Dust Networks

ADDENDUM TEST REPORT TO 91269-7A

2.4GHz Wireless Mote, M2511

Tested To The Following Standards:

FCC PART 15.207, 15.247 and RSS-210 ISSUE 8

Report No.: 91269-7B

Date of issue: March 18, 2011

TESTING
CERT #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.

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Dust Networks
30695 Huntwood Avenue
Hayward, CA 94544

Representative: Gordon Charles

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 91269-7

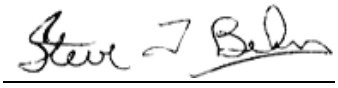
DATE OF EQUIPMENT RECEIPT: January 19, 2011
DATE(S) OF TESTING: January 19 –March 18, 2011

Revision History

Original: Testing of the 2.4GHz Wireless Mote, M2511 to FCC PART 15.247 and RSS-210 ISSUE 8.
Addendum A: To correct references to testing with a +8 dBi instead of a +10 dBi antenna.
Addendum B: To add FCC Part 15.207 AC Conducted test data to the existing data already in the report.

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

Site Registration & Accreditation Information

Location	CB #	Japan	Canada	FCC
Bothell	US0081	R-2296, C-2506, T-1489 & G-284	3082C-1	318736

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 15.247 and RSS-210 Issue 8

Description	Test Procedure/Method	Results
AC Conducted	FCC Part 15 Subpart C Section 15.207 / ANSI C63.4 (2003)	Pass
6dB Bandwidth	FCC Part 15 Subpart C Section 15.247(a)(2) / KDB 558074	Pass
RF Power Output	FCC Part 15 Subpart C Section 15.247(b)(3) / KDB 558074	Pass
Antenna Conducted Spurious Emissions	FCC Part 15 Subpart C Section 15.247(d) / KDB 558074	Pass
Radiated Spurious Emissions	FCC Part 15 Subpart C Section 15.247(d) / KDB 558074	Pass
Peak Power Spectral Density	FCC Part 15 Subpart C Section 15.247(e) / KDB 558074	Pass
99% Bandwidth	RSS-210 Issue 8	Pass

Conditions During Testing

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

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

2.4 GHz Wireless Mote
Manuf: Dust Networks
Model: M2511 with 3 antenna options
Serial: NA
FCC ID: SJC-M2511

2dBi Antenna
Manuf: NA
Model: NA
Serial: NA

6dBi Antenna
Manuf: Phoenix Contact
Model: RAD-ISM-2400-ANT-OMNI-6-0
Serial: 2003662623

8dBi Antenna
Manuf: Phoenix Contact
Model: RAD-ISM-2400-ANT-PAN-8-0
Serial: 1114211262

PERIPHERAL DEVICES

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

TTL Converter
Manuf: B&B Electronics
Model: 232LPTTL33
Serial: 0069810016

Laptop
Manuf: Dell
Model: Inspiron 600m
Serial: NA

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR 15C requirements for Unlicensed Radio Frequency Devices, Subpart C - Intentional Radiators.

15.207 AC Conducted Emissions

Test Notes: Conducted Disturbances at Mains Terminals, LISN method.

Test Procedure: ANSI C63.4

Test Data Sheets

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

Customer:	**Dust Networks**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**91269**	Date:	3/18/2011
Test Type:	**Conducted Emissions**	Time:	1:48:50 PM
Equipment:	**2.4GHz Wireless Mote**	Sequence#:	4
Manufacturer:	Dust Networks	Tested By:	Benny Lovan
Model:	M2511		120V 60Hz
S/N:	193307		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00494	50uH LISN-Line (dB)	3816/NM	3/30/2009	3/30/2011
	AN00494	50uH LISN-Neutral (dB)	3816/NM	3/30/2009	3/30/2011
T2	ANP05300	Cable	RG214/U	3/7/2011	3/7/2013
T3	ANP05440	Cable		3/7/2011	3/7/2013
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	12/2/2010	12/2/2012
T5	ANP01211	Attenuator	23-10-34	5/18/2009	5/18/2011
	AN02668	Spectrum Analyzer	E4446A	2/23/2011	2/23/2013

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

Function	Manufacturer	Model #	S/N
Power Supply	Cincon Electronics	TR15RA120	None
2.4GHz Wireless Mote*	Dust Networks	M2511	193307

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Conducted Emissions 150kHz - 30MHz

Temperature:70.8 Degrees Fahrenheit
Humidity: 40%
Atmospheric Pressure: 102.9 kPa

The unit is on the table with the lid of the chassis removed. The unit is "advertising" where the unit looks for other devices to join the network. The unit during this mode is both transmitting and receiving.

Ext Attn: 0 dB

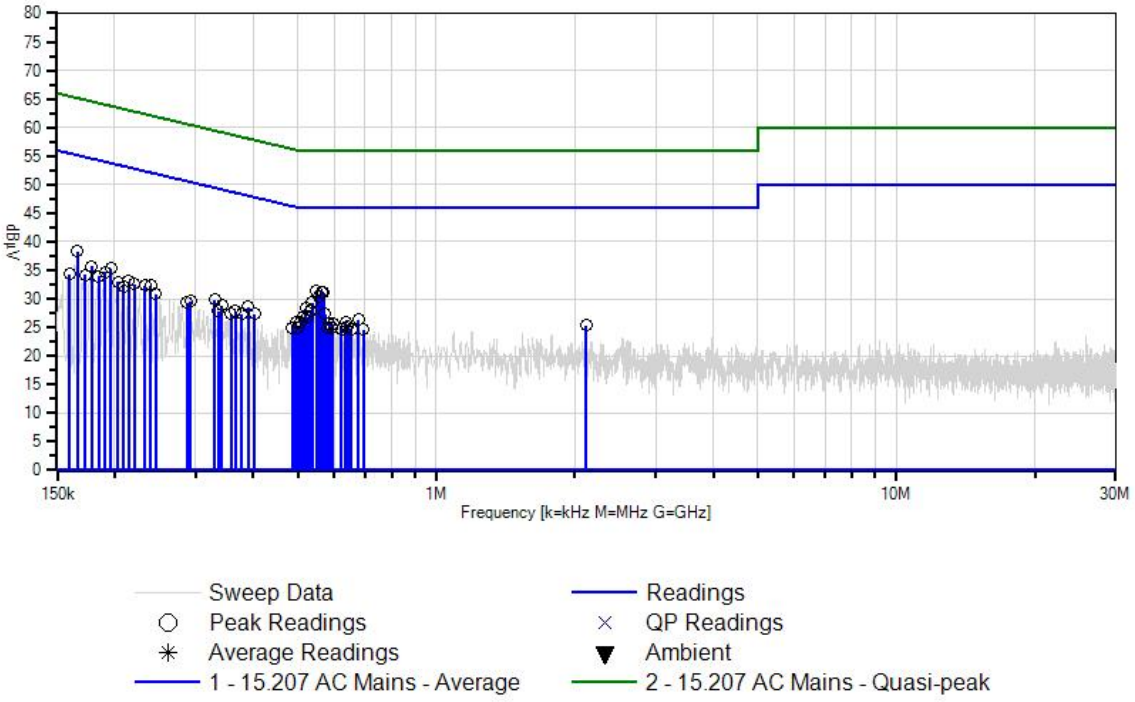
Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	549.963k	21.2	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	31.3	46.0	-14.7	Black
2	562.326k	21.1	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	31.2	46.0	-14.8	Black
3	568.871k	21.0	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	31.1	46.0	-14.9	Black
4	555.781k	20.3	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	30.4	46.0	-15.6	Black
5	537.601k	19.3	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	29.3	46.0	-16.7	Black
6	165.999k	27.9	+0.0 +9.9	+0.0	+0.0	+0.5	+0.0	38.3	55.2	-16.9	Black
7	520.875k	18.3	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	28.3	46.0	-17.7	Black
8	533.238k	17.8	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	27.8	46.0	-18.2	Black
9	196.541k	25.0	+0.1 +10.0	+0.0	+0.0	+0.2	+0.0	35.3	53.8	-18.5	Black
10	573.234k	17.3	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	27.4	46.0	-18.6	Black
11	178.361k	25.2	+0.1 +10.0	+0.0	+0.0	+0.4	+0.0	35.7	54.6	-18.9	Black
12	513.603k	16.9	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	26.9	46.0	-19.1	Black
13	525.966k	16.9	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	26.9	46.0	-19.1	Black
14	190.724k	24.3	+0.1 +10.0	+0.0	+0.0	+0.3	+0.0	34.7	54.0	-19.3	Black
15	390.705k	18.7	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	28.6	48.0	-19.4	Black
16	330.347k	19.8	+0.1 +9.9	+0.0	+0.0	+0.1	+0.0	29.9	49.4	-19.5	Black
17	678.679k	16.2	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	26.3	46.0	-19.7	Black
18	239.446k	22.2	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	32.3	52.1	-19.8	Black

19	214.721k	22.9	+0.1 +10.0	+0.0	+0.0	+0.1	+0.0	33.1	53.0	-19.9	Black
20	507.785k	16.0	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	26.0	46.0	-20.0	Black
21	232.901k	22.2	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	32.3	52.3	-20.0	Black
22	496.150k	16.0	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	26.0	46.1	-20.1	Black
23	635.774k	15.8	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	25.9	46.0	-20.1	Black
24	220.539k	22.4	+0.1 +10.0	+0.0	+0.0	+0.1	+0.0	32.6	52.8	-20.2	Black
25	596.504k	15.5	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	25.6	46.0	-20.4	Black
26	341.982k	18.7	+0.1 +9.9	+0.0	+0.0	+0.1	+0.0	28.8	49.2	-20.4	Black
27	184.906k	23.6	+0.1 +10.0	+0.0	+0.0	+0.2	+0.0	33.9	54.3	-20.4	Black
28	586.324k	15.5	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	25.6	46.0	-20.4	Black
29	203.086k	22.8	+0.1 +10.0	+0.0	+0.0	+0.1	+0.0	33.0	53.5	-20.5	Black
30	402.340k	17.4	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	27.3	47.8	-20.5	Black
31	172.543k	23.8	+0.0 +10.0	+0.0	+0.0	+0.4	+0.0	34.2	54.8	-20.6	Black
32	365.980k	17.8	+0.1 +9.9	+0.0	+0.0	+0.1	+0.0	27.9	48.6	-20.7	Black
33	2.115M	15.0	+0.1 +10.0	+0.0	+0.1	+0.1	+0.0	25.3	46.0	-20.7	Black
34	641.591k	15.1	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	25.2	46.0	-20.8	Black
35	292.532k	19.5	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	29.6	50.5	-20.9	Black
36	378.343k	17.5	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	27.4	48.3	-20.9	Black
37	208.904k	22.0	+0.1 +10.0	+0.0	+0.0	+0.1	+0.0	32.2	53.2	-21.0	Black
38	245.264k	20.8	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	30.9	51.9	-21.0	Black
39	501.240k	14.9	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	24.9	46.0	-21.1	Black
40	579.052k	14.8	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.9	46.0	-21.1	Black
41	591.414k	14.8	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.9	46.0	-21.1	Black
42	637.955k	14.7	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.8	46.0	-21.2	Black
43	487.424k	15.0	+0.1 +9.8	+0.0	+0.0	+0.1	+0.0	25.0	46.2	-21.2	Black
44	287.442k	19.3	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	29.4	50.6	-21.2	Black

45	159.454k	24.0	+0.0 +9.9	+0.0	+0.0	+0.4	+0.0	34.3	55.5	-21.2	Black
46	622.684k	14.6	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.7	46.0	-21.3	Black
47	653.954k	14.6	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.7	46.0	-21.3	Black
48	336.165k	17.8	+0.1 +9.9	+0.0	+0.0	+0.1	+0.0	27.9	49.3	-21.4	Black
49	357.981k	17.3	+0.1 +9.9	+0.0	+0.0	+0.1	+0.0	27.4	48.8	-21.4	Black
50	695.404k	14.5	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.6	46.0	-21.4	Black

CKC Laboratories, Inc. Date: 3/18/2011 Time: 1:48:50 PM Dust Networks WO#: 91269 Model: M2511 SN: 193307
15.207 AC Mains - Average Test Lead: Black 120V 60Hz Sequence#: 4 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.207 AC Mains - Average**
Work Order #: **91269** Date: 3/18/2011
Test Type: **Conducted Emissions** Time: 1:47:46 PM
Equipment: **2.4GHz Wireless Mote** Sequence#: 3
Manufacturer: Dust Networks Tested By: Benny Lovan
Model: M2511 120V 60Hz
S/N: 193307

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00494	50uH LISN-Line (dB)	3816/NM	3/30/2009	3/30/2011
T1	AN00494	50uH LISN-Neutral (dB)	3816/NM	3/30/2009	3/30/2011
T2	ANP05300	Cable	RG214/U	3/7/2011	3/7/2013
T3	ANP05440	Cable		3/7/2011	3/7/2013
T4	ANP05258	High Pass Filter	HE9615-150K-50-720B	12/2/2010	12/2/2012
T5	ANP01211	Attenuator	23-10-34	5/18/2009	5/18/2011
	AN02668	Spectrum Analyzer	E4446A	2/23/2011	2/23/2013

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

Function	Manufacturer	Model #	S/N
Power Supply	Cincon Electronics	TR15RA120	None
2.4GHz Wireless Mote*	Dust Networks	M2511	193307

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Conducted Emissions 150kHz - 30MHz

Temperature:70.8 Degrees Fahrenheit
Humidity: 40%
Atmospheric Pressure: 102.9 kPa

The unit is on the table with the lid of the chassis removed. The unit is "advertising" where the unit looks for other devices to join the network. The unit during this mode is both transmitting and receiving.

