

WOW Insites, LLC

TEST REPORT FOR

**Ethernet Cable Tester
Model: WOW-TVM01-101**

Tested To The Following Standards:

**FCC Part 15 Subpart C Section(s)
15.207 & 15.247**

Report No.: 95531-8

Date of issue: September 29, 2014



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

TABLE OF CONTENTS

Administrative Information	3
Test Report Information	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications/Conditions During Testing	5
Equipment Under Test	6
Peripheral Devices	6
FCC Part 15 Subpart C	7
15.207 AC Conducted Emissions	7
15.247(a)(2) -6dB Occupied Bandwidth	14
15.247(b)(3) Peak Output Power	17
15.247(d) Field Strength of Radiated Spurious Emissions	22
15.247(e) Power Spectral Density	33
Supplemental Information	37
Measurement Uncertainty	37
Emissions Test Details	37

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

WOW Insites, LLC
12165 W Center Rd
Omaha, NE 68144

REPORT PREPARED BY:

Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

REPRESENTATIVE: Chris Gille-WOW Insites, LLC
Paul Carter - SEL
Customer Reference Number: SELc373

Project Number: 95531

DATE OF EQUIPMENT RECEIPT:

September 10, 2014

DATE(S) OF TESTING:

September 10-12, 2014

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):

CKC Laboratories, Inc.

5046 Sierra Pines Drive, Mariposa, CA 95338

1120 Fulton Place, Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure/Method	Description	Modifications*	Results
15.207 / ANSI C63.4	Conducted Emissions	NA	Pass
15.247(a)(2) / DA 00-705	-6dB Occupied Bandwidth	NA	Pass
15.247(b)(3) / DA 00-705	Peak Output Power	NA	Pass
15.247(d) / DA 00-705	Radiated Spurious Emissions and Bandedge	NA	Pass
15.247(e) / DA 00-705	Power Spectral Density	NA	Pass

Modifications*/Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
This product is battery operated equipment with capability of charging, so testing on the AC adaptor was also performed. The EUT is able to operate while charging, so testing was done while charging.
Note: At the time of testing, the date stamp on the plots for section: -6dB Occupied Bandwidth was set on a default setting and should instead read 09/10/2014.
No modifications were made during testing.

***Modifications listed above must be incorporated into all production units.**

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Ethernet Cable Tester

Manuf: WOW Insites LLC
Model: WOW-TVM01-101
Serial: 016

Remote

Manuf: WOW Insites LLC
Model: WOW-TVR01-101
Serial: 1020

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

AC/DC Adaptor

Manuf: CUI INC
Model: EPSA050100U
Serial: 1410

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer:	WOW Insites LLC	Date:	9/12/2014
Specification:	15.207 AC Mains - Average	Time:	15:44:07
Work Order #:	95531	Sequence#:	9
Test Type:	Conducted Emissions	Tested By:	Eddie Mariscal
Equipment:	Ethernet Cable Tester		120V 60Hz
Manufacturer:	WOW Insites LLC		
Model:	WOW-TVM01-101		
S/N:	016		

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP02229	Attenuator	PE7010-10	2/13/2013	2/13/2015
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016
	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
T3	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
	AN03470	Spectrum Analyzer	E4440A	12/2/2013	12/2/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TVRO1-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in normal operating mode, transmitting continuously with modulation enabled.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Environmental Conditions:

Temperature: 21.4°C

Humidity: 42%

Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

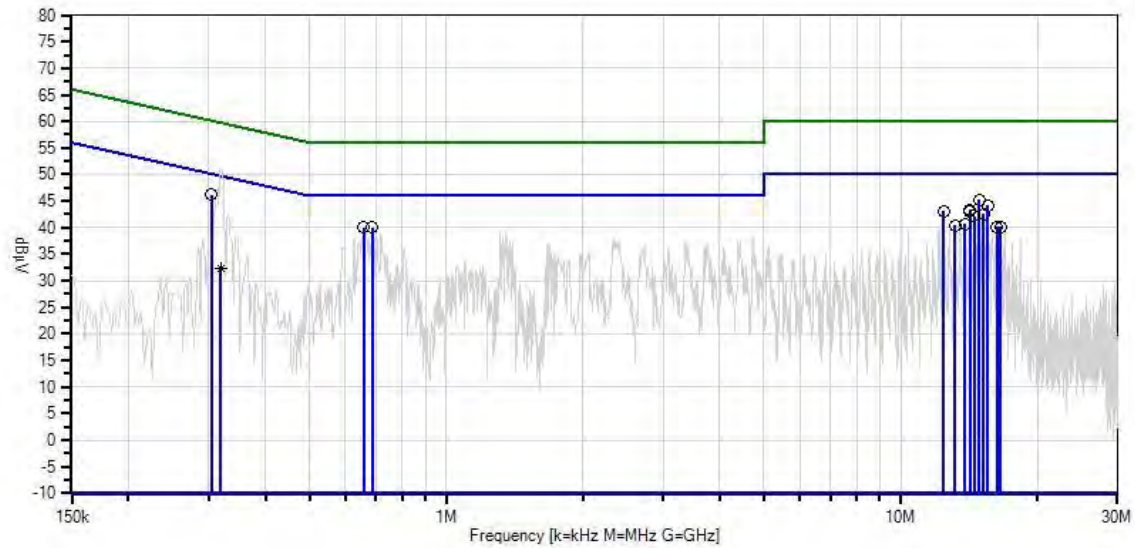
Measurement Data:

Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	304.363k	36.2	+9.7	+0.1	+0.1	+0.1	+0.0	46.2	50.1	-3.9	Black
2	14.909M	34.3	+9.9	+0.8	+0.2	+0.1	+0.0	45.3	50.0	-4.7	Black
3	15.548M	33.2	+9.9	+0.8	+0.2	+0.1	+0.0	44.2	50.0	-5.8	Black
4	657.785k	29.9	+9.7	+0.1	+0.1	+0.2	+0.0	40.0	46.0	-6.0	Black
5	686.874k	29.9	+9.7	+0.1	+0.1	+0.2	+0.0	40.0	46.0	-6.0	Black
6	14.188M	32.4	+9.9	+0.8	+0.2	+0.1	+0.0	43.4	50.0	-6.6	Black
7	12.440M	32.2	+9.9	+0.7	+0.2	+0.1	+0.0	43.1	50.0	-6.9	Black
8	14.215M	32.0	+9.9	+0.8	+0.2	+0.1	+0.0	43.0	50.0	-7.0	Black
9	15.188M	31.5	+9.9	+0.8	+0.2	+0.1	+0.0	42.5	50.0	-7.5	Black
10	14.494M	31.1	+9.9	+0.8	+0.2	+0.1	+0.0	42.1	50.0	-7.9	Black
11	13.845M	29.8	+9.9	+0.7	+0.2	+0.1	+0.0	40.7	50.0	-9.3	Black
12	13.179M	29.5	+9.9	+0.7	+0.2	+0.1	+0.0	40.4	50.0	-9.6	Black
13	16.278M	29.2	+9.9	+0.8	+0.2	+0.1	+0.0	40.2	50.0	-9.8	Black
14	16.593M	29.2	+9.9	+0.8	+0.2	+0.1	+0.0	40.2	50.0	-9.8	Black
15	318.907k	22.3	+9.7	+0.1	+0.1	+0.1	+0.0	32.3	49.7	-17.4	Black
Ave											
^	318.907k	41.3	+9.7	+0.1	+0.1	+0.1	+0.0	51.3	49.7	+1.6	Black

CKC Laboratories, Inc. Date: 9/12/2014 Time: 15:44:07 WOW Insites LLC WO#: 95531
Test Lead: Black 120V 60Hz Sequence#: 9



— Sweep Data	— Readings
○ Peak Readings	× QP Readings
* Average Readings	▼ Ambient
— 1 - 15.207 AC Mains - Average	— 2 - 15.207 AC Mains - Quasi-peak

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **95531**
 Test Type: **Conducted Emissions**
 Equipment: **Ethernet Cable Tester**
 Manufacturer: **WOW Insites LLC**
 Model: **WOW-TVM01-101**
 S/N: **016**

Date: 9/12/2014
 Time: 15:45:40
 Sequence#: 12
 Tested By: Eddie Mariscal
 120V 60Hz

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP02229	Attenuator	PE7010-10	2/13/2013	2/13/2015
T2	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016
T3	AN00374	50uH LISN-White (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
	AN00374	50uH LISN-Black (dB)	8028-TS-50-BNC	3/15/2014	3/15/2015
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
	AN03470	Spectrum Analyzer	E4440A	12/2/2013	12/2/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TVRO1-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in normal operating mode, transmitting continuously with modulation enabled.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Environmental Conditions:

Temperature: 21.4°C

Humidity: 42%

Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

Measurement Data:

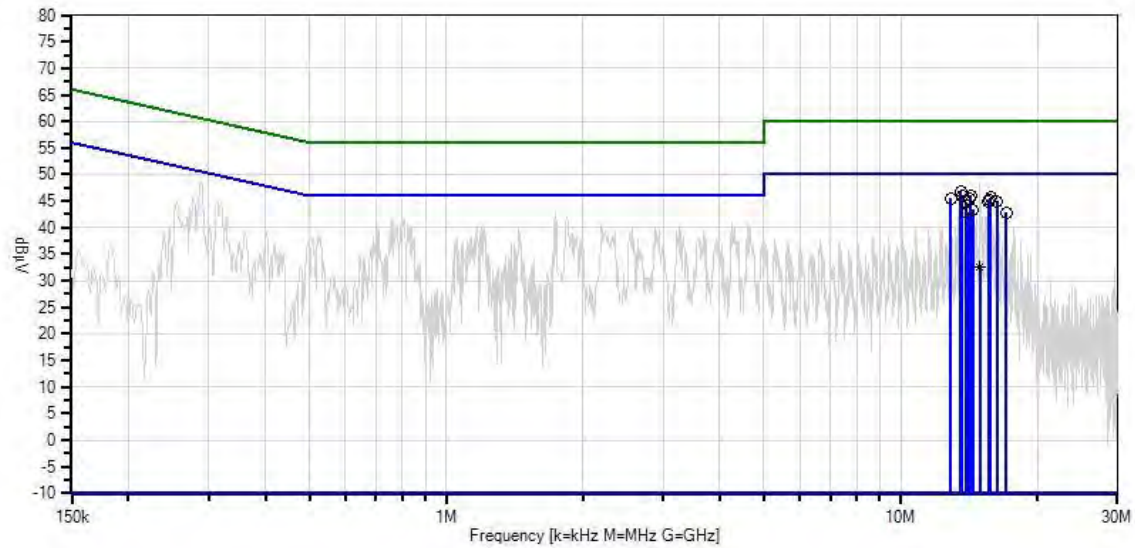
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.539M	36.0	+9.9	+0.7	+0.1	+0.1	+0.0	46.8	50.0	-3.2	White
2	13.629M	35.1	+9.9	+0.7	+0.2	+0.1	+0.0	46.0	50.0	-4.0	White

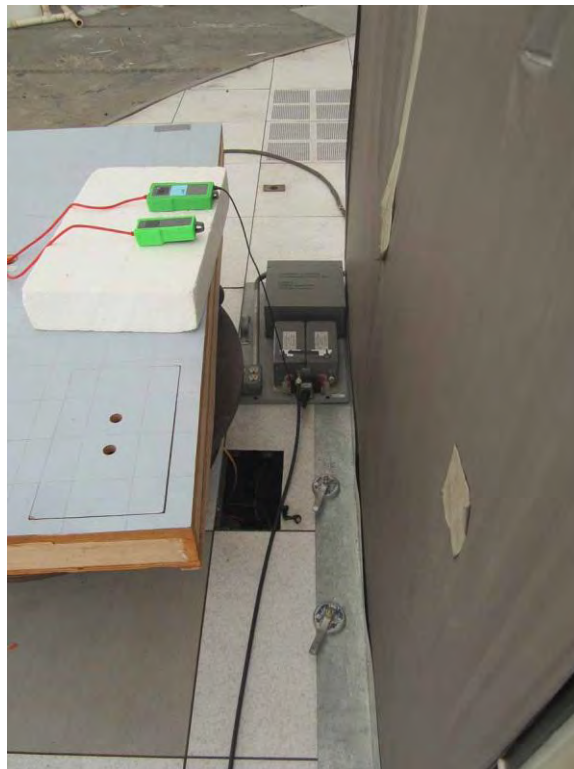
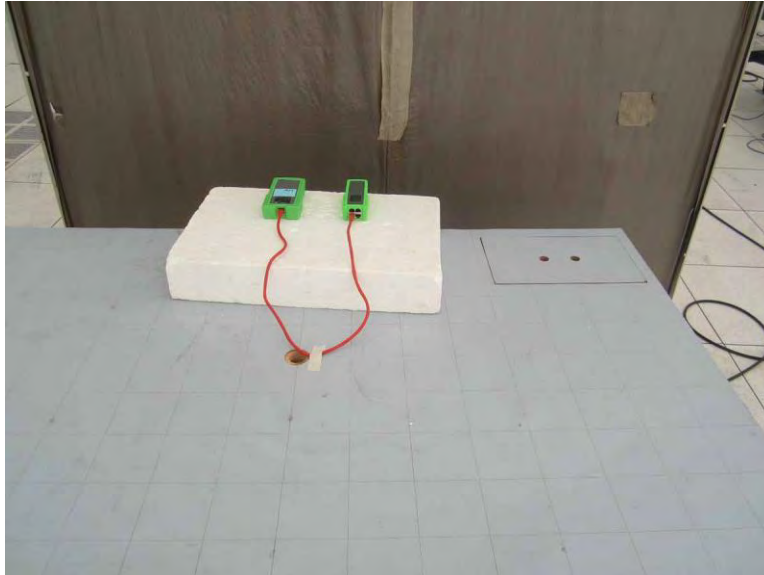
3	14.278M	35.0	+9.9	+0.8	+0.2	+0.1	+0.0	46.0	50.0	-4.0	White
4	15.764M	34.7	+9.9	+0.8	+0.2	+0.1	+0.0	45.7	50.0	-4.3	White
5	12.899M	34.7	+9.9	+0.7	+0.1	+0.1	+0.0	45.5	50.0	-4.5	White
6	14.224M	34.5	+9.9	+0.8	+0.2	+0.1	+0.0	45.5	50.0	-4.5	White
7	15.665M	34.3	+9.9	+0.8	+0.2	+0.1	+0.0	45.3	50.0	-4.7	White
8	16.314M	34.0	+9.9	+0.8	+0.2	+0.1	+0.0	45.0	50.0	-5.0	White
9	13.918M	33.9	+9.9	+0.7	+0.2	+0.1	+0.0	44.8	50.0	-5.2	White
10	15.593M	33.8	+9.9	+0.8	+0.2	+0.1	+0.0	44.8	50.0	-5.2	White
11	14.395M	32.4	+9.9	+0.8	+0.2	+0.1	+0.0	43.4	50.0	-6.6	White
12	14.017M	32.0	+9.9	+0.7	+0.2	+0.1	+0.0	42.9	50.0	-7.1	White
13	17.053M	31.9	+9.9	+0.8	+0.2	+0.1	+0.0	42.9	50.0	-7.1	White
14	14.954M	21.7	+9.9	+0.8	+0.2	+0.1	+0.0	32.7	50.0	-17.3	White
^	Ave 14.954M	36.4	+9.9	+0.8	+0.2	+0.1	+0.0	47.4	50.0	-2.6	White
16	14.936M	21.6	+9.9	+0.8	+0.2	+0.1	+0.0	32.6	50.0	-17.4	White
^	Ave 14.936M	37.7	+9.9	+0.8	+0.2	+0.1	+0.0	48.7	50.0	-1.3	White

CKC Laboratories, Inc. Date: 9/12/2014 Time: 15:45:40 WOW Insites LLC WO#: 95531
Test Lead: White 120V 60Hz Sequence#: 12



— Sweep Data	— Readings
○ Peak Readings	× QP Readings
* Average Readings	▼ Ambient
— 1 - 15.207 AC Mains - Average	— 2 - 15.207 AC Mains - Quasi-peak

Test Setup Photo(s)



15.247(a)(2) -6dB Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.247(a)(2) -6dB Bandwidth**
 Work Order #: **95531**
 Test Type: **Maximized Emissions**
 Equipment: **Ethernet Cable Tester**
 Manufacturer: **WOW Insites LLC**
 Model: **WOW-TVM01-101**
 S/N: **016**

Date: 9/10/2014
 Time: 11:14:43
 Sequence#: 8
 Tested By: Eddie Mariscal

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03155	Preamplifier	83017A	6/26/2013	6/26/2015
T2	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T3	AN03355	Cable	32026-2-29094K-48TC	2/7/2013	2/7/2015
T4	AN03359	Cable		2/4/2013	2/4/2015
T5	AN03360	Cable	32022-2-29094-36TC	2/4/2013	2/4/2015
T6	ANP05904	Cable	32022-2-29094K-144TC	2/15/2013	2/15/2015
T7	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TRV01-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in constant transmit mode with modulation enabled. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

