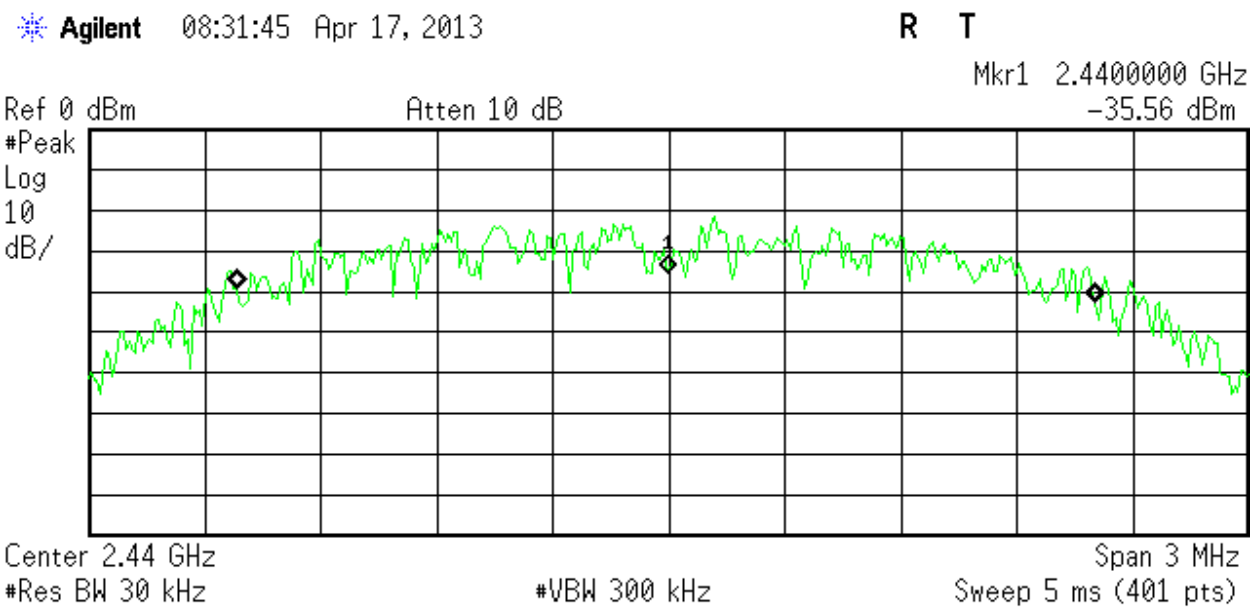
When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured. [RSS-GEN 4.6.1]

MEASUREMENTS / RESULTS

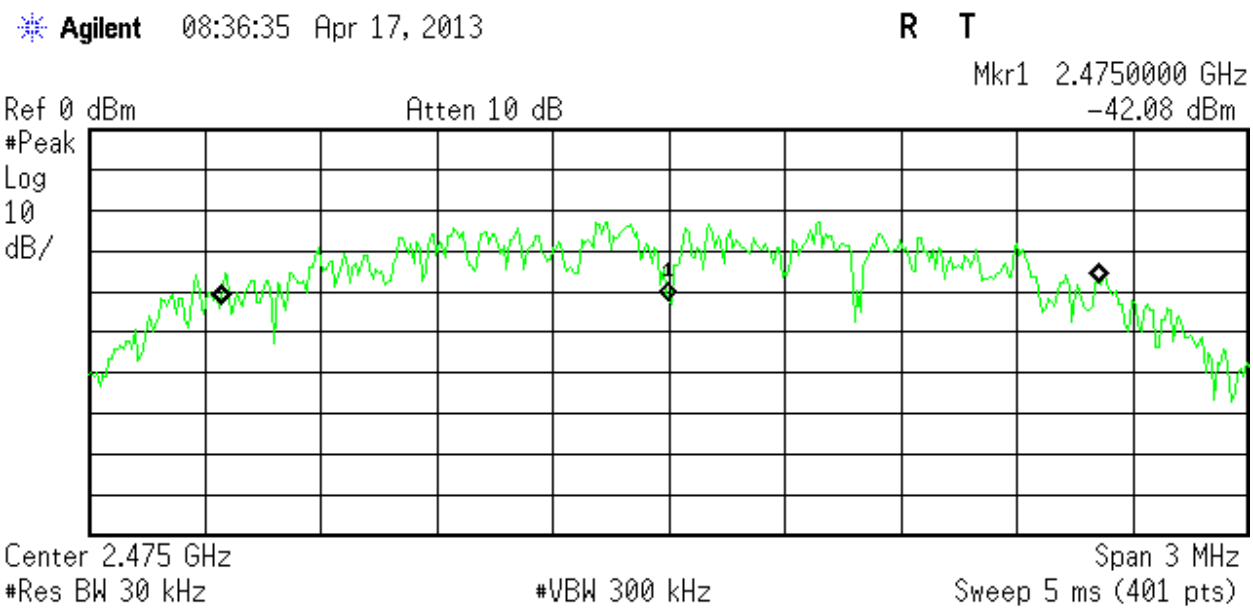
PLOT



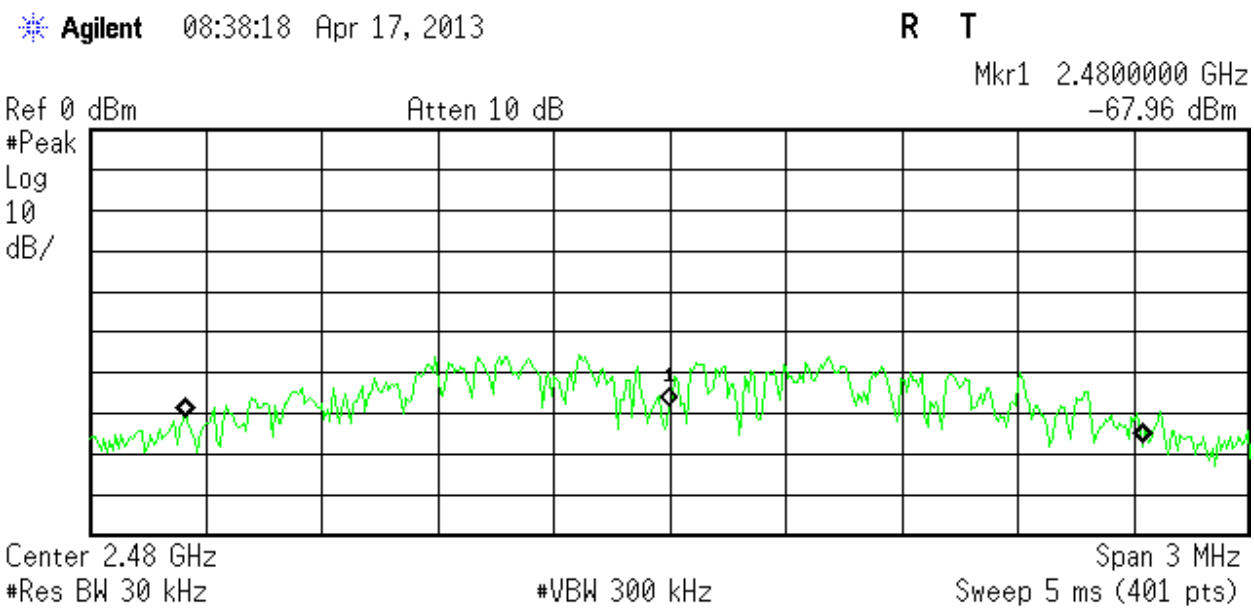
Channel 11


Agilent 08:31:45 Apr 17, 2013
R T
Mkr1 2.4400000 GHz
-35.56 dBm
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 2.44 GHz
#Res BW 30 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
2.2177 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -8.637 kHz
x dB Bandwidth 1.594 MHz*
C:temp.gif file saved

Channel 18


Agilent 08:36:35 Apr 17, 2013
R T
Mkr1 2.4750000 GHz
-42.08 dBm
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 2.475 GHz
#Res BW 30 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
2.2670 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -24.686 kHz
x dB Bandwidth 1.605 MHz*
C:temp.gif file saved

Channel 25

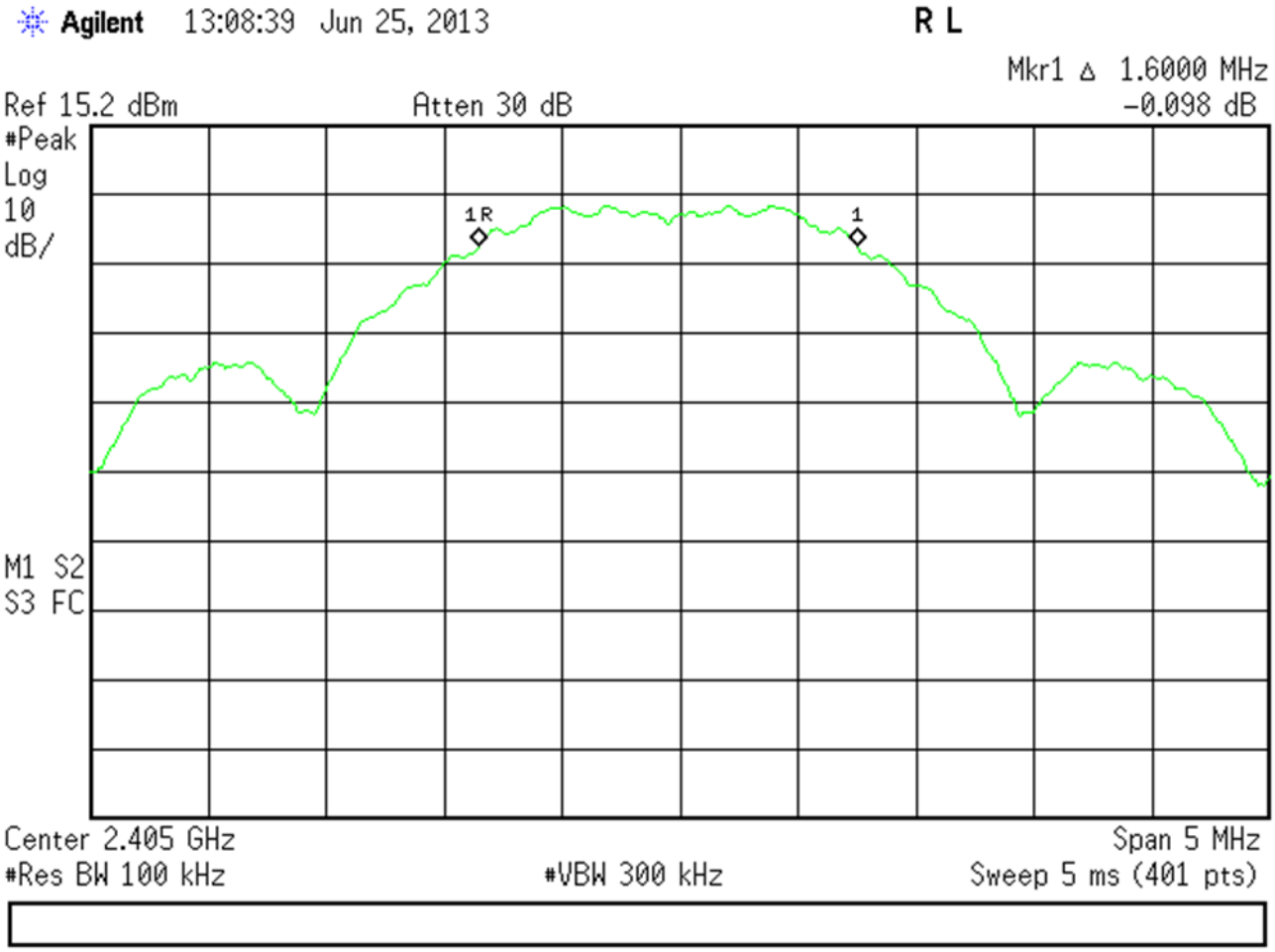

Agilent 08:38:18 Apr 17, 2013
R T
Mkr1 2.4800000 GHz
Ref 0 dBm
Atten 10 dB
-67.96 dBm
#Peak
Log
10
dB/
Center 2.48 GHz
Span 3 MHz
#Res BW 30 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
2.4744 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -13.447 kHz
x dB Bandwidth 1.575 MHz*
C:temp.gif file saved