Ext Attn: 0 dB

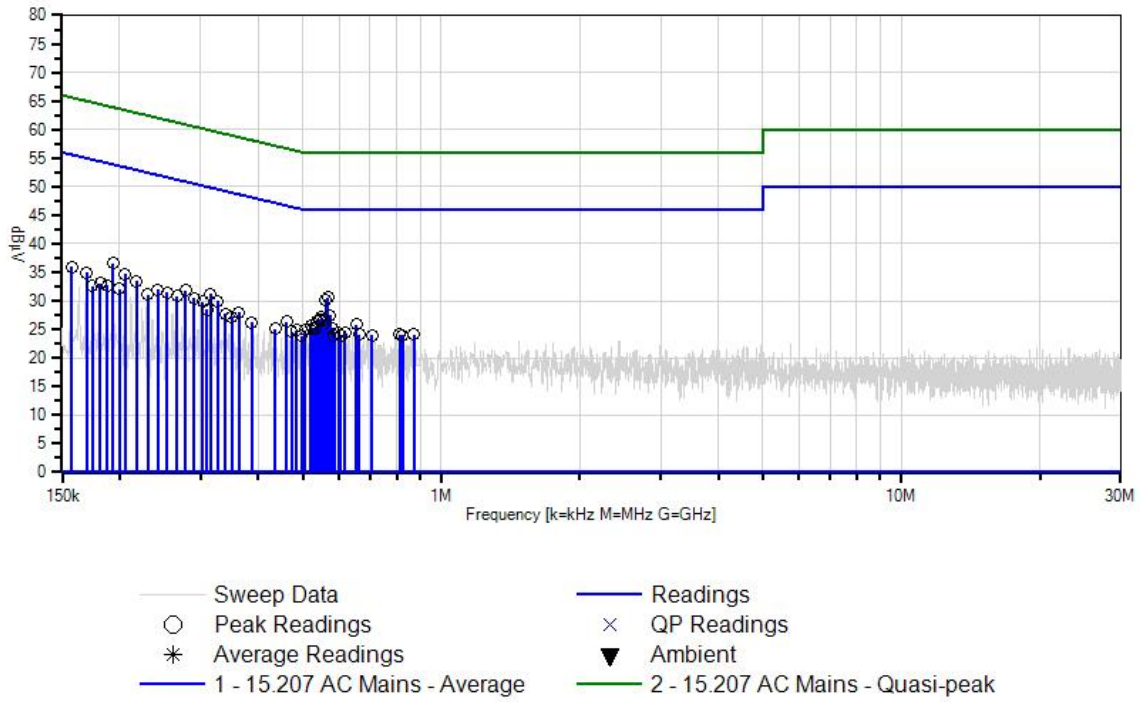
Measurement Data: Reading listed by margin. Test Lead: White

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	567.416k	20.6	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	30.6	46.0	-15.4	White
2	560.871k	20.2	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	30.2	46.0	-15.8	White
3	193.632k	26.4	+0.0 +10.0	+0.0	+0.0	+0.2	+0.0	36.6	53.9	-17.3	White
4	573.234k	17.5	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	27.5	46.0	-18.5	White
5	315.076k	21.1	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	31.2	49.8	-18.6	White
6	205.268k	24.6	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	34.7	53.4	-18.7	White
7	549.236k	17.1	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	27.1	46.0	-18.9	White
8	277.988k	21.7	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	31.8	50.9	-19.1	White
9	544.146k	16.8	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	26.7	46.0	-19.3	White
10	555.054k	16.7	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	26.7	46.0	-19.3	White
11	217.630k	23.3	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	33.4	52.9	-19.5	White
12	326.711k	20.0	+0.0 +9.9	+0.0	+0.0	+0.1	+0.0	30.0	49.5	-19.5	White
13	157.272k	25.4	+0.0 +9.9	+0.0	+0.0	+0.6	+0.0	35.9	55.6	-19.7	White
14	536.874k	16.4	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	26.3	46.0	-19.7	White
15	169.635k	24.6	+0.0 +10.0	+0.0	+0.0	+0.4	+0.0	35.0	55.0	-20.0	White
16	242.355k	21.9	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	32.0	52.0	-20.0	White
17	290.351k	20.4	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	30.5	50.5	-20.0	White
18	253.990k	21.4	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	31.5	51.6	-20.1	White
19	654.681k	15.8	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	25.8	46.0	-20.2	White
20	460.517k	16.5	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	26.4	46.7	-20.3	White
21	266.353k	20.7	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	30.8	51.2	-20.4	White
22	302.713k	19.7	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	29.8	50.2	-20.4	White
23	520.148k	15.7	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	25.6	46.0	-20.4	White

24	363.071k	18.0	+0.0 +9.9	+0.0	+0.0	+0.1	+0.0	28.0	48.7	-20.7	White
25	581.233k	15.2	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	25.2	46.0	-20.8	White
26	525.966k	15.3	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	25.2	46.0	-20.8	White
27	532.510k	15.3	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	25.2	46.0	-20.8	White
28	505.604k	14.9	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	24.8	46.0	-21.2	White
29	229.993k	21.0	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	31.1	52.4	-21.3	White
30	181.270k	22.8	+0.0 +10.0	+0.0	+0.0	+0.3	+0.0	33.1	54.4	-21.3	White
31	187.815k	22.4	+0.0 +10.0	+0.0	+0.0	+0.3	+0.0	32.7	54.1	-21.4	White
32	199.450k	22.0	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	32.1	53.6	-21.5	White
33	309.258k	18.4	+0.0 +10.0	+0.0	+0.0	+0.1	+0.0	28.5	50.0	-21.5	White
34	339.074k	17.7	+0.0 +9.9	+0.0	+0.0	+0.1	+0.0	27.7	49.2	-21.5	White
35	617.593k	14.5	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	24.5	46.0	-21.5	White
36	484.515k	14.9	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	24.8	46.3	-21.5	White
37	350.709k	17.2	+0.0 +9.9	+0.0	+0.0	+0.1	+0.0	27.2	48.9	-21.7	White
38	597.232k	14.3	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	24.3	46.0	-21.7	White
39	472.152k	14.7	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	24.6	46.5	-21.9	White
40	387.069k	16.3	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	26.2	48.1	-21.9	White
41	811.757k	14.0	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.1	46.0	-21.9	White
42	872.116k	14.0	+0.1 +9.8	+0.0	+0.1	+0.1	+0.0	24.1	46.0	-21.9	White
43	664.135k	14.1	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	24.1	46.0	-21.9	White
44	435.792k	15.2	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	25.1	47.1	-22.0	White
45	823.393k	13.9	+0.1 +9.8	+0.0	+0.0	+0.2	+0.0	24.0	46.0	-22.0	White
46	706.313k	14.0	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	24.0	46.0	-22.0	White

47	174.725k	22.2	+0.0 +10.0	+0.0	+0.0	+0.4	+0.0	32.6	54.7	-22.1	White
48	605.231k	13.9	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	23.9	46.0	-22.1	White
49	585.596k	13.9	+0.0 +9.8	+0.0	+0.0	+0.2	+0.0	23.9	46.0	-22.1	White
50	496.877k	14.0	+0.0 +9.8	+0.0	+0.0	+0.1	+0.0	23.9	46.1	-22.2	White

CKC Laboratories, Inc. Date: 3/18/2011 Time: 1:47:46 PM Dust Networks WO#: 91269 Model: M2511 SN: 193307
15.207 AC Mains - Average Test Lead: White 120V 60Hz Sequence#: 3 Ext ATTN: 0 dB



Test Setup Photos

15.247(a)(2)6dB Bandwidth

Test Setup

Temp: 21°C
Humidity: 34%
Pressure: 102.4kPa
Frequency Range: 2405-2475MHz
RBW: 100 kHz
VBW: 300 kHz
Sweep: Auto

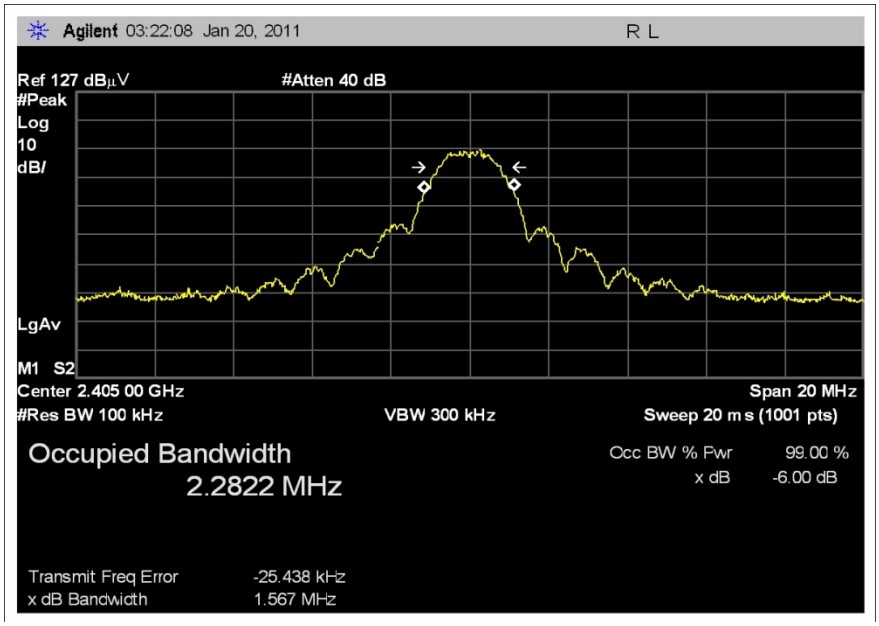
EUT's antenna port is connected to the Spectrum analyzer through a cable and a 20dB attenuator.
EUT is connected to the support laptop through a TTL RS232 adaptor.
Support laptop is setting the EUT in the proper mode (TX) and channels:
LOW: 2405MHz
MID: 2440MHz
HIGH: 2475MHz

Engineer Name: A. del Angel

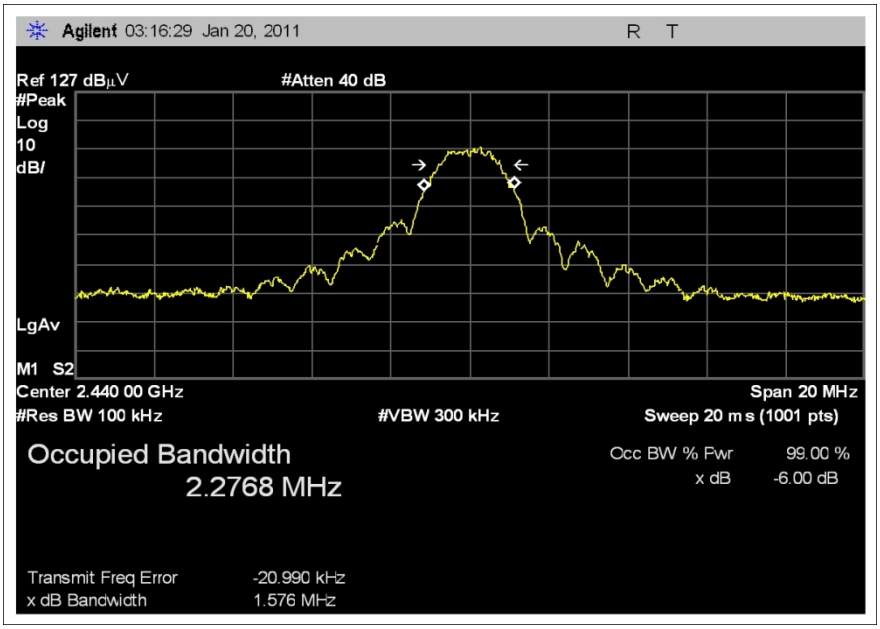
Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	E4440A	Agilent	8/25/2009	8/25/2011
P05747	Attenuator	PE7004-20	Pasternack	3/18/2010	3/18/2012
03121	Cable	32026-2-29080-84	Astrolab	10/23/2009	10/23/2011

Test Data

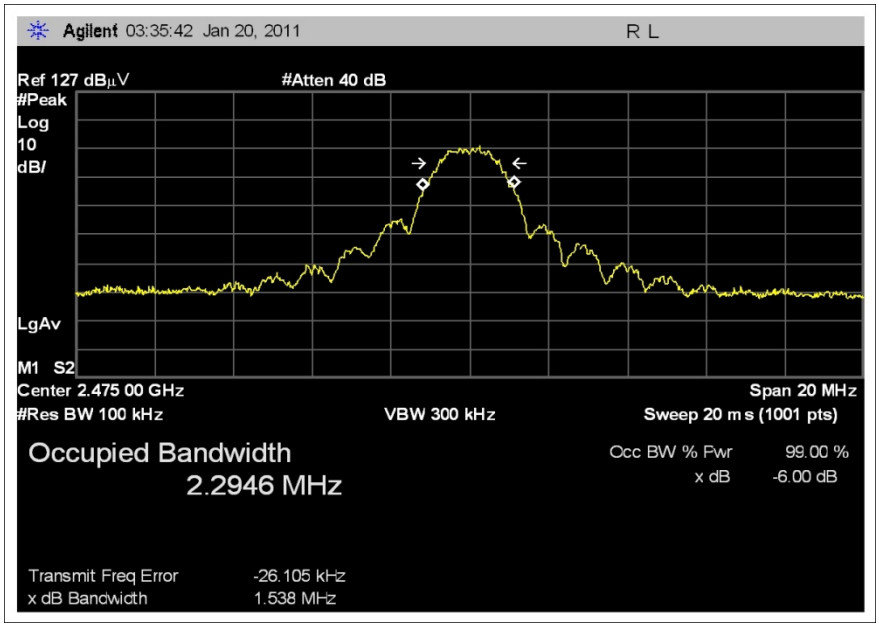
Frequency (MHz)	6dB Bandwidth (kHz)	15.247(a)(2)Limit	Result
2405	1567	>500kHz	Pass
2440	1576	>500kHz	Pass
2475	1538	>500kHz	Pass



Low

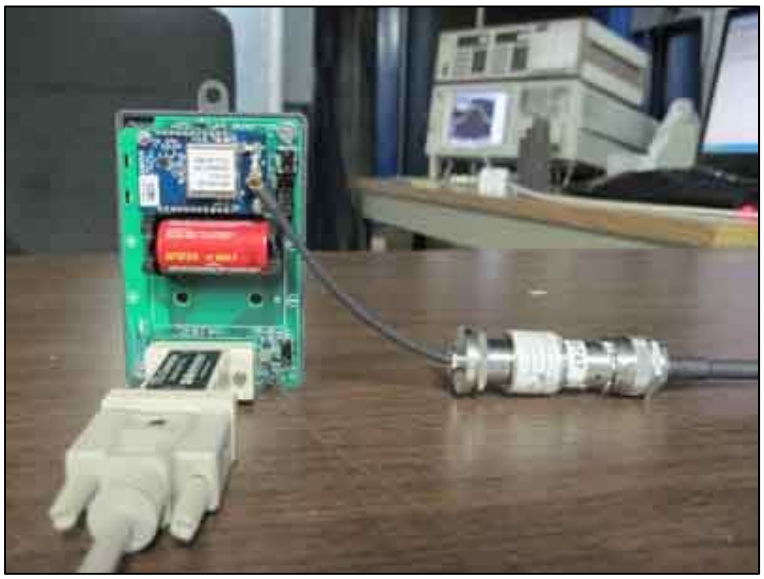


Mid



High

Test Setup Photos



15.247(b)(3) RF Power Output

Test Setup

Temp: 21°C
Humidity: 34%
Pressure: 102.4kPa
Frequency Range: 2405-2475MHz
RBW: 3MHz
VBW: 8MHz
Sweep: Auto