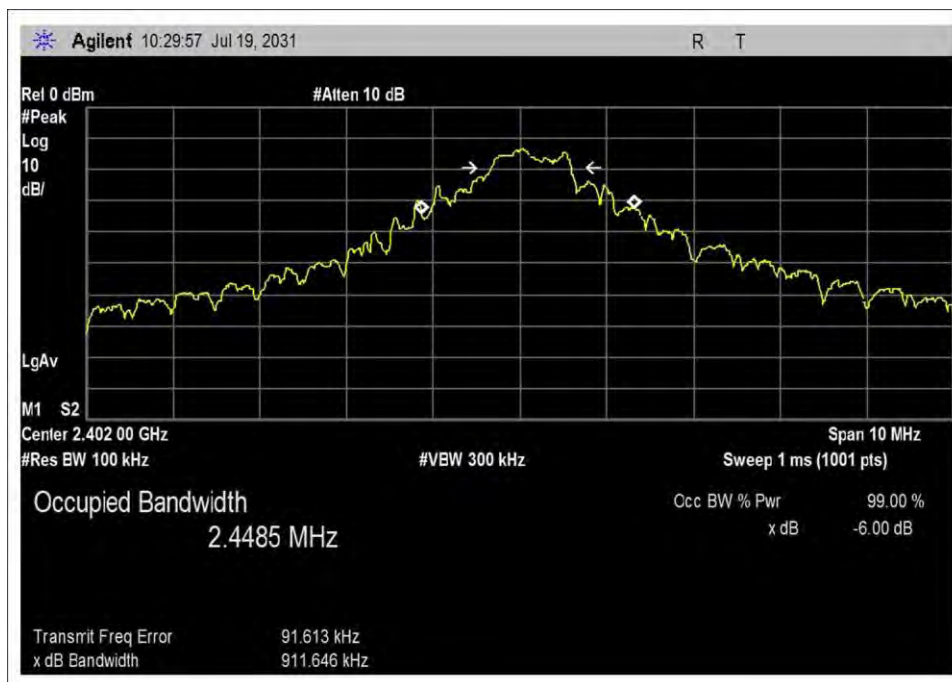
Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

Frequency Range of Interest: Fundamental (2.402GHz, 2.442GHz, 2.480GHz)

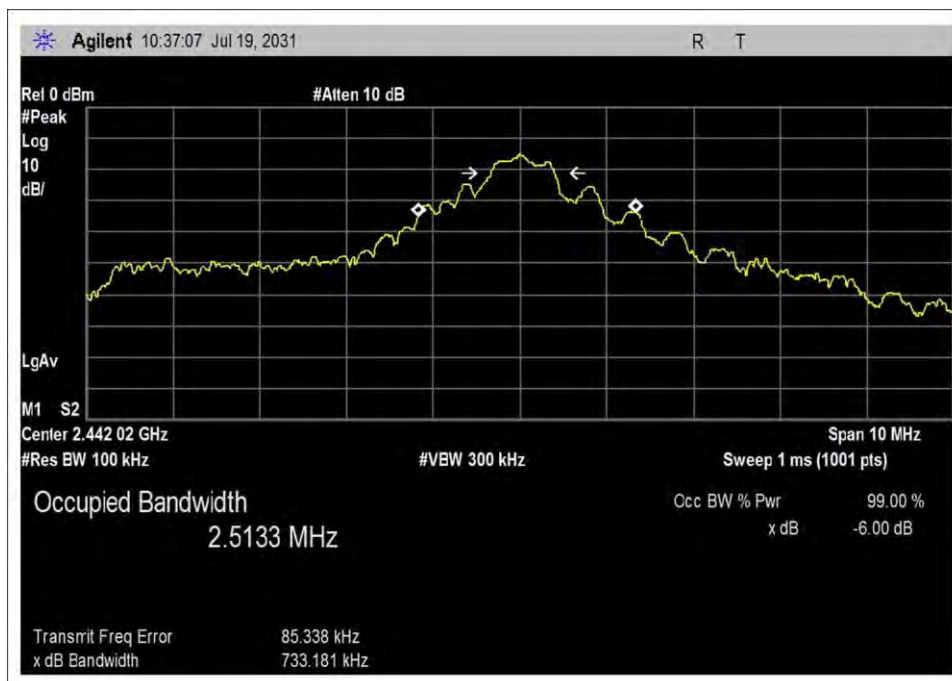
Highest Generated Frequency: 2.480GHz

Environmental Conditions: Temperature: 21.4°C, Humidity: 42%, Atmospheric Pressure: 97.8 kPa

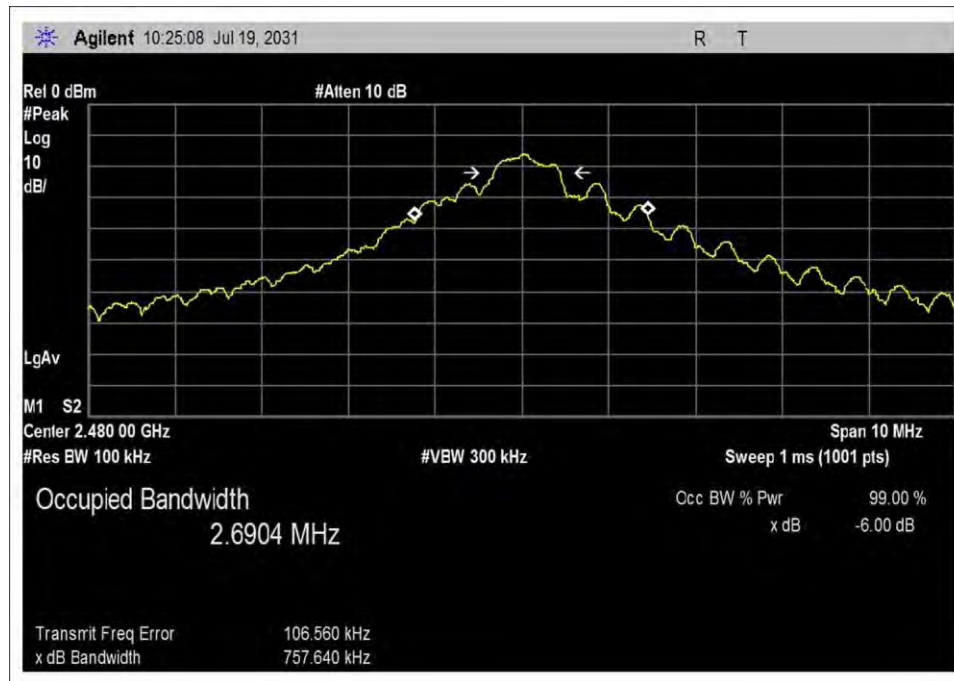
Test Data



Low

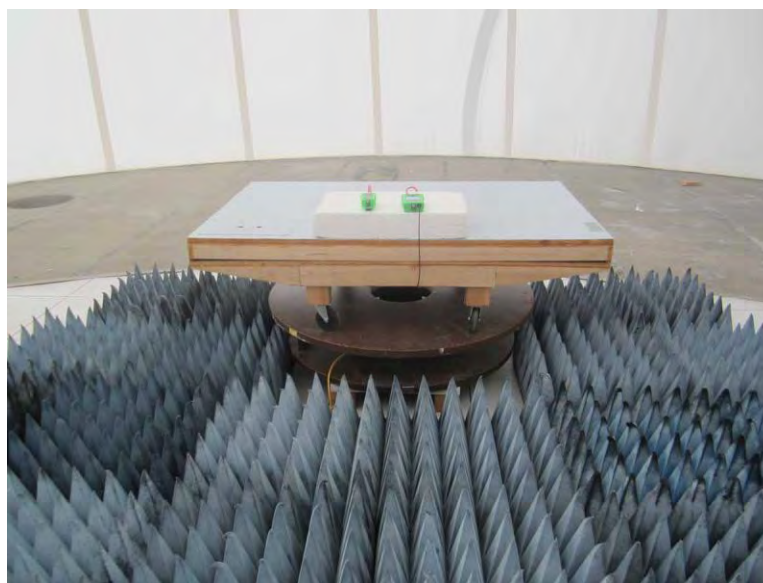


Middle



High

Test Setup Photo



15.247(b)(3) Peak Output Power

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.247(b) Peak Output Power**
 Work Order #: **95531**
 Test Type: **Maximized Emissions**
 Equipment: **Master**
 Manufacturer: **WOW Insites LLC**
 Model: **WOW-TVM01-101**
 S/N: **016**

Date: 9/10/2014
 Time: 11:14:43
 Sequence#: 8
 Tested By: Eddie Mariscal

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03155	Preamp	83017A	6/26/2013	6/26/2015
T2	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T3	AN03355	Cable	32026-2-29094K-48TC	2/7/2013	2/7/2015
T4	AN03359	Cable		2/4/2013	2/4/2015
T5	AN03360	Cable	32022-2-29094-36TC	2/4/2013	2/4/2015
T6	ANP05904	Cable	32022-2-29094K-144TC	2/15/2013	2/15/2015
T7	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TRV01-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in constant transmit mode with modulation enabled. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

