

# 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

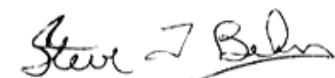
Project Number: 95531

**DATE OF EQUIPMENT RECEIPT:**  
**DATE(S) OF TESTING:**

September 10, 2014  
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-TVRO1-101  
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**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **95531** Date: **9/12/2014**  
 Test Type: **Conducted Emissions** Time: **15:44:07**  
 Equipment: **Ethernet Cable Tester** Sequence#: **9**  
 Manufacturer: **WOW Insites LLC** Tested By: **Eddie Mariscal**  
 Model: **WOW-TVM01-101** **120V 60Hz**  
 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-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.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Environmental Conditions:

Temperature: 21.4°C

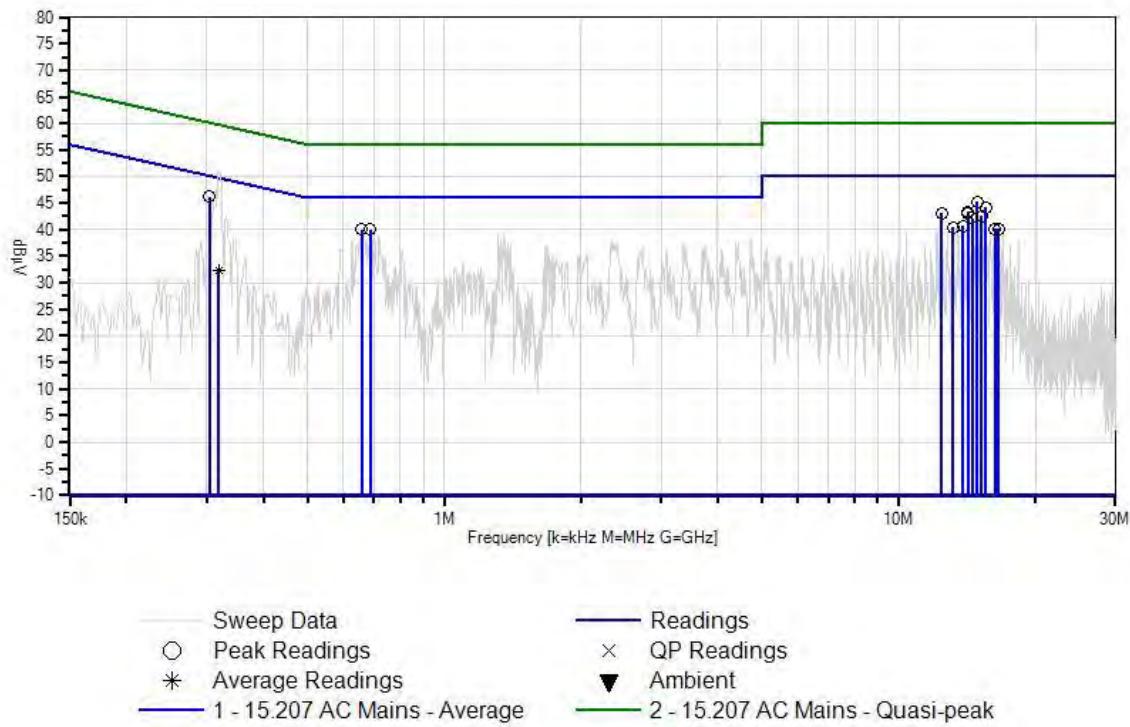
Humidity: 42%

Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

#	Freq MHz	Reading listed by margin.					Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
		Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB					
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 Ave	22.3	+9.7	+0.1	+0.1	+0.1	+0.0	32.3	49.7	-17.4	Black
^	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



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** Date: **9/12/2014**  
 Test Type: **Conducted Emissions** Time: **15:45:40**  
 Equipment: **Ethernet Cable Tester** Sequence#: **12**  
 Manufacturer: **WOW Insites LLC** Tested By: **Eddie Mariscal**  
 Model: **WOW-TVM01-101** **120V 60Hz**  
 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
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-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.

Frequency Range of Interest: 0.15-30MHz

RBW = 9kHz; VBW > RBW

Environmental Conditions:

Temperature: 21.4°C

Humidity: 42%

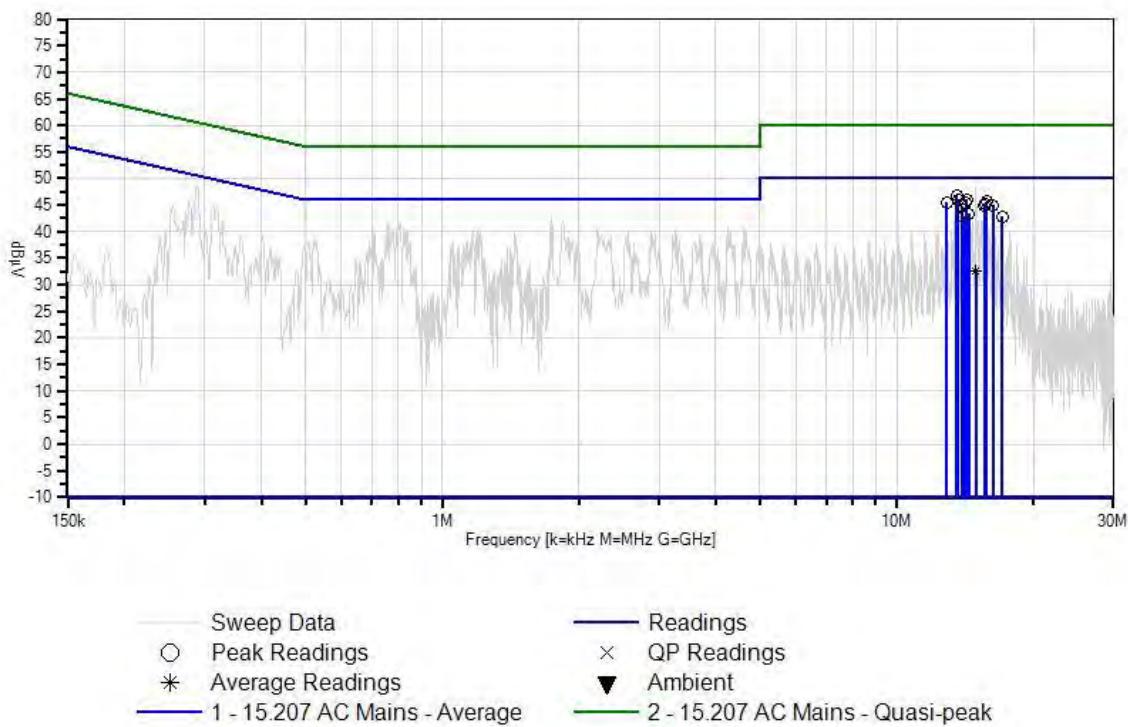
Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