EUT's antenna port is connected to the Spectrum analyzer through a cable and a 20dB attenuator.
EUT is connected to the support laptop through a TTL RS232 adaptor.
Test is being performed with a fresh battery to satisfy FCC15.31 (e) voltage variations on power.
Support laptop is setting the EUT in the proper mode (TX) and channels:
LOW: 2405MHz
MID: 2440MHz
HIGH: 2475MHz

Engineer Name: A. del Angel

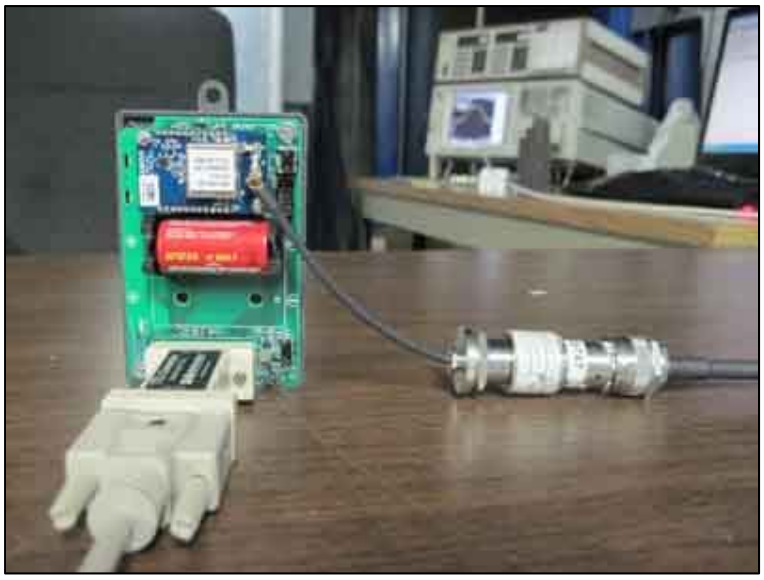
Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	E4440A	Agilent	8/25/2009	8/25/2011
P05747	Attenuator	PE7004-20	Pasternack	3/18/2010	3/18/2012
03121	Cable	32026-2-29080-84	Astrolab	10/23/2009	10/23/2011

Test Data

Frequency (MHz)	RF Output Power (dBm)	15.247(b)(3)Limit	Result
2405	4.6	28dBm*	Pass
2440	5.2	28dBm*	Pass
2475	5.3	28dBm*	Pass

Note: *The 30dBm limit from FCC 15.247 has been modified due to the fact that one of the antenna options has a gain of 8dBi and the specified limit is for antennas with a maximum gain of 6dBi, thus the limit has been reduced by 2dBi to account for the 8dBi antenna.

Test Setup Photos



15.247(d) Conducted Spurious Emissions

Test Data Sheets

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

Customer:	**Dust Networks**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**91269**	Date:	1/24/2011
Test Type:	**Conducted Emissions**	Time:	12:06:13
Equipment:	**2.4 GHz Wireless Mote**	Sequence#:	1
Manufacturer:	Dust Networks	Tested By:	Armando del Angel
Model:	M2511 with 3 antenna options		3Vdc
S/N:	NA		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	ANP05747	Attenuator	PE7004-20	3/18/2010	3/18/2012

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

Function	Manufacturer	Model #	S/N
2.4 GHz Wireless Mote*	Dust Networks	M2511 with 3 antenna options	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 9kHz - 26000MHz
RBW: 100MHz
VBW: 300kHz
Sweep: Auto
Mode: TX

EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS233 (serial) cable.
Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz
MID = 2440MHz
HIGH = 2475MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

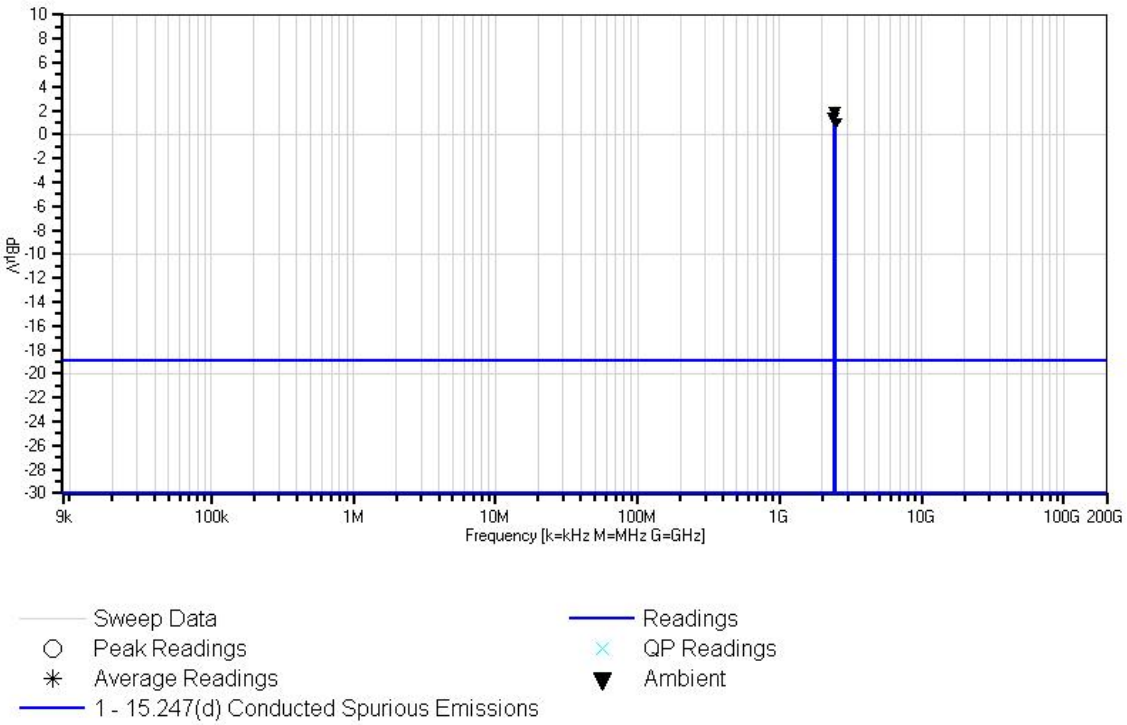
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2440.260M Ambient	-19.4	+1.3	+0.0	+20.1		+0.0	2.0	1.1 Fundamental MID	+0.9	Anten
2	2404.725M Ambient	-19.8	+1.3	+0.0	+20.1		+0.0	1.6	1.1 Fundamental LOW	+0.5	Anten
3	2474.725M Ambient	-20.3	+1.3	+0.0	+20.1		+0.0	1.1	1.1 Fundamental HIGH	+0.0	Anten
4	7213.460M	-61.0	+2.5	+0.0	+20.3		+0.0	-38.2	-18.9 LOW	-19.3	Anten
5	7216.220M	-62.0	+2.5	+0.0	+20.3		+0.0	-39.2	-18.9 LOW	-20.3	Anten
6	7321.460M	-62.2	+2.4	+0.0	+20.3		+0.0	-39.5	-18.9 MID	-20.6	Anten
7	7318.420M	-62.4	+2.4	+0.0	+20.3		+0.0	-39.7	-18.9 MID	-20.8	Anten
8	1979.000M	-61.8	+1.2	+0.0	+20.2		+0.0	-40.4	-18.9 HIGH	-21.5	Anten
9	7423.400M	-63.4	+2.3	+0.0	+20.3		+0.0	-40.8	-18.9 HIGH	-21.9	Anten
10	1952.800M	-62.8	+1.2	+0.0	+20.2		+0.0	-41.4	-18.9 MID	-22.5	Anten
11	1924.700M	-62.9	+1.2	+0.0	+20.2		+0.0	-41.5	-18.9 LOW	-22.6	Anten
12	7426.180M	-64.9	+2.3	+0.0	+20.3		+0.0	-42.3	-18.9 HIGH	-23.4	Anten
13	4810.940M	-65.5	+2.0	+0.0	+20.2		+0.0	-43.3	-18.9 LOW	-24.4	Anten
14	4878.980M	-65.6	+2.0	+0.0	+20.2		+0.0	-43.4	-18.9 MID	-24.5	Anten

15	4808.980M	-65.7	+2.0	+0.0	+20.2	+0.0	-43.5	-18.9 LOW	-24.6	Anten
16	4880.980M	-66.0	+2.0	+0.0	+20.3	+0.0	-43.7	-18.9 MID	-24.8	Anten
17	4948.980M	-66.6	+2.0	+0.0	+20.2	+0.0	-44.4	-18.9 HIGH	-25.5	Anten
18	4950.960M	-67.2	+2.0	+0.0	+20.2	+0.0	-45.0	-18.9 HIGH	-26.1	Anten
19	2884.800M	-67.8	+1.6	+0.0	+20.1	+0.0	-46.1	-18.9 LOW	-27.2	Anten
20	9614.120M	-71.1	+2.9	+0.0	+20.3	+0.0	-47.9	-18.9 LOW	-29.0	Anten
21	2969.100M	-70.9	+1.6	+0.0	+20.1	+0.0	-49.2	-18.9 HIGH	-30.3	Anten
22	7426.180M	-73.2	+2.3	+0.0	+20.3	+0.0	-50.6	-18.9 HIGH	-31.7	Anten
23	9761.460M	-74.0	+2.7	+0.0	+20.4	+0.0	-50.9	-18.9 MID	-32.0	Anten
24	2926.500M	-72.8	+1.6	+0.0	+20.1	+0.0	-51.1	-18.9 MID	-32.2	Anten
25	494.500M	-81.3	+0.5	+0.0	+20.1	+0.0	-60.7	-18.9 HIGH	-41.8	Anten
26	488.500M	-81.5	+0.5	+0.0	+20.1	+0.0	-60.9	-18.9 MID	-42.0	Anten
27	479.900M	-81.7	+0.5	+0.0	+20.1	+0.0	-61.1	-18.9 LOW	-42.2	Anten
28	960.900M	-84.1	+0.8	+0.0	+20.1	+0.0	-63.2	-18.9 LOW	-44.3	Anten
29	975.000M	-86.1	+0.8	+0.0	+20.1	+0.0	-65.2	-18.9 MID	-46.3	Anten
30	990.100M	-87.1	+0.8	+0.0	+20.1	+0.0	-66.2	-18.9 HIGH	-47.3	Anten

CKC Laboratories, Inc. Date: 1/24/2011 Time: 12:06:13 Dust Networks WO#: 91269
15.247(d) Conducted Spurious Emissions Test Lead: Antenna Port Antenna Port Sequence#: 1 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Conducted Spurious Emissions**
Work Order #: **91269** Date: 1/21/2011
Test Type: **Conducted Emissions** Time: 4:14:42 PM
Equipment: **2.4 GHz Wireless Mote** Sequence#: 2
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511 with 3 antenna options 3Vdc
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T2	ANP05747	Attenuator	PE7004-20	3/18/2010	3/18/2012

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

Function	Manufacturer	Model #	S/N
2.4 GHz Wireless Mote*	Dust Networks	M2511 with 3 antenna options	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2387-2405MHz
RBW: 100MHz
VBW: 300kHz
Sweep: Auto
Mode: TX

EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS233 (serial) cable.
Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz

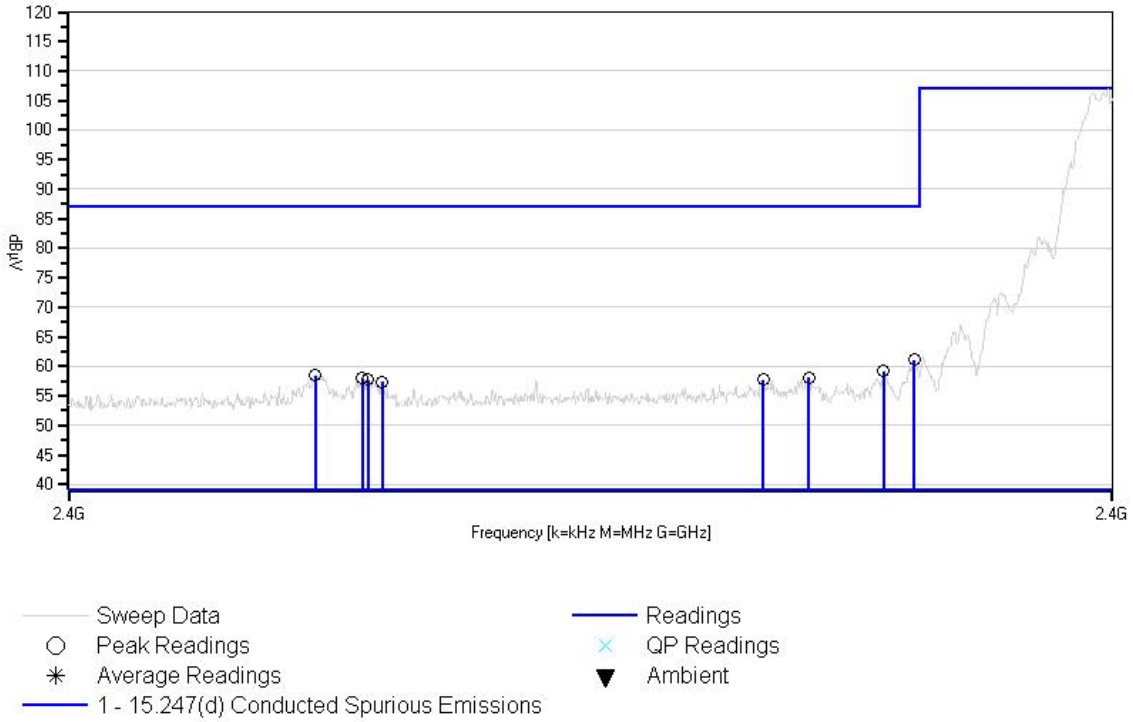
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2399.843M	39.7	+1.3	+20.1			+0.0	61.1	87.0	-25.9	Anten
2	2399.060M	37.8	+1.3	+20.1			+0.0	59.2	87.0	-27.8	Anten
3	2384.345M	37.1	+1.3	+20.1			+0.0	58.5	87.0	-28.5	Anten
4	2397.116M	36.7	+1.3	+20.1			+0.0	58.1	87.0	-28.9	Anten
5	2385.560M	36.6	+1.3	+20.1			+0.0	58.0	87.0	-29.0	Anten

6	2395.928M	36.4	+1.3	+20.1	+0.0	57.8	87.0	-29.2	Anten
7	2385.722M	36.3	+1.3	+20.1	+0.0	57.7	87.0	-29.3	Anten
8	2386.073M	36.0	+1.3	+20.1	+0.0	57.4	87.0	-29.6	Anten

