SNUPI Technologies

TEST REPORT FOR

Gateway
Model: 810-00008

Tested To The Following Standards:

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

Report No.: 96653-8

Date of issue: February 17, 2015

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

SNUPI Technologies
4512 University Way NE
Seattle, WA 98105

Representative: Patrick Vilbrandt
Customer Reference Number: 1095

REPORT PREPARED BY:

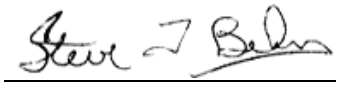
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 96653

DATE OF EQUIPMENT RECEIPT: January 28, 2015
DATE(S) OF TESTING: January 28-29, 2015

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.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

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
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 15.207 & 15.247

Test Procedure	Description	Modifications*	Results
15.207	Conducted Emissions	Mod #1	Pass
15.247(a)(2)	-6dB Occupied Bandwidth	Mod #1	Pass
15.247(b)(3)	RF Power Output	Mod #1	Pass
15.247(d)	Radiated Spurious Emissions and Band Edge	Mod #1	Pass
15.247(e)	Power Spectral Density	Mod #1	Pass

NA = Not Applicable

Modifications* During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

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

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Gateway
Manuf: SNUPI Technologies
Model: 810-00008
Serial: 90-7A-F1-FE-FD-0B

PERIPHERAL DEVICES

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

N300 Wireless Router
Manuf: NetGear
Model: WNR2000
Serial: NA

Laptop
Manuf: Dell
Model: Precision M4400
Serial: NA

FCC PART 15 SUBPART C

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **SNUPI Technologies**
Specification: **15.207 AC Mains - Quasi-peak**
Work Order #: **96653** Date: 1/29/2015
Test Type: **Conducted Emissions** Time: 09:40:53
Equipment: **Gateway** Sequence#: 5
Manufacturer: SNUPI Technologies Tested By: Steven Pittsford
Model: 810-00008 120V 60Hz
S/N: 90-7A-F1-FE-FD-0B

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	9/2/2014	9/2/2016
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Gateway*	SNUPI Technologies	810-00008	90-7A-F1-FE-FD-0B

Support Devices:

Function	Manufacturer	Model #	S/N
N300 Wireless Router	NetGear	WNR2000	
Laptop	Dell	Precision M4400	

Test Conditions / Notes:

Temperature: 23°C
Pressure: 103.3kPa
Humidity: 41%
Frequency: 150k-30MHz
Test Method: ANSI C63.4 (2009)

Mode: The EUT is Transmitting.

The EUT is located on top of a Styrofoam table, 80cm over the ground plane.
The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M.
The router is connected to the laptop.

Ethernet shell disconnected from digital ground by removing R128 & C194.

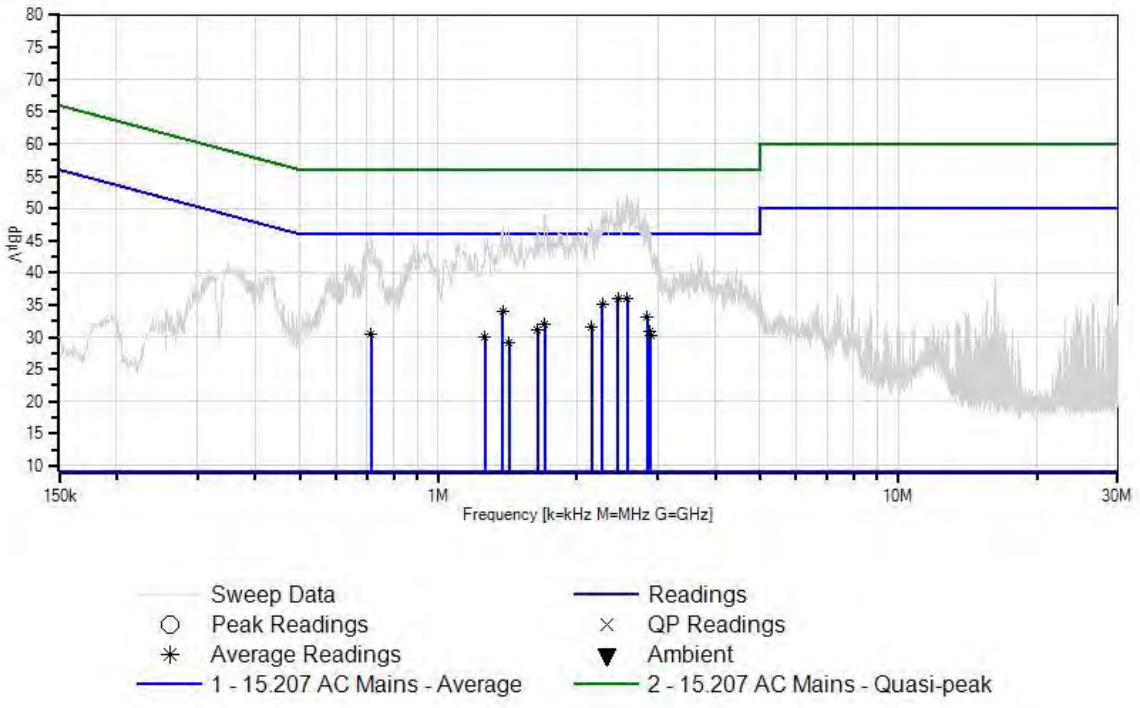
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	2.455M	26.3	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	36.0	46.0	-10.0	Line
Ave											
^	2.455M	41.6	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	51.3	46.0	+5.3	Line
3	2.574M	26.2	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	35.9	46.0	-10.1	Line
Ave											
^	2.574M	42.4	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	52.1	46.0	+6.1	Line
5	2.276M	25.3	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	35.0	46.0	-11.0	Line
Ave											
^	2.276M	40.0	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	49.7	46.0	+3.7	Line
7	1.383M	23.9	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	33.9	46.0	-12.1	Line
Ave											
^	1.383M	37.5	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	47.5	46.0	+1.5	Line
9	2.850M	23.3	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	33.0	46.0	-13.0	Line
Ave											
^	2.850M	38.3	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	48.0	46.0	+2.0	Line
11	1.706M	22.3	+9.2 +0.1	+0.1	+0.0	+0.4	+0.0	32.1	46.0	-13.9	Line
Ave											
^	1.706M	39.3	+9.2 +0.1	+0.1	+0.0	+0.4	+0.0	49.1	46.0	+3.1	Line
13	2.157M	21.7	+9.2 +0.1	+0.1	+0.0	+0.4	+0.0	31.5	46.0	-14.5	Line
Ave											
^	2.157M	38.2	+9.2 +0.1	+0.1	+0.0	+0.4	+0.0	48.0	46.0	+2.0	Line
15	1.647M	21.5	+9.2 +0.1	+0.1	+0.0	+0.3	+0.0	31.2	46.0	-14.8	Line
Ave											
^	1.647M	36.5	+9.2 +0.1	+0.1	+0.0	+0.3	+0.0	46.2	46.0	+0.2	Line

17	2.889M Ave	21.1	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	30.8	46.0	-15.2	Line
^	2.889M	36.7	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	46.4	46.0	+0.4	Line
19	713.585k Ave	20.4	+9.4 +0.2	+0.1	+0.0	+0.4	+0.0	30.5	46.0	-15.5	Line
^	713.585k	35.5	+9.4 +0.2	+0.1	+0.0	+0.4	+0.0	45.6	46.0	-0.4	Line
21	2.902M Ave	20.6	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	30.3	46.0	-15.7	Line
^	2.902M	36.2	+9.1 +0.1	+0.1	+0.0	+0.4	+0.0	45.9	46.0	-0.1	Line
23	1.264M Ave	20.1	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	30.1	46.0	-15.9	Line
^	1.264M	35.6	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	45.6	46.0	-0.4	Line
25	1.426M Ave	19.2	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	29.2	46.0	-16.8	Line
^	1.426M	36.8	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	46.8	46.0	+0.8	Line

CKC Laboratories, Inc. Date: 1/29/2015 Time: 09:40:53 SNUPI Technologies WO#: 96653
Test Lead: Line 120V 60Hz Sequence#: 5 Line
SNUPI Technologies Gateway P/N: 810-00008



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **SNUPI Technologies**
Specification: **15.207 AC Mains - Quasi-peak**
Work Order #: **96653** Date: 1/29/2015
Test Type: **Conducted Emissions** Time: 09:53:08
Equipment: **Gateway** Sequence#: 6
Manufacturer: SNUPI Technologies Tested By: Steven Pittsford
Model: 810-00008 120V 60Hz
S/N: 90-7A-F1-FE-FD-0B

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	9/2/2014	9/2/2016
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
T4	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Gateway*	SNUPI Technologies	810-00008	90-7A-F1-FE-FD-0B

Support Devices:

Function	Manufacturer	Model #	S/N
N300 Wireless Router	NetGear	WNR2000	
Laptop	Dell	Precision M4400	

Test Conditions / Notes:

Temperature: 23°C
Pressure: 103.3kPa
Humidity: 41%
Frequency: 150k-30MHz
Test Method: ANSI C63.4 (2009)

Mode: The EUT is Transmitting.

The EUT is located on top of a Styrofoam table, 80cm over the ground plane.
The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M.
The router is connected to the laptop.

Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

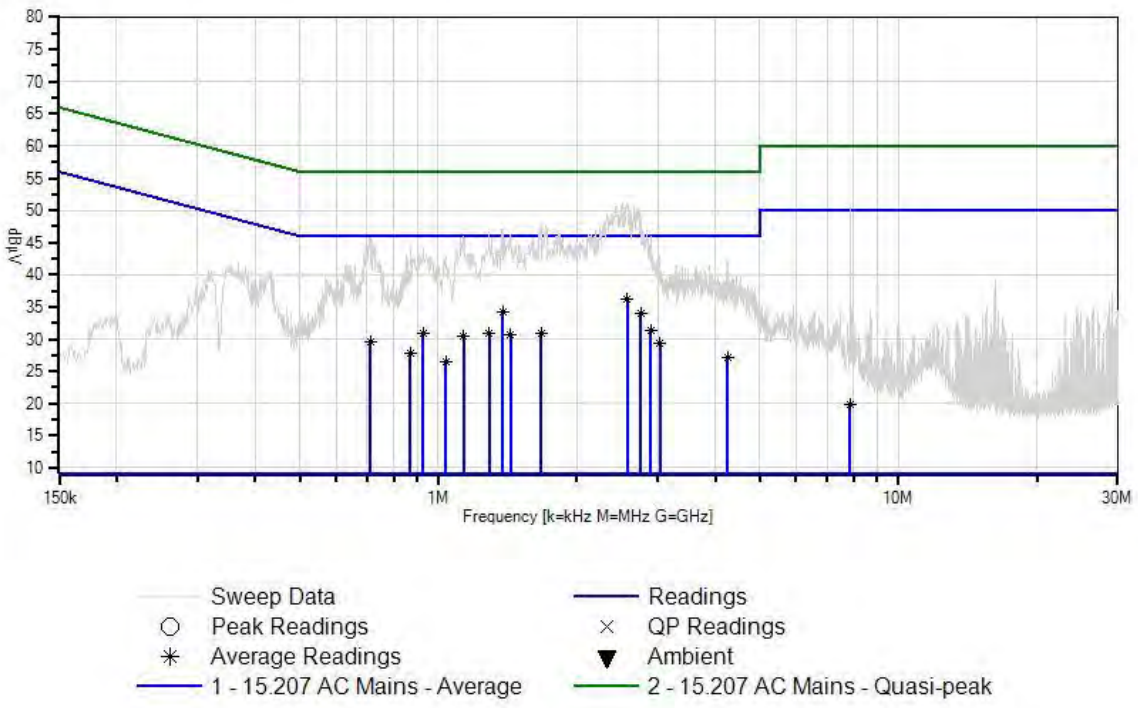
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Neutral

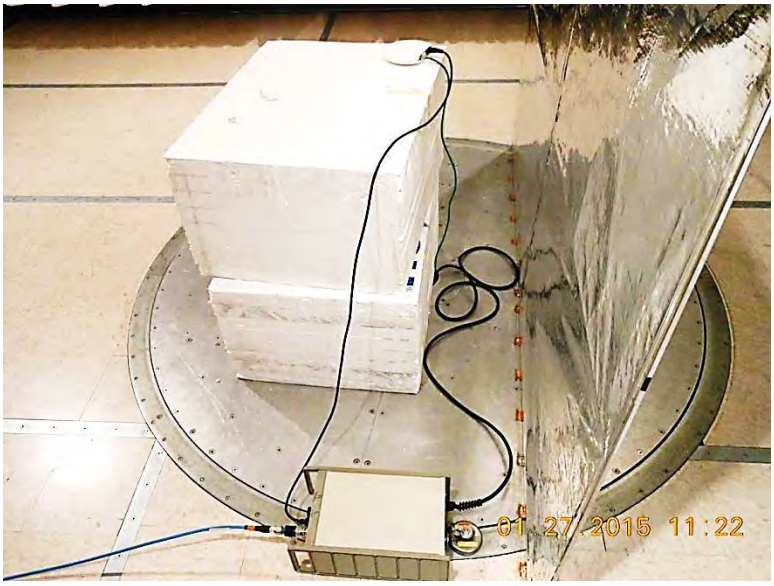
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	2.578M	26.5	+9.1	+0.1	+0.0	+0.3	+0.0	36.1	46.0	-9.9	Neutr
	Ave		+0.1								
^	2.578M	41.6	+9.1	+0.1	+0.0	+0.3	+0.0	51.2	46.0	+5.2	Neutr
			+0.1								
3	1.379M	24.4	+9.3	+0.1	+0.0	+0.3	+0.0	34.3	46.0	-11.7	Neutr
	Ave		+0.2								
^	1.379M	37.2	+9.3	+0.1	+0.0	+0.3	+0.0	47.1	46.0	+1.1	Neutr
			+0.2								
5	2.757M	24.5	+9.1	+0.1	+0.0	+0.3	+0.0	34.1	46.0	-11.9	Neutr
	Ave		+0.1								
^	2.757M	39.3	+9.1	+0.1	+0.0	+0.3	+0.0	48.9	46.0	+2.9	Neutr
			+0.1								
7	2.902M	21.7	+9.1	+0.1	+0.0	+0.4	+0.0	31.4	46.0	-14.6	Neutr
	Ave		+0.1								
^	2.902M	36.3	+9.1	+0.1	+0.0	+0.4	+0.0	46.0	46.0	+0.0	Neutr
			+0.1								
9	1.672M	21.2	+9.2	+0.1	+0.0	+0.3	+0.0	30.9	46.0	-15.1	Neutr
	Ave		+0.1								
^	1.672M	38.3	+9.2	+0.1	+0.0	+0.3	+0.0	48.0	46.0	+2.0	Neutr
			+0.1								
11	928.238k	20.9	+9.3	+0.1	+0.0	+0.4	+0.0	30.9	46.0	-15.1	Neutr
	Ave		+0.2								
12	1.290M	20.9	+9.3	+0.1	+0.0	+0.4	+0.0	30.9	46.0	-15.1	Neutr
	Ave		+0.2								
^	1.290M	36.7	+9.3	+0.1	+0.0	+0.4	+0.0	46.7	46.0	+0.7	Neutr
			+0.2								
14	928.238k	20.9	+9.3	+0.1	+0.0	+0.4	+0.0	30.9	46.0	-15.1	Neutr
	Ave		+0.2								
^	928.238k	34.1	+9.3	+0.1	+0.0	+0.4	+0.0	44.1	46.0	-1.9	Neutr
			+0.2								
16	1.434M	20.7	+9.3	+0.1	+0.0	+0.3	+0.0	30.6	46.0	-15.4	Neutr
	Ave		+0.2								
^	1.434M	36.3	+9.3	+0.1	+0.0	+0.3	+0.0	46.2	46.0	+0.2	Neutr
			+0.2								
18	1.137M	20.6	+9.3	+0.1	+0.0	+0.3	+0.0	30.5	46.0	-15.5	Neutr
	Ave		+0.2								
^	1.137M	36.2	+9.3	+0.1	+0.0	+0.3	+0.0	46.1	46.0	+0.1	Neutr
			+0.2								
20	712.129k	19.4	+9.4	+0.1	+0.0	+0.4	+0.0	29.5	46.0	-16.5	Neutr
	Ave		+0.2								
^	712.129k	35.7	+9.4	+0.1	+0.0	+0.4	+0.0	45.8	46.0	-0.2	Neutr
			+0.2								
22	3.029M	19.6	+9.1	+0.1	+0.0	+0.4	+0.0	29.3	46.0	-16.7	Neutr
	Ave		+0.1								
^	3.029M	33.5	+9.1	+0.1	+0.0	+0.4	+0.0	43.2	46.0	-2.8	Neutr
			+0.1								

24 Ave	869.206k	17.6	+9.4 +0.2	+0.1	+0.0	+0.4	+0.0	27.7	46.0	-18.3	Neutr
^	869.206k	34.6	+9.4 +0.2	+0.1	+0.0	+0.4	+0.0	44.7	46.0	-1.3	Neutr
26 Ave	4.250M	17.6	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	27.2	46.0	-18.8	Neutr
^	4.250M	32.4	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	42.0	46.0	-4.0	Neutr
28 Ave	1.039M	16.5	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	26.5	46.0	-19.5	Neutr
^	1.039M	33.0	+9.3 +0.2	+0.1	+0.0	+0.4	+0.0	43.0	46.0	-3.0	Neutr
30 Ave	7.851M	10.4	+8.8 +0.1	+0.1	+0.1	+0.4	+0.0	19.9	50.0	-30.1	Neutr
^	7.851M	41.8	+8.8 +0.1	+0.1	+0.1	+0.4	+0.0	51.3	50.0	+1.3	Neutr

CKC Laboratories, Inc. Date: 1/29/2015 Time: 09:53:08 SNUPI Technologies WO#: 96653
Test Lead: Neutral 120V 60Hz Sequence#: 6 Neutral
SNUPI Technologies Gateway P/N: 810-00008



Test Setup Photos



15.247(a)(2) -6dB Bandwidth

Test Conditions / Setup

Test Conditions:
Temp: 23°C
Humidity: 41%
Pressure: 103.3kPa
Date Tested: 1/27/15
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

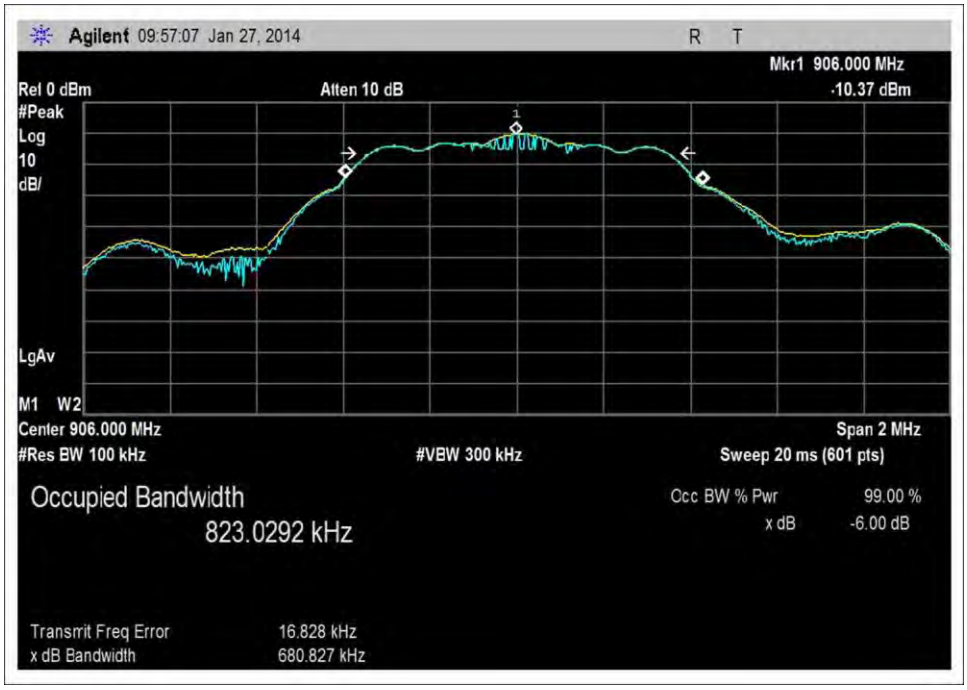
Engineer: Steven Pittsford

Test Equipment					
Asset #	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