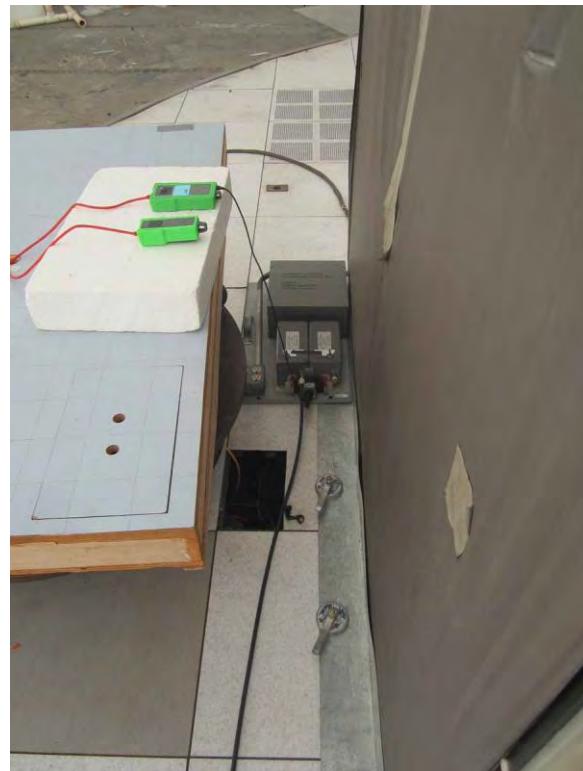
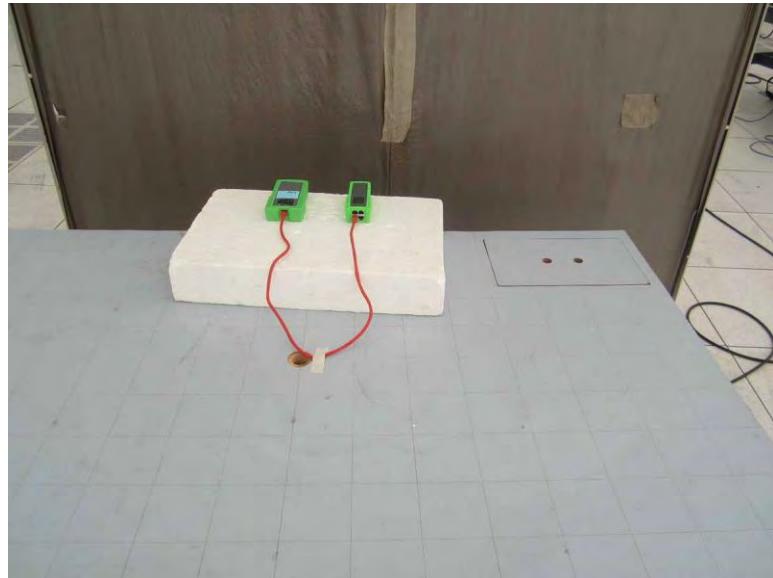
#	Freq MHz	Reading listed by margin.				Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
		Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB					
1	13.539M	36.0	+9.9	+0.7	+0.1	+0.1	+0.0	46.8	50.0	-3.2
2	13.629M	35.1	+9.9	+0.7	+0.2	+0.1	+0.0	46.0	50.0	-4.0

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 Ave	21.7	+9.9	+0.8	+0.2	+0.1	+0.0	32.7	50.0	-17.3	White
^	14.954M	36.4	+9.9	+0.8	+0.2	+0.1	+0.0	47.4	50.0	-2.6	White
16	14.936M Ave	21.6	+9.9	+0.8	+0.2	+0.1	+0.0	32.6	50.0	-17.4	White
^	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



### 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** 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-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 constant transmit mode with modulation enabled. The EUT was investigated about three orthogonal axes. The reported data represents the worst-case orientation.

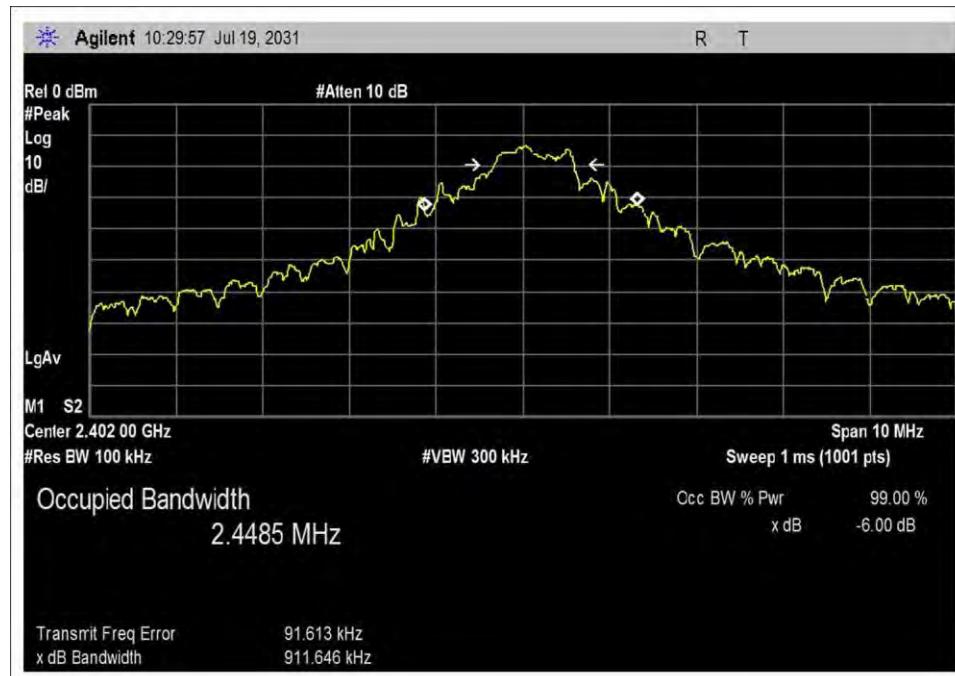
Tested in accordance with 15.31(e). The EUT is battery operated, so testing was performed with a freshly charged battery.