CKC Laboratories, Inc. Date: 1/21/2011 Time: 4:14:42 PM Dust Networks WO#: 91269
15.247(d) Conducted Spurious Emissions Test Lead: Antenna Port Antenna Port Sequence#: 2 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Conducted Spurious Emissions**
Work Order #: **91269** Date: 1/21/2011
Test Type: **Conducted Emissions** Time: 4:11:18 PM
Equipment: **2.4 GHz Wireless Mote** Sequence#: 3
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511 with 3 antenna options 3Vdc
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T2	ANP05747	Attenuator	PE7004-20	3/18/2010	3/18/2012

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

Function	Manufacturer	Model #	S/N
2.4 GHz Wireless Mote*	Dust Networks	M2511 with 3 antenna options	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2475-2500MHz
RBW: 100MHz
VBW: 300kHz
Sweep: Auto
Mode: TX

EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS233 (serial) cable.
Support laptop is setting the EUT in the proper mode and channels:
HIGH = 2475MHz

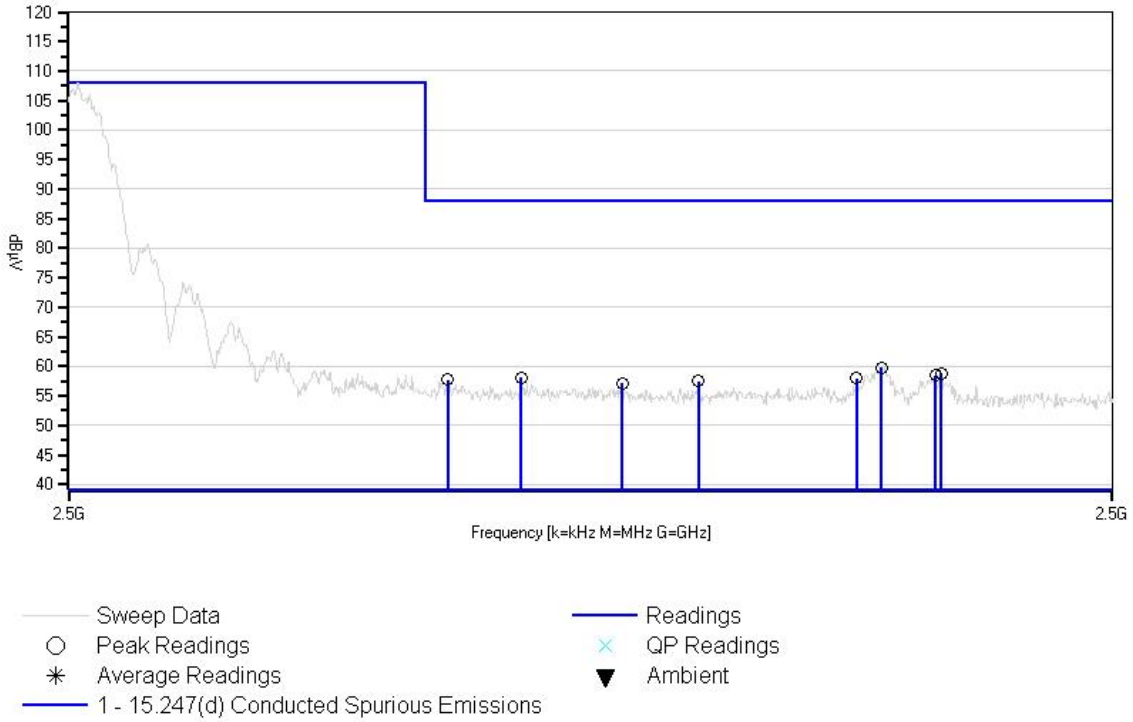
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Antenna Port

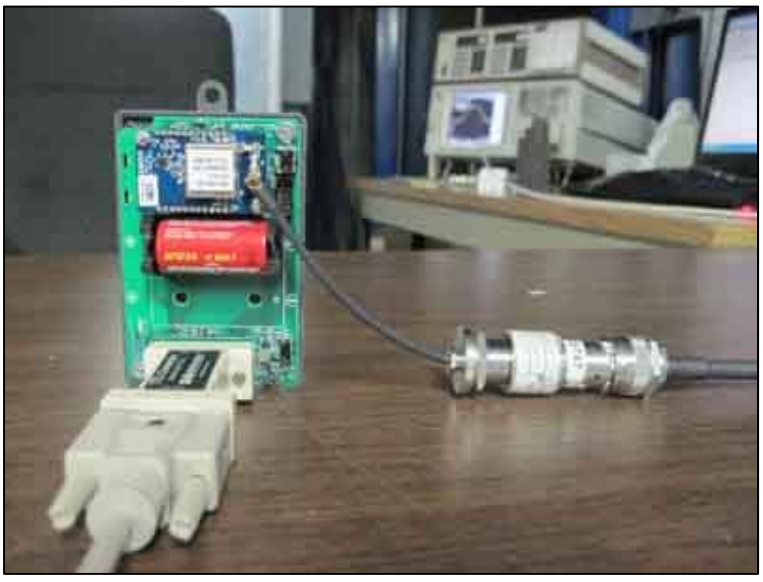
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2494.450M	38.4	+1.3	+20.1			+0.0	59.8	88.0	-28.2	Anten
2	2495.875M	37.4	+1.3	+20.1			+0.0	58.8	88.0	-29.2	Anten
3	2495.750M	37.1	+1.3	+20.1			+0.0	58.5	88.0	-29.5	Anten
4	2485.800M	36.7	+1.3	+20.1			+0.0	58.1	88.0	-29.9	Anten
5	2493.850M	36.6	+1.3	+20.1			+0.0	58.0	88.0	-30.0	Anten

6	2484.050M	36.3	+1.3	+20.1	+0.0	57.7	88.0	-30.3	Anten
7	2490.050M	36.1	+1.3	+20.1	+0.0	57.5	88.0	-30.5	Anten
8	2488.225M	35.8	+1.3	+20.1	+0.0	57.2	88.0	-30.8	Anten

CKC Laboratories, Inc. Date: 1/21/2011 Time: 4:11:18 PM Dust Networks WO#: 91269
15.247(d) Conducted Spurious Emissions Test Lead: Antenna Port Antenna Port Sequence#: 3 Ext ATTN: 0 dB

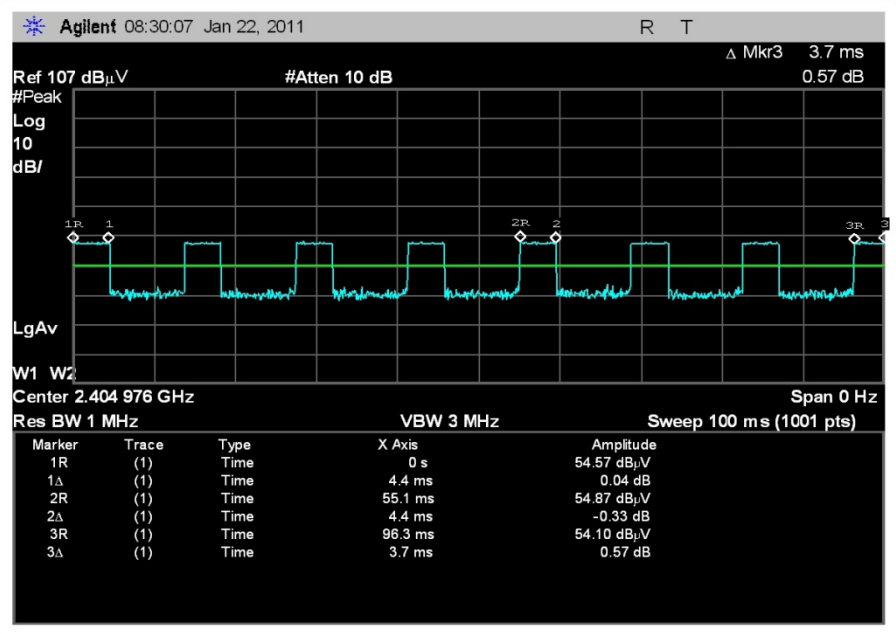


Test Setup Photos



15.247(d) Radiated Spurious Emissions

Test Data



***DCCF transducer Duty Cycle Correction applied where needed and applicable.**

2dBi Test Data Sheets

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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/30/2011
Test Type: **Radiated Scan** Time: 09:17:33
Equipment: **2.4 GHz Wireless Mote** Sequence#: 1
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	6/8/2010	6/8/2012
T2	AN01316	Preamp	8447D	5/21/2010	5/21/2012
T3	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
T4	ANP05360	Cable	RG214	11/8/2010	11/8/2012
T5	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T6	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T7	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T8	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T9	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T10	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T11	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013
T12	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
T13	ANWO91269	Duty Cycle Correction Factor		NCR	NCR
T14	AN02742	Active Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	11/10/2010	11/10/2012
T15	AN02763-69	Waveguide	Multiple	9/2/2010	9/2/2012
T16	ANP05425	Cable	PE35591-120	12/17/2009	12/17/2011
T17	ANP05428	Cable	PE35591-60	12/17/2009	12/17/2011

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

Function	Manufacturer	Model #	S/N
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA
2dBi Antenna	NA	NA	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 9kHz-26GHz
RBW: 9-250kHz = 200Hz
0.250-30MHz = 9kHz
30-1000MHz = 100kHz
1-26GHz = 1MHz
VBW: 9-250kHz = 600Hz
0.250-30MHz = 27kHz
30-1000MHz = 300kHz
1-26GHz = 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +2 dBi Type N Plug antenna.
Duty Cycle Correction Factor will be applied where the emissions are above the limit.
DCCF = 20 log (On time/100ms) = -9.2dB

Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz
MID = 2440MHz
HIGH = 2475MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

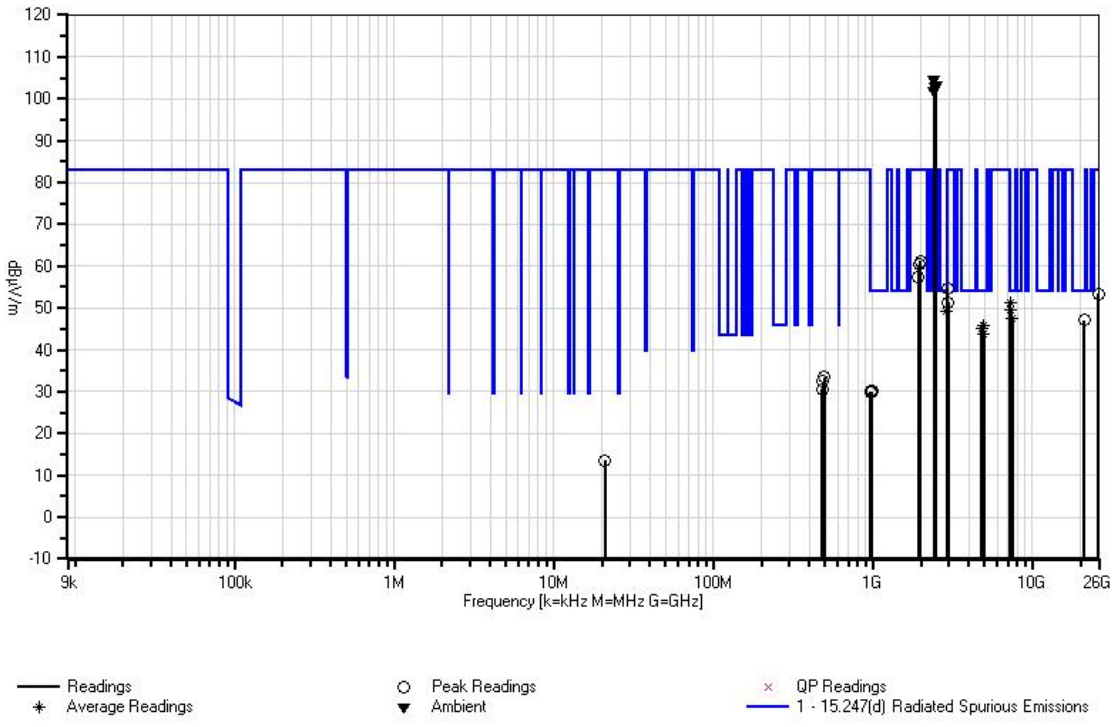
#	Freq	Rdng	T1 T5 T9 T13 T17	T2 T6 T10 T14	T3 T7 T11 T15	T4 T8 T12 T16	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2404.915M	66.7	+0.0	+0.0	+0.0	+0.0	+0.0	104.7	103.0	+1.7	Verti
	Ambient		+0.0	+1.3	+0.0	+27.9	290		LOW Fundamental		125
			-34.5	+0.3	+40.3	+2.7					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
2	2475.480M	70.8	+0.0	+0.0	+0.0	+0.0	+0.0	103.3	103.0	+0.3	Verti
	Ambient		+0.0	+1.3	+0.0	+27.9	290		HIGH Fundamental		119
			-34.4	+0.2	+34.7	+2.8					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

3	2440.486M Ambient	67.8	+0.0 +0.0 -34.5 +0.0 +0.0	+0.0 +1.3 +0.3 +0.0	+0.0 +0.0 +37.5 +0.0	+0.0 +27.9 +2.7 +0.0	+0.0 329	103.0	103.0 MID Fundamental	+0.0	Verti 119
4	2405.023M Ambient	64.0	+0.0 +0.0 -34.5 +0.0 +0.0	+0.0 +1.3 +0.3 +0.0	+0.0 +0.0 +40.3 +0.0	+0.0 +27.9 +2.7 +0.0	+0.0 251	102.0	103.0 LOW Fundamental	-1.0	Horiz 126
5	7321.488M Ave	48.2	+0.0 +0.0 -34.6 -9.2 +0.0	+0.0 +2.4 +0.5 +0.0	+0.0 +0.0 +0.9 +0.0	+0.0 +36.1 +5.2 +0.0	+0.0 190	49.5	54.0 MID	-4.5	Verti 128
6	2886.930M Ave	46.9	+0.0 +0.0 -34.3 +0.0 +0.0	+0.0 +1.6 +0.3 +0.0	+0.0 +0.0 +3.0 +0.0	+0.0 +28.8 +3.0 +0.0	+0.0 293	49.3	54.0 LOW	-4.7	Verti 119
7	7426.444M Ave	46.1	+0.0 +0.0 -34.6 -9.2 +0.0	+0.0 +2.3 +0.4 +0.0	+0.0 +0.0 +0.9 +0.0	+0.0 +36.2 +5.3 +0.0	+0.0 195	47.4	54.0 HIGH	-6.6	Verti 150
8	21128.000 M	38.3	+0.0 +0.0 +0.0 +0.0 +7.3	+0.0 +0.0 +0.0 -12.9	+0.0 +0.0 +0.0 +0.4	+0.0 +0.0 +0.0 +13.9	+0.0	47.0	54.0	-7.0	Verti
9	4880.963M Ave	39.1	+0.0 +0.0 -33.7 +0.0 +0.0	+0.0 +2.0 +0.4 +0.0	+0.0 +0.0 +0.8 +0.0	+0.0 +33.0 +4.2 +0.0	+0.0 180	45.8	54.0 MID	-8.2	Verti 119
10	4809.003M Ave	38.8	+0.0 +0.0 -33.8 +0.0 +0.0	+0.0 +2.0 +0.4 +0.0	+0.0 +0.0 +0.8 +0.0	+0.0 +32.9 +4.2 +0.0	+0.0 219	45.3	54.0 LOW	-8.7	Verti 157
11	4948.966M Ave	36.9	+0.0 +0.0 -33.7 +0.0 +0.0	+0.0 +2.0 +0.4 +0.0	+0.0 +0.0 +0.8 +0.0	+0.0 +33.1 +4.3 +0.0	+0.0 217	43.8	54.0 HIGH	-10.2	Verti 135
12	1980.003M	63.8	+0.0 +0.0 -34.7 +0.0 +0.0	+0.0 +1.2 +0.3 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +28.1 +2.5 +0.0	+0.0 290	61.2	83.0	-21.8	Verti 119