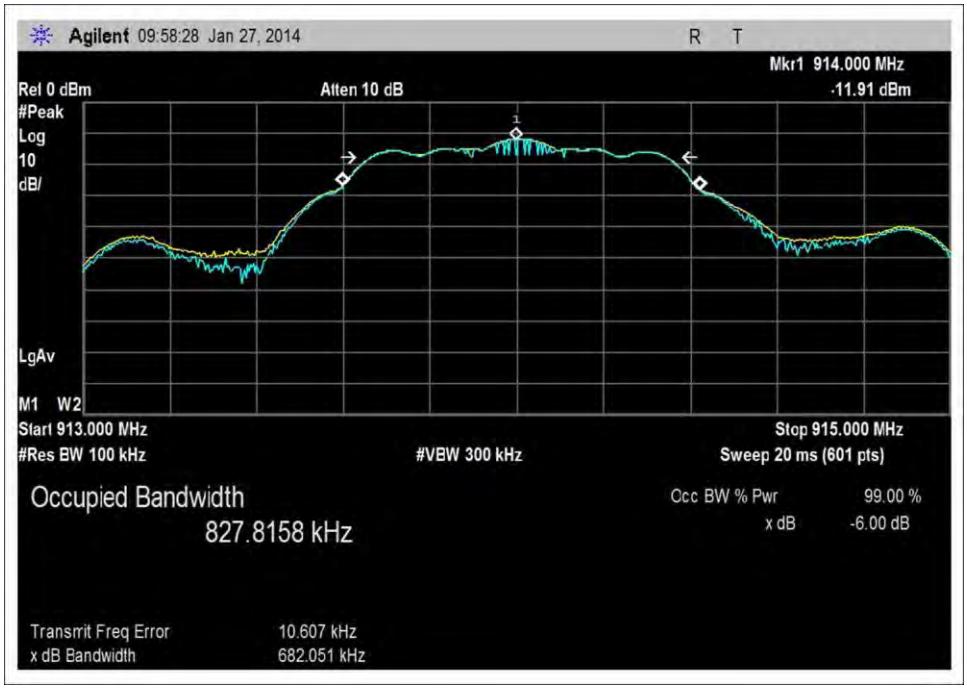
Gateway Setup
The EUT's antenna is non-removable, thus the data will be gathered through radiated measurements. EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M. This router is then connected to the laptop.
Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

Frequency (MHz)	-6dB Bandwidth (Gateway)	
906	680.8kHz	
914	685.1kHz	
924	680.8kHz	

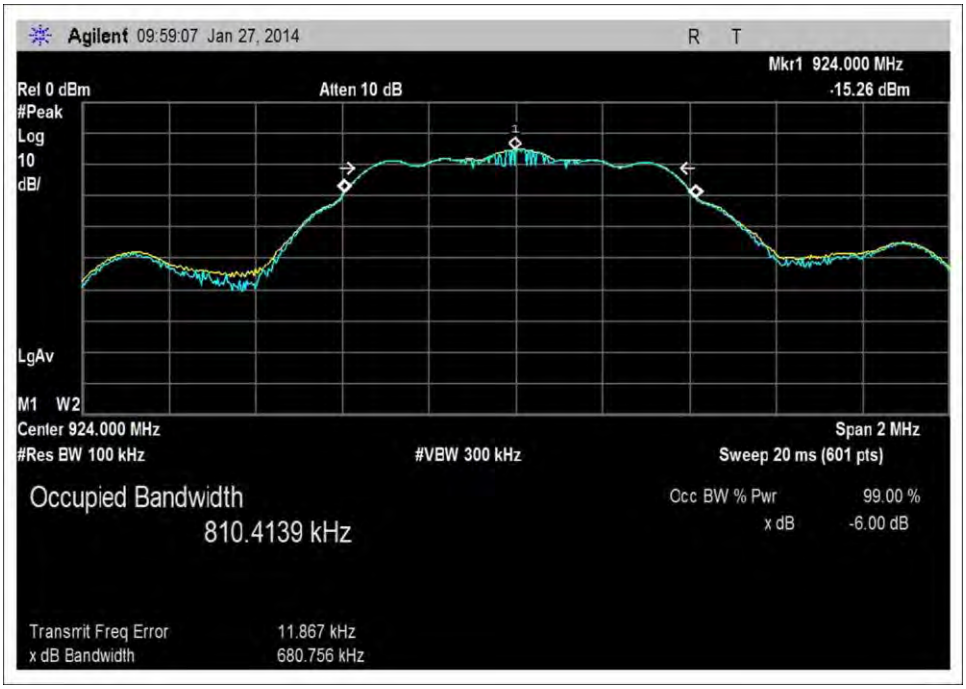
Test Data



Low Channel

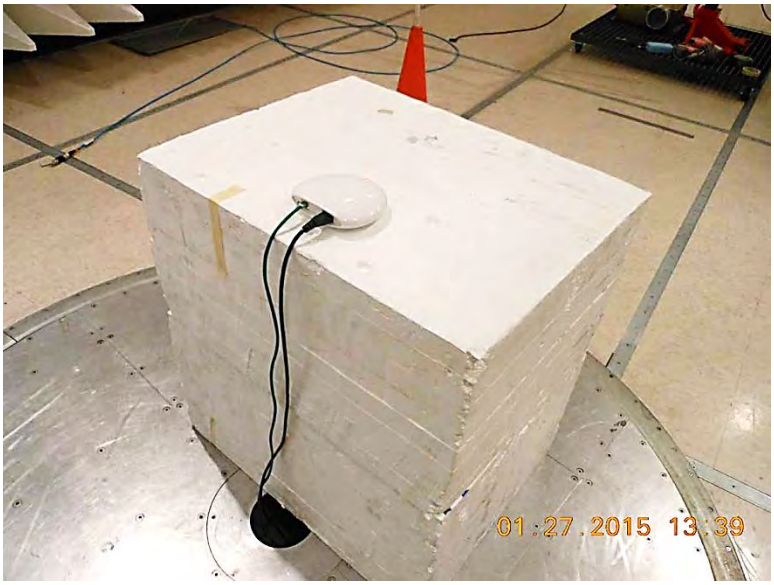


Middle Channel



High Channel

Test Setup Photo



15.247(b)(3) RF Power Output

Test Conditions / Setup

Test Conditions:
Temp: 23°C
Humidity: 41%
Pressure: 103.3kPa
Date Tested: 1/28/15
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Engineer: Steven Pittsford

Test Equipment					
Asset #	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Gateway Setup
The EUT's antenna is non-removable, thus the data will be gathered through radiated measurements. EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M. This router is then connected to the laptop.
Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

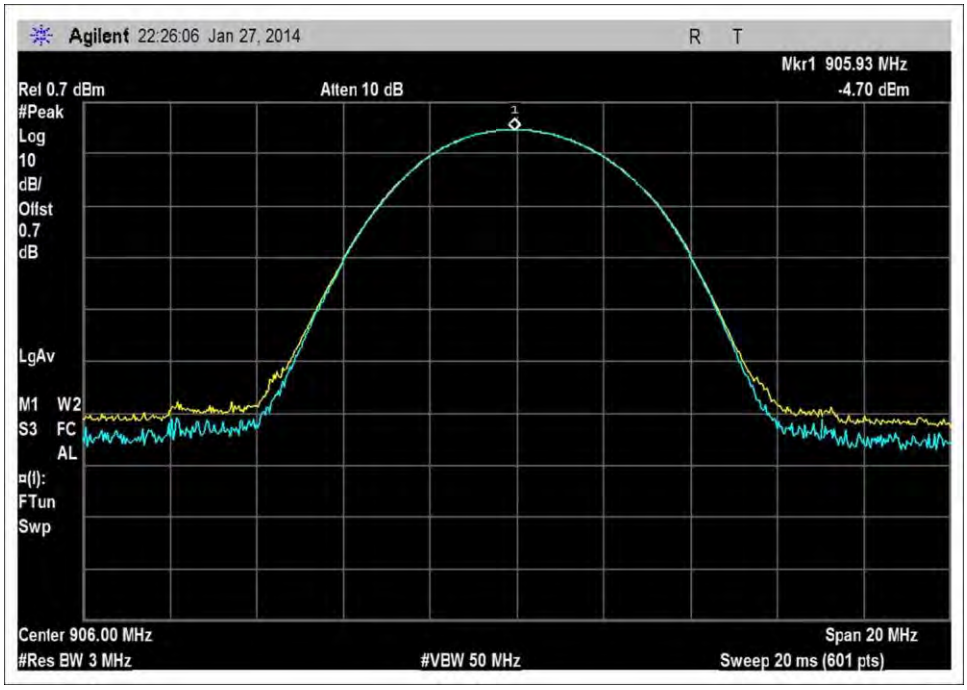
Correction factors are factored into the spectrum analyzer screen captures.