Channel 26

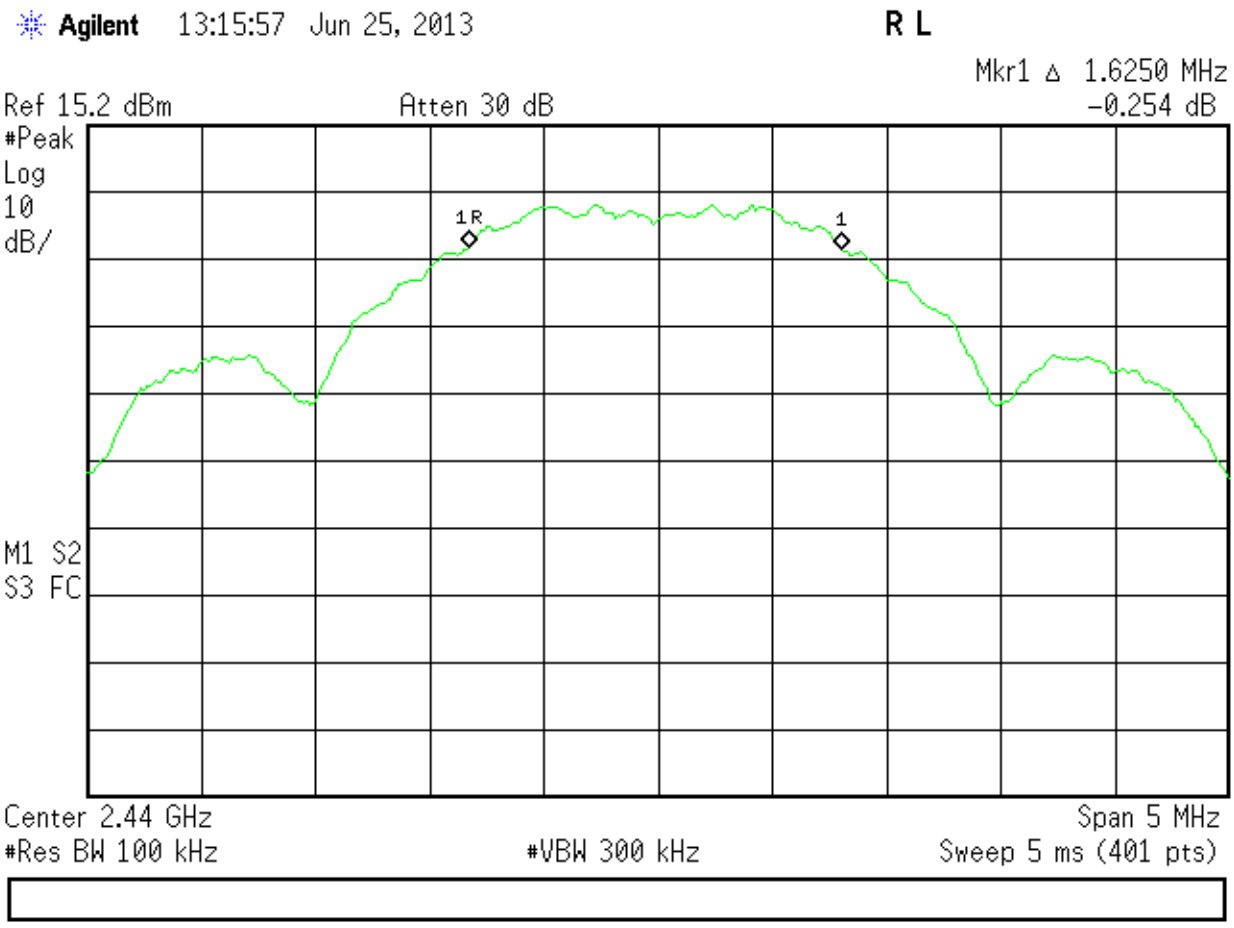
6dB BW

Requirement

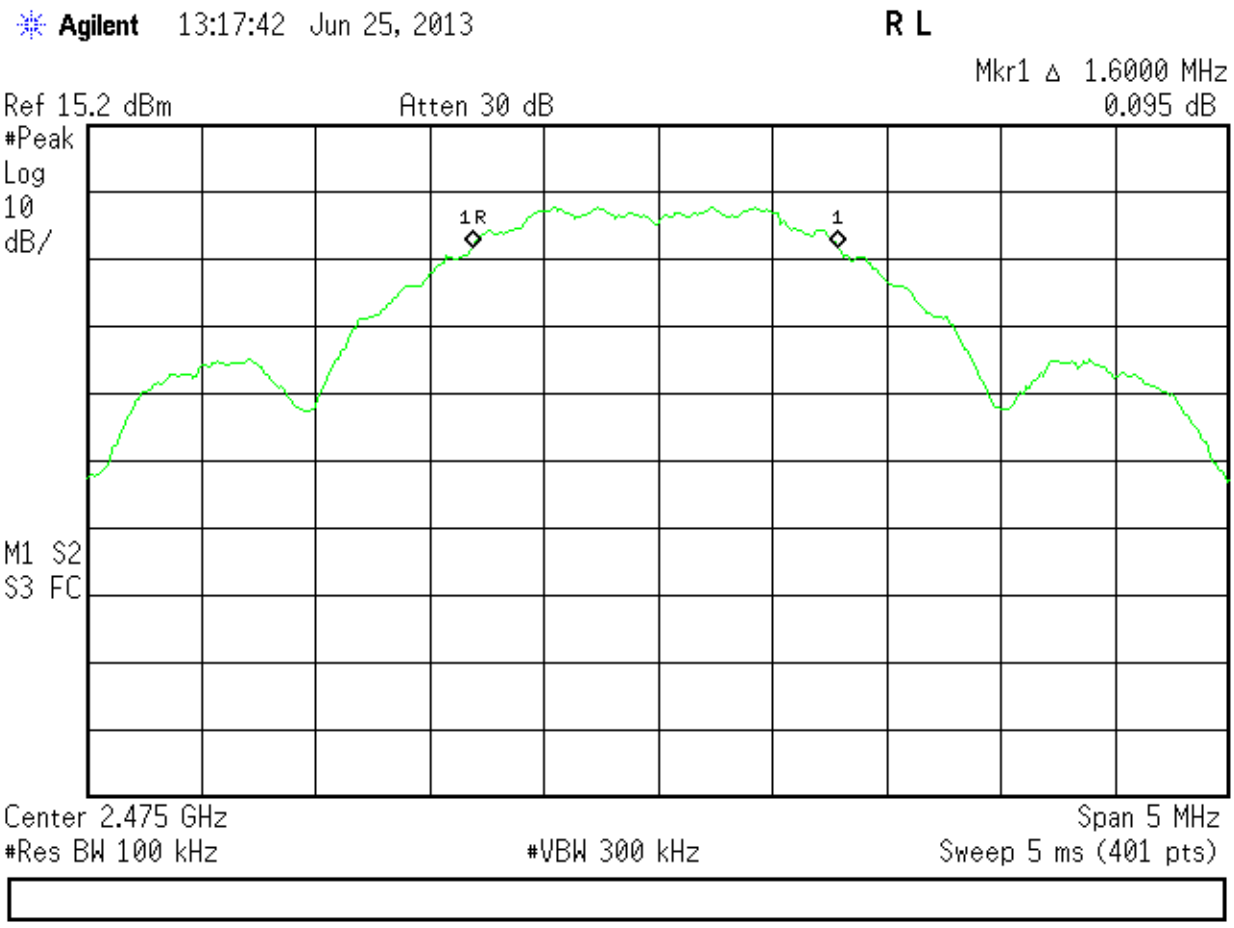
The minimum 6 dB bandwidth shall be at least 500 kHz. [15.247(a) (2)]



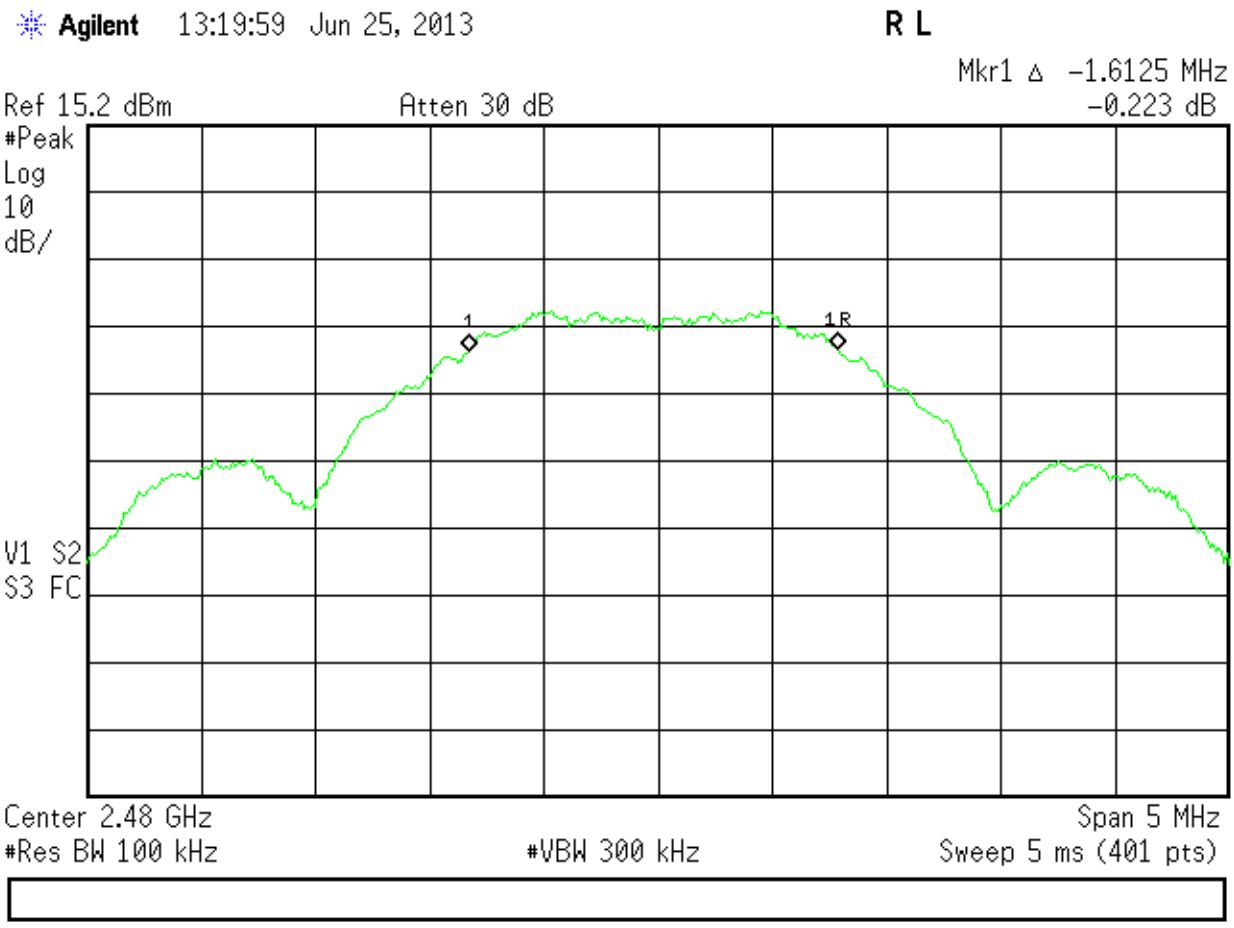
CH11


Agilent 13:15:57 Jun 25, 2013
R L
Mkr1 Δ 1.6250 MHz
-0.254 dB
Ref 15.2 dBm
Atten 30 dB
#Peak
Log
10
dB/
1R
1
M1 S2
S3 FC
Center 2.44 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)

CH 18


Agilent 13:17:42 Jun 25, 2013
R L
Mkr1 Δ 1.6000 MHz
0.095 dB
Ref 15.2 dBm
Atten 30 dB
#Peak
Log
10
dB/
1R
1
M1 S2
S3 FC
Center 2.475 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)

CH 25



CH 26

Rev. 6/3/2013

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Peak Power

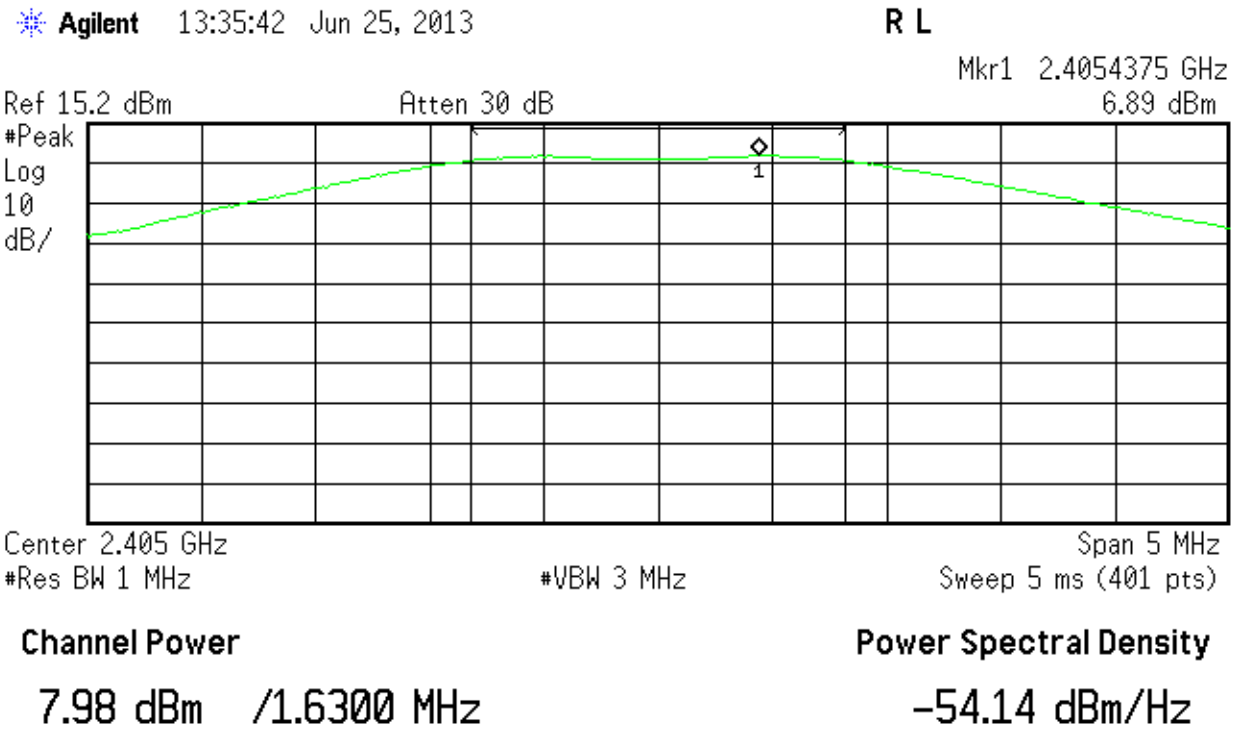
LIMIT

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.
[15.247(b) (3)]