13	1951.989M	63.2	+0.0 +0.0 -34.8 +0.0 +0.0	+0.0 +1.2 +0.3 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +28.0 +2.5 +0.0	+0.0 329	60.4	83.0	-22.6	Verti 119
14	976.983M	29.9	+0.0 +2.3 +0.0 +0.0 +0.0	-29.0 +0.8 +0.0 +0.0	+24.1 +0.0 +0.0 +0.0	+2.0 +0.0 +0.0 +0.0	+0.0 109	30.1	54.0 MID	-23.9	Verti 105
15	990.965M	29.4	+0.0 +2.4 +0.0 +0.0 +0.0	-28.9 +0.8 +0.0 +0.0	+24.3 +0.0 +0.0 +0.0	+2.1 +0.0 +0.0 +0.0	+0.0 105	30.1	54.0 HIGH	-23.9	Verti 100
16	961.018M	30.1	+0.0 +2.2 +0.0 +0.0 +0.0	-29.1 +0.8 +0.0 +0.0	+23.9 +0.0 +0.0 +0.0	+2.0 +0.0 +0.0 +0.0	+0.0 104	29.9	54.0 LOW	-24.1	Verti 100
17	1924.023M	60.3	+0.0 +0.0 -34.9 +0.0 +0.0	+0.0 +1.2 +0.3 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +27.8 +2.5 +0.0	+0.0 290	57.2	83.0	-25.8	Verti 125
18	2927.943M	52.6	+0.0 +0.0 -34.2 +0.0 +0.0	+0.0 +1.6 +0.3 +0.0	+0.0 +0.0 +2.5 +0.0	+0.0 +28.9 +3.1 +0.0	+0.0	54.8	83.0 MID	-28.2	Verti 119
19	25792.000 M	40.6	+0.0 +0.0 +0.0 +0.0 +8.1	+0.0 +0.0 +0.0 -11.2	+0.0 +0.0 +0.0 +0.3	+0.0 +0.0 +0.0 +15.6	+0.0	53.4	83.0	-29.6	Verti
20	7216.334M Ave	50.0	+0.0 +0.0 -34.6 -9.2 +0.0	+0.0 +2.5 +0.5 +0.0	+0.0 +0.0 +1.0 +0.0	+0.0 +36.0 +5.2 +0.0	+0.0 203	51.4	83.0 LOW	-31.6	Verti 107
21	2970.047M	49.3	+0.0 +0.0 -34.2 +0.0 +0.0	+0.0 +1.6 +0.3 +0.0	+0.0 +0.0 +2.2 +0.0	+0.0 +29.0 +3.1 +0.0	+0.0 290	51.3	83.0 HIGH	-31.7	Verti 119
22	494.875M	41.9	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.9 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 105	33.5	83.0 HIGH	-49.5	Verti 100

23	487.645M	40.9	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.8 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 95	32.4	83.0 MID	-50.6	Verti 100
24	480.880M	39.1	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.7 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 100	30.5	83.0 LOW	-52.5	Verti 110
25	20.935M	45.3	+7.6 +0.4 +0.0 +0.0 +0.0	+0.0 +0.1 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.2 +0.0 +0.0 +0.0	-40.0	13.6	83.0	-69.4	Verti
26	33.466k	55.5	+11.1 +0.1 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0	-13.3	83.0	-96.3	Verti

CKC Laboratories, Inc. Date: 1/30/2011 Time: 09:17:33 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 1 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/29/2011
Test Type: **Radiated Scan** Time: 10:08:55
Equipment: **2.4 GHz Wireless Mote** Sequence#: 3
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01316	Preamp	8447D	5/21/2010	5/21/2012
	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
	ANP05360	Cable	RG214	11/8/2010	11/8/2012
	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN02374	Horn Antenna-ANSI C63.5 Calibration	RGA-60	10/12/2009	10/12/2011
T4	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T5	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013
T6	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
	ANWO91269	Duty Cycle Correction Factor		NCR	NCR

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

Function	Manufacturer	Model #	S/N
2dBi Antenna	NA	NA	NA
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2378-2405MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +2 dBi Type N Plug antenna.

Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz

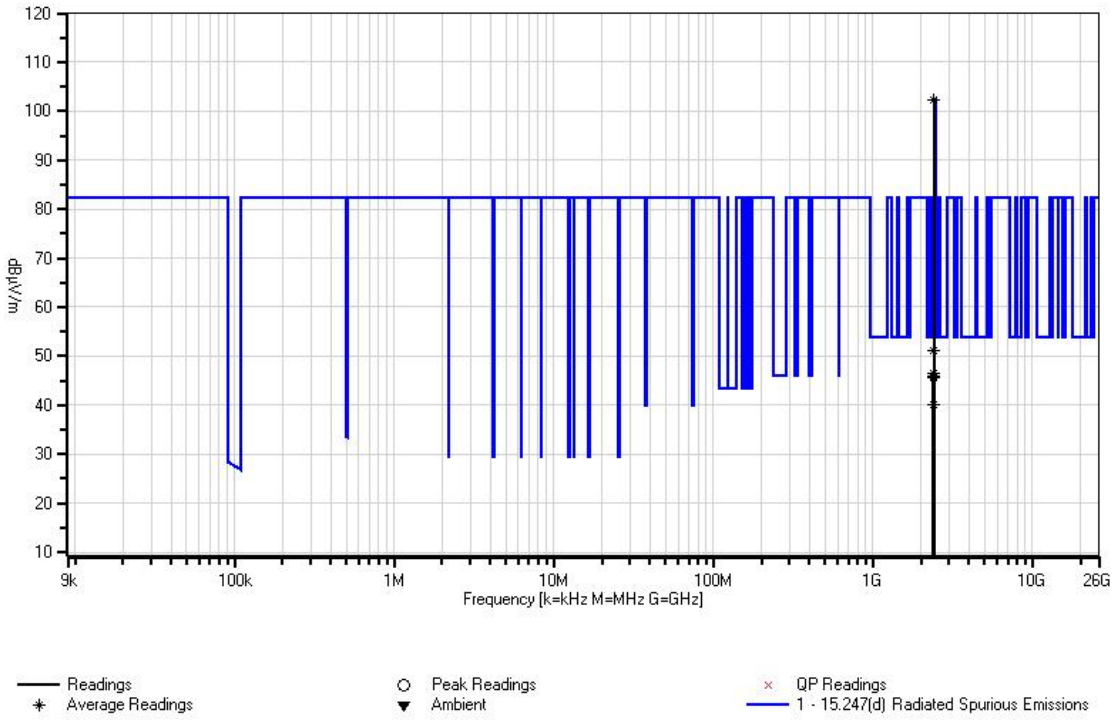
Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2404.946M	103.6	+1.3	+0.0	+28.9	-34.5	+0.0	102.3	102.3	+0.0	Verti
	Ave		+0.3	+2.7			290				125
2	2384.291M	48.0	+1.3	+0.0	+28.8	-34.5	+0.0	46.6	54.0	-7.4	Verti
	Ave		+0.3	+2.7			290				125
3	2385.717M	46.9	+1.3	+0.0	+28.8	-34.5	+0.0	45.5	54.0	-8.5	Verti
	Ave		+0.3	+2.7			290				125
4	2390.000M	41.4	+1.3	+0.0	+28.8	-34.5	+0.0	40.0	54.0	-14.0	Verti
	Ave		+0.3	+2.7			290				125
5	2400.000M	52.6	+1.3	+0.0	+28.8	-34.5	+0.0	51.2	82.3	-31.1	Verti
	Ave		+0.3	+2.7			290				125
6	2399.978M	52.6	+1.3	+0.0	+28.8	-34.5	+0.0	51.2	82.3	-31.1	Verti
	Ave		+0.3	+2.7			290				125
7	2396.090M	47.2	+1.3	+0.0	+28.8	-34.5	+0.0	45.8	82.3	-36.5	Verti
	Ave		+0.3	+2.7			290				125

CKC Laboratories, Inc. Date: 1/29/2011 Time: 10:08:55 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 3 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/29/2011
Test Type: **Radiated Scan** Time: 10:05:40
Equipment: **2.4 GHz Wireless Mote** Sequence#: 2
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01316	Preamp	8447D	5/21/2010	5/21/2012
	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
	ANP05360	Cable	RG214	11/8/2010	11/8/2012
	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN02374	Horn Antenna-ANSI C63.5 Calibration	RGA-60	10/12/2009	10/12/2011
T4	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T5	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013
T6	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
	ANWO91269	Duty Cycle Correction Factor		NCR	NCR

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

Function	Manufacturer	Model #	S/N
2dBi Antenna	NA	NA	NA
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2475-2500MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +2 dBi Type N Plug antenna.
Support laptop is setting the EUT in the proper mode and channels:
HIGH = 2475MHz

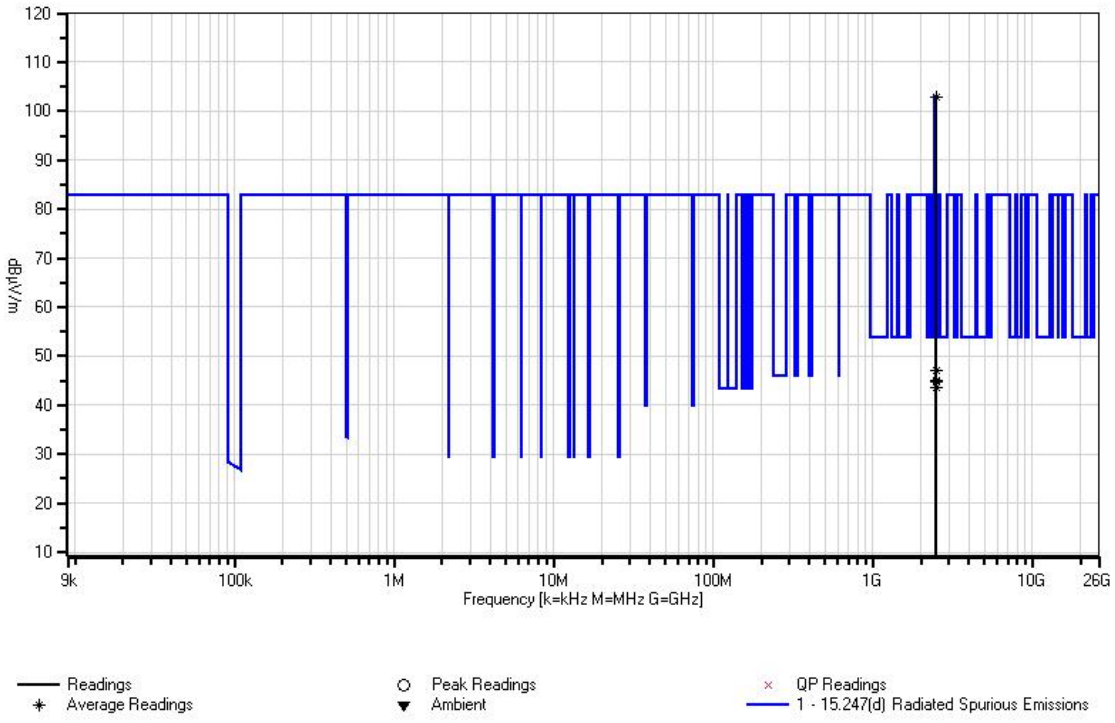
Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2475.000M	104.0	+1.3	+0.0	+29.0	-34.4	+0.0	102.9	102.9	+0.0	Verti
	Ave		+0.2	+2.8			290				119
2	2494.275M	48.2	+1.3	+0.0	+29.0	-34.4	+0.0	47.1	54.0	-6.9	Verti
	Ave		+0.2	+2.8			290				119
3	2483.725M	46.0	+1.3	+0.0	+29.0	-34.4	+0.0	44.9	54.0	-9.1	Verti
	Ave		+0.2	+2.8			290				119
4	2483.500M	45.8	+1.3	+0.0	+29.0	-34.4	+0.0	44.7	54.0	-9.3	Verti
	Ave		+0.2	+2.8			290				119
5	2495.750M	44.7	+1.3	+0.0	+29.0	-34.4	+0.0	43.6	54.0	-10.4	Verti
	Ave		+0.2	+2.8			290				119

CKC Laboratories, Inc. Date: 1/29/2011 Time: 10:05:40 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 2 Ext ATTN: 0 dB



6dBi Test Data Sheets

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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/30/2011
Test Type: **Radiated Scan** Time: 09:20:24
Equipment: **2.4 GHz Wireless Mote** Sequence#: 1
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	6/8/2010	6/8/2012
T2	AN01316	Preamp	8447D	5/21/2010	5/21/2012
T3	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
T4	ANP05360	Cable	RG214	11/8/2010	11/8/2012
T5	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T6	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T7	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T8	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T9	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T10	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
T11	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T12	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013
T13	ANWO91269	Duty Cycle Correction Factor		NCR	NCR
T14	AN02742	Active Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	11/10/2010	11/10/2012
T15	AN02763-69	Waveguide	Multiple	9/2/2010	9/2/2012
T16	ANP05425	Cable	PE35591-120	12/17/2009	12/17/2011
T17	ANP05428	Cable	PE35591-60	12/17/2009	12/17/2011

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

Function	Manufacturer	Model #	S/N
6dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-OMNI-6-0	2003662623
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 9kHz-26GHz
RBW: 9-250kHz = 200Hz
0.250-30MHz = 9kHz
30-1000MHz = 100kHz
1-26GHz = 1MHz
VBW: 9-250kHz = 600Hz
0.250-30MHz = 27kHz
30-1000MHz = 300kHz
1-26GHz = 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +6 dBi Antenna assembly.
Duty Cycle Correction Factor will be applied where the emissions are above the limit.
DCCF = 20 log (On time/100ms) = -9.2dB

Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz
MID = 2440MHz
HIGH = 2475MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

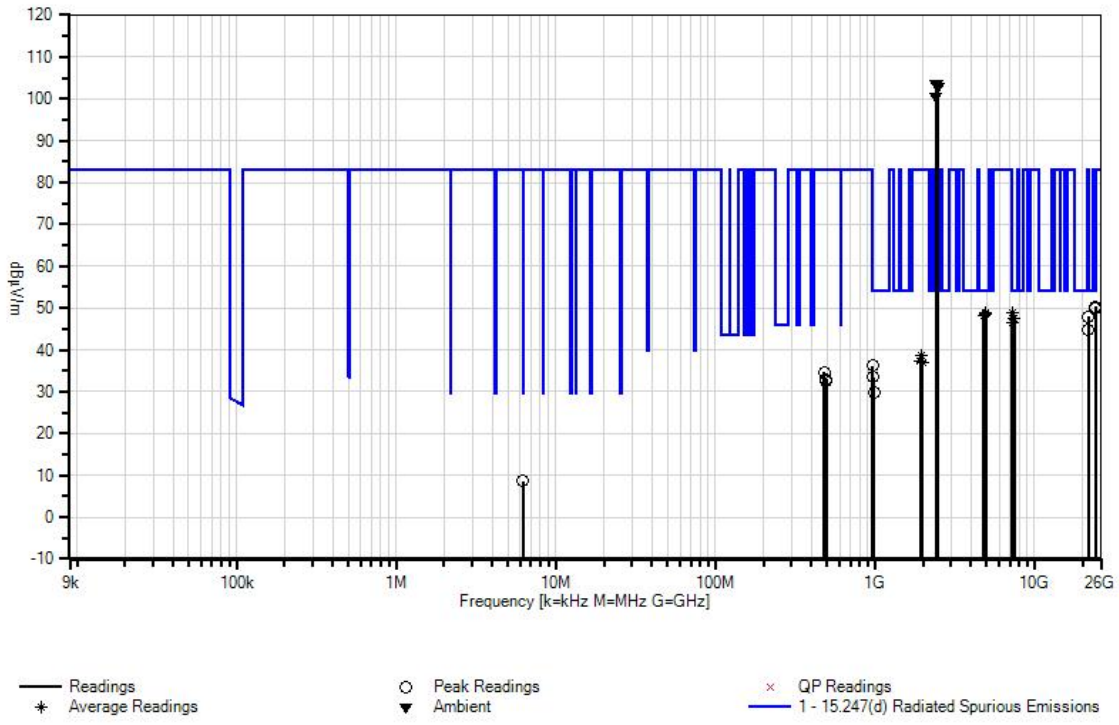
#	Freq	Rdng	T1 T5 T9 T13 T17	T2 T6 T10 T14	T3 T7 T11 T15	T4 T8 T12 T16	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2405.500M	65.7	+0.0	+0.0	+0.0	+0.0	+0.0	103.6	103.0	+0.6	Verti
	Ambient		+0.0	+1.3	+0.0	+27.9	163		LOW Fundamental		100
			+0.3	+2.7	-34.5	+40.2					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
2	2440.450M	68.4	+0.0	+0.0	+0.0	+0.0	+0.0	103.6	103.0	+0.6	Verti
	Ambient		+0.0	+1.3	+0.0	+27.9	175		MID Fundamental		100
			+0.3	+2.7	-34.5	+37.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

3	2475.514M	70.5	+0.0	+0.0	+0.0	+0.0	+0.0	103.0	103.0	+0.0	Verti
	Ambient		+0.0	+1.3	+0.0	+27.9	164		HIGH Fundamental		100
			+0.2	+2.8	-34.4	+34.7					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
4	2404.960M	62.8	+0.0	+0.0	+0.0	+0.0	+0.0	100.8	103.0	-2.2	Horiz
	Ambient		+0.0	+1.3	+0.0	+27.9	315		LOW Fundamental		100
			+0.3	+2.7	-34.5	+40.3					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
5	4879.039M	42.3	+0.0	+0.0	+0.0	+0.0	+0.0	49.0	54.0	-5.0	Verti
	Ave		+0.0	+2.0	+0.0	+33.0	192		LOW		100
			+0.4	+4.2	-33.7	+0.8					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
6	4949.001M	41.5	+0.0	+0.0	+0.0	+0.0	+0.0	48.4	54.0	-5.6	Verti
	Ave		+0.0	+2.0	+0.0	+33.1	192		HIGH		100
			+0.4	+4.3	-33.7	+0.8					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
7	4810.923M	41.7	+0.0	+0.0	+0.0	+0.0	+0.0	48.2	54.0	-5.8	Verti
	Ave		+0.0	+2.0	+0.0	+32.9	191		LOW		104
			+0.4	+4.2	-33.8	+0.8					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
8	7426.524M	46.1	+0.0	+0.0	+0.0	+0.0	+0.0	47.4	54.0	-6.6	Verti
	Ave		+0.0	+2.3	+0.0	+36.2	192		HIGH		114
			+0.4	+5.3	-34.6	+0.9					
			-9.2	+0.0	+0.0	+0.0					
			+0.0								
9	7321.471M	45.1	+0.0	+0.0	+0.0	+0.0	+0.0	46.4	54.0	-7.6	Verti
	Ave		+0.0	+2.4	+0.0	+36.1	149		MID		108
			+0.5	+5.2	-34.6	+0.9					
			-9.2	+0.0	+0.0	+0.0					
			+0.0								
10	963.005M	36.4	+0.0	-29.0	+23.9	+2.0	+0.0	36.3	54.0	-17.7	Verti
			+2.2	+0.8	+0.0	+0.0	286		LOW		115
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
11	975.000M	33.2	+0.0	-29.0	+24.1	+2.0	+0.0	33.4	54.0	-20.6	Verti
			+2.3	+0.8	+0.0	+0.0	83		MID		111
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
12	988.965M	29.2	+0.0	-28.9	+24.3	+2.1	+0.0	29.9	54.0	-24.1	Verti
			+2.4	+0.8	+0.0	+0.0	101		HIGH		126
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

13	24051.510 M	40.3	+0.0 +0.0 +0.0 +0.0 +8.0	+0.0 +0.0 +0.0 -13.5	+0.0 +0.0 +0.0 +0.4	+0.0 +0.0 +0.0 +15.1	+0.0 242	50.3	83.0	-32.7	Horiz 116
14	24048.870 M	39.9	+0.0 +0.0 +0.0 +0.0 +8.0	+0.0 +0.0 +0.0 -13.5	+0.0 +0.0 +0.0 +0.4	+0.0 +0.0 +0.0 +15.1	+0.0 242	49.9	83.0	-33.1	Verti 116
15	7216.536M Ave	47.4	+0.0 +0.0 +0.5 -9.2 +0.0	+0.0 +2.5 +5.2 +0.0	+0.0 +0.0 -34.6 +0.0	+0.0 +36.0 +1.0 +0.0	+0.0 191	48.8	83.0 LOW	-34.2	Verti 100
16	21643.680 M	40.2	+0.0 +0.0 +0.0 +0.0 +7.4	+0.0 +0.0 +0.0 -14.3	+0.0 +0.0 +0.0 +0.6	+0.0 +0.0 +0.0 +14.1	+0.0 242	48.0	83.0	-35.0	Horiz 116
17	21647.340 M	37.0	+0.0 +0.0 +0.0 +0.0 +7.4	+0.0 +0.0 +0.0 -14.3	+0.0 +0.0 +0.0 +0.6	+0.0 +0.0 +0.0 +14.1	+0.0 242	44.8	83.0	-38.2	Verti 116
18	1952.013M Ave	41.3	+0.0 +0.0 +0.3 +0.0 +0.0	+0.0 +1.2 +2.5 +0.0	+0.0 +0.0 -34.8 +0.0	+0.0 +28.0 +0.0 +0.0	+0.0 235	38.5	83.0 MID	-44.5	Verti 100
19	1924.014M Ave	40.4	+0.0 +0.0 +0.3 +0.0 +0.0	+0.0 +1.2 +2.5 +0.0	+0.0 +0.0 -34.9 +0.0	+0.0 +27.8 +0.0 +0.0	+0.0 154	37.3	83.0 LOW	-45.7	Verti 174
20	1980.017M Ave	39.4	+0.0 +0.0 +0.3 +0.0 +0.0	+0.0 +1.2 +2.5 +0.0	+0.0 +0.0 -34.7 +0.0	+0.0 +28.1 +0.0 +0.0	+0.0 242	36.8	83.0 HIGH	-46.2	Verti 116
21	480.900M	43.3	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.7 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 193	34.7	83.0 LOW	-48.3	Verti 100
22	495.220M	41.4	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.9 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 191	33.0	83.0 HIGH	-50.0	Verti 100

23	488.199M	41.0	+0.0 +1.5 +0.0 +0.0 +0.0	-29.6 +0.5 +0.0 +0.0	+17.8 +0.0 +0.0 +0.0	+1.3 +0.0 +0.0 +0.0	+0.0 191	32.5	83.0 MID	-50.5	Verti 100
24	6.200M	38.9	+9.5 +0.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.1 +0.0 +0.0 +0.0	-40.0 360	8.7	83.0	-74.3	Verti 100
25	25.999k	55.1	+11.9 +0.1 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0	-12.9	83.0	-95.9	Verti 100

CKC Laboratories, Inc. Date: 1/30/2011 Time: 09:20:24 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 1 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/25/2011
Test Type: **Radiated Scan** Time: 16:00:05
Equipment: **2.4 GHz Wireless Mote** Sequence#: 2
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01316	Preamp	8447D	5/21/2010	5/21/2012
	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
	ANP05360	Cable	RG214	11/8/2010	11/8/2012
	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN03209	Preamp	83051A	10/29/2010	10/29/2012
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T5	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T6	ANP05542	Cable	Heliax	10/23/2009	10/23/2011

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

Function	Manufacturer	Model #	S/N
6dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-OMNI-6-0	2003662623
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2378-2405MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +6 dBi Antenna assembly.
Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz

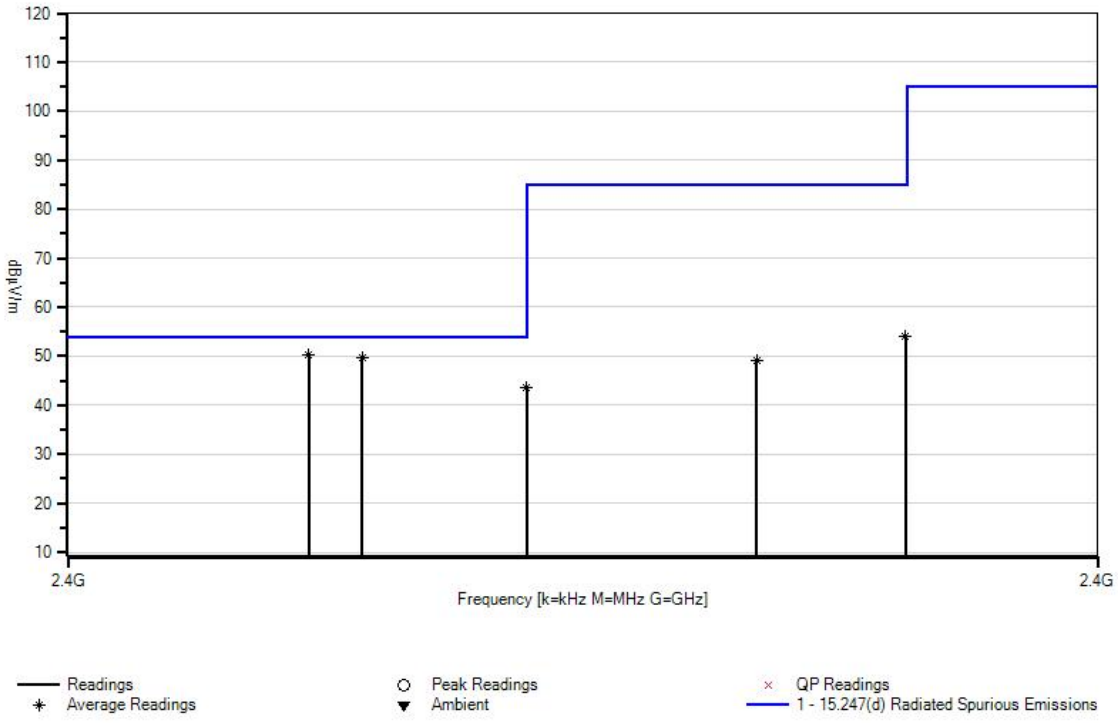
Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2384.291M	44.8	+1.3	+0.0	-26.7	+28.0	+0.0	50.4	54.0	-3.6	Verti
	Ave		+0.3	+2.7			302				107
2	2385.695M	44.0	+1.3	+0.0	-26.7	+28.0	+0.0	49.6	54.0	-4.4	Verti
	Ave		+0.3	+2.7			302				107
3	2390.000M	38.1	+1.3	+0.0	-26.7	+28.0	+0.0	43.7	54.0	-10.3	Verti
	Ave		+0.3	+2.7			302				107
4	2399.951M	48.5	+1.3	+0.0	-26.7	+27.9	+0.0	54.0	85.1	-31.1	Verti
	Ave		+0.3	+2.7			302				107
5	2396.036M	43.4	+1.3	+0.0	-26.7	+28.0	+0.0	49.0	85.1	-36.1	Verti
	Ave		+0.3	+2.7			302				107

CKC Laboratories, Inc. Date: 1/25/2011 Time: 16:00:05 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 2 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/25/2011
Test Type: **Radiated Scan** Time: 16:08:43
Equipment: **2.4 GHz Wireless Mote** Sequence#: 3
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01316	Preamp	8447D	5/21/2010	5/21/2012
	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
	ANP05360	Cable	RG214	11/8/2010	11/8/2012
	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN03209	Preamp	83051A	10/29/2010	10/29/2012
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T5	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T6	ANP05542	Cable	Heliax	10/23/2009	10/23/2011

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

Function	Manufacturer	Model #	S/N
6dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-OMNI-6-0	2003662623
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2475-2500MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +6 dBi Antenna assembly.