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

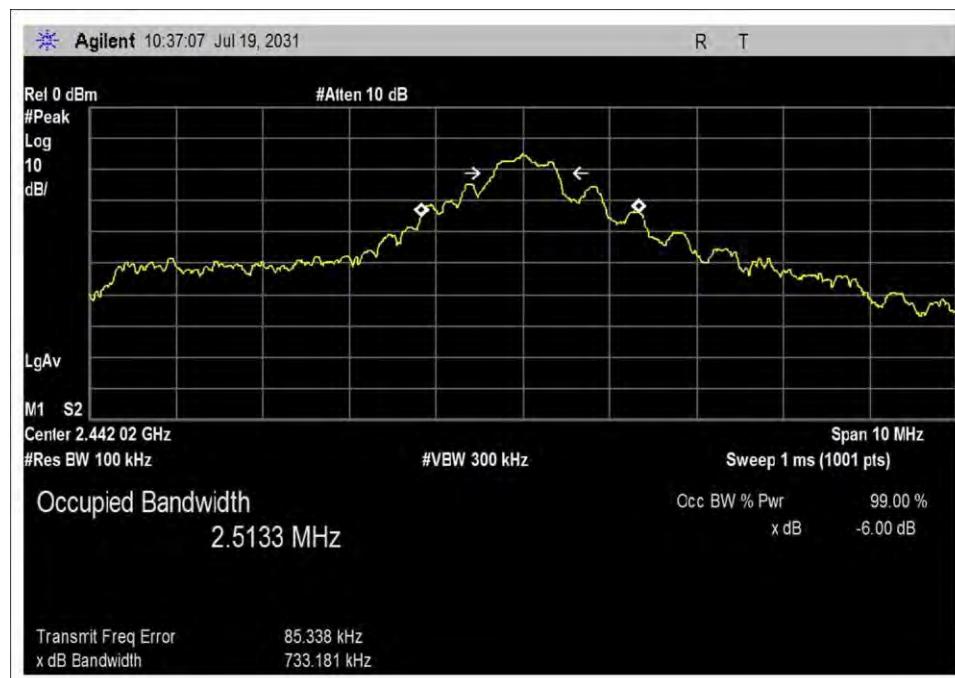
Highest Generated Frequency: 2.480GHz

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

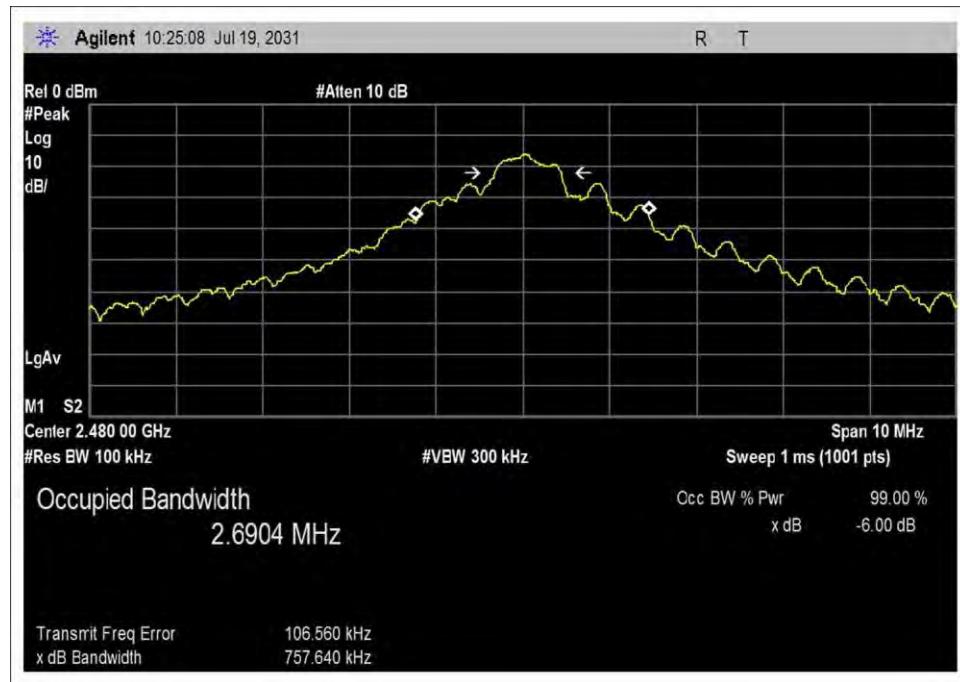
## Test Data



Low

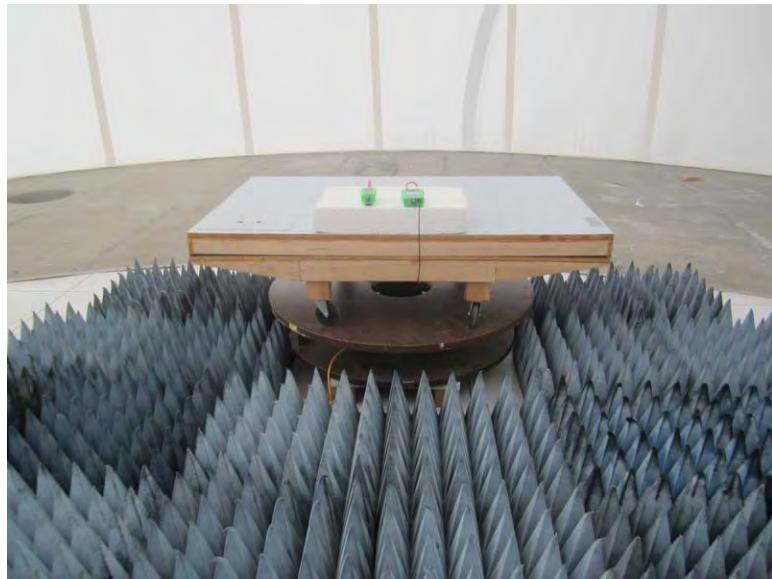


Middle



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** Date: **9/10/2014**  
 Test Type: **Maximized Emissions** Time: **11:14:43**  
 Equipment: **Master** 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-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 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:

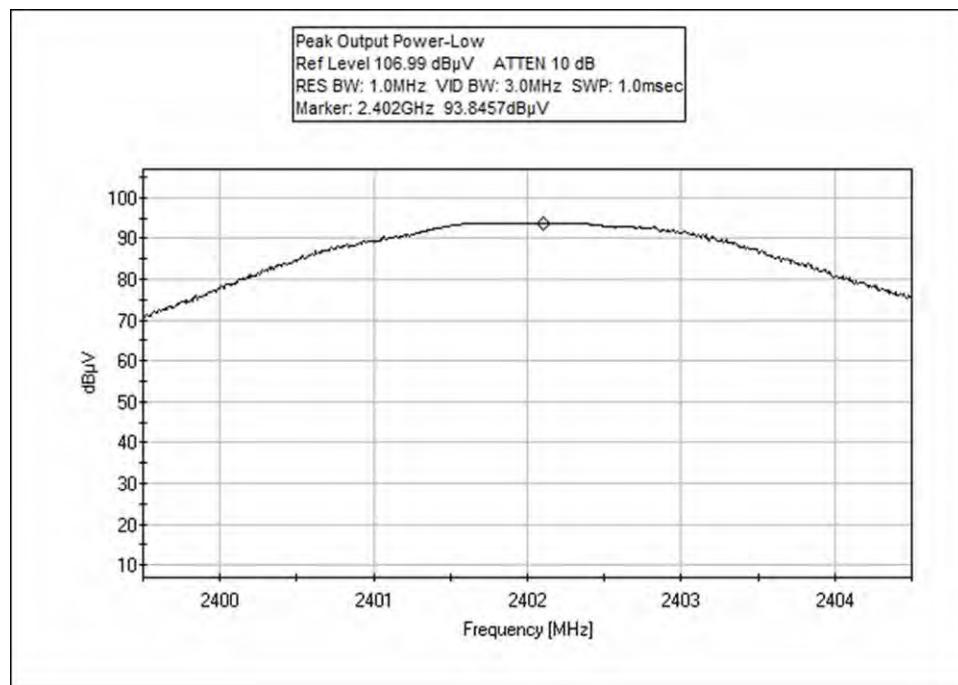
Temperature: 21.4°C

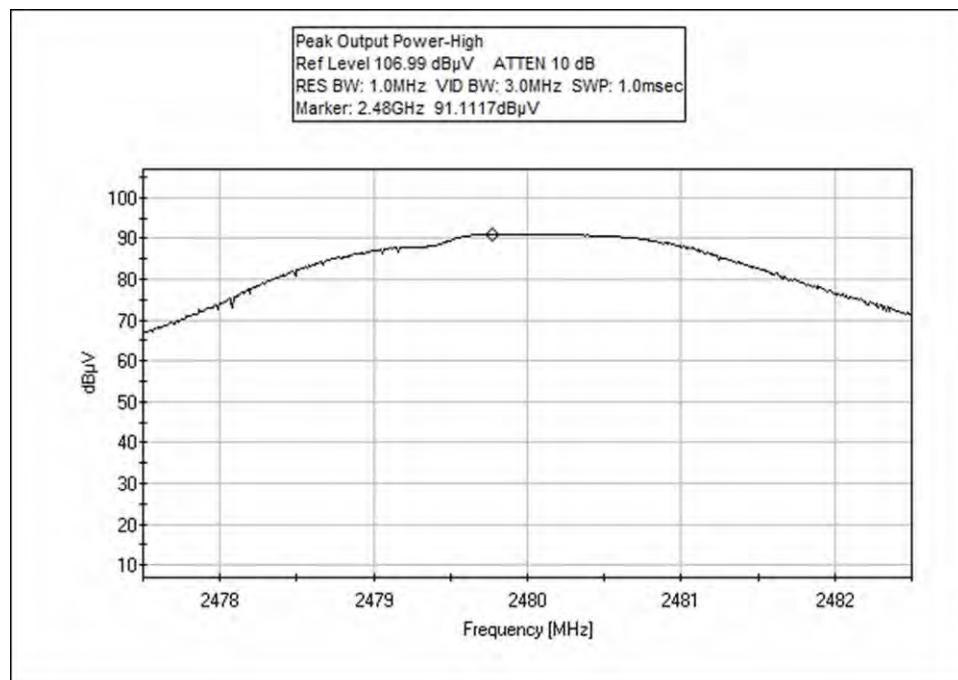
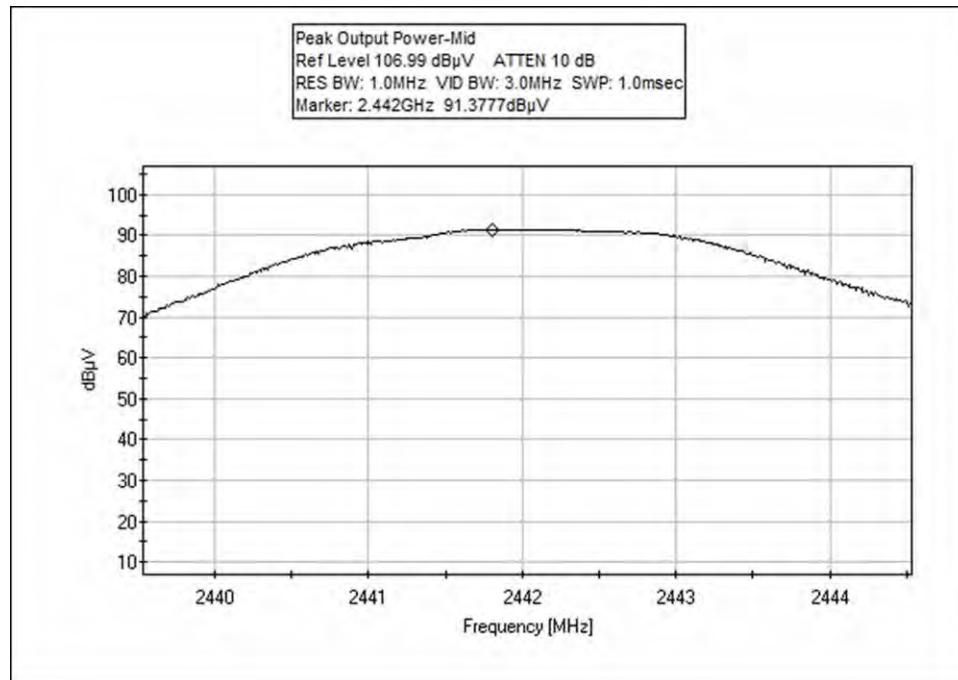
Humidity: 42%

Atmospheric Pressure: 97.8 kPa

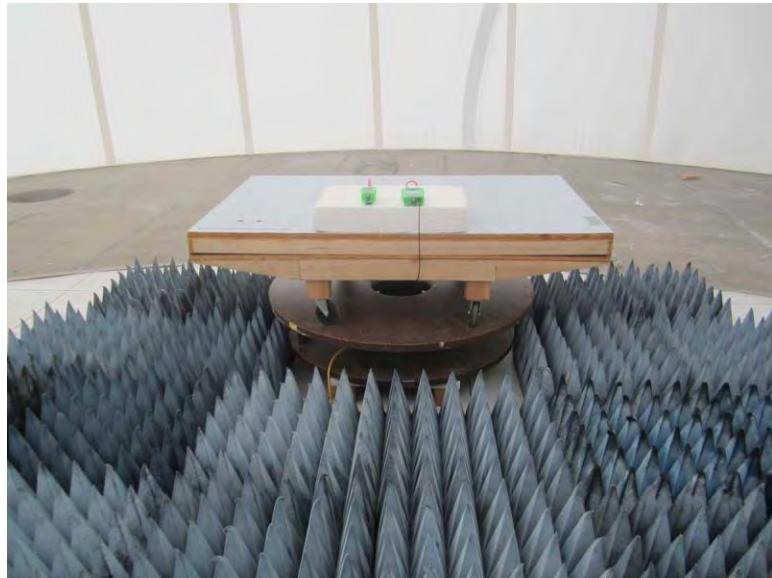
Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables, Amplifiers and antennas (dB)	Corrected Reading (dBuV)	Antenna Gain (dBi)	Peak Output Power (dBm)
2402	93.8	-4.0	89.8	+5.14	-10.5
2440	91.4	-4.0	87.4	+5.14	-13.0
2480	91.1	-3.9	87.2	+5.14	-13.2

## 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	8447F (dB)	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-TV01-101	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