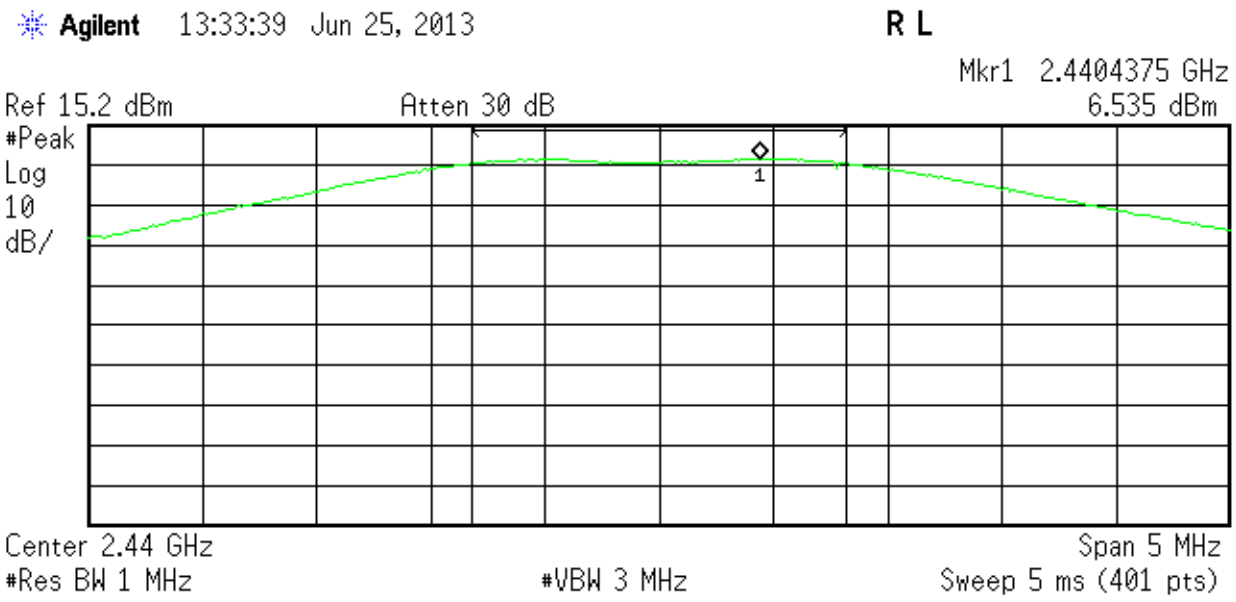
Measurement procedure PK2

MEASUREMENTS / RESULTS

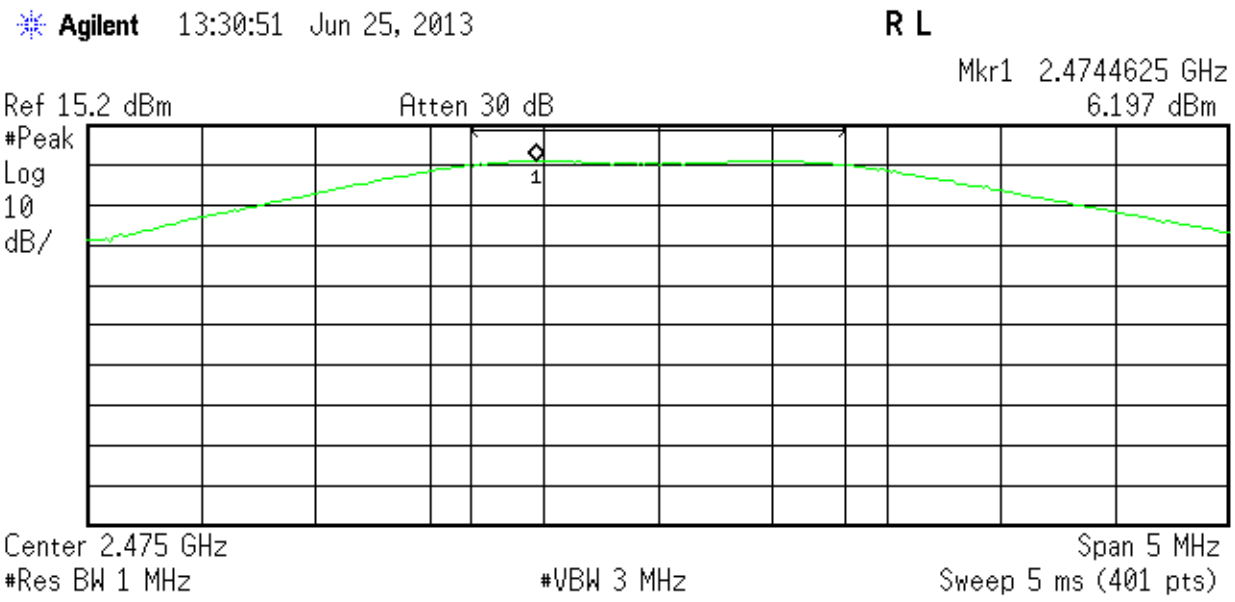
PLOTS



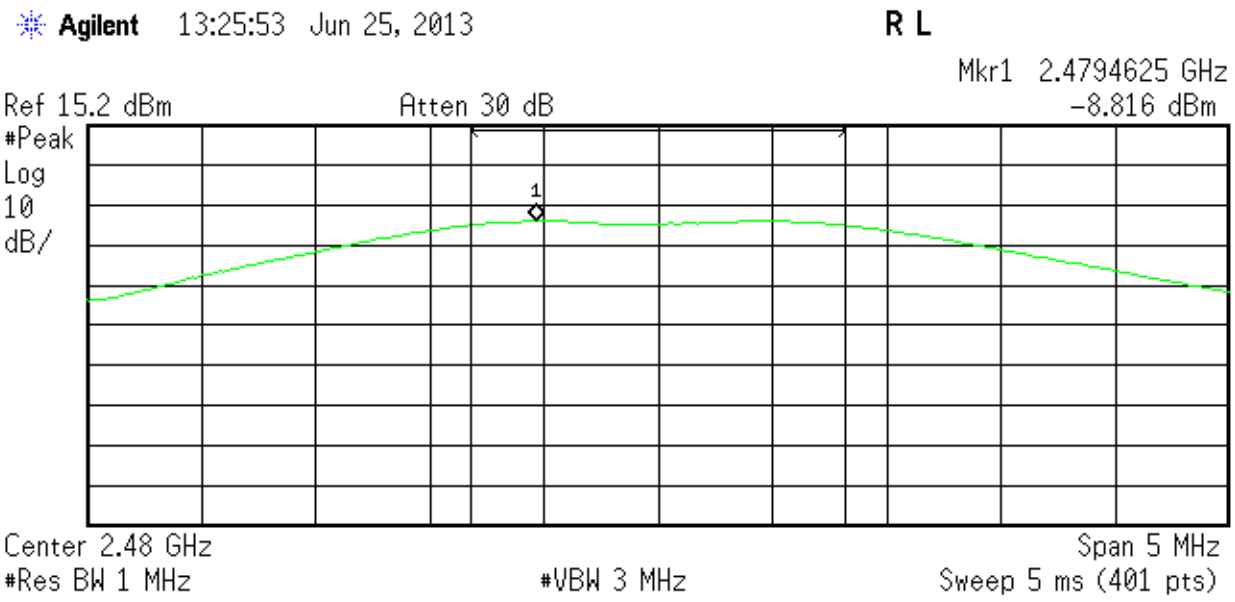
Channel 11


Agilent 13:33:39 Jun 25, 2013
R L
Mkr1 2.4404375 GHz
6.535 dBm
Ref 15.2 dBm
Atten 30 dB
#Peak
Log
10
dB/
1
Center 2.44 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 5 MHz
Sweep 5 ms (401 pts)
Channel Power
7.63 dBm /1.6300 MHz
Power Spectral Density
-54.47 dBm/Hz

Channel 18


Agilent 13:30:51 Jun 25, 2013
R L
Mkr1 2.4744625 GHz
6.197 dBm
Ref 15.2 dBm
Atten 30 dB
#Peak
Log
10
dB/
Center 2.475 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 5 MHz
Sweep 5 ms (401 pts)
Channel Power
7.29 dBm /1.6300 MHz
Power Spectral Density
-54.83 dBm/Hz

Channel 25


Agilent 13:25:53 Jun 25, 2013
R L
Mkr1 2.4794625 GHz
-8.816 dBm
Ref 15.2 dBm
Atten 30 dB
#Peak
Log
10
dB/
1
Center 2.48 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 5 MHz
Sweep 5 ms (401 pts)
Channel Power
-7.87 dBm /1.6300 MHz
Power Spectral Density
-69.99 dBm/Hz

Channel 26

Peak Out Put Power Table

5.2.1 Maximum Peak Conducted Output Power Level

Tested by: Tuyen Truong
Date: 6/24/2013 **Analyzer:** Gold SA
Company: Osram **Attenuator:** PE7019-20 #791
EUT: iQZigBee 2.4GHz RF Module

Channel (MHz)	mode	Power setting in ART	Measured power (dBm)	Attenuator factor (dB)	Dongle factor (dB)	Adjusted power measurement (dBm)	Limit (dBm)	Margin (dB)	Result
2405	TX Stream	8	7.98	0	0.3	8.28	30	-21.72	pass
2440	TX Stream	8	7.63	0	0.3	7.93	30	-22.07	pass
2475	TX Stream	8	7.29	0	0.3	7.59	30	-22.41	pass
2480	TX Stream	-8	-7.87	0	0.3	-7.57	30	-37.57	pass

Rev. 6/16/2013

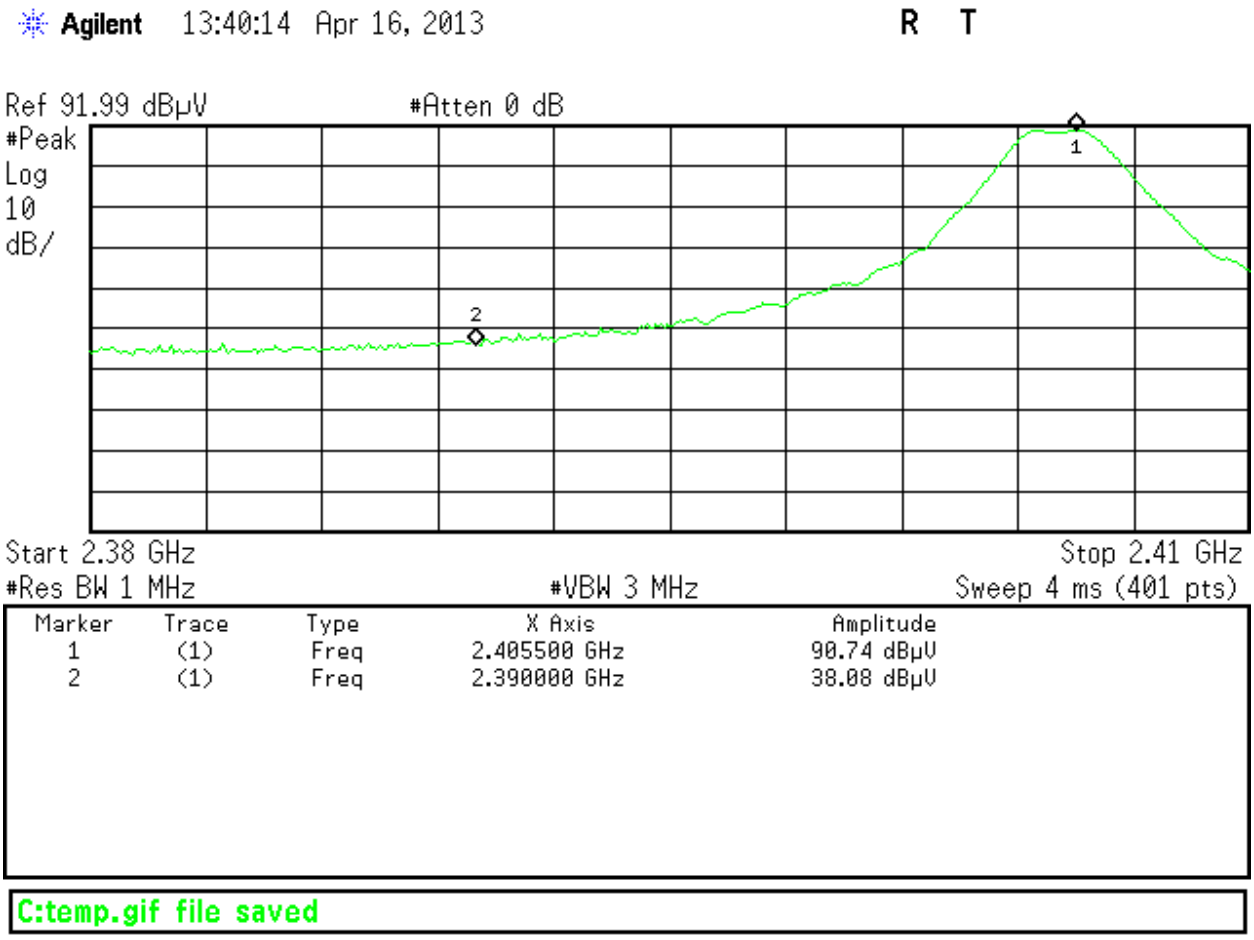
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	5/30/2014
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.							