The following formula will be used to calculate the Peak Output Power:

$$P = (Ed)^2 / (30 * G)$$

E = Field strength of the measurement converted to V/M

d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

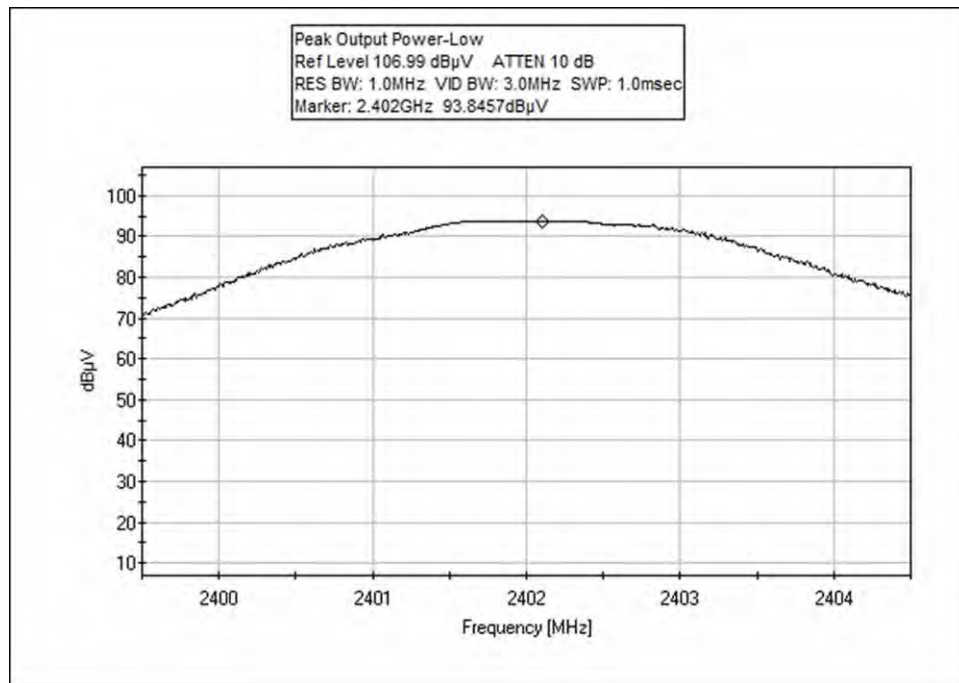
P = The power in watts for which we are solving

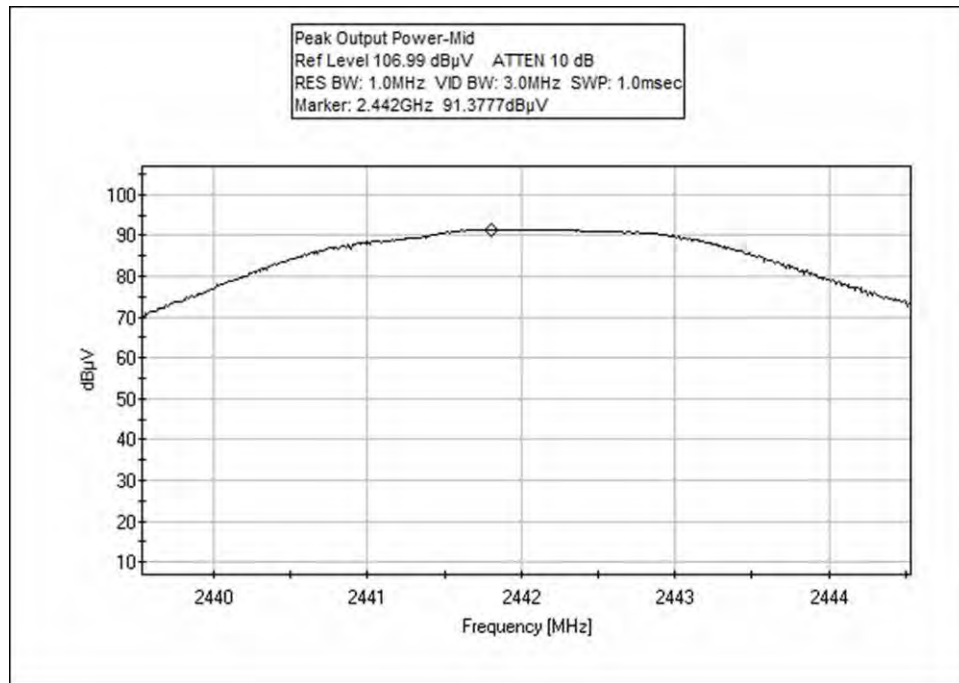
Highest Generated Frequency: 2.4GHz
Frequency Range of Interest: Fundamental (2.402GHz, 2.442GHz, 2.480GHz)
Span = 3MHz
RBW = 10kHz
VBW = 3 * RBW;

Environmental Conditions:
Temperature: 21.4°C
Humidity: 42%
Atmospheric Pressure: 97.8 kPa

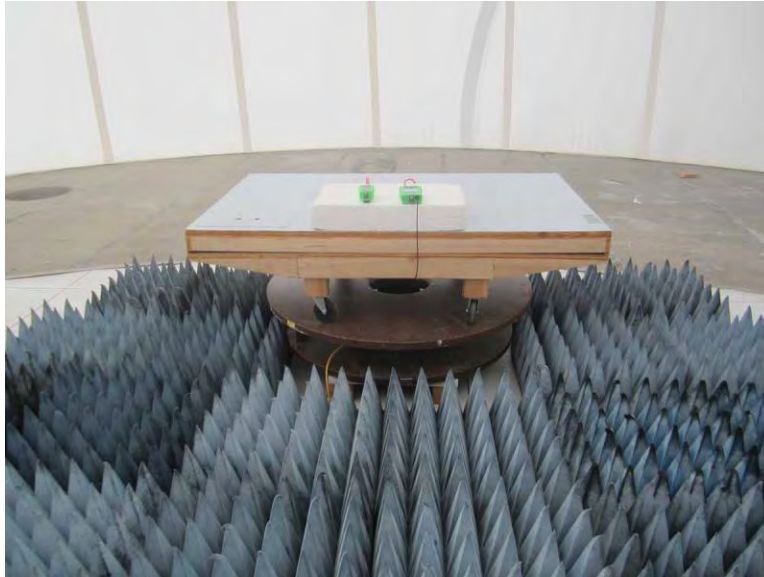
Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables, Amplifiers and antennas (dB)	Corrected Reading (dBuV)	Antenna Gain (dBi)	Peak Output Power (dBm)
2402	93.8	-4.0	89.8	+5.14	-10.5
2440	91.4	-4.0	87.4	+5.14	-13.0
2480	91.1	-3.9	87.2	+5.14	-13.2

Test Data





Test Setup Photo(s)



High Frequency



X-Axis



Y-Axis



Z-Axis

15.247(d) Field Strength of Radiated Spurious Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **95531** Date: 9/12/2014
 Test Type: **Maximized Emissions** Time: 14:21:45
 Equipment: **Ethernet Cable Tester** Sequence#: 8
 Manufacturer: WOW Insites LLC Tested By: Eddie Mariscal
 Model: WOW-TVM01-101
 S/N: 016

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01991	Biconilog Antenna	CBL6111C	3/7/2014	3/7/2016
T2	AN00449	Preamp-Bottom Amp (dB)	8447F	4/7/2014	4/7/2016
T3	ANP05922	Cable	RG/214	9/5/2014	9/5/2016
T4	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T5	ANP06228	Cable	CXTA04A-100	9/5/2014	9/5/2016
	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TVR01-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in normal operating mode, transmitting continuously with modulation enabled. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

Frequency Range of Interest: .009-1000MHz

Highest Generated Frequency: 2.480GHz

0.009-0.15MHz: RBW = 200Hz; VBW > RBW

0.15-30MHz: RBW = 9kHz; VBW > RBW

30-1000MHz: RBW = 120kHz; VBW > RBW

Environmental Conditions: Temperature: 21.4°C, Humidity: 42%, Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

Measurement Data:

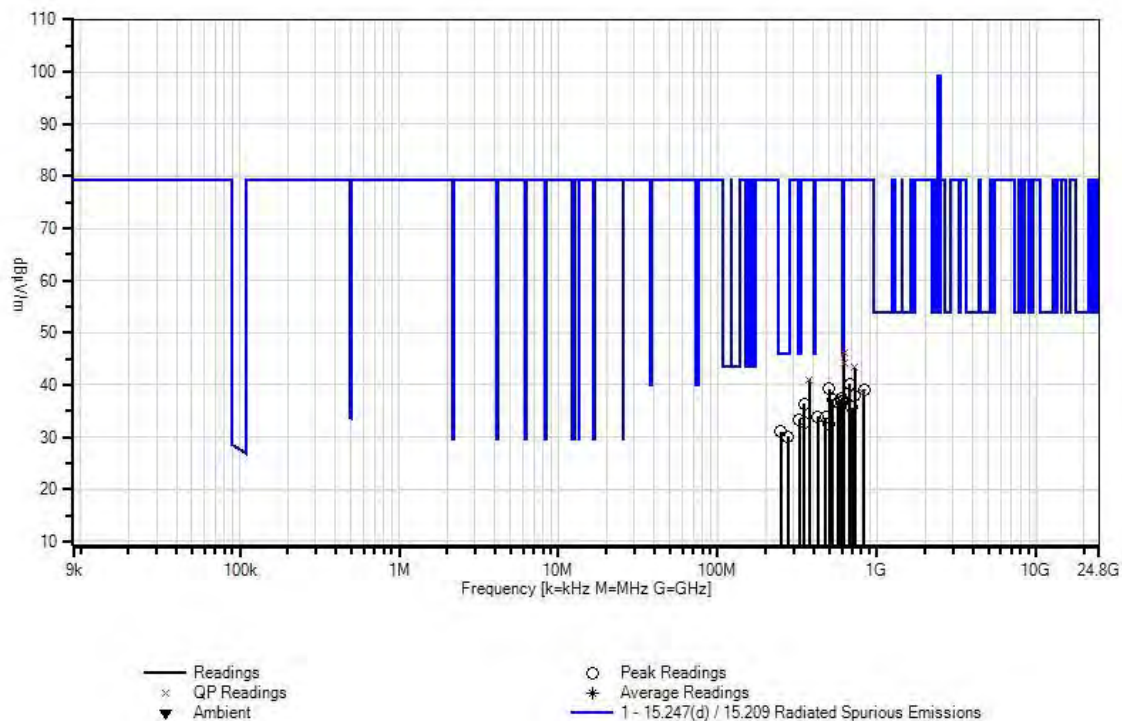
Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	324.927M	38.0	+14.1 +4.0	-22.8	+0.1	+0.0	+0.0	33.4	46.0	-12.6	Horiz
2	250.000M	37.4	+12.6 +3.4	-22.5	+0.1	+0.0	+0.0	31.0	46.0	-15.0	Vert
3	275.020M	35.9	+13.0 +3.6	-22.6	+0.1	+0.0	+0.0	30.0	46.0	-16.0	Vert
4	624.992M QP	43.9	+20.1 +5.7	-23.6	+0.2	+0.0	+0.0	46.3	79.3	-33.0	Horiz
^	624.992M	45.1	+20.1 +5.7	-23.6	+0.2	+0.0	+0.0	47.5	79.3	-31.8	Horiz
6	625.000M QP	41.7	+20.1 +5.7	-23.6	+0.2	+0.0	+0.0	44.1	79.3	-35.2	Vert
^	625.000M	48.6	+0.0 +5.7	+0.0	+0.0	+0.0	+0.0	54.3	79.3	-25.0	Vert
^	624.995M	44.5	+20.1 +5.7	-23.6	+0.2	+0.0	+0.0	46.9	79.3	-32.4	Vert
9	725.000M QP	39.3	+20.9 +6.3	-23.4	+0.2	+0.0	+0.0	43.3	79.3	-36.0	Horiz
^	725.000M	40.5	+20.9 +6.3	-23.4	+0.2	+0.0	+0.0	44.5	79.3	-34.8	Horiz
11	374.897M QP	44.1	+15.5 +4.3	-22.9	+0.1	+0.0	+0.0	41.1	79.3	-38.2	Horiz
^	374.897M	46.1	+15.5 +4.3	-22.9	+0.1	+0.0	+0.0	43.1	79.3	-36.2	Horiz
13	674.975M	37.1	+20.4 +6.0	-23.5	+0.2	+0.0	+0.0	40.2	79.3	-39.1	Horiz
14	499.990M	39.2	+18.0 +5.1	-23.3	+0.2	+0.0	+0.0	39.2	79.3	-40.1	Vert
15	825.530M	32.6	+22.2 +6.8	-22.7	+0.2	+0.0	+0.0	39.1	79.3	-40.2	Vert
16	825.000M QP	32.1	+22.2 +6.8	-22.7	+0.2	+0.0	+0.0	38.6	79.3	-40.7	Horiz
^	825.000M	37.2	+22.2 +6.8	-22.7	+0.2	+0.0	+0.0	43.7	79.3	-35.6	Horiz
18	725.005M	33.9	+20.9 +6.3	-23.4	+0.2	+0.0	+0.0	37.9	79.3	-41.4	Vert
19	600.011M	35.1	+20.0 +5.6	-23.6	+0.2	+0.0	+0.0	37.3	79.3	-42.0	Horiz
20	524.920M	36.6	+18.5 +5.2	-23.4	+0.2	+0.0	+0.0	37.1	79.3	-42.2	Vert
21	599.990M	34.7	+20.0 +5.6	-23.6	+0.2	+0.0	+0.0	36.9	79.3	-42.4	Vert
22	574.955M	34.8	+19.5 +5.5	-23.5	+0.2	+0.0	+0.0	36.5	79.3	-42.8	Horiz
23	349.915M	39.9	+14.9 +4.2	-22.8	+0.1	+0.0	+0.0	36.3	79.3	-43.0	Horiz

24	700.005M	32.4	+20.5 +6.1	-23.5	+0.2	+0.0	+0.0	35.7	79.3	-43.6	Horiz
25	424.970M	35.5	+16.7 +4.6	-23.1	+0.2	+0.0	+0.0	33.9	79.3	-45.4	Vert
26	474.990M	34.4	+17.6 +4.9	-23.3	+0.2	+0.0	+0.0	33.8	79.3	-45.5	Vert
27	349.915M	36.4	+14.9 +4.2	-22.8	+0.1	+0.0	+0.0	32.8	79.3	-46.5	Horiz
28	500.010M	32.4	+18.0 +5.1	-23.3	+0.2	+0.0	+0.0	32.4	79.3	-46.9	Horiz

CKC Laboratories, Inc Date: 9/12/2014 Time: 14:21:45 WOW Insites LLC WO#: 95531
 Test Distance: 3 Meters Sequence#: 8



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **95531** Date: 9/11/2014
 Test Type: **Maximized Emissions** Time: 15:24:44
 Equipment: **Ethernet Cable Tester** Sequence#: 8
 Manufacturer: **WOW Insites LLC** Tested By: **Eddie Mariscal**
 Model: **WOW-TVM01-101**
 S/N: **016**

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03155	Preamplifier	83017A	6/26/2013	6/26/2015
T2	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T3	AN03355	Cable	32026-2-29094K-48TC	2/7/2013	2/7/2015
T4	AN03359	Cable		2/4/2013	2/4/2015
T5	AN03360	Cable	32022-2-29094-36TC	2/4/2013	2/4/2015
T6	ANP05904	Cable	32022-2-29094K-144TC	2/15/2013	2/15/2015
T7	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
	AN02046	Horn Antenna	MWH-1826/B	2/4/2013	2/4/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TVRO1-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in constant transmit mode. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

Frequency Range of Interest: 1-24.80GHz

Highest Generated Frequency: 2.480GHz

RBW = 1MHz; VBW > RBW;

Environmental Conditions:

Temperature: 21.4°C

Humidity: 42%

Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

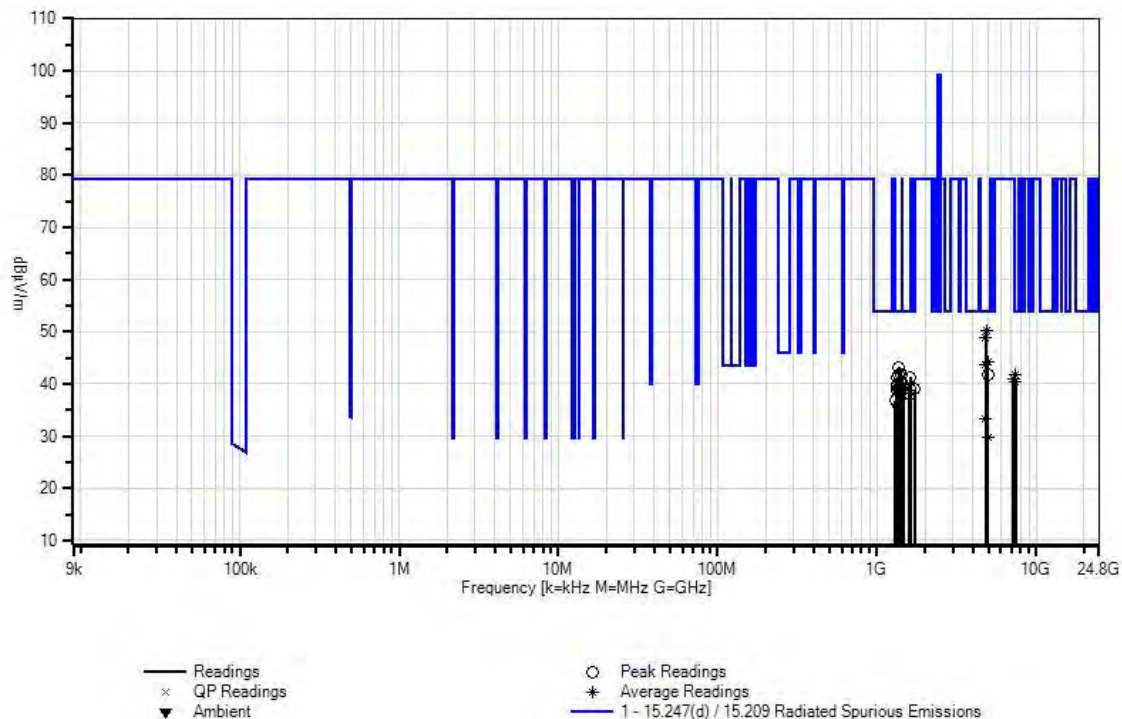
Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	4883.867M Ave	47.0	-32.9 +1.0	+30.2 +3.2	+0.8 +0.0	+0.8	+0.0	50.1	54.0 Transmit Mid Channel	-3.9	Vert
^	4883.870M	55.2	-32.9 +1.0	+30.2 +3.2	+0.8 +0.0	+0.8	+0.0	58.3	54.0 Transmit Mid Channel	+4.3	Vert
3	4804.300M Ave	46.0	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	48.8	54.0 Transmit Low Channel	-5.2	Vert
^	4804.300M	54.6	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	57.4	54.0 Transmit Low Channel	+3.4	Vert
5	4960.223M Ave	41.0	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8	+0.0	44.2	54.0 Transmit High Channel	-9.8	Vert
^	4960.230M	51.5	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8	+0.0	54.7	54.0 Transmit High Channel	+0.7	Vert
7	4804.550M Ave	40.9	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	43.7	54.0 Transmit Low Channel	-10.3	Horiz
^	4804.550M	50.5	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	53.3	54.0 Transmit Low Channel	-0.7	Horiz
9	1375.017M	51.5	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	43.1	54.0 Transmit Mid Channel	-10.9	Vert
10	7326.500M Ave	33.3	-32.7 +1.1	+33.8 +4.2	+1.3 +0.0	+0.9	+0.0	41.9	54.0 Transmit Mid Channel	-12.1	Vert
^	7326.500M	43.9	-32.7 +1.1	+33.8 +4.2	+1.3 +0.0	+0.9	+0.0	52.5	54.0 Transmit Mid Channel	-1.5	Vert
12	4960.200M	38.6	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8	+0.0	41.8	54.0 Transmit High Channel	-12.2	Horiz
13	1374.967M	50.1	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	41.7	54.0 Transmit Low Channel	-12.3	Vert
14	1424.817M	49.8	-33.9 +0.5	+22.5 +1.9	+0.5 +0.0	+0.4	+0.0	41.7	54.0 Transmit Mid Channel	-12.3	Vert
15	1625.017M	48.1	-33.7 +0.6	+23.3 +2.0	+0.5 +0.0	+0.5	+0.0	41.3	54.0 Transmit Mid Channel	-12.7	Vert