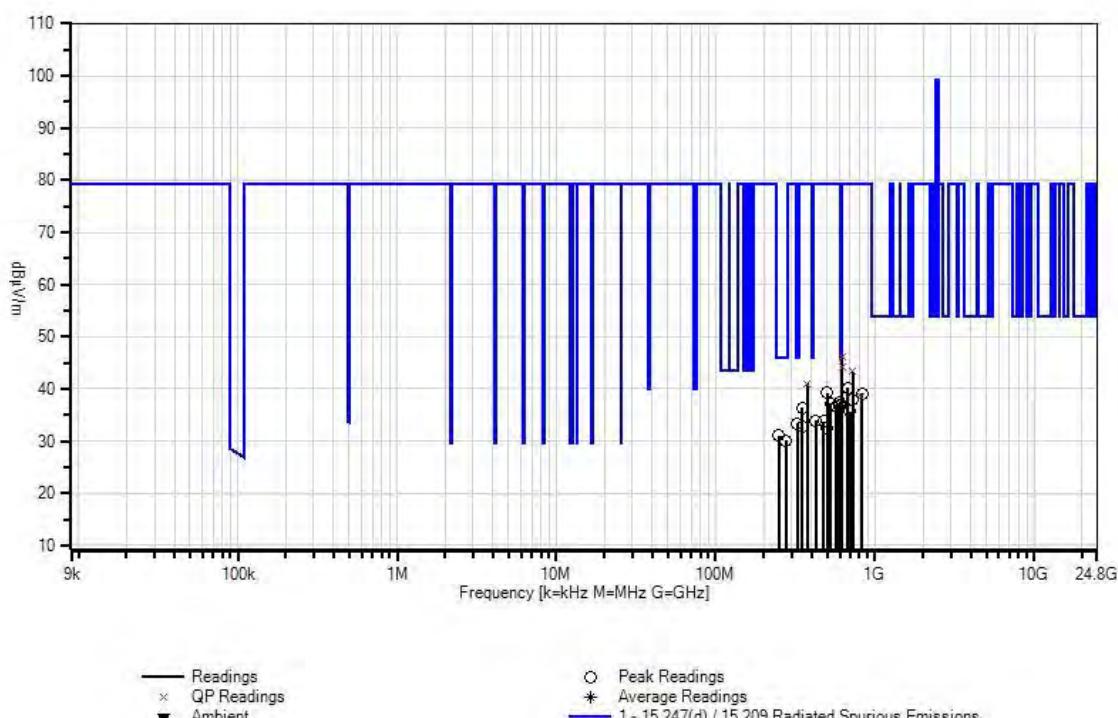
Environmental Conditions: Temperature: 21.4°C, Humidity: 42%, Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar
			MHz	dB $\mu$ V	dB	dB	dB			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	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
	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-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 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%

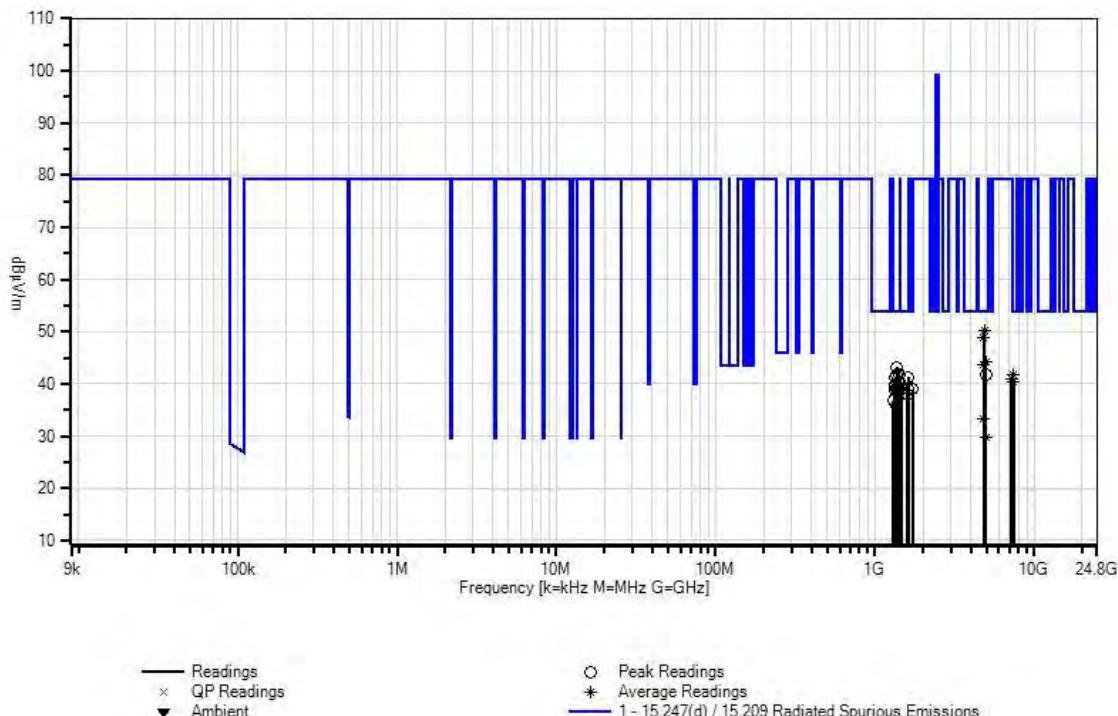
Atmospheric Pressure: 97.8 kPa

Ext Attn: 0 dB

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar
1	4883.867M	47.0	-32.9 +1.0	+30.2 +3.2	+0.8 +0.0	+0.8	+0.0	50.1	54.0	-3.9	Vert
	Ave										Transmit Mid Channel
^	4883.870M	55.2	-32.9 +1.0	+30.2 +3.2	+0.8 +0.0	+0.8	+0.0	58.3	54.0	+4.3	Vert
											Transmit Mid Channel
3	4804.300M	46.0	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	48.8	54.0	-5.2	Vert
	Ave										Transmit Low Channel
^	4804.300M	54.6	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	57.4	54.0	+3.4	Vert
											Transmit Low Channel
5	4960.223M	41.0	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8	+0.0	44.2	54.0	-9.8	Vert
	Ave										Transmit High Channel
^	4960.230M	51.5	-33.0 +1.0	+30.3 +3.3	+0.8 +0.0	+0.8	+0.0	54.7	54.0	+0.7	Vert
											Transmit High Channel
7	4804.550M	40.9	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	43.7	54.0	-10.3	Horiz
	Ave										Transmit Low Channel
^	4804.550M	50.5	-33.0 +0.9	+30.0 +3.2	+0.8 +0.0	+0.9	+0.0	53.3	54.0	-0.7	Horiz
											Transmit Low Channel
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	-10.9	Vert
											Transmit Mid Channel
10	7326.500M	33.3	-32.7 +1.1	+33.8 +4.2	+1.3 +0.0	+0.9	+0.0	41.9	54.0	-12.1	Vert
	Ave										Transmit Mid Channel
^	7326.500M	43.9	-32.7 +1.1	+33.8 +4.2	+1.3 +0.0	+0.9	+0.0	52.5	54.0	-1.5	Vert
											Transmit Mid Channel
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	-12.2	Horiz
											Transmit High Channel
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	-12.3	Vert
											Transmit Low Channel
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	-12.3	Vert
											Transmit Mid Channel
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	-12.7	Vert
											Transmit Mid Channel