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

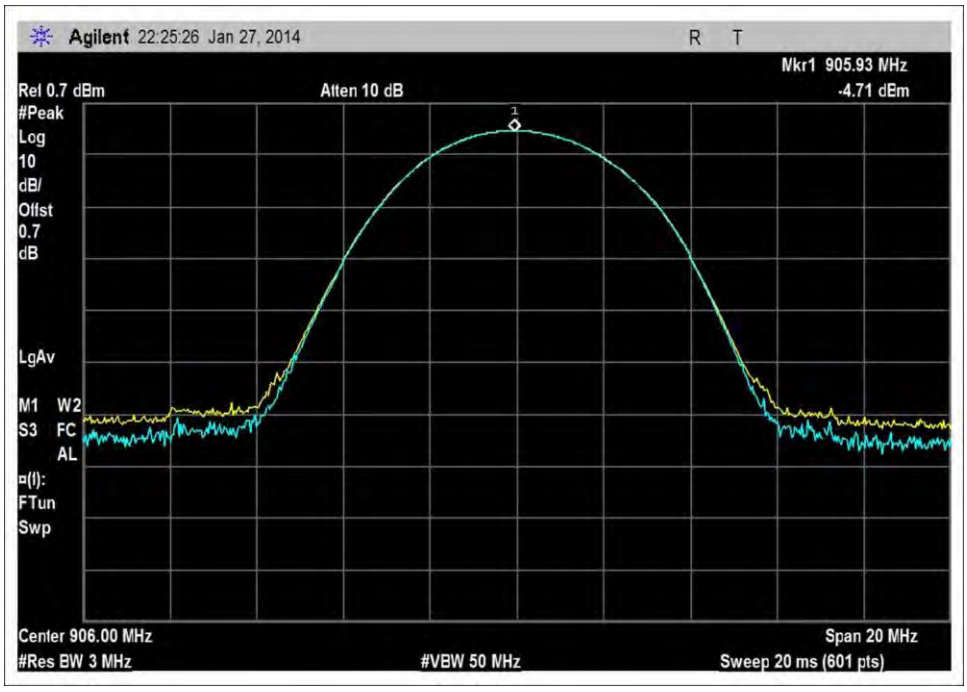
E = Field strength of the measurement converted to V/M
d = Measurement distance in meters
G = Numerical gain of the EUT's antenna relative to an isotropic radiator.
P = The power in watts for which we are solving.

Frequency (MHz)	Voltage	Corrections due to cables, amplifiers and antennas (dB)	Corrected Reading (dBm)	Antenna Gain (dBi)	Conducted Power (Watts)
906	Nominal	0.7	-4.7	-2.9	0.01
906	85%	0.7	-4.7	-2.9	0.01
906	115%	0.7	-4.7	-2.9	0.01
914	Nominal	0.8	-5.0	-3.2	0.01
914	85%	0.8	-5.0	-3.2	0.01
914	115%	0.8	-5.0	-3.2	0.01
924	Nominal	1.0	-7.1	-5.3	0.01
924	85%	1.0	-7.1	-5.3	0.01
924	115%	1.0	-7.1	-5.3	0.01