Band Edge Measurements

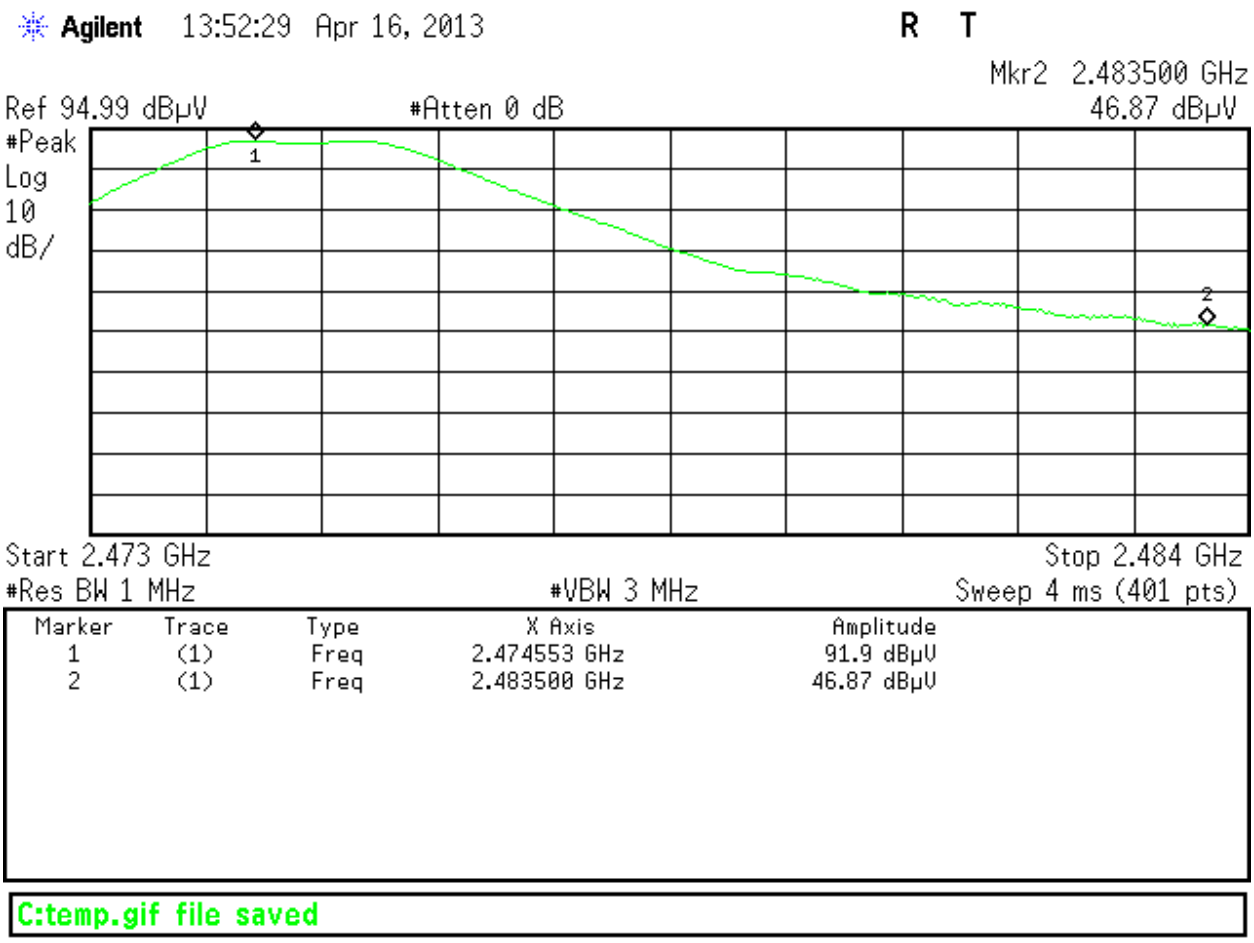
LIMITS

"In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits." [15.247(d)]

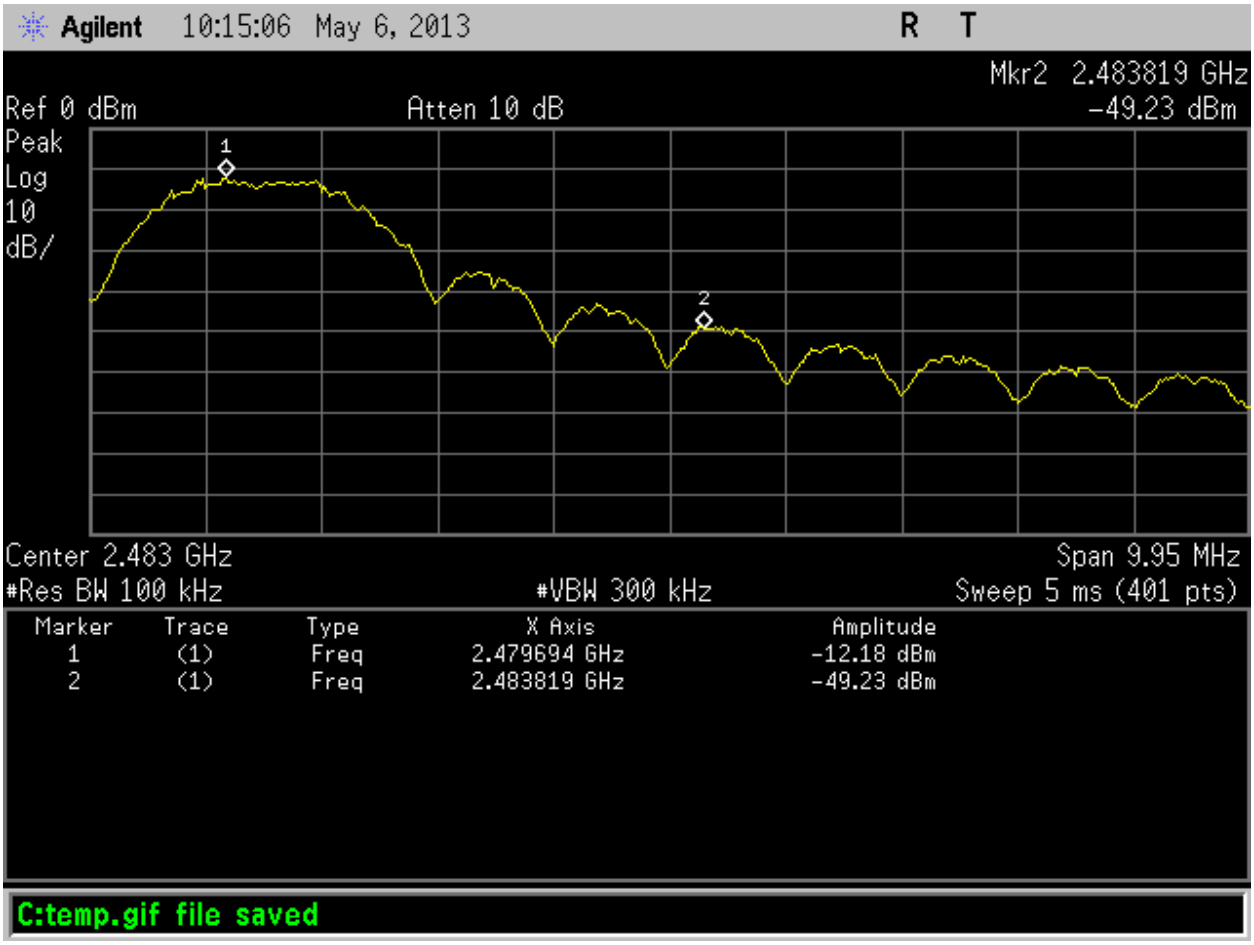
PLOTS (Conducted)



Low Band Edge for Channel 11



High Band Edge for Channel 25



High Band Edge for Channel 26

Band Edge (Radiated)

Radiated Emissions Table

Date: 06-May-13 **Company:** Osram **Work Order:** N0030
Engineer: Arik Zwirner **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** battery
Temp: 22°C **Humidity:** 21% **Pressure:** 1017mBar
Frequency Range: band edge at 2484.5MHz **Measurement Distance:** 3 m
Notes: **EUT Max Freq:** 2.4GHz

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
H	2483.5	47.6	39.8	18.8	29.0	3.3	61.1	53.3	74.0	-12.9	Pass	54.0	-0.7	Pass

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785
Analyzer: Asset #1328 **Preamp:** Brown **Antenna:** Black Horn

Band Edge and Restricted Spurious - Radiated Emissions Table

Date: 16-Apr-13 **Company:** Osram **Work Order:** N0030
Engineer: Tuyen Truong **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** 3Vdc
Temp: 23°C **Humidity:** 20% **Pressure:** 1001mBar
Frequency Range: 1 - 2.9 GHz **Measurement Distance:** 3 m
Notes: If peak reading passes Average limit, no average measurement was done. **EUT Max Freq:** 2.4GHz

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Lower BandEdge - Running channel 11 (2405 MHz)				---	---	---	---	---	---	---	---	---	---	---
v	2307.9	37.36	37.4	21.8	28.0	3.1	46.7	46.7	74.0	-27.3	Pass	54.0	-7.3	Pass
h	2361.0	34.99	34.9	21.8	28.1	3.2	44.5	44.4	74.0	-29.5	Pass	54.0	-9.6	Pass
v	2383.4	38.3	38.3	21.8	28.1	3.2	47.8	47.8	74.0	-26.2	Pass	54.0	-6.2	Pass
h	2390.0	35.35	35.4	21.7	28.1	3.2	45.0	45.0	74.0	-29.0	Pass	54.0	-9.0	Pass
v	2390.0	38.82	38.8	21.7	28.1	3.2	48.4	48.4	74.0	-25.6	Pass	54.0	-5.6	Pass
Upper Bandege - Running channel 25 (2475 MHz)														
v	2483.5	46.87	35.7	22.1	28.5	3.3	56.6	45.4	74.0	-17.4	Pass	54.0	-8.6	Pass
v	2491.3	40.08	40.1	22.2	28.5	3.4	49.8	49.8	74.0	-24.2	Pass	54.0	-4.2	Pass

Table Result: Pass by -5.6 dB ***Worst Freq:*** 2390.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785 **Cable 3:** ---
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Orange Horn **Preselector:** ---

Radiated Spurious Emissions

LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
[15.247(d)]

MEASUREMENTS / RESULTS

Radiated Emissions Table

Date: 16-Apr-13 **Company:** Osram **Work Order:** N0030
Engineer: Chris Bramley **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** 3Vdc
Temp: 25.2°C **Humidity:** 20% **Pressure:** 1001mBar
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes: EUT runnning on channel 18 **EUT Max Freq:** 2.4GHz
Fundamental freq at 2.44GHz

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
v	48.92	17.3	22.5	8.3	0.5	3.6	---	---	---	40.0	-36.4	Pass
v	117.8	25.8	22.5	13.7	0.8	17.8	---	---	---	43.5	-25.7	Pass
v	149.5	25.2	22.5	12.4	0.9	16.0	---	---	---	43.5	-27.5	Pass
v	152.6	25.1	22.5	12.2	0.9	15.7	---	---	---	43.5	-27.8	Pass
v	177.5	23.9	22.5	10.8	0.9	13.1	---	---	---	43.5	-30.4	Pass
v	180.6	24.4	22.5	10.7	0.9	13.5	---	---	---	43.5	-30.0	Pass

Table Result: Pass by -25.7 dB ***Worst Freq:*** 117.8 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785
Analyzer: Gold **Preamp:** Blue **Antenna:** Red-Black

Note: Spurious emissions above 1GHz were scanned up to 25GHz.

RBW:1MHz, VBW 1MHz and 30Hz

Harmonics and Spurious Emissions

Date: 16-Apr-13 **Company:** Osram **Work Order:** N0030
Engineer: Tuyen Truong **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** 3Vdc
Temp: 23°C **Humidity:** 20% **Pressure:** 1001mBar
Measurement Distance: 3 m, 1m
Notes: Running channel 25 (2475MHz) **EUT Max Freq:** 2.4GHz
If peak reading passes Average limit, no average measurement was done.