Support laptop is setting the EUT in the proper mode and channels:
HIGH = 2475MHz

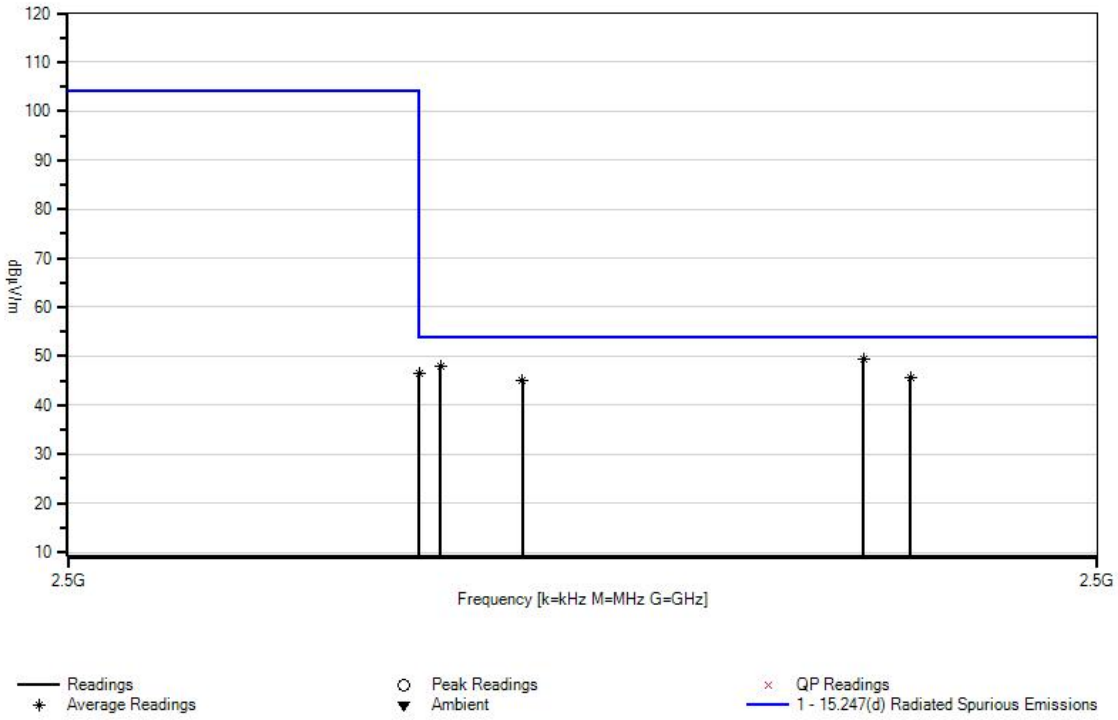
Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6							
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2494.300M	43.9	+1.3	+0.0	-26.8	+27.9	+0.0	49.3	54.0	-4.7	Verti
	Ave		+0.2	+2.8			177				112
2	2484.025M	42.4	+1.3	+0.0	-26.8	+27.9	+0.0	47.8	54.0	-6.2	Verti
	Ave		+0.2	+2.8			177				112
3	2483.500M	41.0	+1.3	+0.0	-26.8	+27.9	+0.0	46.4	54.0	-7.6	Verti
	Ave		+0.2	+2.8			177				112
4	2495.450M	40.1	+1.3	+0.0	-26.8	+27.9	+0.0	45.5	54.0	-8.5	Verti
	Ave		+0.2	+2.8			177				112
5	2486.000M	39.5	+1.3	+0.0	-26.8	+27.9	+0.0	44.9	54.0	-9.1	Verti
	Ave		+0.2	+2.8			177				112

CKC Laboratories, Inc. Date: 1/25/2011 Time: 16:08:43 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 3 Ext ATTN: 0 dB



8dBi Test Data Sheets

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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/30/2011
Test Type: **Radiated Scan** Time: 09:33:49
Equipment: **2.4 GHz Wireless Mote** Sequence#: 1
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	6/8/2010	6/8/2012
T2	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T3	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T5	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T6	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
T7	AN01271	Preamp	83017A	9/17/2009	9/17/2011
T8	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013
T9	ANWO91269	Duty Cycle Correction Factor		NCR	NCR
T10	AN01316	Preamp	8447D	5/21/2010	5/21/2012
T11	AN01993	Biconilog Antenna	CBL6111C	10/9/2009	10/9/2011
T12	ANP05360	Cable	RG214	11/8/2010	11/8/2012
T13	ANP05366	Cable	RG-214	10/20/2009	10/20/2011
T14	AN02742	Active Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	11/10/2010	11/10/2012
T15	AN02763-69	Waveguide	Multiple	9/2/2010	9/2/2012
T16	ANP05425	Cable	PE35591-120	12/17/2009	12/17/2011
T17	ANP05428	Cable	PE35591-60	12/17/2009	12/17/2011

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

Function	Manufacturer	Model #	S/N
8dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-PAN-8-0	1114211262
2.4 GHz Wireless Mote*	Dust Networks	M2511	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 9kHz-26GHz
RBW: 9-250kHz = 200Hz
0.250-30MHz = 9kHz
30-1000MHz = 100kHz
1-26GHz = 1MHz
VBW: 9-250kHz = 600Hz
0.250-30MHz = 27kHz
30-1000MHz = 300kHz
1-26GHz = 10Hz
Sweep: Auto
Mode: TX

EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +8 dBi Antenna assembly.
Duty Cycle Correction Factor will be applied where the emissions are above the limit.
DCCF = 20 log (On time/100ms) = -9.2dB

Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz
MID = 2440MHz
HIGH = 2475MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

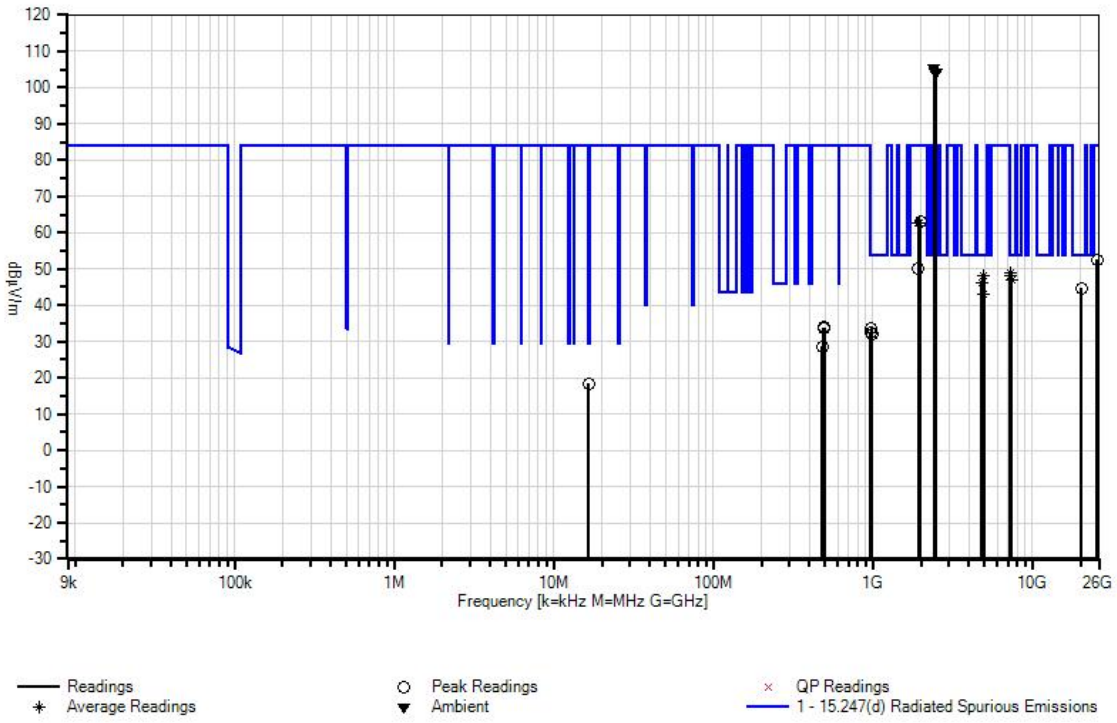
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11	T12					
			T13	T14	T15	T16					
			T17								
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2404.484M	67.3	+0.0	+1.3	+0.0	+27.9	+0.0	105.3	104.1	+1.2	Verti
	Ambient		+0.3	+2.7	-34.5	+40.3	102		LOW Fundamental		117
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
2	2475.480M	71.7	+0.0	+1.3	+0.0	+27.9	+0.0	104.2	104.1	+0.1	Verti
	Ambient		+0.2	+2.8	-34.4	+34.7	103		HIGH Fundamental		147
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

3	2440.450M Ambient	68.9	+0.0 +0.3 +0.0 +0.0 +0.0	+1.3 +2.7 +0.0 +0.0	+0.0 -34.5 +0.0 +0.0	+27.9 +37.5 +0.0 +0.0	+0.0 103	104.1	104.1 MID Fundamental	+0.0	Verti 119
4	7321.404M Ave	47.0	+0.0 +0.5 -9.2 +0.0 +0.0	+2.4 +5.2 +0.0 +0.0	+0.0 -34.6 +0.0 +0.0	+36.1 +0.9 +0.0 +0.0	+0.0 193	48.3	54.0 MID	-5.7	Verti 152
5	4949.000M Ave	41.1	+0.0 +0.4 +0.0 +0.0 +0.0	+2.0 +4.3 +0.0 +0.0	+0.0 -33.7 +0.0 +0.0	+33.1 +0.8 +0.0 +0.0	+0.0 167	48.0	54.0 HIGH	-6.0	Verti 102
6	7423.507M Ave	45.4	+0.0 +0.5 -9.2 +0.0 +0.0	+2.3 +5.3 +0.0 +0.0	+0.0 -34.6 +0.0 +0.0	+36.2 +0.9 +0.0 +0.0	+0.0 167	46.8	54.0 HIGH	-7.2	Verti 136
7	4808.909M Ave	39.6	+0.0 +0.4 +0.0 +0.0 +0.0	+2.0 +4.2 +0.0 +0.0	+0.0 -33.8 +0.0 +0.0	+32.9 +0.8 +0.0 +0.0	+0.0 137	46.1	54.0 LOW	-7.9	Verti 142
8	20128.000 M	36.4	+0.0 +0.0 +0.0 +0.0 +7.0	+0.0 +0.0 +0.0 -12.3	+0.0 +0.0 +0.0 +0.3	+0.0 +0.0 +0.0 +13.4	+0.0 360	44.8	54.0	-9.2	Verti 100
9	4878.906M Ave	36.4	+0.0 +0.4 +0.0 +0.0 +0.0	+2.0 +4.2 +0.0 +0.0	+0.0 -33.7 +0.0 +0.0	+33.0 +0.8 +0.0 +0.0	+0.0 344	43.1	54.0 MID	-10.9	Verti 212
10	974.805M	33.7	+0.0 +0.0 +0.0 +2.2 +0.0	+0.8 +0.0 -29.0 +0.0	+0.0 +0.0 +24.1 +0.0	+0.0 +0.0 +2.0 +0.0	+0.0 360	33.8	54.0 MID	-20.2	Verti 100
11	1980.021M	65.5	+0.0 +0.3 +0.0 +0.0 +0.0	+1.2 +2.5 +0.0 +0.0	+0.0 -34.7 +0.0 +0.0	+28.1 +0.0 +0.0 +0.0	+0.0 85	62.9	84.1 HIGH	-21.2	Verti 112
12	1923.949M Ave	65.7	+0.0 +0.3 +0.0 +0.0 +0.0	+1.2 +2.5 +0.0 +0.0	+0.0 -34.9 +0.0 +0.0	+27.8 +0.0 +0.0 +0.0	+0.0 125	62.6	84.1 LOW	-21.5	Verti 122

13	961.992M	32.7	+0.0 +0.0 +0.0 +2.2 +0.0	+0.8 +0.0 -29.1 +0.0	+0.0 +0.0 +23.9 +0.0	+0.0 +0.0 +2.0 +0.0	+0.0	32.5	54.0 LOW	-21.5	Verti 153
14	1952.088M Ave	65.3	+0.0 +0.3 +0.0 +0.0 +0.0	+1.2 +2.5 +0.0 +0.0	+0.0 -34.8 +0.0 +0.0	+28.0 +0.0 +0.0 +0.0	+0.0 95	62.5	84.1 MID	-21.6	Verti 112
15	988.905M	31.2	+0.0 +0.0 +0.0 +2.4 +0.0	+0.8 +0.0 -28.9 +0.0	+0.0 +0.0 +24.3 +0.0	+0.0 +0.0 +2.1 +0.0	+0.0 360	31.9	54.0 HIGH	-22.1	Verti 100
16	25472.000 M	40.5	+0.0 +0.0 +0.0 +0.0 +8.1	+0.0 +0.0 +0.0 -11.8	+0.0 +0.0 +0.0 +0.3	+0.0 +0.0 +0.0 +15.5	+0.0	52.6	84.1	-31.5	Verti 100
17	1923.959M	53.4	+0.0 +0.3 +0.0 +0.0 +0.0	+1.2 +2.5 +0.0 +0.0	+0.0 -34.9 +0.0 +0.0	+27.8 +0.0 +0.0 +0.0	+0.0 10	50.3	84.1 LOW	-33.8	Horiz 251
18	7216.462M Ave	47.4	+0.0 +0.5 +0.0 +0.0 +0.0	+2.5 +5.2 +0.0 +0.0	+0.0 -34.6 +0.0 +0.0	+36.0 +1.0 +0.0 +0.0	+0.0 190	48.8	84.1 LOW	-35.3	Verti 120
19	487.905M	42.5	+0.0 +0.0 +0.0 +1.5 +0.0	+0.5 +0.0 -29.6 +0.0	+0.0 +0.0 +17.8 +0.0	+0.0 +0.0 +1.3 +0.0	+0.0 360	34.0	84.1 MID	-50.1	Verti 100
20	495.027M	42.1	+0.0 +0.0 +0.0 +1.5 +0.0	+0.5 +0.0 -29.6 +0.0	+0.0 +0.0 +17.9 +0.0	+0.0 +0.0 +1.3 +0.0	+0.0 360	33.7	84.1 HIGH	-50.4	Verti 100
21	480.905M	37.3	+0.0 +0.0 +0.0 +1.5 +0.0	+0.5 +0.0 -29.6 +0.0	+0.0 +0.0 +17.7 +0.0	+0.0 +0.0 +1.3 +0.0	+0.0 360	28.7	84.1 LOW	-55.4	Verti 100

22	109.182k	40.1	+9.7 +0.0 +0.0 +0.1 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0 360	-30.1	26.9	-57.0	Verti 100
23	16.494M	49.0	+8.8 +0.0 +0.0 +0.3 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.2 +0.0	-40.0	18.3	84.1	-65.8	Verti 100

CKC Laboratories, Inc. Date: 1/30/2011 Time: 09:33:49 Dust Networks WO#: 91269
15.247(d) Radiated Spurious Emissions Test Distance: 3 Meters Vertical Sequence#: 1 Ext ATTN: 0 dB



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/28/2011
Test Type: **Radiated Scan** Time: 15:09:20
Equipment: **2.4 GHz Wireless Mote** Sequence#: 3
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T4	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T5	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
T6	AN01271	Preamp	83017A	9/17/2009	9/17/2011
	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013