16	1349.817M	49.6	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	41.2	54.0 Transmit Low Channel	-12.8	Horiz
17	7440.381M Ave	31.4	-32.6 +1.1	+33.9 +4.2	+1.4 +0.0	+1.1	+0.0	40.5	54.0 Transmit High Channel	-13.5	Vert
^	7440.381M	43.2	-32.6 +1.1	+33.9 +4.2	+1.4 +0.0	+1.1	+0.0	52.3	54.0 Transmit High Channel	-1.7	Vert
19	1425.000M	48.6	-33.9 +0.5	+22.5 +1.9	+0.5 +0.0	+0.4	+0.0	40.5	54.0 Transmit High Channel	-13.5	Vert
20	1349.633M	48.3	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	39.9	54.0 Transmit Mid Channel	-14.1	Vert
21	1449.950M	47.7	-33.9 +0.5	+22.6 +1.9	+0.5 +0.0	+0.5	+0.0	39.8	54.0 Transmit Mid Channel	-14.2	Vert
22	1350.000M	47.9	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	39.5	54.0 Transmit High Channel	-14.5	Vert
23	1624.583M	45.9	-33.7 +0.6	+23.3 +2.0	+0.5 +0.0	+0.5	+0.0	39.1	54.0 Transmit Low Channel	-14.9	Horiz
24	1375.000M	47.5	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	39.1	54.0 Transmit High Channel	-14.9	Vert
25	1474.967M	46.8	-33.9 +0.5	+22.7 +1.9	+0.5 +0.0	+0.5	+0.0	39.0	54.0 Transmit Mid Channel	-15.0	Vert
26	1400.000M	47.0	-33.9 +0.5	+22.5 +1.9	+0.5 +0.0	+0.4	+0.0	38.9	54.0 Transmit High Channel	-15.1	Vert
27	1325.000M	47.4	-34.1 +0.5	+22.3 +1.8	+0.5 +0.0	+0.4	+0.0	38.8	54.0 Transmit High Channel	-15.2	Vert
28	1400.100M	46.7	-33.9 +0.5	+22.5 +1.9	+0.5 +0.0	+0.4	+0.0	38.6	54.0 Transmit Low Channel	-15.4	Horiz
29	1600.000M	45.0	-33.8 +0.6	+23.2 +2.0	+0.5 +0.0	+0.5	+0.0	38.0	54.0 Transmit High Channel	-16.0	Vert
30	1300.000M	45.6	-34.2 +0.5	+22.3 +1.8	+0.4 +0.0	+0.4	+0.0	36.8	54.0 Transmit High Channel	-17.2	Vert
31	1375.000M	44.3	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4	+0.0	35.9	54.0 Transmit Low Channel	-18.1	Horiz
32	4802.650M Ave	30.4	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	33.2	54.0 Transmit Low Channel	-20.8	Vert

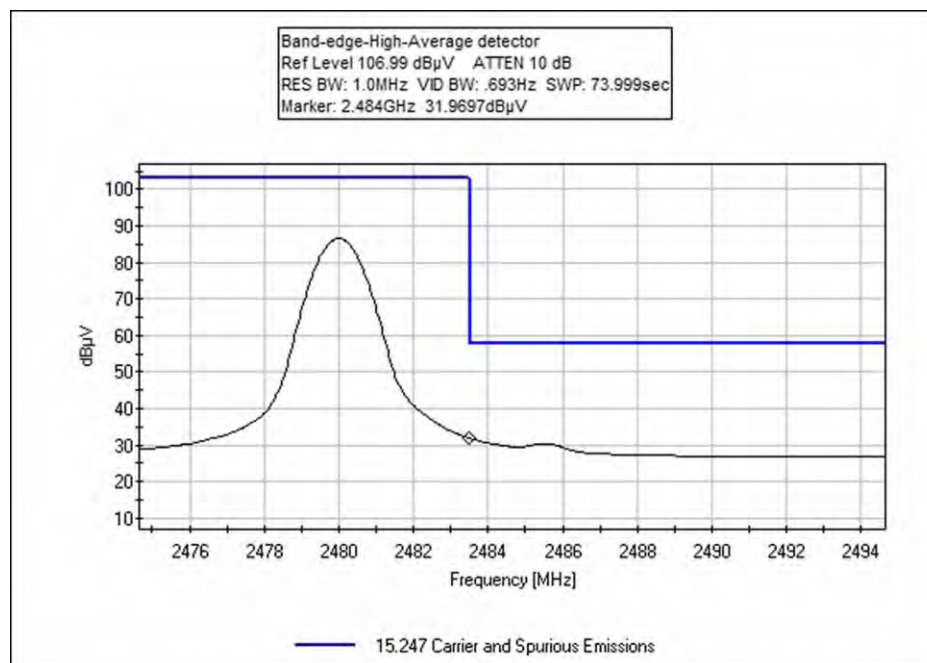
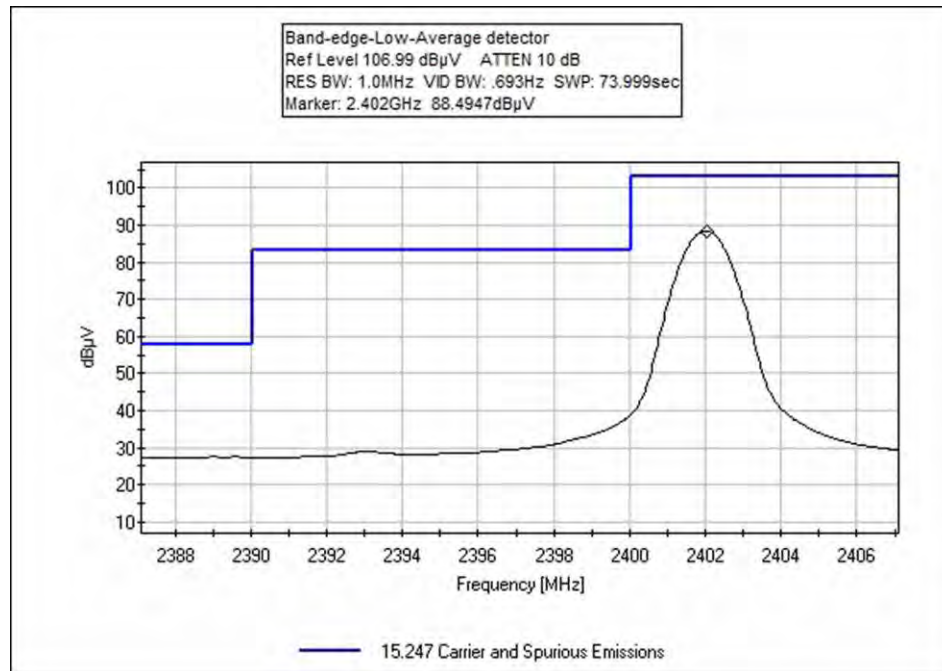
^	4802.650M	56.3	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9 +0.0	+0.0	59.1	54.0 Transmit Low Channel	+5.1	Vert
34	4957.900M Ave	26.4	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8 +0.0	+0.0	29.6	54.0 Transmit High Channel	-24.4	Vert
^	4957.900M	56.4	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8 +0.0	+0.0	59.6	54.0 Transmit High Channel	+5.6	Vert
36	7206.767M Ave	32.7	-32.7 +1.0	+33.7 +4.1	+1.3 +0.0	+0.8 +0.0	+0.0	40.9	79.3 Transmit Low Channel	-38.4	Vert
^	7206.770M	44.0	-32.7 +1.0	+33.7 +4.1	+1.3 +0.0	+0.8 +0.0	+0.0	52.2	79.3 Transmit Low Channel	-27.1	Vert
38	1725.000M	44.8	-33.4 +0.6	+23.8 +2.1	+0.5 +0.0	+0.5 +0.0	+0.0	38.9	79.3 Transmit High Channel	-40.4	Vert