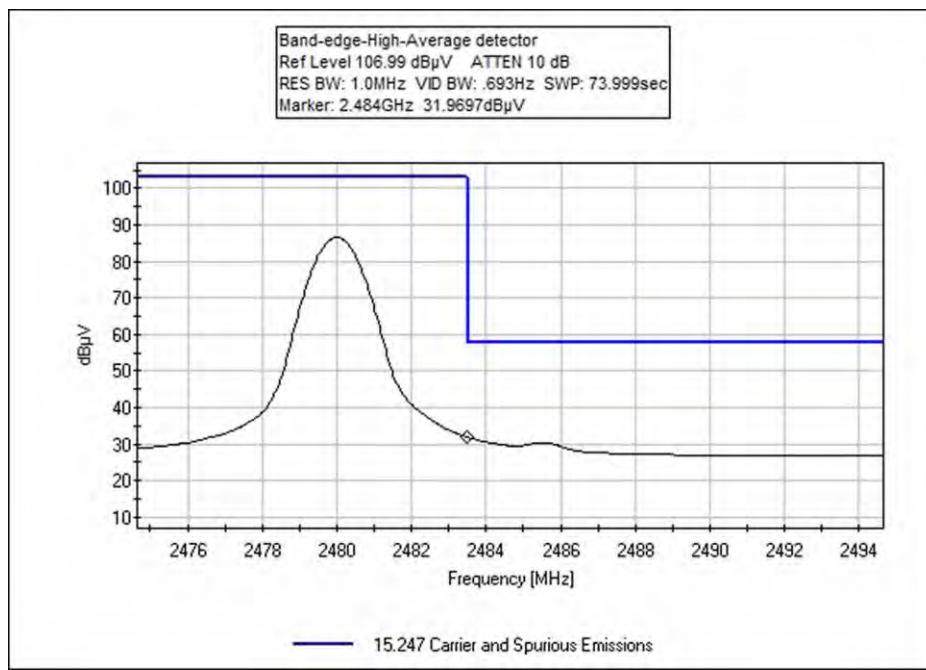
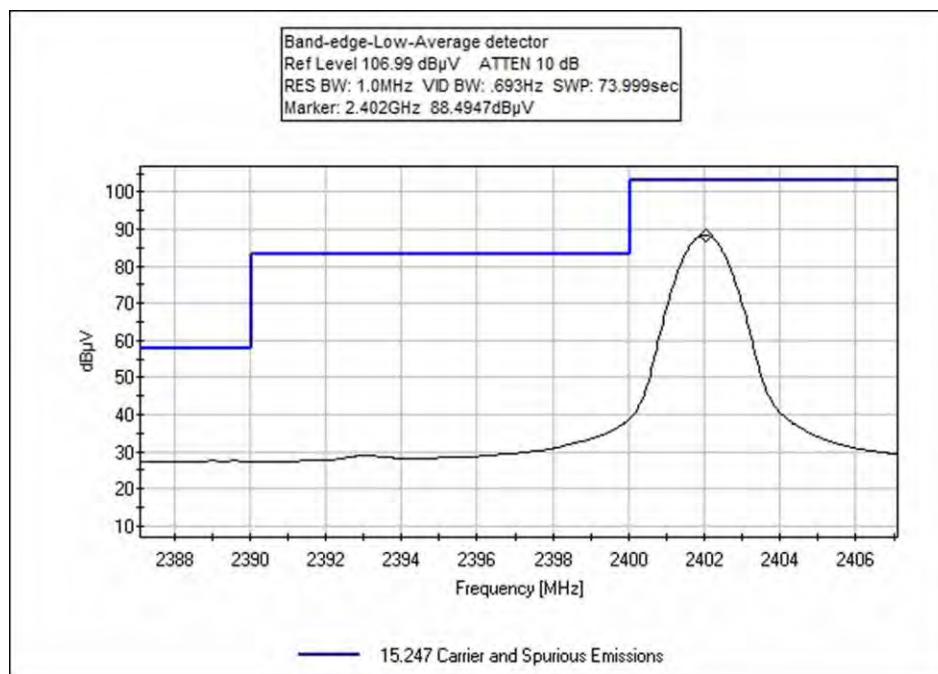
16	1349.817M	49.6	-34.0 +0.5	+22.4 +1.8	+0.5 +0.0	+0.4 +0.0	+0.0 41.2	54.0 Transmit Low Channel	-12.8	Horiz
17	7440.381M Ave	31.4	-32.6 +1.1	+33.9 +4.2	+1.4 +0.0	+1.1 +0.0	+0.0 40.5	54.0 Transmit High Channel	-13.5	Vert
^	7440.381M	43.2	-32.6 +1.1	+33.9 +4.2	+1.4 +0.0	+1.1 +0.0	+0.0 52.3	54.0 Transmit 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	+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	+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	+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	+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	+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	+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	+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	+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	+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	+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	+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	+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	+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	+0.0 33.2	54.0 Transmit Low Channel	-20.8	Vert