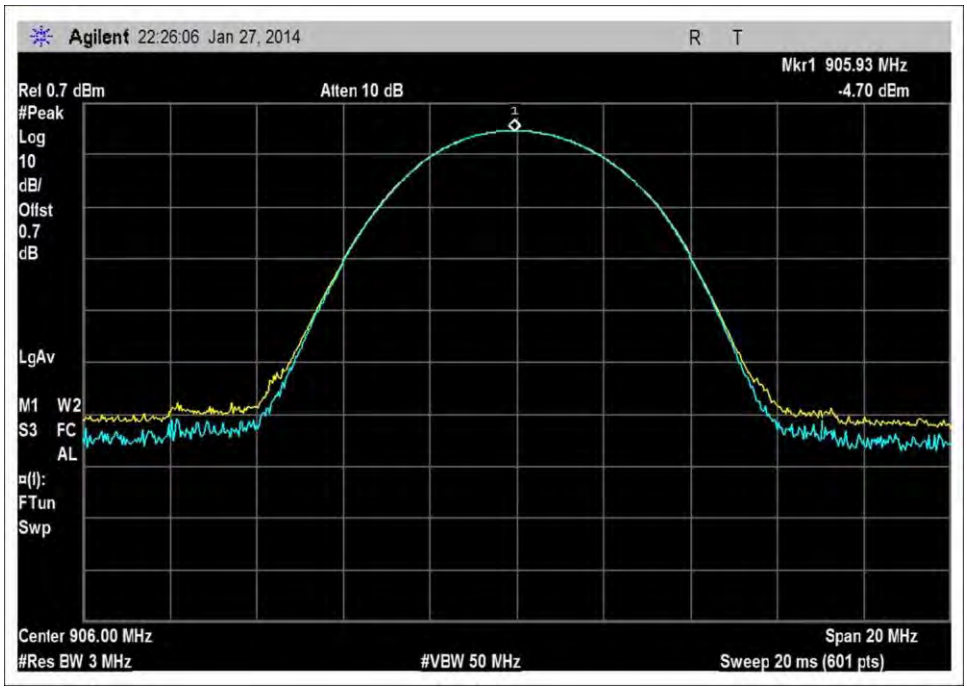
Test Data



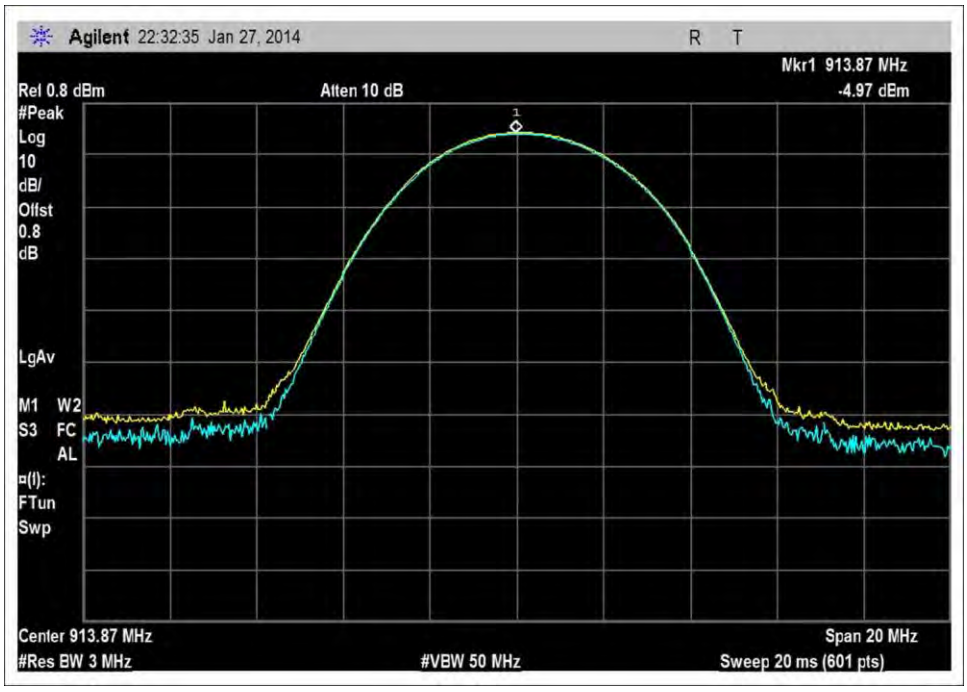
Low Nom Volt



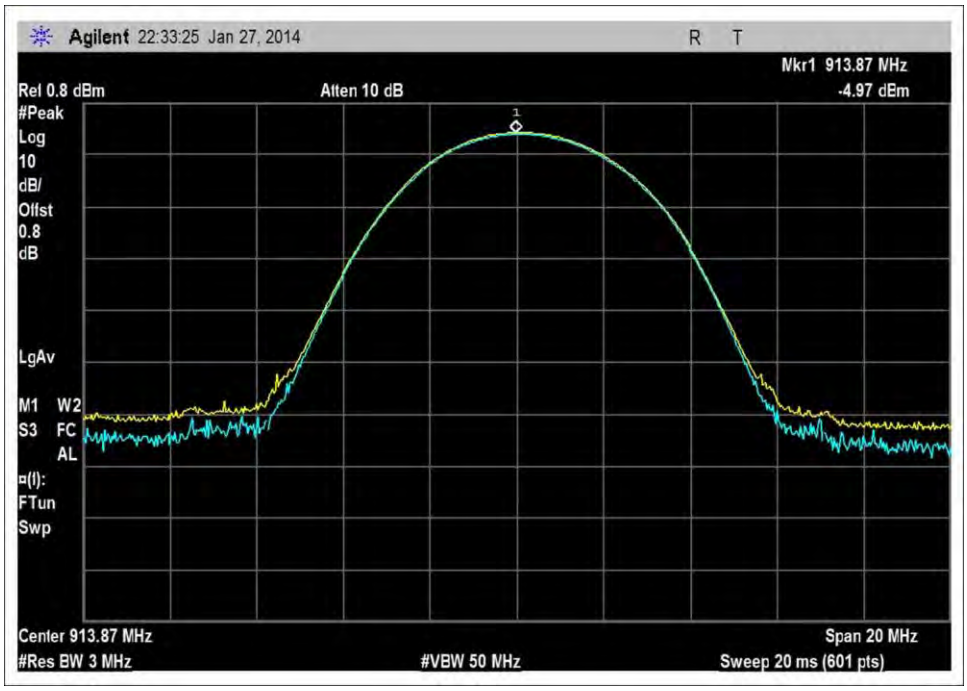
Low 85% Volt



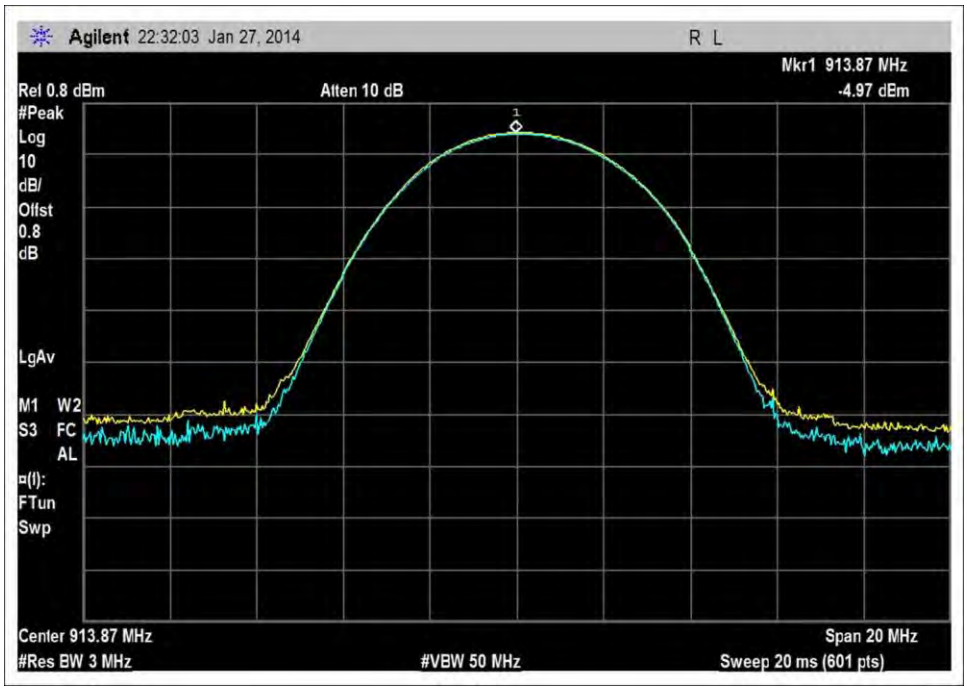
Low 115% Volt



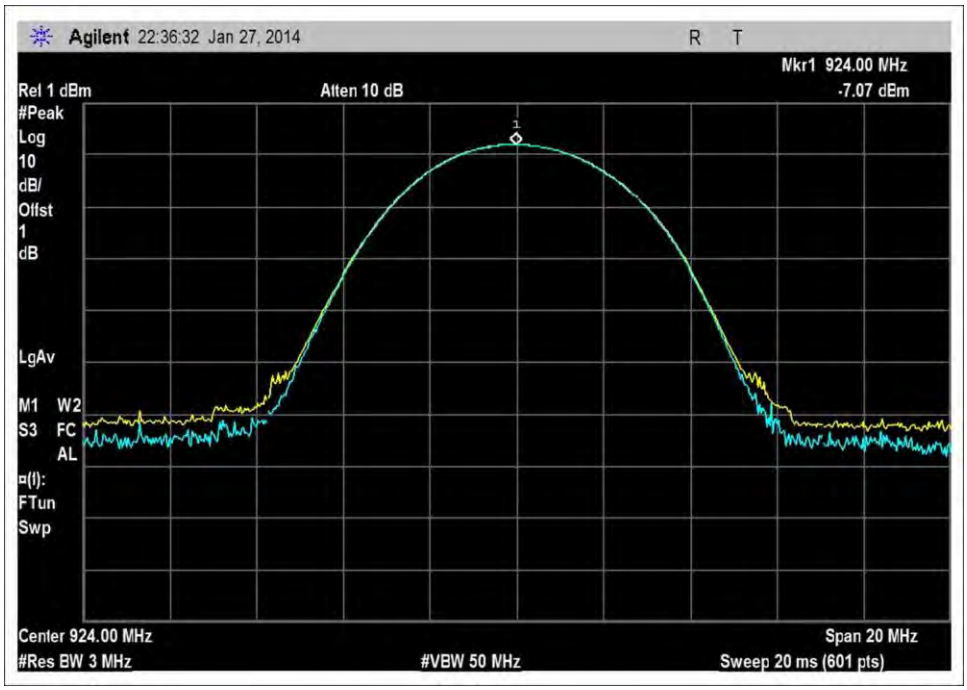
Mid Nom Volt



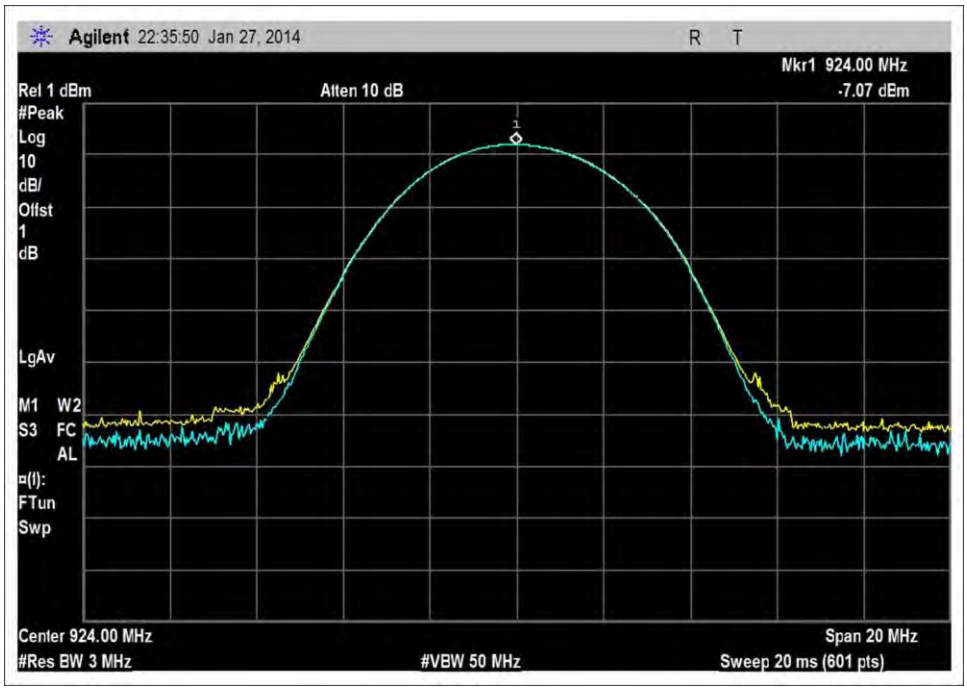
Mid 85% Volt



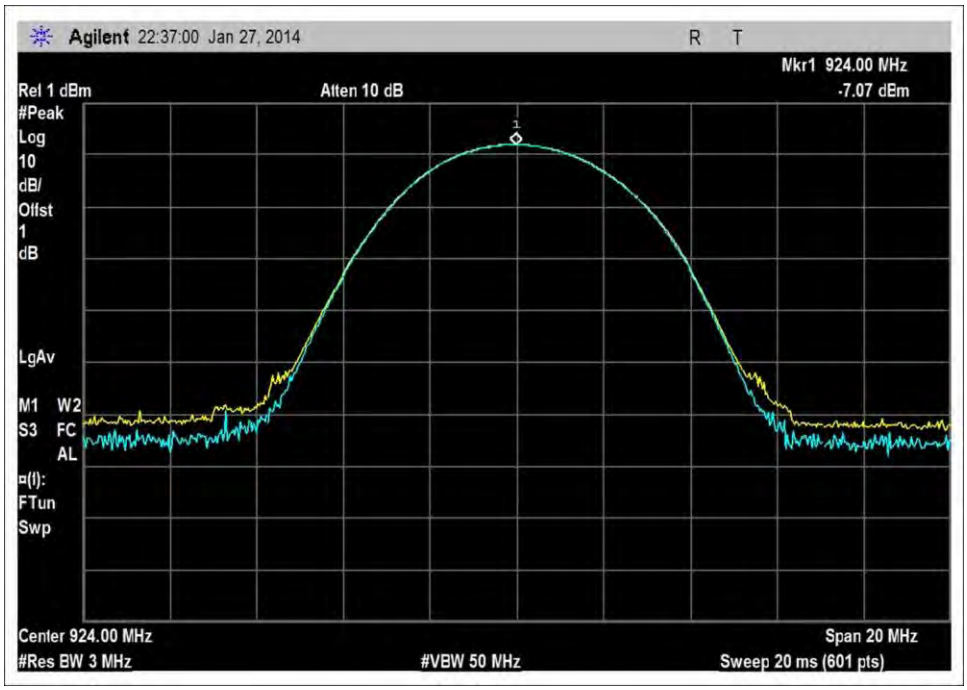
Mid 115% Volt



High Nom Volt

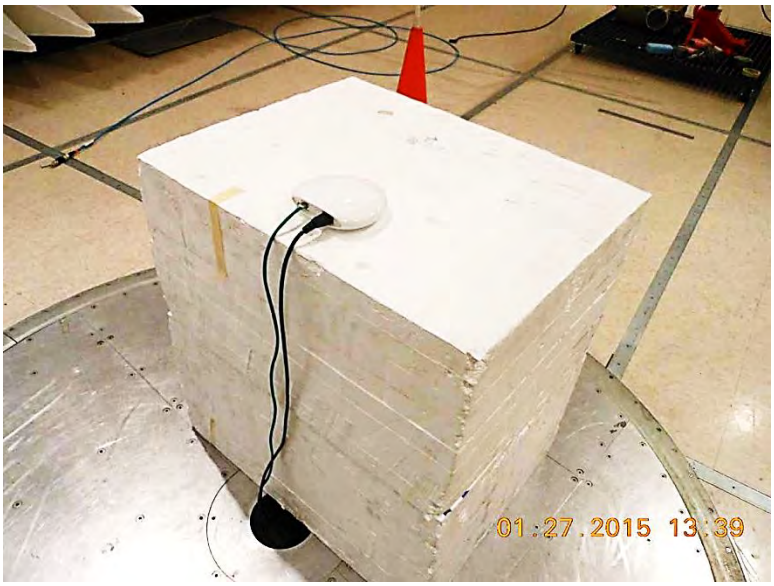


High 85% Volt



High 115% Volt

Test Setup Photo



15.247(d) Radiated Spurious Emissions and Band Edge

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **SNUPI Technologies**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #: **96653** Date: 1/28/2015
Test Type: **Maximized Emissions** Time: 15:27:05
Equipment: **Gateway** Sequence#: 9
Manufacturer: SNUPI Technologies Tested By: Steven Pittsford
Model: 810-00008
S/N: 90-7A-F1-FE-FD-0B

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03209	Preamp	83051A	3/5/2013	3/5/2015
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	9/16/2013	9/16/2015
T3	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T4	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T5	AN02872	Spectrum Analyzer	E4440A	7/19/2013	7/19/2015
T6	AN03170	High Pass Filter	HM1155-11SS	10/14/2013	10/14/2015
T7	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016
T8	AN02307	Preamp	8447D	3/14/2014	3/14/2016
T9	AN01996	Biconilog Antenna	CBL6111C	7/16/2014	7/16/2016
T10	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T11	ANP05963	Cable	RG-214	2/21/2014	2/21/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Gateway*	SNUPI Technologies	810-00008	90-7A-F1-FE-FD-0B

Support Devices:

Function	Manufacturer	Model #	S/N
N300 Wireless Router	NetGear	WNR2000	
Laptop	Dell	Precision M4400	

Test Conditions / Notes:

Temperature: 23°C
Pressure: 103.3kPa
Humidity: 41%
Frequency: 9k-9.28GHz
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Mode: The EUT is transmitting at Low Mid and High Channels.

The EUT is located on top of a Styrofoam table, 80cm over the ground plane.
The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M.
The router is connected to the laptop.

Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

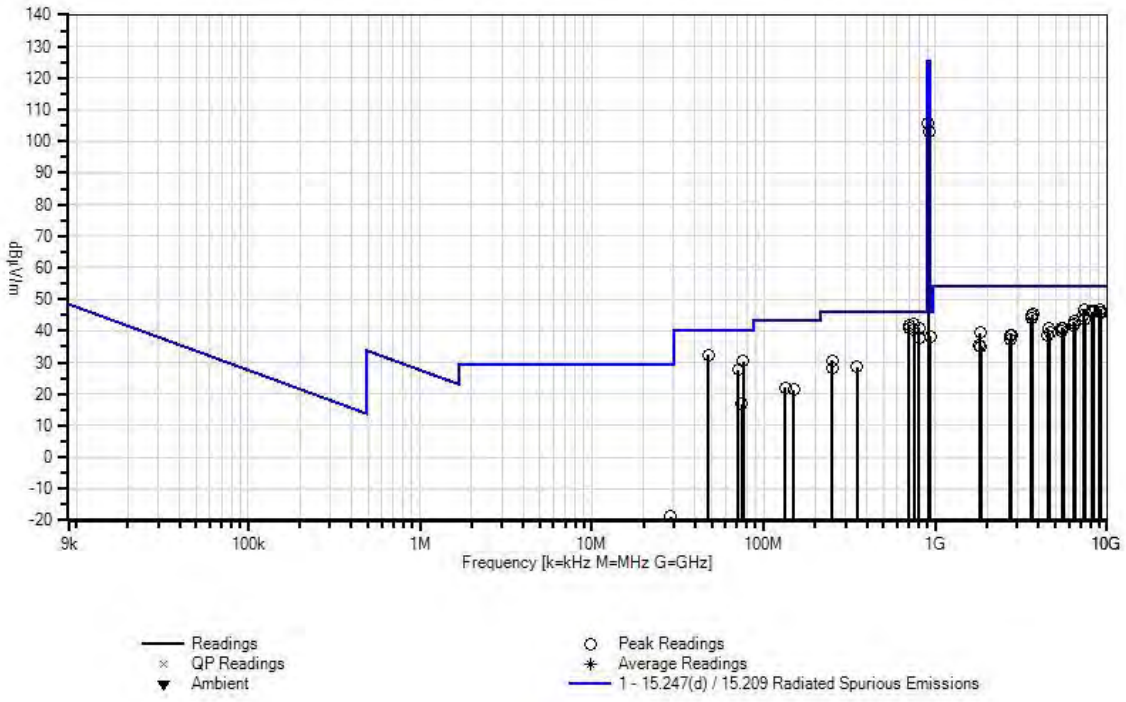
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	750.048M	44.3	+0.0 +0.0 +21.6	+0.0 +0.0 +1.8	+0.0 +0.0 +1.4	+0.8 -27.8	+0.0 360	42.1	46.0	-3.9	V & H 103
2	699.824M	45.5	+0.0 +0.0 +20.7	+0.0 +0.0 +1.7	+0.0 +0.0 +1.3	+0.8 -28.1	+0.0 360	41.9	46.0	-4.1	V & H 125
3	800.272M	42.1	+0.0 +0.0 +22.5	+0.0 +0.0 +1.9	+0.0 +0.0 +1.4	+0.8 -27.7	+0.0 360	41.0	46.0	-5.0	V & H 103
4	699.824M	44.3	+0.0 +0.0 +20.7	+0.0 +0.0 +1.7	+0.0 +0.0 +1.3	+0.8 -28.1	+0.0 360	40.7	46.0	-5.3	V & H 103
5	750.048M	42.6	+0.0 +0.0 +21.6	+0.0 +0.0 +1.8	+0.0 +0.0 +1.4	+0.8 -27.8	+0.0 360	40.4	46.0	-5.6	V & H 125
6	9140.052M	29.2	-27.6 +0.0 +0.0	+36.7 +0.2 +0.0	+5.5 +0.0 +0.0	+2.8 +0.0	+0.0 -15	46.8	54.0 Mid	-7.2	V & H 102
7	7311.696M	30.3	-28.2 +0.0 +0.0	+37.0 +0.2 +0.0	+4.8 +0.0 +0.0	+2.4 +0.0	+0.0	46.5	54.0 Mid	-7.5	V & H 102
8	47.770M	49.7	+0.0 +0.0 +9.9	+0.0 +0.0 +0.4	+0.0 +0.0 +0.3	+0.2 -28.0	+0.0	32.5	40.0	-7.5	V & H 251
9	933.250M	37.3	+0.0 +0.0 +23.8	+0.0 +0.0 +2.1	+0.0 +0.0 +1.5	+0.9 -27.3	+0.0	38.3	46.0	-7.7	V & H 99
10	8226.314M	29.3	-28.1 +0.0 +0.0	+36.7 +0.1 +0.0	+5.6 +0.0 +0.0	+2.5 +0.0	+0.0 360	46.1	54.0 Mid	-7.9	V & H 102

11	8153.907M	29.2	-28.1 +0.0 +0.0	+36.8 +0.1 +0.0	+5.6 +0.0 +0.0	+2.5 +0.0	+0.0	46.1	54.0 Low	-7.9	V & H 106
12	9059.764M	28.8	-27.6 +0.0 +0.0	+36.5 +0.2 +0.0	+5.3 +0.0 +0.0	+2.8 +0.0	+0.0 360	46.0	54.0 Low	-8.0	V & H 106
13	9239.688M	28.1	-27.7 +0.0 +0.0	+36.9 +0.2 +0.0	+5.7 +0.0 +0.0	+2.8 +0.0	+0.0 359	46.0	54.0 High	-8.0	V & H 107
14	800.272M	38.9	+0.0 +0.0 +22.5	+0.0 +0.0 +1.9	+0.0 +0.0 +1.4	+0.8 -27.7	+0.0 360	37.8	46.0	-8.2	V & H 125
15	8316.351M	29.0	-28.0 +0.0 +0.0	+36.5 +0.1 +0.0	+5.6 +0.0 +0.0	+2.6 +0.0	+0.0 309	45.8	54.0 High	-8.2	V & H 107
16	3696.009M	41.2	-31.0 +0.0 +0.0	+29.8 +0.3 +0.0	+3.3 +0.0 +0.0	+1.6 +0.0	+0.0 360	45.2	54.0 High	-8.8	V & H 99
17	3656.043M	40.8	-30.9 +0.0 +0.0	+29.8 +0.3 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0	44.8	54.0 Mid	-9.2	V & H 103
18	7248.063M	28.9	-28.2 +0.0 +0.0	+36.7 +0.1 +0.0	+4.8 +0.0 +0.0	+2.4 +0.0	+0.0 360	44.7	54.0 Low	-9.3	V & H 106
19	76.300M	49.8	+0.0 +0.0 +7.2	+0.0 +0.0 +0.5	+0.0 +0.0 +0.4	+0.3 -27.8	+0.0 360	30.4	40.0	-9.6	V & H 103
20	3624.083M	39.9	-30.9 +0.0 +0.0	+29.7 +0.3 +0.0	+3.2 +0.0 +0.0	+1.6 +0.0	+0.0 213	43.8	54.0 Low	-10.2	V & H 112
21	7391.761M	27.3	-28.2 +0.0 +0.0	+37.3 +0.1 +0.0	+4.7 +0.0 +0.0	+2.5 +0.0	+0.0 235	43.7	54.0 High	-10.3	V & H 107
22	6397.862M	31.1	-29.0 +0.0 +0.0	+34.0 +0.2 +0.0	+4.3 +0.0 +0.0	+2.4 +0.0	+0.0 359	43.0	54.0 Mid	-11.0	V & H 100
23	6467.761M	30.4	-28.9 +0.0 +0.0	+34.1 +0.2 +0.0	+4.3 +0.0 +0.0	+2.3 +0.0	+0.0	42.4	54.0 High	-11.6	V & H 107
24	6342.063M	30.0	-29.0 +0.0 +0.0	+33.9 +0.2 +0.0	+4.3 +0.0 +0.0	+2.4 +0.0	+0.0	41.8	54.0 Low	-12.2	V & H 106
25	71.120M	47.8	+0.0 +0.0 +6.6	+0.0 +0.0 +0.4	+0.0 +0.0 +0.4	+0.3 -27.8	+0.0	27.7	40.0	-12.3	V & H 251
26	5436.063M	31.3	-30.2 +0.0 +0.0	+32.9 +0.2 +0.0	+4.1 +0.0 +0.0	+2.7 +0.0	+0.0 360	41.0	54.0 Low	-13.0	V & H 106
27	5543.661M	30.9	-30.1 +0.0 +0.0	+33.0 +0.2 +0.0	+4.1 +0.0 +0.0	+2.6 +0.0	+0.0 360	40.7	54.0 High	-13.3	V & H 107