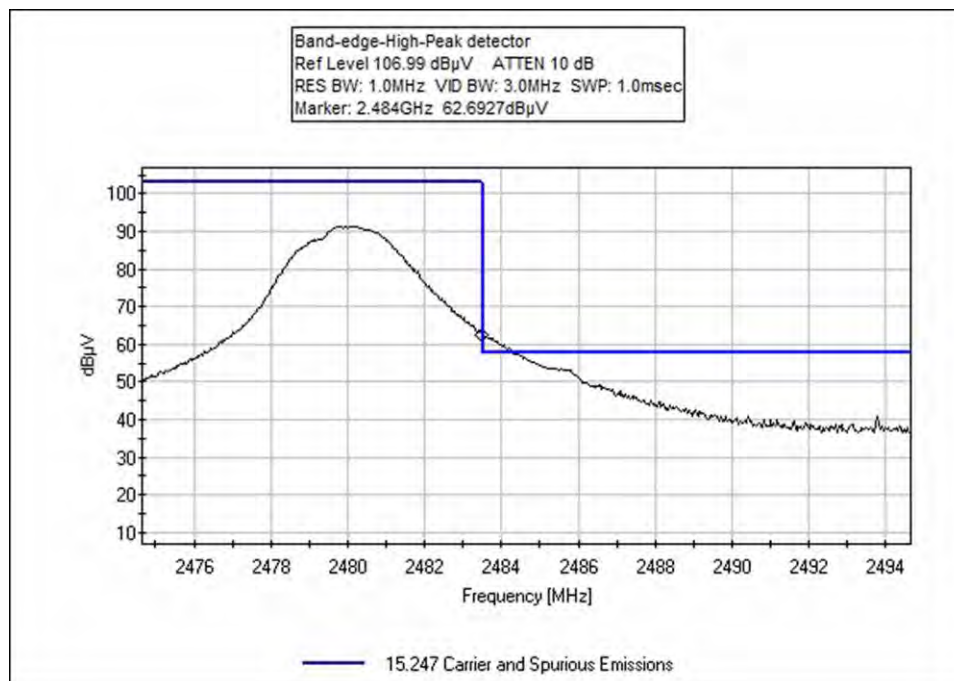
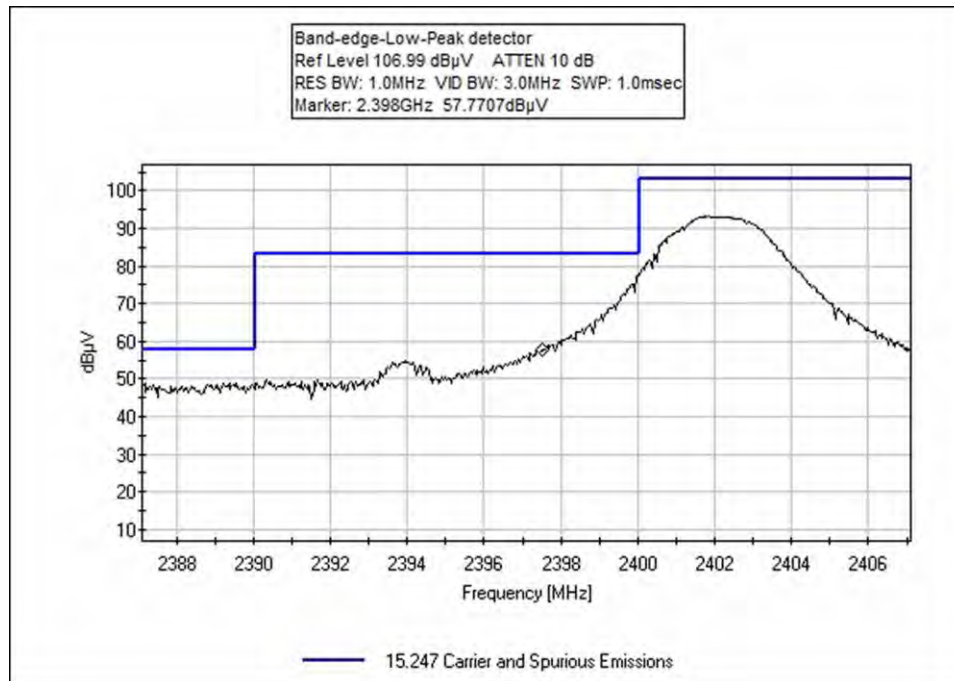
CKC Laboratories, Inc Date: 9/11/2014 Time: 15:24:44 WOW Insites LLC WO#: 95531
Test Distance: 3 Meters Sequence#: 8



Bandedge

Test Data

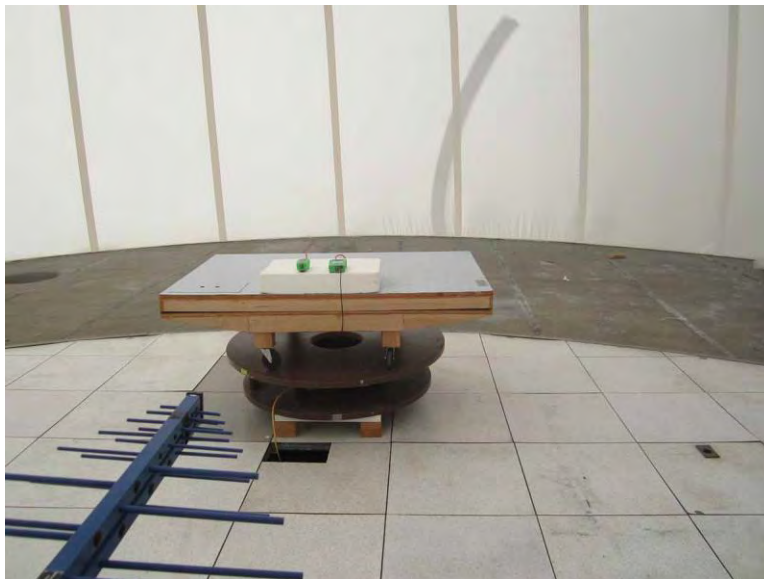




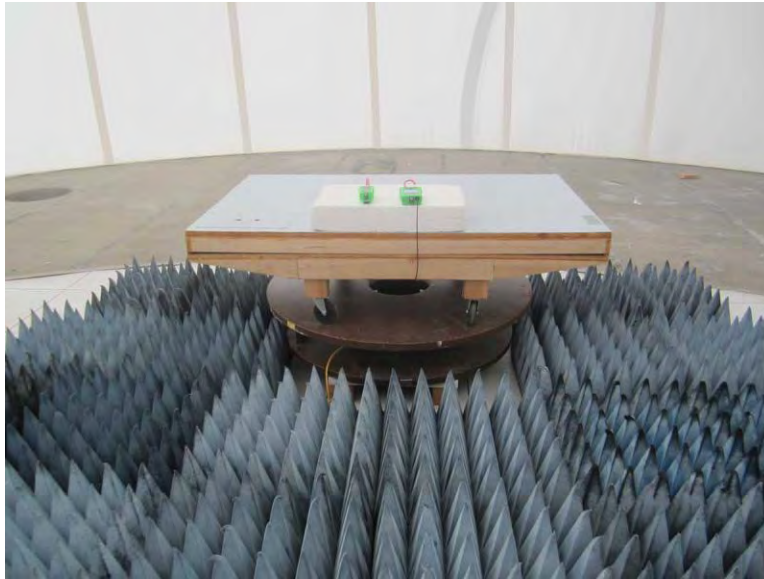
Test Setup Photo(s)



Low Frequency



Middle Frequency



High Frequency

15.247(e) Power Spectral Density

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **WOW Insites LLC**
 Specification: **15.247(e) Power Spectral Density**
 Work Order #: **95531** Date: 9/10/2014
 Test Type: **Maximized Emissions** Time: 11:14:43
 Equipment: **Ethernet Cable Tester** Sequence#: 8
 Manufacturer: WOW Insites LLC Tested By: Eddie Mariscal
 Model: WOW-TVM01-101
 S/N: 016

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03155	Preamp	83017A	6/26/2013	6/26/2015
T2	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T3	AN03355	Cable	32026-2-29094K-48TC	2/7/2013	2/7/2015
T4	AN03359	Cable		2/4/2013	2/4/2015
T5	AN03360	Cable	32022-2-29094-36TC	2/4/2013	2/4/2015
T6	ANP05904	Cable	32022-2-29094K-144TC	2/15/2013	2/15/2015
T7	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Ethernet Cable Tester*	WOW Insites LLC	WOW-TVM01-101	016
Remote	WOW Insites LLC	WOW-TVRO1-101	1020

Support Devices:

Function	Manufacturer	Model #	S/N
AC/DC Adaptor	CUI INC	EPSA050100U	1410

Test Conditions / Notes:

The EUT is placed atop a Styrofoam support atop a wooden, nonconductive turntable of height 80cm. The EUT employs an integral antenna and is placed in constant transmit mode with modulation enabled. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

The following formula will be used to calculate the power spectral density:

$$P = (Ed)^2 / (30 * G)$$

E = Field strength of the measurement converted to V/M

d = Measurement distance in meters

G = Numerical gain of the EUT's antenna relative to an isotropic radiator.