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
h	4950.0	37.3	33.2	20.2	33.1	5.1	55.3	51.2	74.0	-18.7	Pass	54.0	-2.8	Pass
v	4950.0	29.46	27.4	20.2	33.1	5.1	47.5	45.4	74.0	-26.5	Pass	54.0	-8.6	Pass
h	7426.0	43.32	38.7	19.9	37.2	6.4	67.0	62.4	83.5	-16.5	Pass	63.5	-1.1	Pass
v	7426.0	43.47	37.5	19.9	37.2	6.4	67.2	61.2	83.5	-16.3	Pass	63.5	-2.3	Pass
v	9901.8	41.17	35.6	19.0	38.6	7.2	68.0	62.4	83.5	-15.5	Pass	63.5	-1.1	Pass
h	9901.9	34.91	27.7	19.0	38.6	7.2	61.7	54.5	83.5	-21.8	Pass	63.5	-9.0	Pass
h	12377.5	35.4	26.2	18.2	39.3	8.3	64.8	55.6	83.5	-18.7	Pass	63.5	-7.9	Pass
v	12377.5	35.02	26.5	18.2	39.3	8.3	64.4	55.9	83.5	-19.1	Pass	63.5	-7.6	Pass

Table Result: Pass by -1.1 dB ***Worst Freq:*** 9901.8 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785 **Cable 3:** ---
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Orange Horn **Preselector:** ---

Radiated Emissions Table

Date: 16-Apr-13 **Company:** Osram **Work Order:** N0030
Engineer: Tuyen Truong **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** 3Vdc
Temp: 23°C **Humidity:** 20% **Pressure:** 1001mBar
Frequency Range: 6 - 18 GHz **Measurement Distance:** 3 m,1m
Notes: Running channel 11 (2405MHz) **EUT Max Freq:** 2.4GHz
If peak reading passes Average limit, no average measurement was done.

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
v	4810.0	33.32	33.3	20.0	32.9	4.9	51.1	51.1	74.0	-22.9	Pass	54.0	-2.9	Pass
h	4810.0	36.98	30.7	20.0	32.9	4.9	54.8	48.5	74.0	-19.2	Pass	54.0	-5.5	Pass
h	7215.0	44.72	38.9	19.9	37.0	6.2	68.0	62.2	83.5	-15.5	Pass	63.5	-1.3	Pass
v	7215.0	41.75	35.1	19.9	37.0	6.2	65.1	58.4	83.5	-18.4	Pass	63.5	-5.1	Pass
h	9620.0	34.75	34.8	19.3	38.4	7.3	61.2	61.2	83.5	-22.3	Pass	63.5	-2.3	Pass
v	9620.0	35.26	35.3	19.3	38.4	7.3	61.7	61.7	83.5	-21.8	Pass	63.5	-1.8	Pass
h	12025.0	34.02	34.0	18.3	39.5	8.0	63.2	63.2	83.5	-20.3	Pass	63.5	-0.3	Pass
v	12025.0	33.45	33.5	18.3	39.5	8.0	62.7	62.7	83.5	-20.8	Pass	63.5	-0.8	Pass

Table Result: Pass by -0.3 dB ***Worst Freq:*** 12025.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785 **Cable 3:** ---
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Orange Horn **Preselector:** ---

Radiated Emissions Table

Date: 16-Apr-13 **Company:** Osram **Work Order:** N0030
Engineer: Tuyen Truong **EUT Desc:** iQZigBee 2.4GHz RF Module (C sample) **EUT Operating Voltage/Frequency:** 3Vdc
Temp: 23°C **Humidity:** 20% **Pressure:** 1001mBar
Measurement Distance: 3 m
Notes: Running channel 18 (2440MHz) **EUT Max Freq:** 2.4GHz
If peak reading passes Average limit, no average measurement was done.

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak Limit (dBµV/m)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
h	4880.0	37.8	32.5	20.1	32.9	5.0	55.6	50.3	74.0	-18.4	Pass	54.0	-3.7	Pass
v	4880.0	33.4	33.4	20.1	32.9	5.0	51.2	51.2	74.0	-22.8	Pass	54.0	-2.8	Pass
v	7320.0	42.25	36.8	19.9	37.2	6.4	66.0	60.5	83.5	-17.5	Pass	63.5	-3.0	Pass
h	7320.0	42.4	36.7	19.9	37.2	6.4	66.1	60.4	83.5	-17.4	Pass	63.5	-3.1	Pass
h	9760.0	34.96	35.0	19.2	38.4	7.4	61.6	61.6	83.5	-21.9	Pass	63.5	-1.9	Pass
v	9760.0	37.45	32.5	19.2	38.4	7.4	64.1	59.1	83.5	-19.4	Pass	63.5	-4.4	Pass
h	12200.0	33.35	33.4	18.0	39.4	8.1	62.9	62.9	83.5	-20.6	Pass	63.5	-0.6	Pass

Table Result: Pass by -2.8 dB ***Worst Freq:*** 4880.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785 **Cable 3:** ---
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Orange Horn **Preselector:** ---

Rev. 6/3/2013

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz		II	2/16/2014
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/31/2014
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	4/15/2014
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	1/28/2015
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	7/27/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/20/2014
CHAMBER1 Thermohygrometer		35519-044	Control Company	72457642	1345	II	8/19/2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
Asset #1781	9kHz - 18GHz		Florida RF			II	3/6/2014
Asset #1785	9kHz - 18GHz		Florida RF			II	3/14/2014

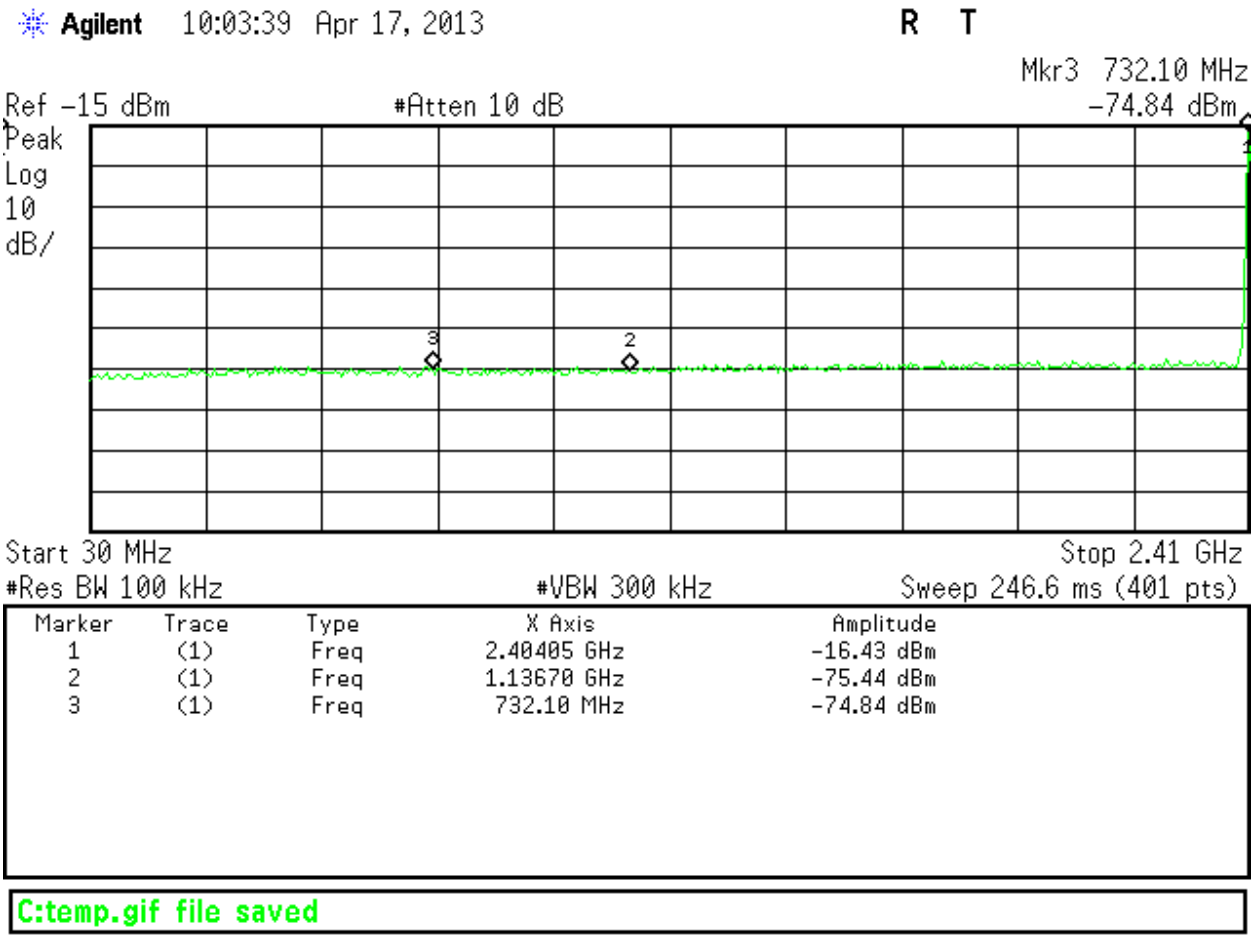
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Conducted Spurious Emissions

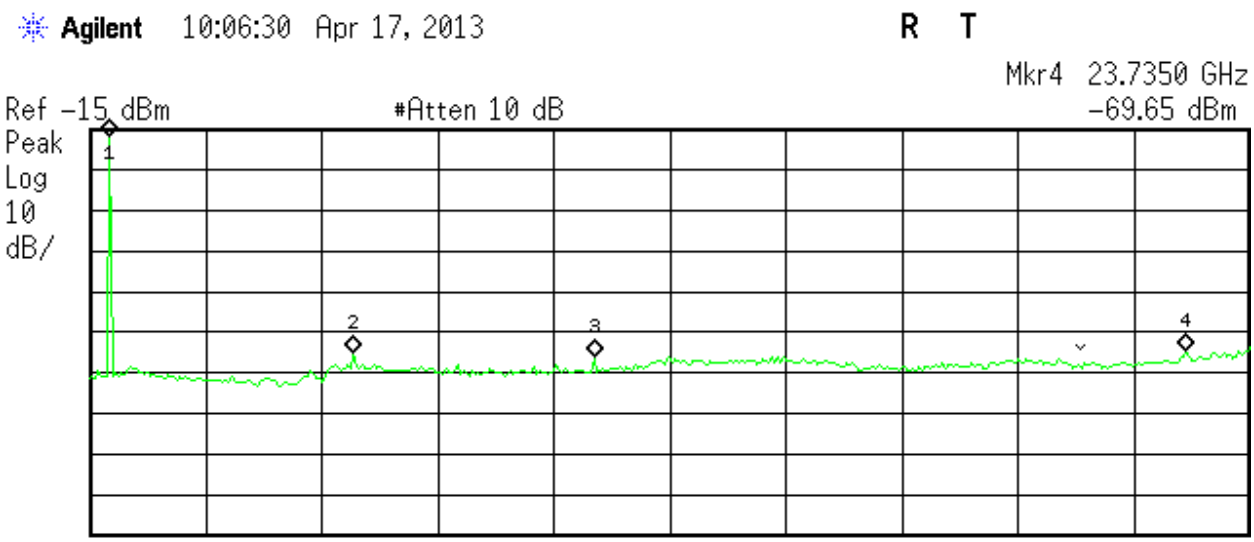
LIMITS

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power…
[15.247(d)]