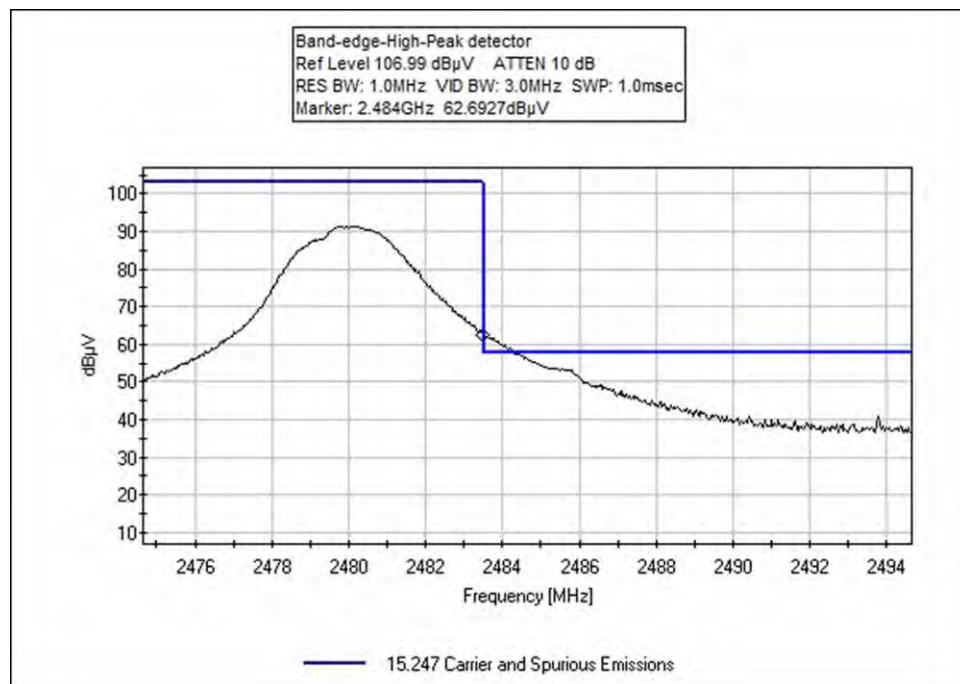
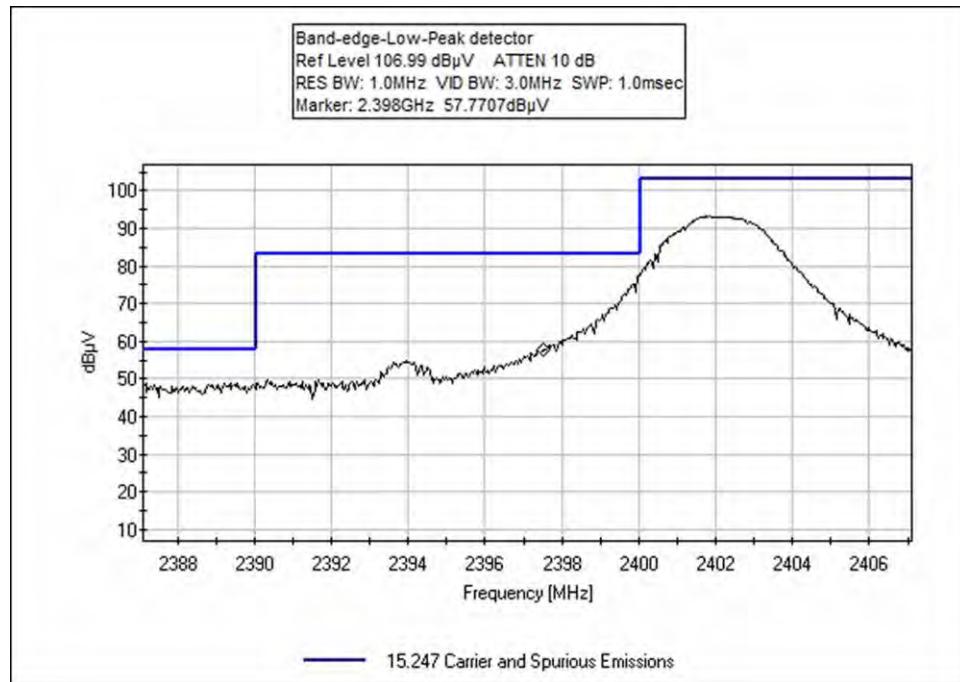
^	4802.650M	56.3	-33.0	+30.0	+0.8	+0.9	+0.0	59.1	54.0	+5.1	Vert
			+0.9	+3.2	+0.0						Transmit Low Channel
34	4957.900M	26.4	-33.0	+30.3	+0.8	+0.8	+0.0	29.6	54.0	-24.4	Vert
	Ave		+1.0	+3.3	+0.0						Transmit High Channel
^	4957.900M	56.4	-33.0	+30.3	+0.8	+0.8	+0.0	59.6	54.0	+5.6	Vert
			+1.0	+3.3	+0.0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

 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





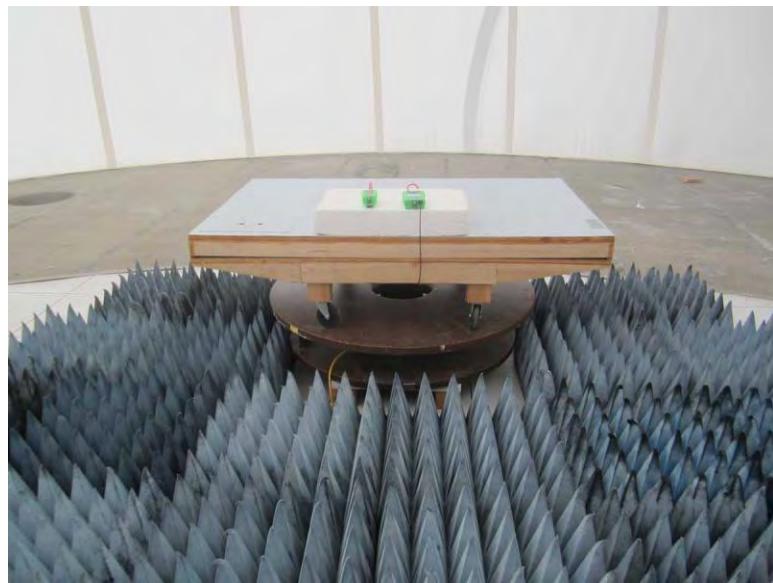
## Test Setup Photo(s)



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-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 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:

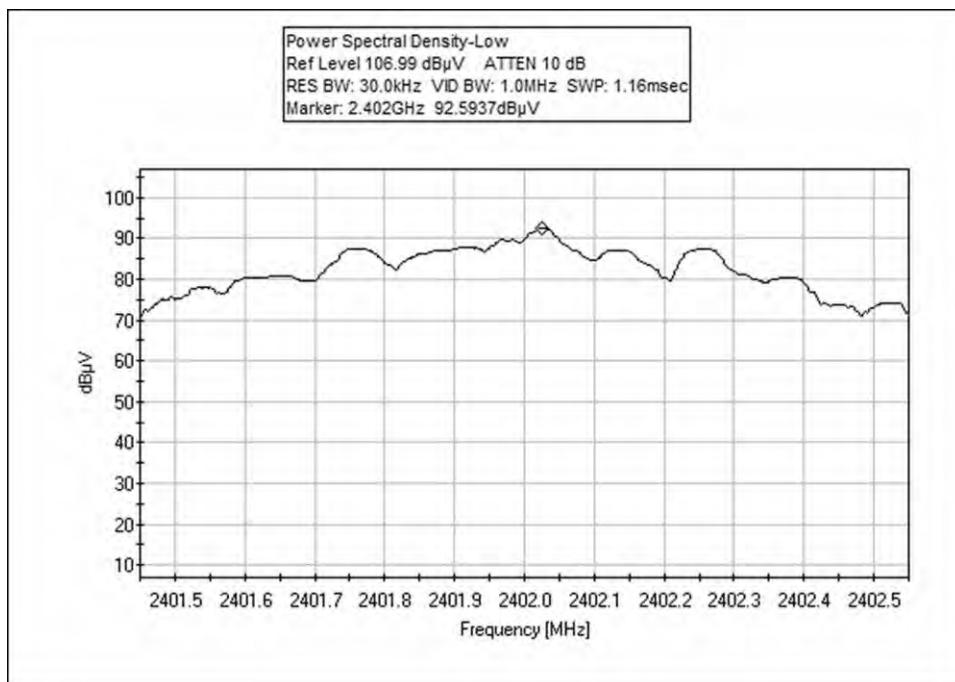
Temperature: 21.4°C

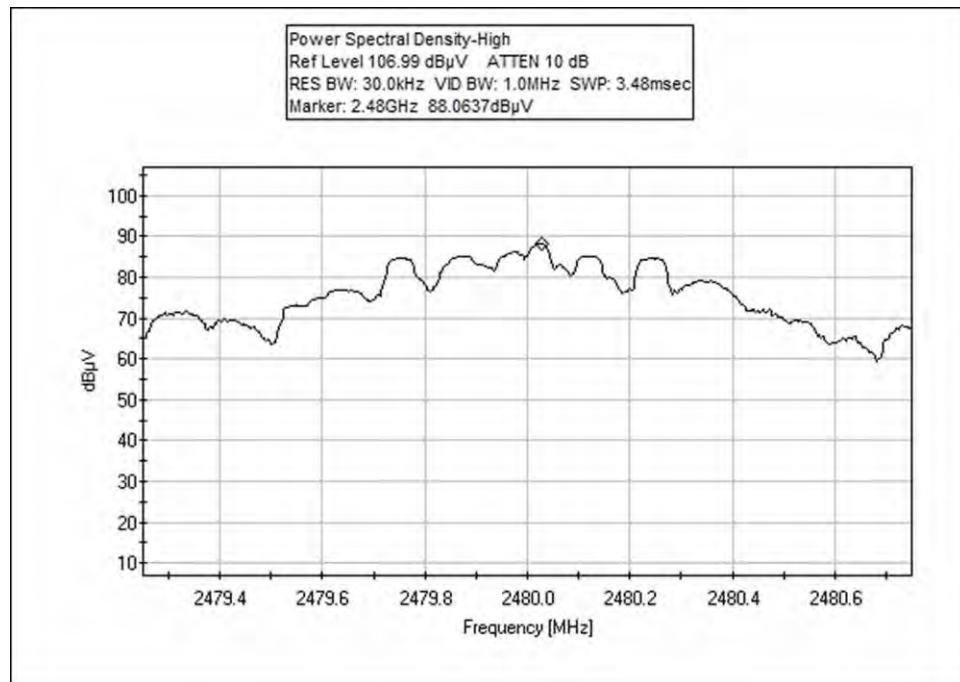
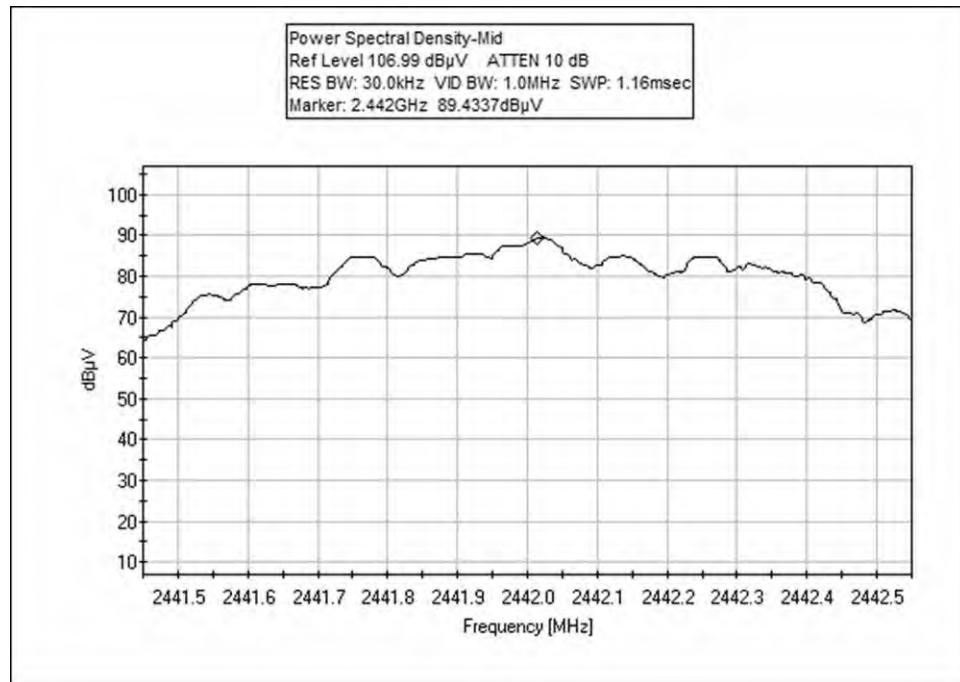
Humidity: 42%

Atmospheric Pressure: 97.8 kPa

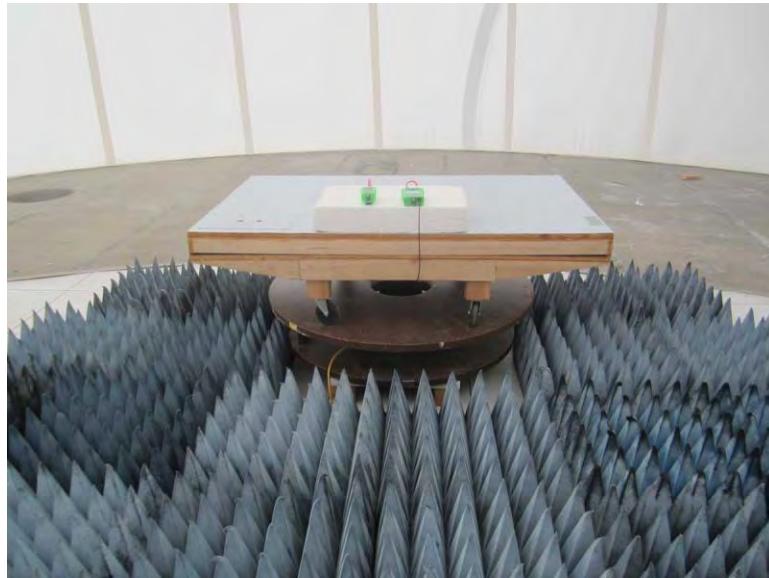
Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cables, Amplifiers and antennas (dB)	Corrected Reading (dBuV)	Antenna Gain (dBi)	Spectral Density (dBm)
<b>2402</b>	92.6	-4.0	88.6	+5.14	-11.8
<b>2440</b>	89.4	-4.0	85.4	+5.14	-15.0
<b>2480</b>	88.1	-3.9	84.9	+5.14	-15.5

## 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  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  was corrected by using the following formula. This reading was then compared to the applicable specification limit.

<b>SAMPLE CALCULATIONS</b>	
Meter reading	(dB $\mu$ V)
+ Antenna Factor	(dB)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB $\mu$ V/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.

<b>MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE</b>			
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.