P = The power in watts for which we are solving

Highest Generated Frequency: 2.480GHz
Frequency Range of Interest: Fundamental (2.402GHz, 2.442GHz, 2.480GHz)

Environmental Conditions:

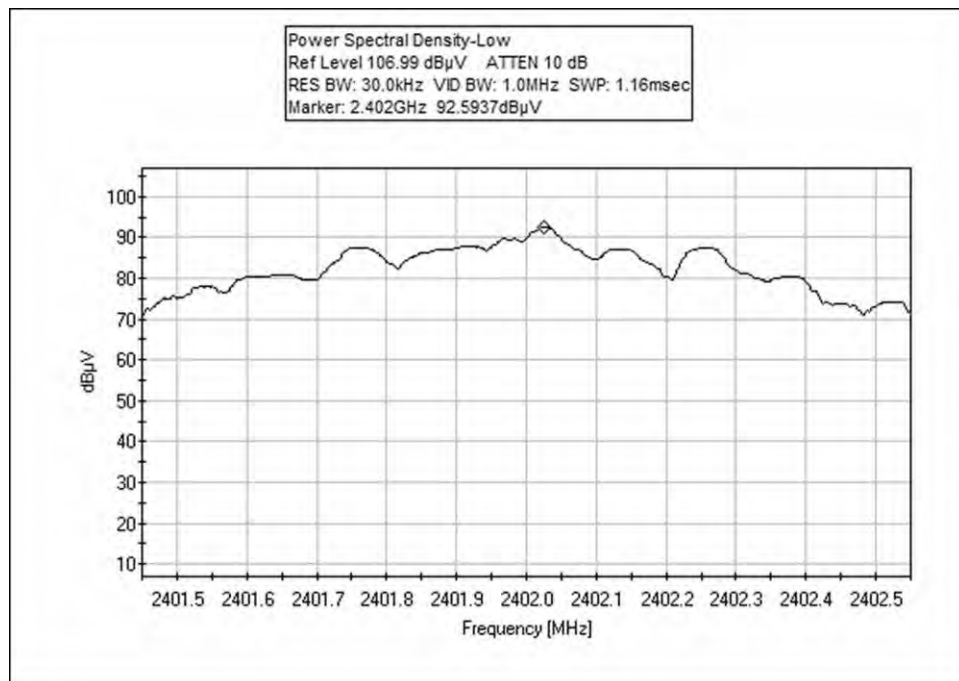
Temperature: 21.4°C

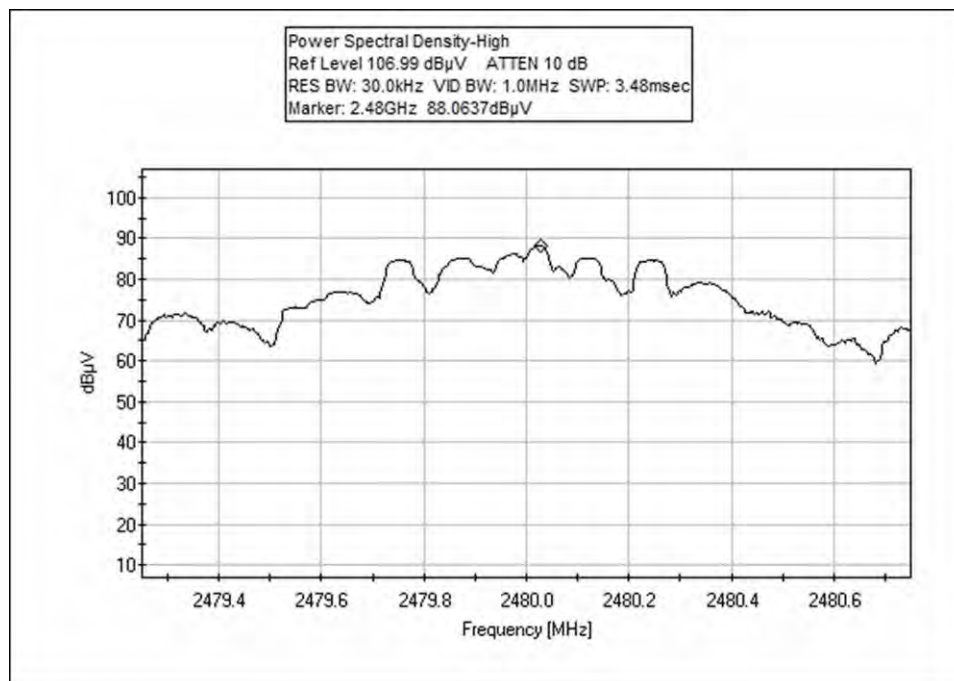
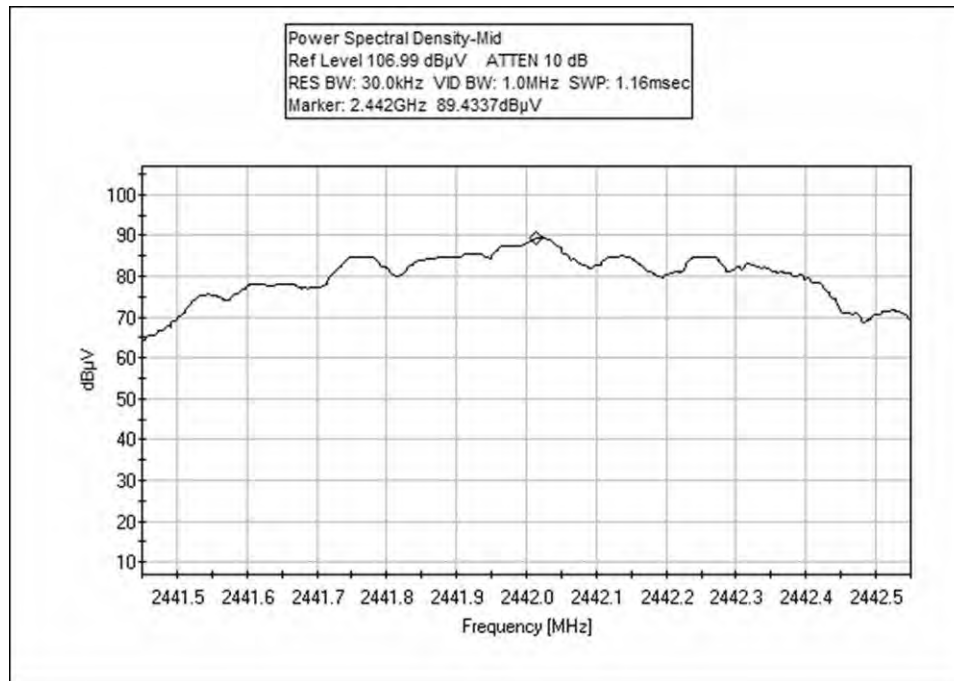
Humidity: 42%

Atmospheric Pressure: 97.8 kPa

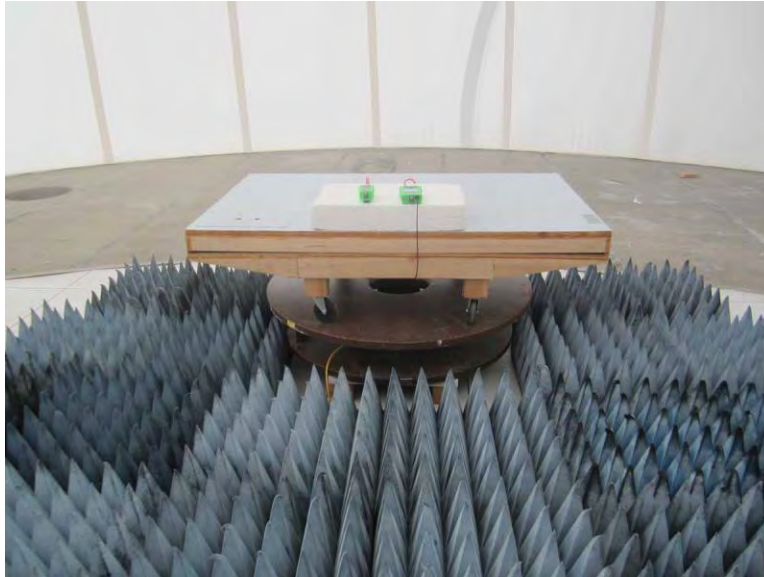
Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables, Amplifiers and antennas (dB)	Corrected Reading (dBuV)	Antenna Gain (dBi)	Spectral Density (dBm)
2402	92.6	-4.0	88.6	+5.14	-11.8
2440	89.4	-4.0	85.4	+5.14	-15.0
2480	88.1	-3.9	84.9	+5.14	-15.5

Test Data





Test Setup Photo



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.