MEASUREMENTS / RESULTS



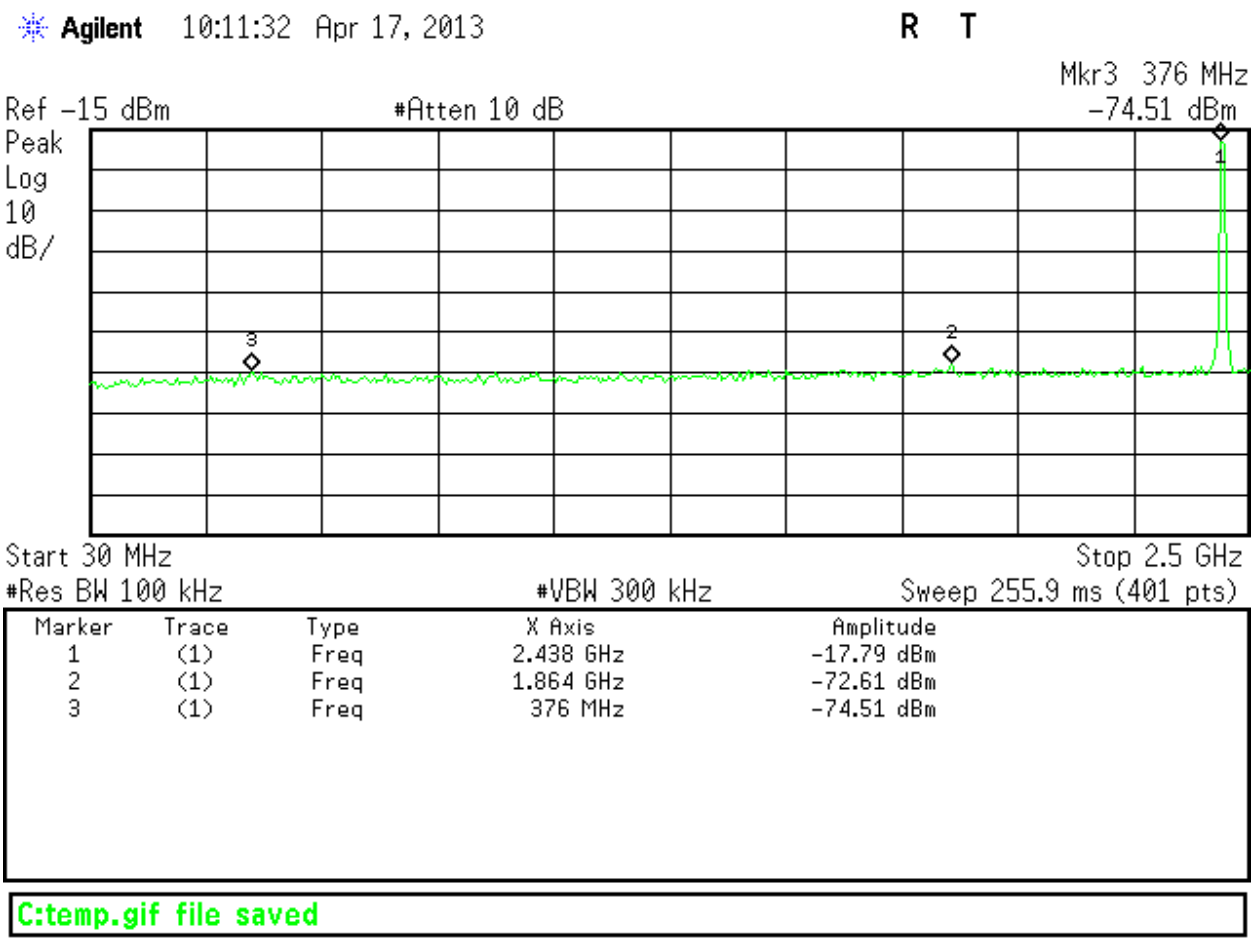
Channel 11, 30MHz-2.41GHz



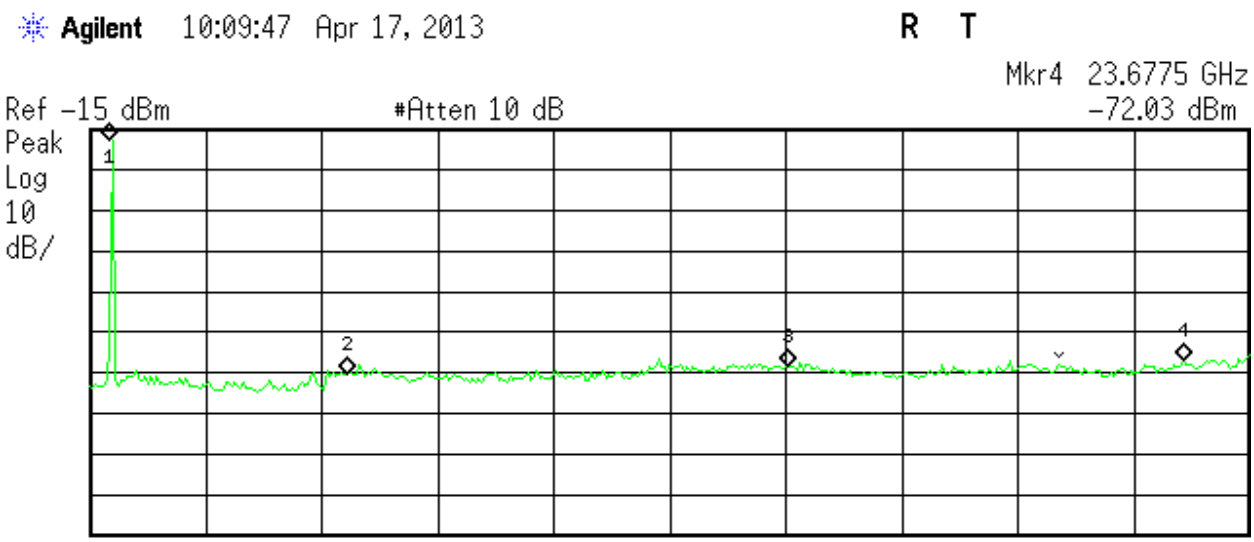
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.4025 GHz	-16.85 dBm
2	(1)	Freq	7.2325 GHz	-70.11 dBm
3	(1)	Freq	12.0050 GHz	-71.23 dBm
4	(1)	Freq	23.7350 GHz	-69.65 dBm