28	4570.006M	34.2	-31.0	+31.4	+3.6	+2.2	+0.0	40.7	54.0	-13.3	V & H
			+0.0	+0.3	+0.0	+0.0	360		Mid		103
			+0.0	+0.0	+0.0						
29	5484.006M	30.1	-30.1	+32.9	+4.1	+2.6	+0.0	39.8	54.0	-14.2	V & H
			+0.0	+0.2	+0.0	+0.0			Mid		122
			+0.0	+0.0	+0.0						
30	4620.134M	32.7	-31.0	+31.6	+3.6	+2.2	+0.0	39.4	54.0	-14.6	V & H
			+0.0	+0.3	+0.0	+0.0			High		107
			+0.0	+0.0	+0.0						
31	1827.981M	38.9	-30.6	+27.2	+2.3	+1.2	+0.0	39.4	54.0	-14.6	V & H
			+0.0	+0.4	+0.0	+0.0	360		Mid		114
			+0.0	+0.0	+0.0						
32	4530.000M	32.5	-31.0	+31.3	+3.5	+2.1	+0.0	38.7	54.0	-15.3	V & H
			+0.0	+0.3	+0.0	+0.0			Low		106
			+0.0	+0.0	+0.0						
33	2741.888M	35.5	-30.2	+28.8	+2.8	+1.4	+0.0	38.6	54.0	-15.4	V & H
			+0.0	+0.3	+0.0	+0.0	360		Mid		113
			+0.0	+0.0	+0.0						
34	250.000M	42.7	+0.0	+0.0	+0.0	+0.5	+0.0	30.5	46.0	-15.5	V & H
			+0.0	+0.0	+0.0	-27.1	360				103
			+12.7	+1.0	+0.7						
35	2772.069M	35.2	-30.2	+28.9	+2.8	+1.5	+0.0	38.5	54.0	-15.5	V & H
			+0.0	+0.3	+0.0	+0.0			High		114
			+0.0	+0.0	+0.0						
36	2717.892M	34.3	-30.2	+28.7	+2.8	+1.4	+0.0	37.3	54.0	-16.7	V & H
			+0.0	+0.3	+0.0	+0.0	360		Low		122
			+0.0	+0.0	+0.0						
37	349.900M	37.9	+0.0	+0.0	+0.0	+0.6	+0.0	28.5	46.0	-17.5	V & H
			+0.0	+0.0	+0.0	-27.2	360				125
			+15.2	+1.1	+0.9						
38	250.030M	40.5	+0.0	+0.0	+0.0	+0.5	+0.0	28.3	46.0	-17.7	V & H
			+0.0	+0.0	+0.0	-27.1	360				125
			+12.7	+1.0	+0.7						
39	1811.862M	35.0	-30.6	+27.1	+2.3	+1.2	+0.0	35.4	54.0	-18.6	V & H
			+0.0	+0.4	+0.0	+0.0	360		Low		128
			+0.0	+0.0	+0.0						
40	1847.965M	34.3	-30.6	+27.4	+2.3	+1.2	+0.0	35.0	54.0	-19.0	V & H
			+0.0	+0.4	+0.0	+0.0	360		High		104
			+0.0	+0.0	+0.0						
41	906.000M	105.0	+0.0	+0.0	+0.0	+0.9	+0.0	105.7	125.2	-19.5	V & H
			+0.0	+0.0	+0.0	-27.4	21				99
			+23.7	+2.0	+1.5						
42	133.307M	36.4	+0.0	+0.0	+0.0	+0.4	+0.0	22.0	43.5	-21.5	V & H
			+0.0	+0.0	+0.0	-27.7	360				99
			+11.8	+0.6	+0.5						
43	149.972M	35.8	+0.0	+0.0	+0.0	+0.4	+0.0	21.4	43.5	-22.1	V & H
			+0.0	+0.0	+0.0	-27.5	284				99
			+11.4	+0.7	+0.6						
44	914.152M	102.0	+0.0	+0.0	+0.0	+0.9	+0.0	102.8	125.2	-22.4	V & H
			+0.0	+0.0	+0.0	-27.3	360				103
			+23.7	+2.0	+1.5						

45	74.424M	36.4	+0.0 +0.0 +7.0	+0.0 +0.0 +0.4	+0.0 +0.0 +0.4	+0.3 -27.8	+0.0	16.7	40.0	-23.3	V & H 99
46	150.000k	47.8	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +9.6 +0.0	+0.0 +0.0	-80.0 359	-22.6	24.1	-46.7	Perp 107
47	28.687M	16.1	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.3 +4.6 +0.0	+0.2 +0.0	-40.0 359	-18.8	29.5	-48.3	Perp 107
48	14.414k	44.5	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 +14.0 +0.0	+0.0 +0.0	-80.0	-21.5	44.4	-65.9	Perp 107

CKC Laboratories, Inc. Date: 1/28/2015 Time: 15:27:05 SNUPI Technologies WO#: 96653
Test Distance: 3 Meters Sequence#: 9 V & H
SNUPI Technologies Gateway P/N: 810-00008



Band Edge

Test Conditions / Setup

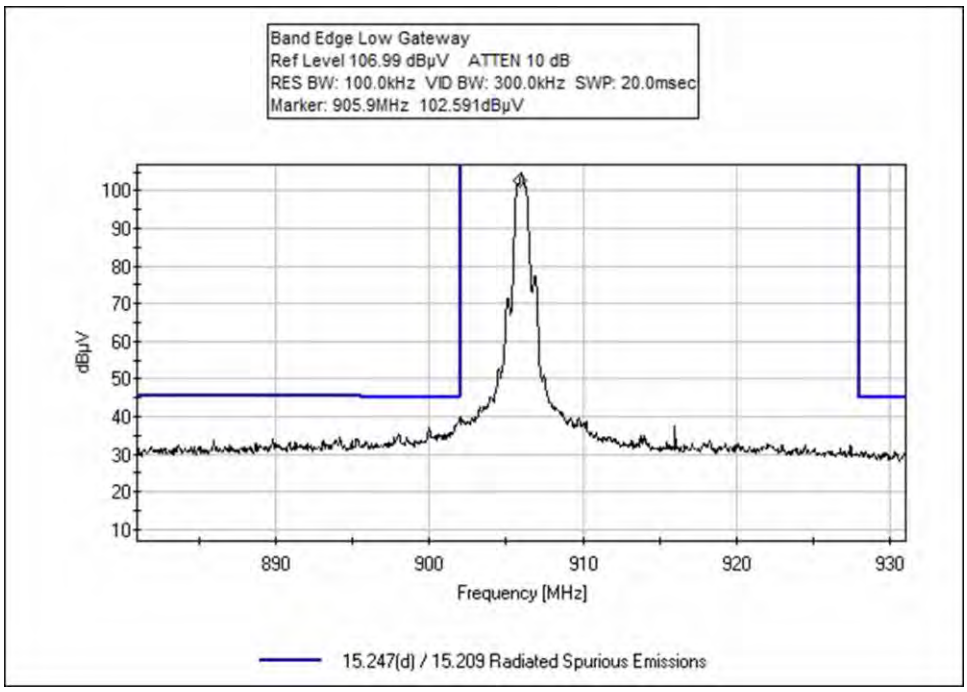
Test Conditions:
Temp: 23°C
Humidity: 41%
Pressure: 103.3kPa
Date Tested: 1/28/15
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

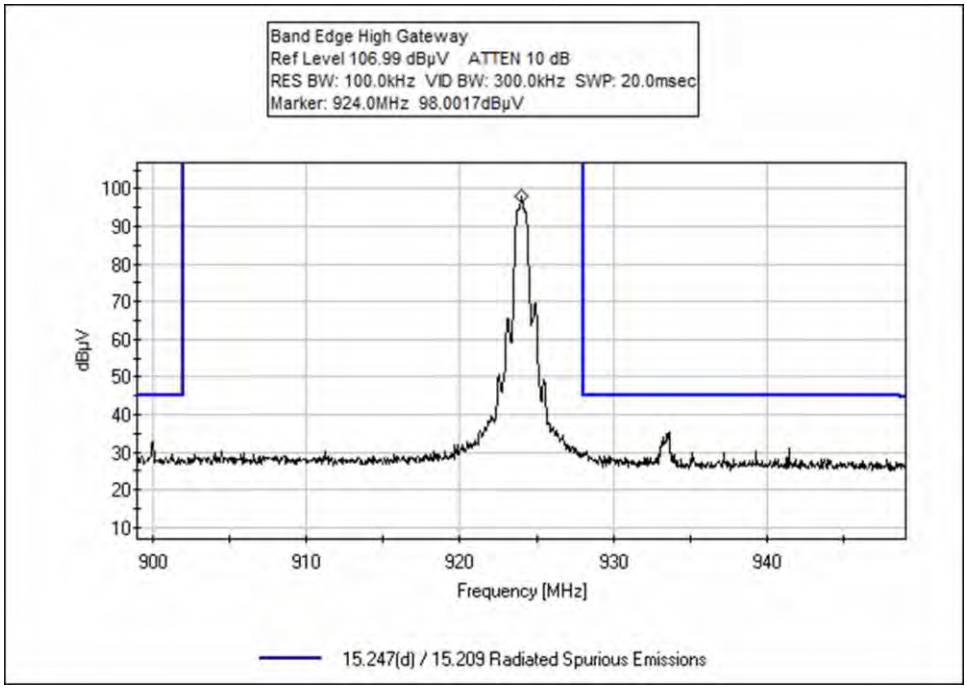
Engineer: Steven Pittsford

Test Equipment					
Asset #	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

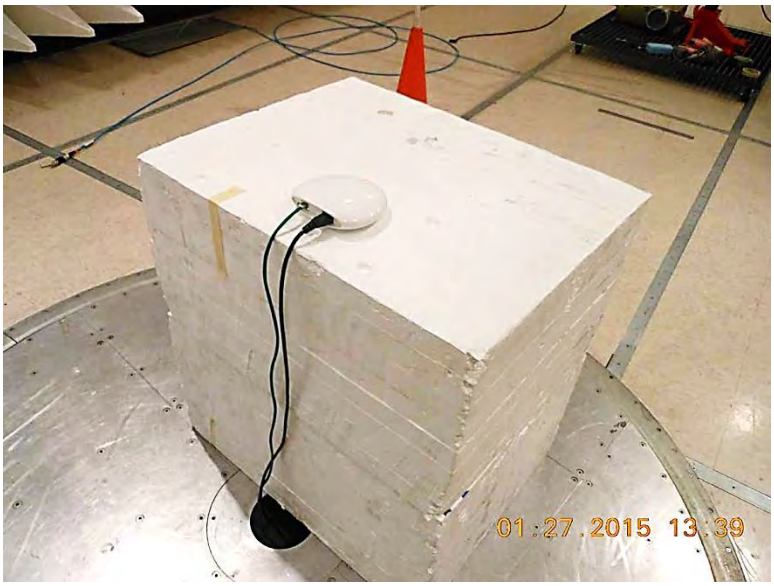
Gateway Setup
The EUT's antenna is non-removable, thus the data will be gathered through radiated measurements. EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M. This router is then connected to the laptop.
Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

Test Data


Band Edge Low Gateway
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 905.9MHz 102.591dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
890
900
910
920
930
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge High Gateway
Ref Level 106.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 924.0MHz 98.0017dBµV
dBµV
100
90
80
70
60
50
40
30
20
10
900
910
920
930
940
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photo



15. 247(e) Power Spectral Density

Test Conditions / Setup

Test Conditions:
Temp: 23°C
Humidity: 41%
Pressure: 103.3kPa
Date Tested: 1/29/15
Test Method: KDB 558074 D01 DTS Meas Guidance v03r02

Engineer: Steven Pittsford

Test Equipment					
Asset #	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01996	Biconilog Antenna	Chase	CBL6111C	7/16/2014	7/16/2016
02307	Preamp	HP	8447D	3/14/2014	3/14/2016
P05360	Cable	Belden	RG214	12/1/2014	12/1/2016
P06505	Cable	Astrolab	32026-29080-29080-84	10/18/2013	10/18/2015
02872	Spectrum Analyzer	Agilent	E4440A	7/19/2013	7/19/2015
P05963	Cable	Belden	RG-214	2/21/2014	2/21/2016

Gateway Setup
The EUT's antenna is non-removable, thus the data will be gathered through radiated measurements. EUT is located on top of a Styrofoam table, 80cm over the ground plane. The EUT is connected to a wireless router located outside the test chamber via an unshielded Cat 5e cable operating at 100M. This router is then connected to the laptop.
Mod #1: Ethernet shell disconnected from digital ground by removing R128 & C194.