C:temp.gif file saved

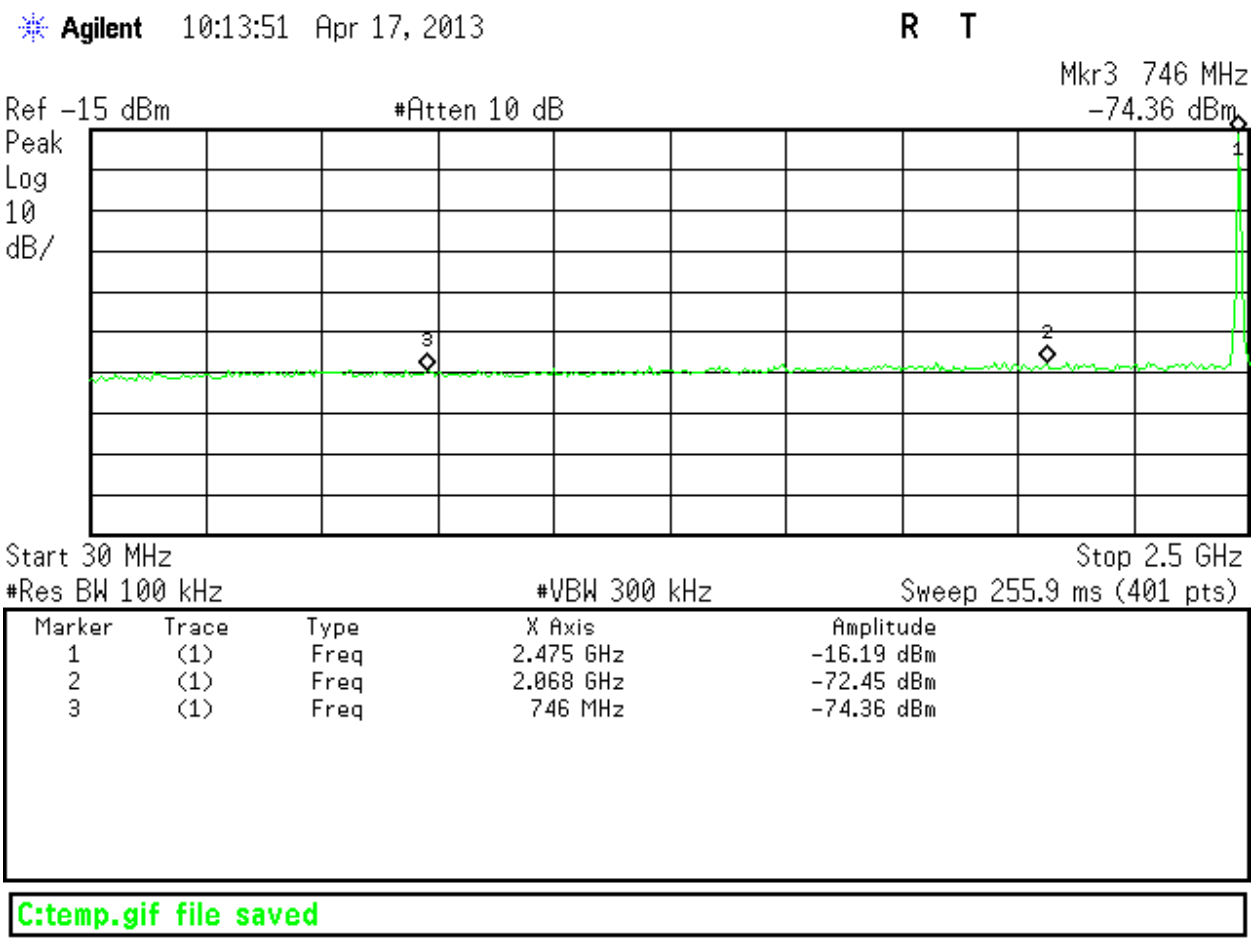
Channel 11, 2-25GHz



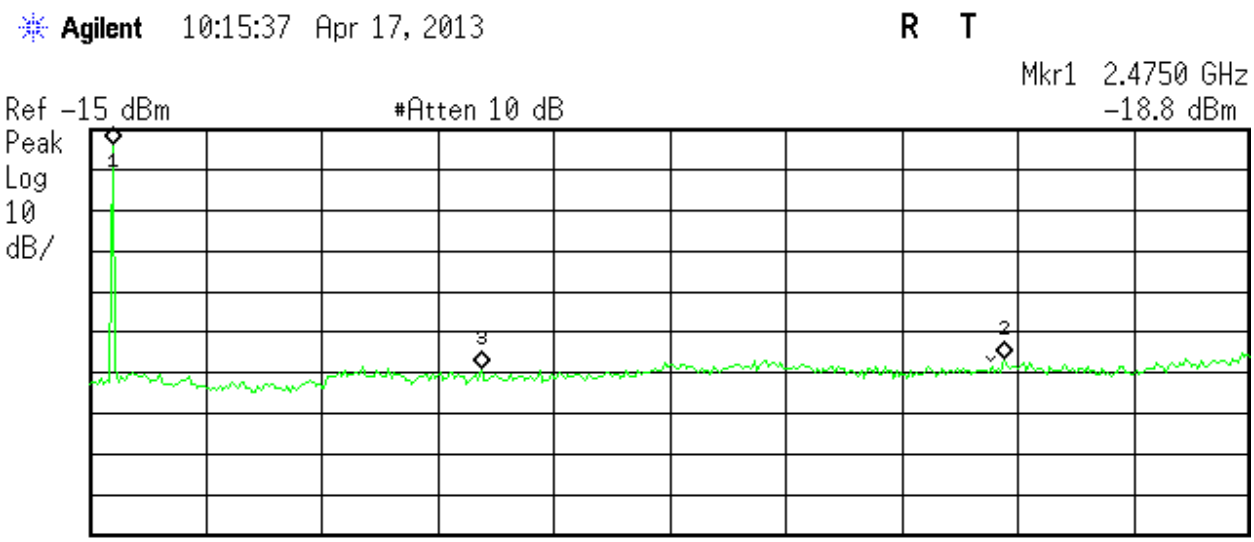
Channel 18, 30MHz – 2.5GHz



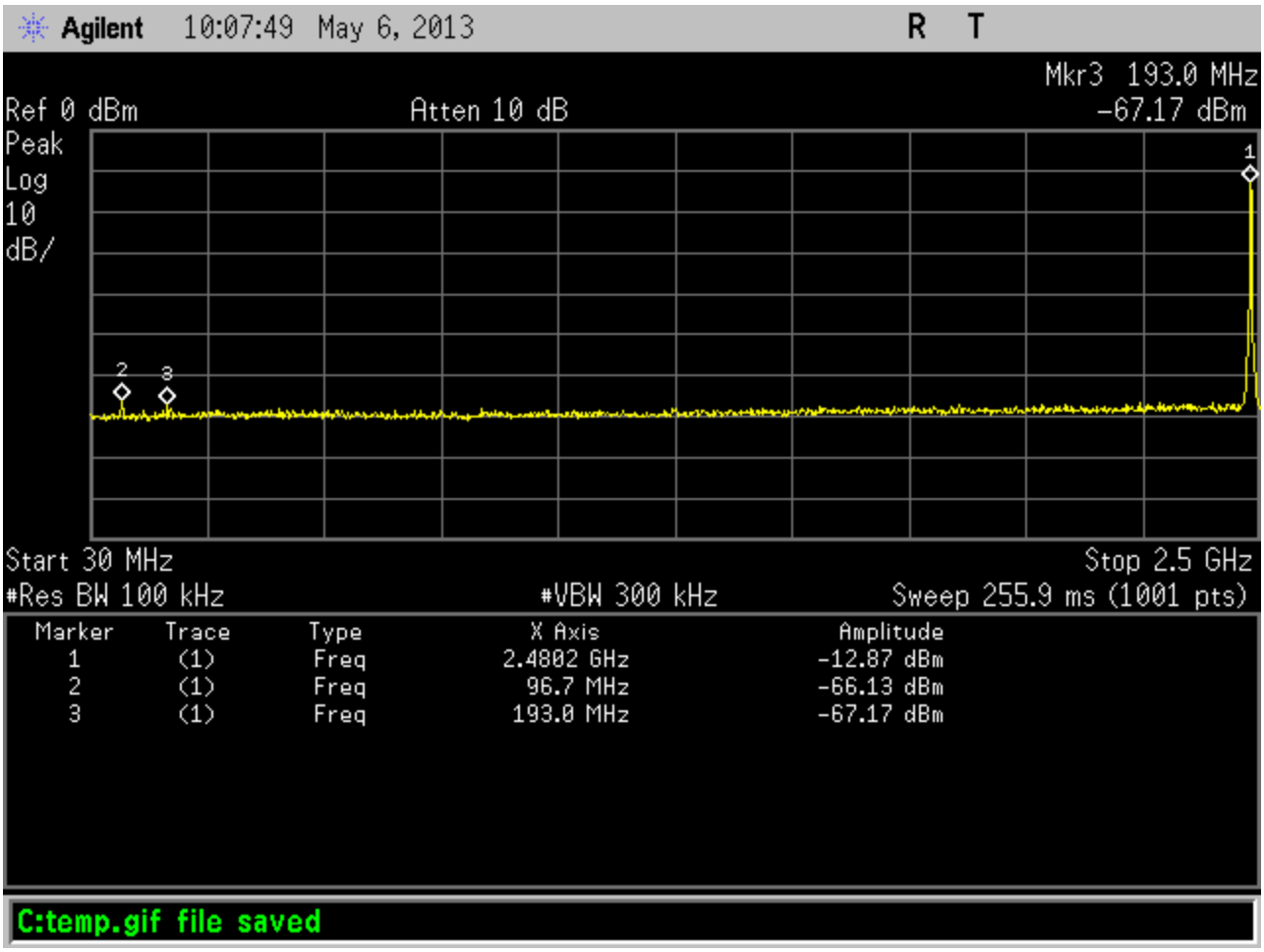
Channel18, 2-25GHz



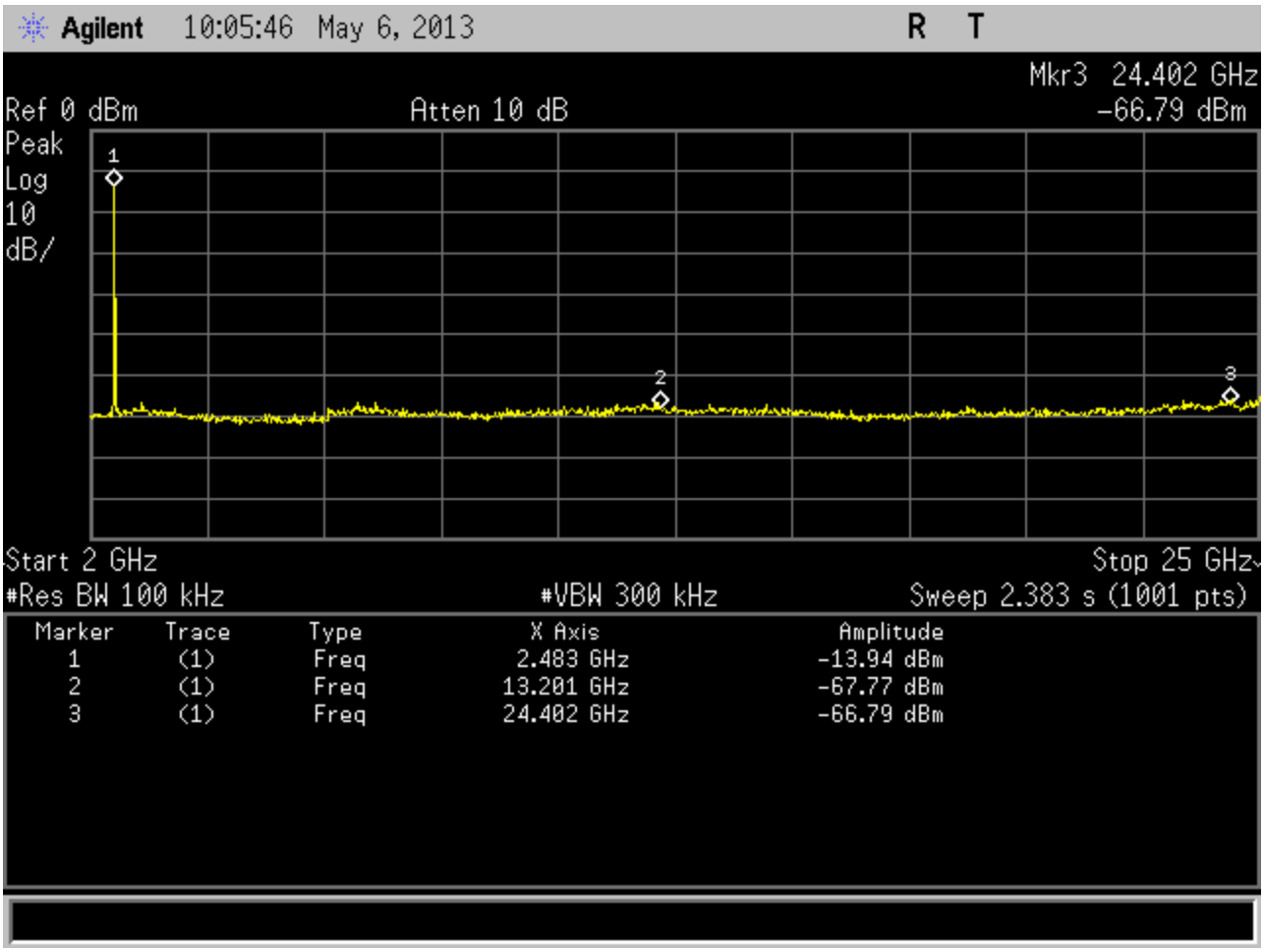
Channel 25, 30MHz – 2.5GHz



Channel 25, 2-25GHz



Channel 26, 30MHz – 2.5GHz



Channel 26, 2-25GHz

Rev. 6/3/2013

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014

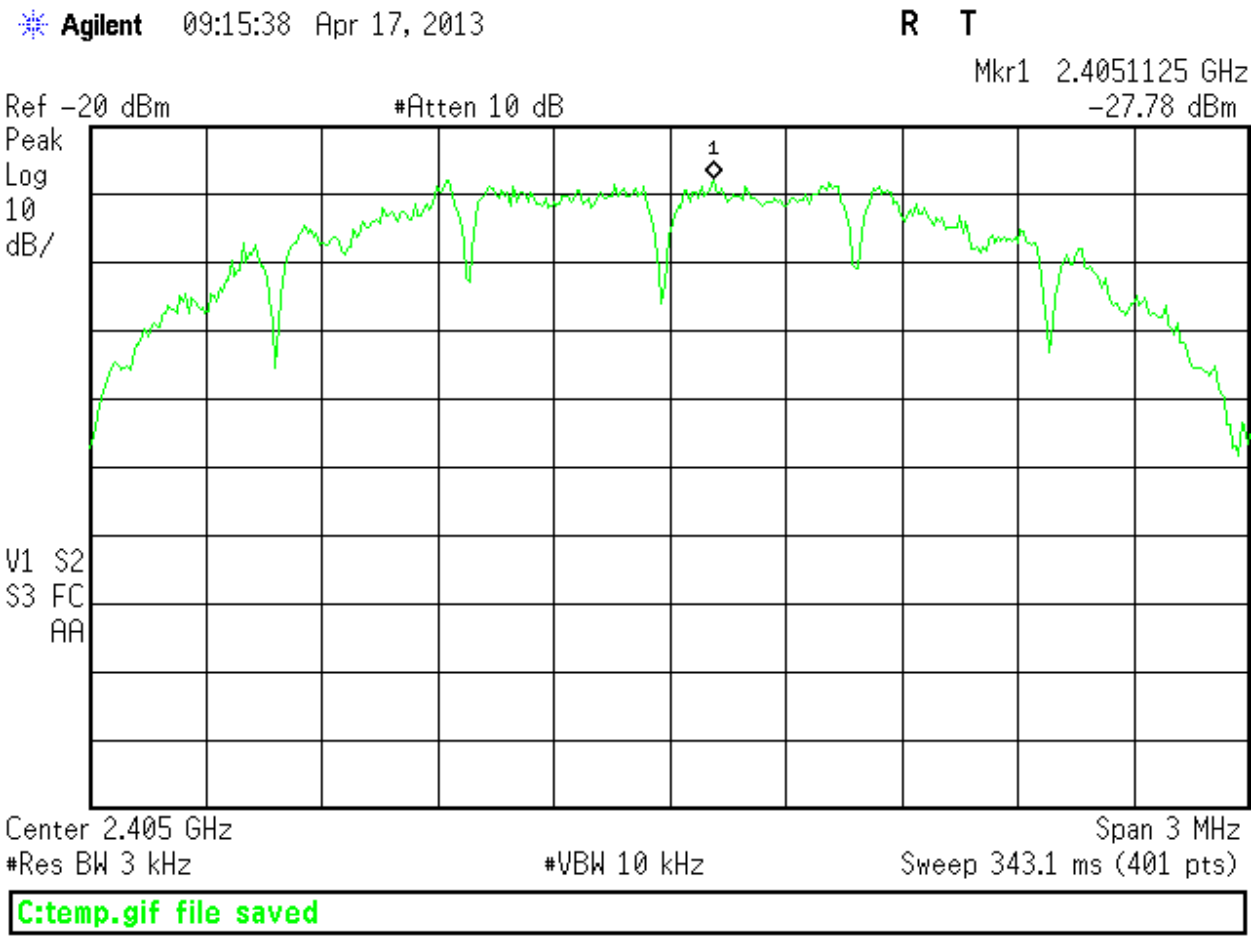
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Power Spectral Density

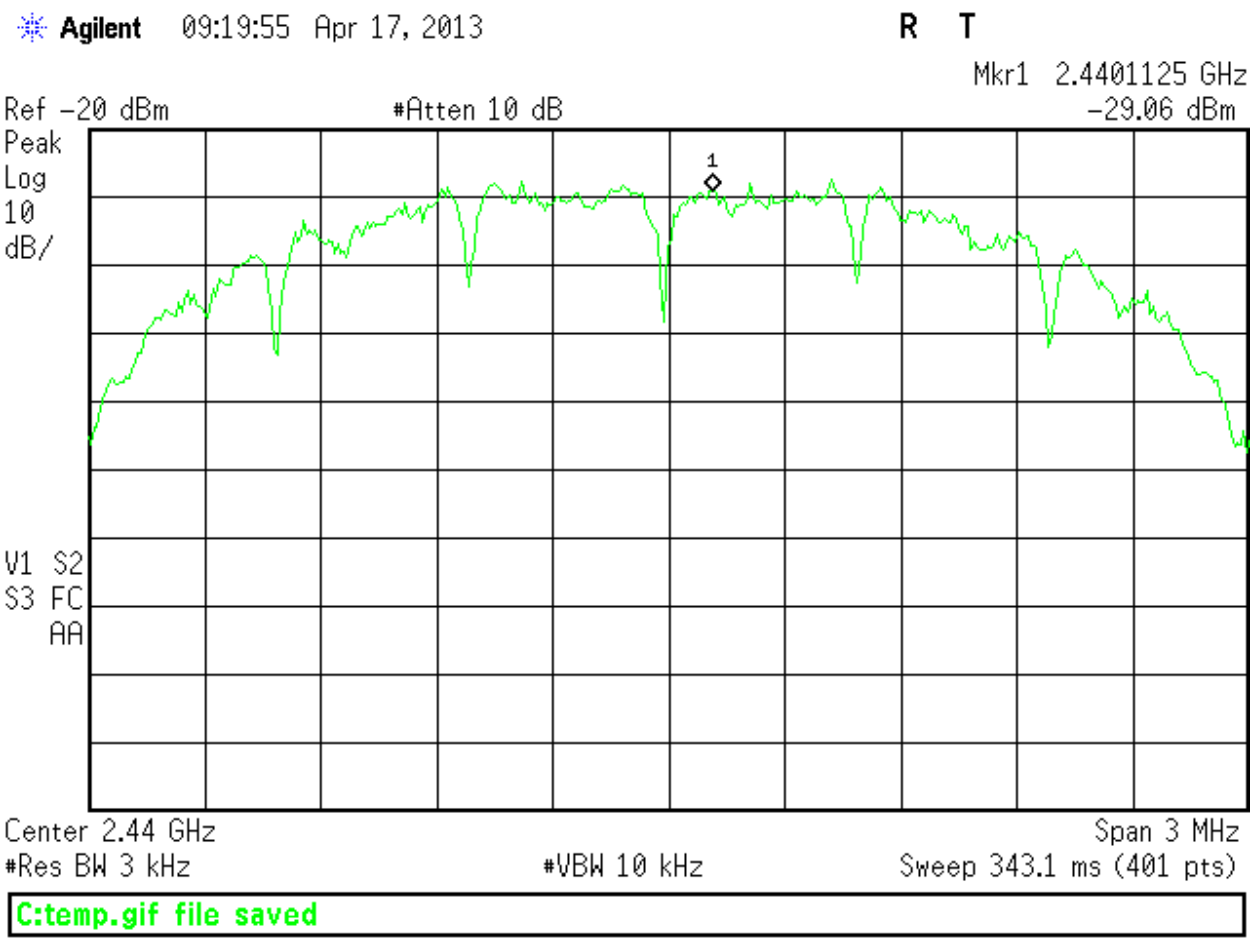
LIMIT

…the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. [15.247(e)]

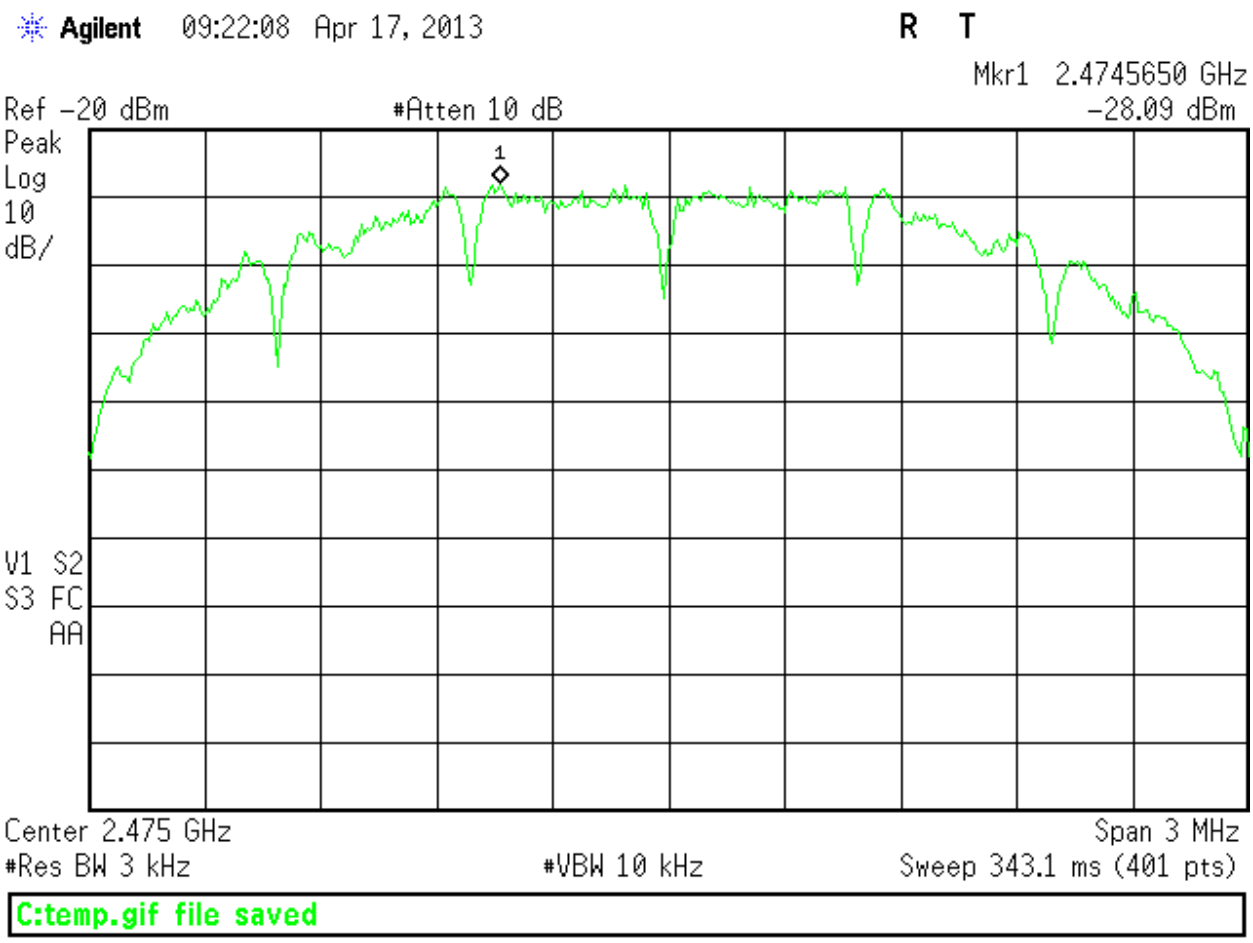
MEASUREMENTS / RESULTS



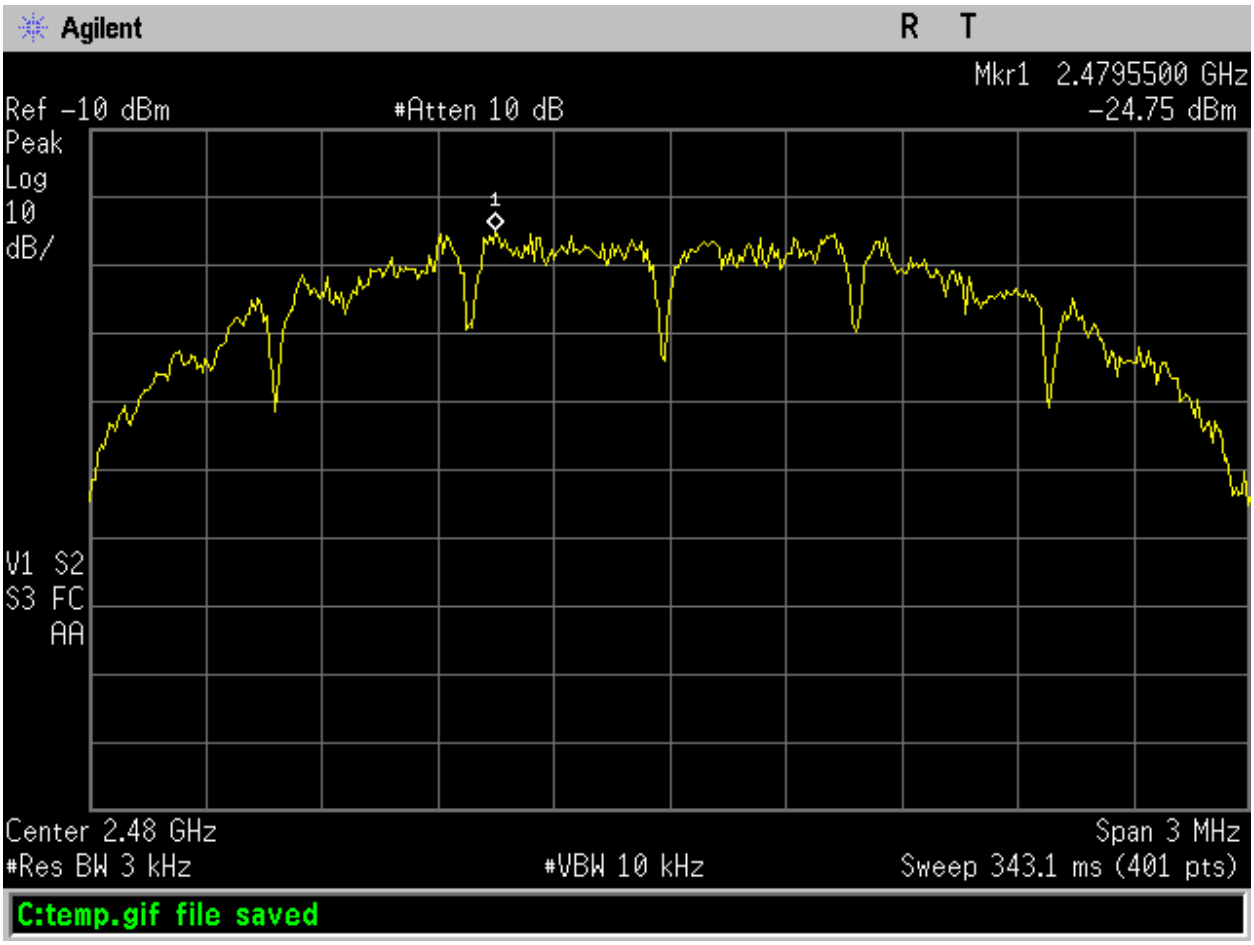
Channel 11


Agilent 09:19:55 Apr 17, 2013
R T
Mkr1 2.4401125 GHz
-29.06 dBm
Ref -20 dBm
#Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Center 2.44 GHz
Span 3 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 343.1 ms (401 pts)
C:temp.gif file saved

Channel 18


Agilent 09:22:08 Apr 17, 2013
R T
Mkr1 2.4745650 GHz
-28.09 dBm
Ref -20 dBm
#Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Center 2.475 GHz
Span 3 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 343.1 ms (401 pts)
C:temp.gif file saved

Channel 25


Agilent
R T
Mkr1 2.4795500 GHz
-24.75 dBm
Ref -10 dBm
#Atten 10 dB
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Center 2.48 GHz
#Res BW 3 kHz
#VBW 10 kHz
Span 3 MHz
Sweep 343.1 ms (401 pts)
C:temp.gif file saved

Channel 26

PSD Data Table

15.247 (e) Maximum Power Spectral Density

Tested by: Tuyen Truong
Date: 4/17/2013, 5/6/13 **Analyzer:** Gold SA
Company: Osram **Attenuator:** PE7019-20 #791
EUT: iQZigBee 2.4GHz RF Module

channel (MHz)	mode	power setting in ART (dBm)	measured PSD (dBM)	attenuator factor (dB)	dongle factor (dB)	adjusted power measurement	bandwidth correction factor adjustment	limit (dBm)	margin (dB)	result
2405	TX Stream	8	-27.78	19.98	0.3	-7.5	0	8	-15.5	pass
2440	TX Stream	8	-29.06	20.02	0.3	-8.74	0	8	-16.74	pass
2475	TX Stream	8	-28.09	20.02	0.3	-7.77	0	8	-15.77	pass
2480	TX Stream	-8	-24.75	0	0.3	-24.45	0	8	-32.45	pass

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014
Attenuator							
HF 20dB 50W Attenuator	0.009-18 GHz	PE7019-20	Pasternack	1	791	II	1-Jun-13

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

AC Line Conducted Emissions

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

AC side of AC/DC Power Supply Conducted Emissions Data Table

Date: 25-Jun-13 **Company:** Osram **Work Order:** N0030
Engineer: Tuyen Truong **EUT Desc:** iQZigBee 2.4GHz RF Module
Temp: 25.0 ºC **Humidity:** 31% **Pressure:** 1011 mBar
Notes: tested the AC side of EUT Support Power Supply
Frequency Range: 0.15 - 30MHz **EUT Input Voltage/Frequency:** 3Vdc

	Quasi-Peak Readings		Average Readings		LISN Factors		Cable	ATTN	FCC/CISPR Class B			FCC/CISPR Class B		
Frequency (MHz)	QP1 (dBµV)	QP2 (dBµV)	AVG1 (dBµV)	AVG2 (dBµV)	L1 (dB)	L2 (dB)	Factor (dB)	Factor (dB)	QP Limit (dBµV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBµV)	Margin (dB)	Result (Pass/Fail)
0.15	10.0	11.4	2.5	3.2	-0.1	-0.1	-0.1	-20.5	66.0	-34.0	Pass	56.0	-32.2	Pass
3.58	19.9	26.7	8.4	13.5	0.0	-0.1	-0.1	-20.4	56.0	-8.7	Pass	46.0	-11.9	Pass
6.70	23.8	24.7	11.0	18.3	-0.1	-0.1	-0.1	-20.4	60.0	-14.7	Pass	50.0	-11.1	Pass
16.57	13.8	14.2	3.4	5.7	-0.1	-0.1	-0.3	-20.4	60.0	-25.1	Pass	50.0	-23.5	Pass
25.75	13.7	14.2	3.5	3.8	-0.1	-0.1	-0.3	-20.5	60.0	-25.0	Pass	50.0	-25.4	Pass
29.25	14.8	17.0	4.7	7.8	-0.1	-0.2	-0.3	-20.5	60.0	-22.1	Pass	50.0	-21.3	Pass

Result: Pass ***Worst Margin:*** -8.7 dB ***Frequency:*** 3.580 MHz

Measurement Device: LISN ASSET 1730(Line 1) LISN ASSET 1731(Line 2) **Cable:** CEMI-12 **Spectrum Analyzer:** SA EMI Chamber (1327)
Attenuator: 20dB Attenuator-37 **Site:** CEMI 1

C-S CEMI Calculator Version 3.0.12 *Equipment Factor Sheet rev: 5/21/2013*

Product was tested on AC side of a support supply.

Rev. 6/16/2013							
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	5/30/2014
LISNs/Measurement Probes	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
LISN Asset 1731	150kHz-30MHz	LI-150A	Com-Power	201091	1731	I	2/14/2014
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**
CEMI 1	719150		A-0015			III	NA
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/20/2014
CEMI1 Thermohygrometer		35519-044	Control Company	72457738	1335	II	8/19/2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
CEMI-12	9kHz - 2GHz		C-S			II	5/4/2014
Attenuators	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
20dB Attenuator-37	9kHz-2GHz			N/A		II	10/4/2013
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.							

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz) NIST CISPR	 5.6dB 4.6dB	 N/A 5.2dB (Ucispr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions NIST CISPR	 3.9dB 3.6dB	 N/A 3.6dB (Ucispr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: • Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	 3.4% 0.3dB	 5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("**Client**"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "**Conditions**"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("**Test Report**") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS**," "**BUREAU VERITAS CONSUMER PRODUCTS SERVICES**," "**BVCPS**", "**MTL**", "**ACTS**", "**MTL-ACTS**" and **CURTIS-STRAUS** (collectively, the "**Marks**") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.

13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

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