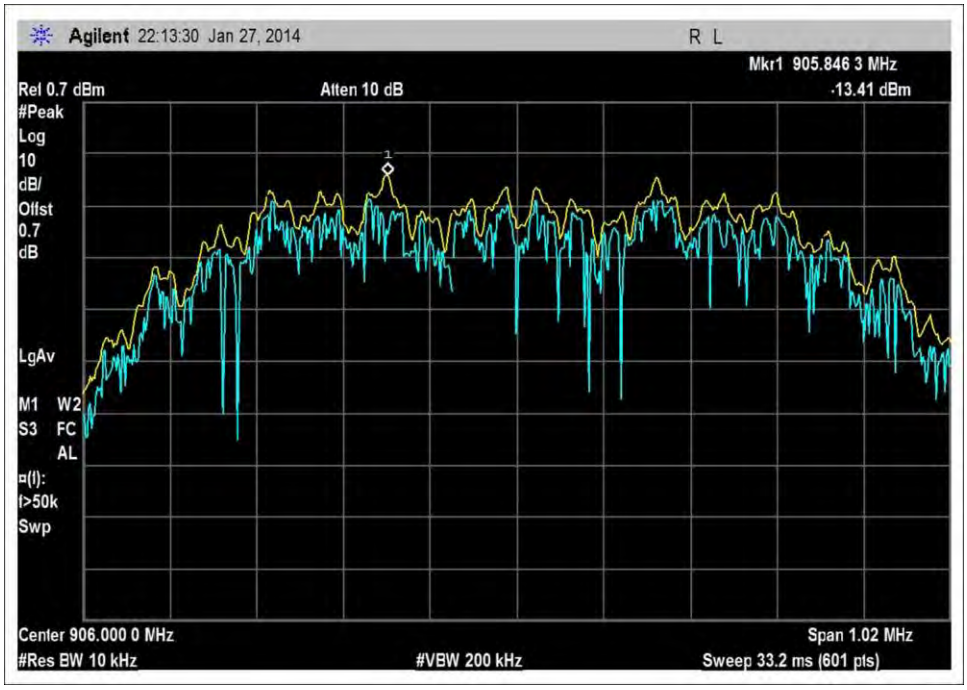
Correction factors are factored into the spectrum analyzer screen captures.

P = 10log((Ed)^2 / (30 * G)*1000)

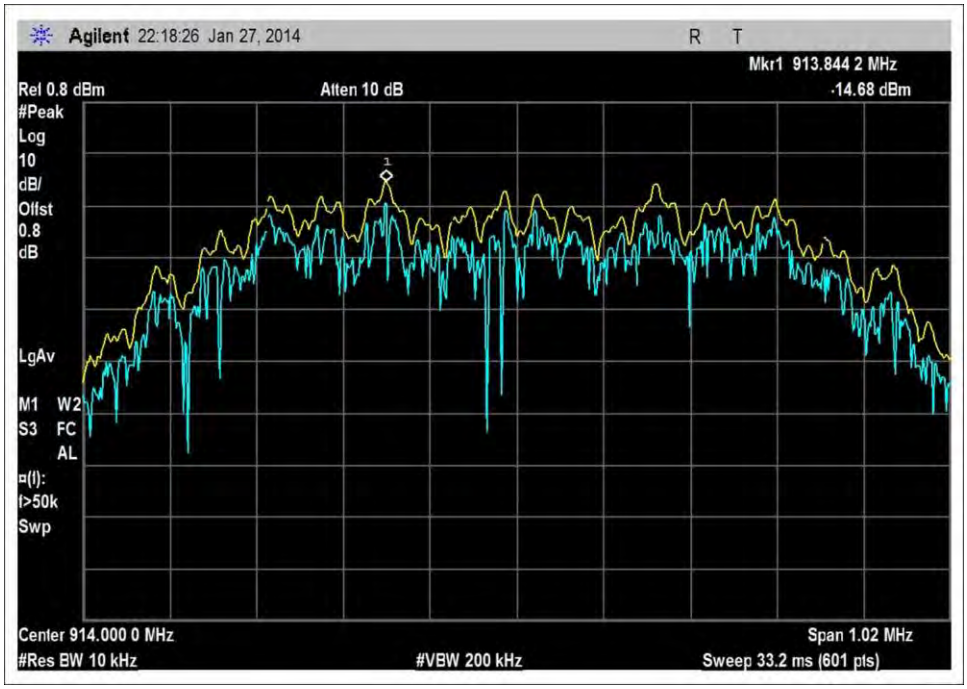
E = Field strength of the measurement converted to V/M
d = Measurement distance in meters
G = Numerical gain of the EUT's antenna relative to an isotropic radiator.
P = The power in dBm for which we are solving

Frequency (MHz)	Corrections due to cables, amplifiers, antennas (dB)	Corrected Reading (dBm)	Antenna Gain (dBi)	Spectral Density (dBm)
906	0.7	-13.4	-2.9	1.27
914	0.8	-14.7	-3.2	0.27
924	1.0	-16.8	-5.3	0.27

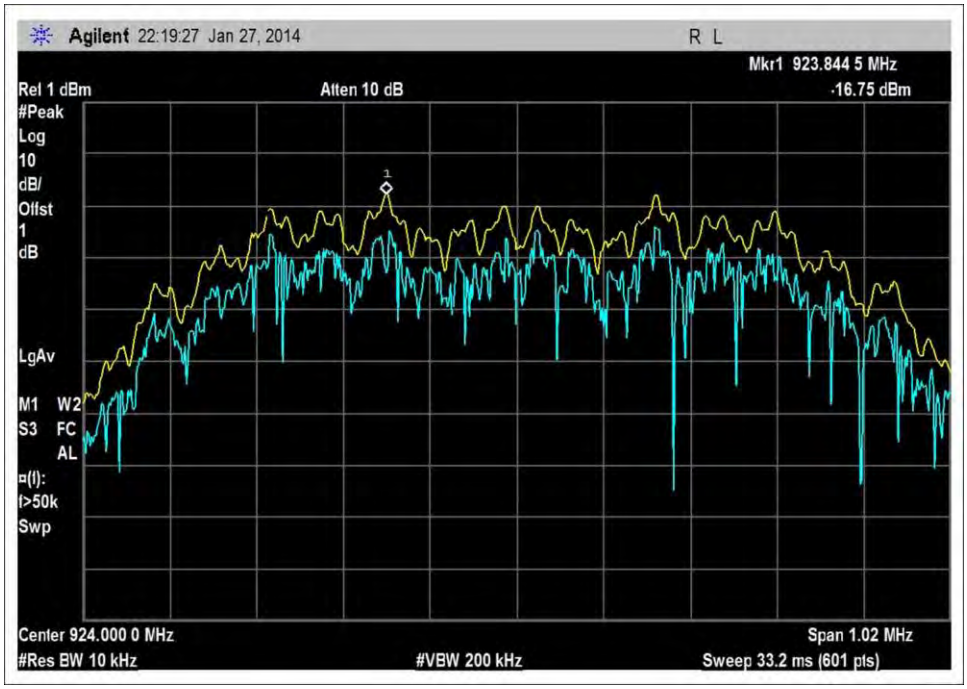
Test Data



Low

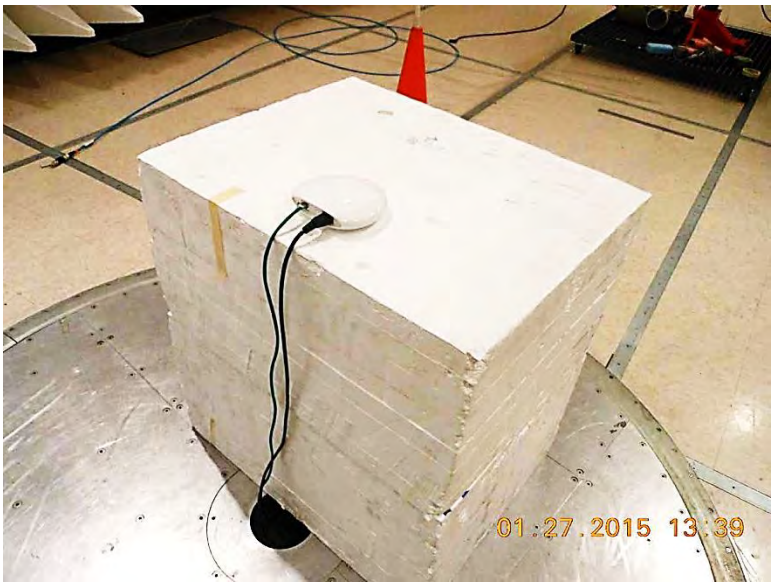


Mid


Agilent 22:19:27 Jan 27, 2014
R L
Mkr1 923.844 5 MHz
-16.75 dBm
Rel 1 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
1
dB
LgAv
M1 W2
S3 FC
AL
¤(f):
f>50k
Swp
Center 924.000 0 MHz
Span 1.02 MHz
#Res BW 10 kHz
#VBW 200 kHz
Sweep 33.2 ms (601 pts)

High

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

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

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 dBµV/m, the spectrum analyzer reading in dBµV 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.