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

Function	Manufacturer	Model #	S/N
8dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-PAN-8-0	1114211262
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2378-2405MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

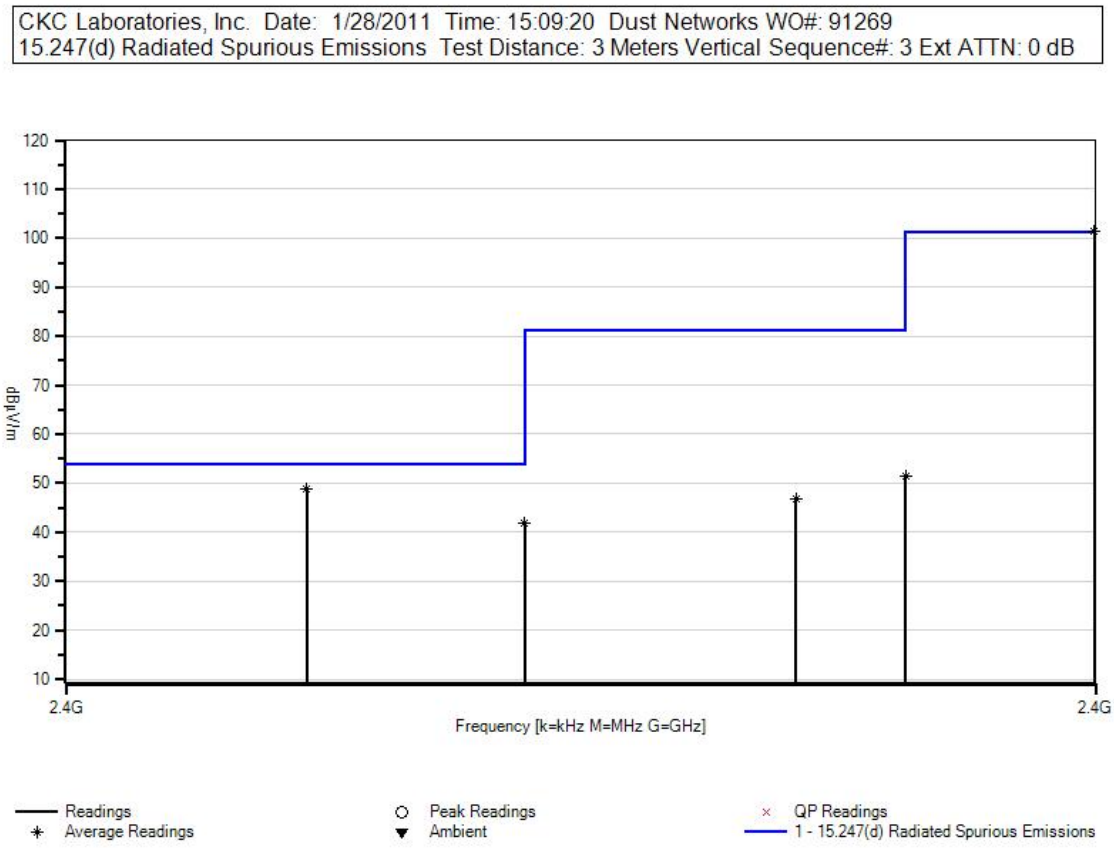
EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +8 dBi Antenna assembly.
Support laptop is setting the EUT in the proper mode and channels:
LOW = 2405MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2404.973M	103.6	+1.3	+0.0	+27.9	+0.3	+0.0	101.3	101.3	+0.0	Verti
	Ave		+2.7	-34.5			102				147
2	2384.291M	51.0	+1.3	+0.0	+28.0	+0.3	+0.0	48.8	54.0	-5.2	Verti
	Ave		+2.7	-34.5			102				147
3	2390.000M	44.1	+1.3	+0.0	+28.0	+0.3	+0.0	41.9	54.0	-12.1	Verti
	Ave		+2.7	-34.5			102				147
4	2400.000M	53.8	+1.3	+0.0	+27.9	+0.3	+0.0	51.5	81.3	-29.8	Verti
	Ave		+2.7	-34.5			102				147
5	2397.116M	49.1	+1.3	+0.0	+27.9	+0.3	+0.0	46.8	81.3	-34.5	Verti
	Ave		+2.7	-34.5			102				147



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

Customer: **Dust Networks**
Specification: **15.247(d) Radiated Spurious Emissions**
Work Order #: **91269** Date: 1/28/2011
Test Type: **Radiated Scan** Time: 15:13:43
Equipment: **2.4 GHz Wireless Mote** Sequence#: 2
Manufacturer: Dust Networks Tested By: Armando del Angel
Model: M2511
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03121	Cable	32026-2-29080-84	10/23/2009	10/23/2011
T2	AN02872	Spectrum Analyzer	E4440A	8/25/2009	8/25/2011
T3	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	5/7/2010	5/7/2012
T4	AN03123	Cable	32026-2-29801-12	10/23/2009	10/23/2011
T5	ANP05542	Cable	Heliax	10/23/2009	10/23/2011
T6	AN01271	Preamp	83017A	9/17/2009	9/17/2011
	AN03116	High Pass Filter	11SH10-00313	1/26/2011	1/26/2013

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

Function	Manufacturer	Model #	S/N
8dBi Antenna	Phoenix Contact	RAD-ISM-2400-ANT-PAN-8-0	1114211262
2.4 GHz Wireless Mote*	Dust Networks	M2511	NA

Support Devices:

Function	Manufacturer	Model #	S/N
TTL Converter	B&B Electronics	232LPTTL33	0069810016
Laptop	Dell	Inspiron 600m	NA

Test Conditions / Notes:

Temperature: 21°C
Humidity: 34%
Pressure: 102.1kPa
Freq. Range: 2475-2500MHz
RBW: 1MHz
VBW: 10Hz
Sweep: Auto
Mode: TX

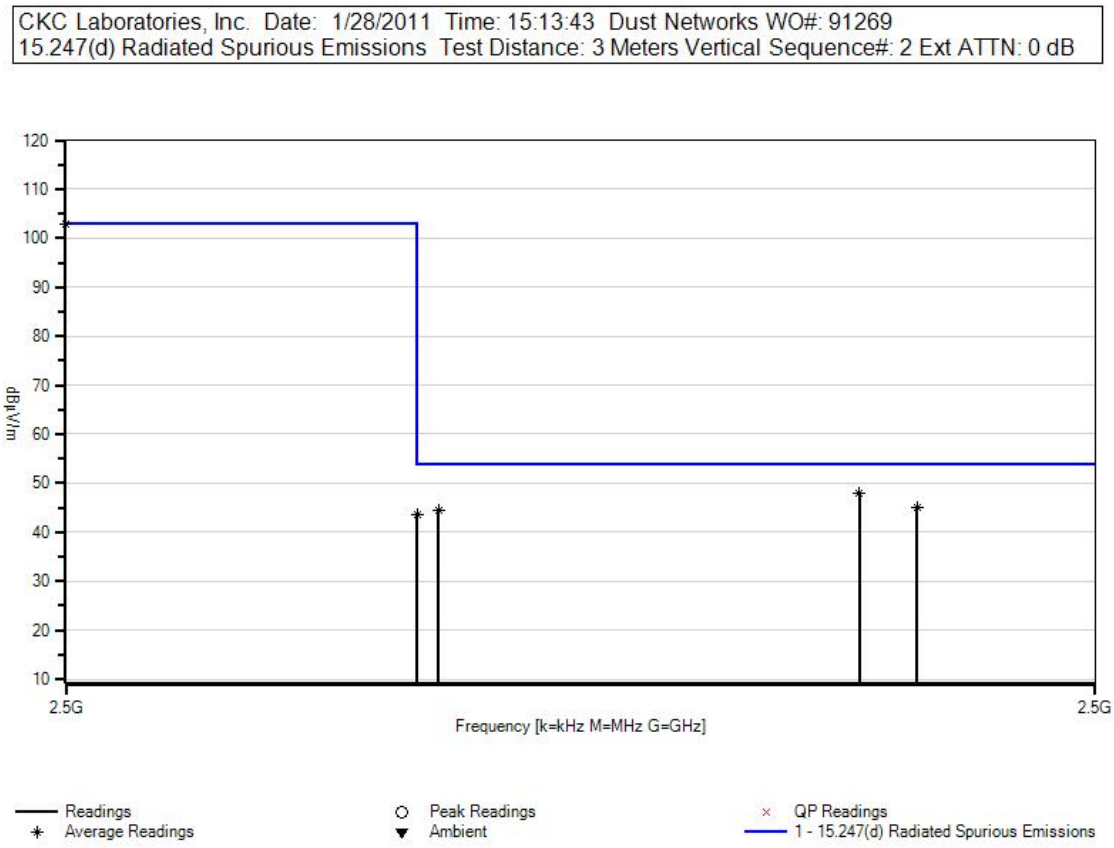
EUT is raised 80cm from the ground plane with styrofoam.
EUT is at 3m from the receive antenna.
EUT is connected to the support laptop through a TTL Converter.
The TTL converter is connected to the support laptop through a RS232 (serial) cable.
Antenna port connected to +8 dBi Antenna assembly.
Support laptop is setting the EUT in the proper mode and channels:
HIGH = 2475MHz

Note: Due to runtime limitations on the EUT (Modulated signal runtime <1 min), emission maximization is being performed with CW signals in both vertical & horizontal polarizations. Recorded results are only for the polarization(s) where the highest emissions were found.

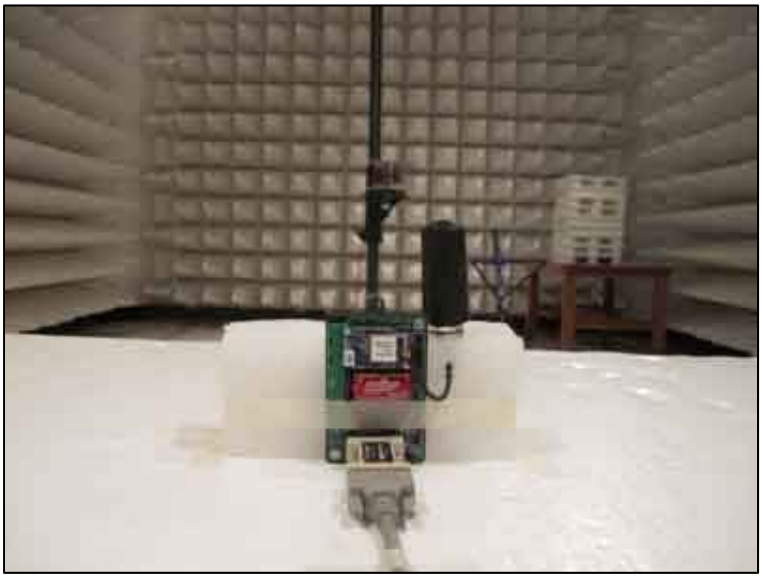
Ext Attn: 0 dB

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

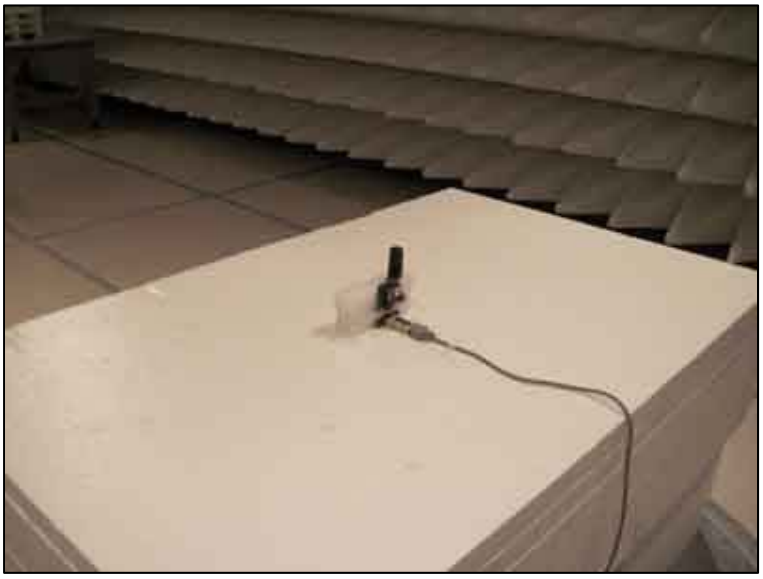
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2475.000M	105.1	+1.3	+0.0	+27.9	+0.2	+0.0	102.9	102.9	+0.0	Verti
	Ave		+2.8	-34.4			102				147
2	2494.250M	50.1	+1.3	+0.0	+27.9	+0.2	+0.0	47.9	54.0	-6.1	Verti
	Ave		+2.8	-34.4			102				147
3	2495.650M	47.1	+1.3	+0.0	+27.9	+0.2	+0.0	44.9	54.0	-9.1	Verti
	Ave		+2.8	-34.4			102				147
4	2484.025M	46.7	+1.3	+0.0	+27.9	+0.2	+0.0	44.5	54.0	-9.5	Verti
	Ave		+2.8	-34.4			102				147
5	2483.500M	45.9	+1.3	+0.0	+27.9	+0.2	+0.0	43.7	54.0	-10.3	Verti
	Ave		+2.8	-34.4			102				147



Test Setup Photos



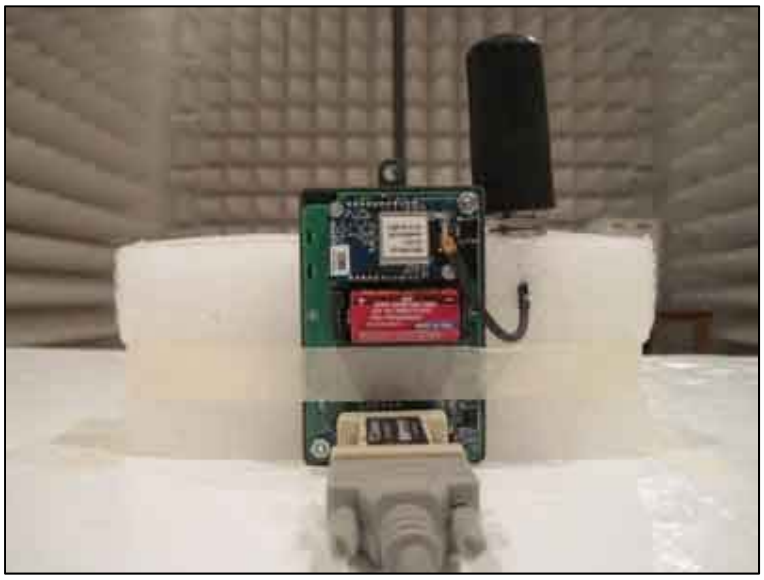
2dBi



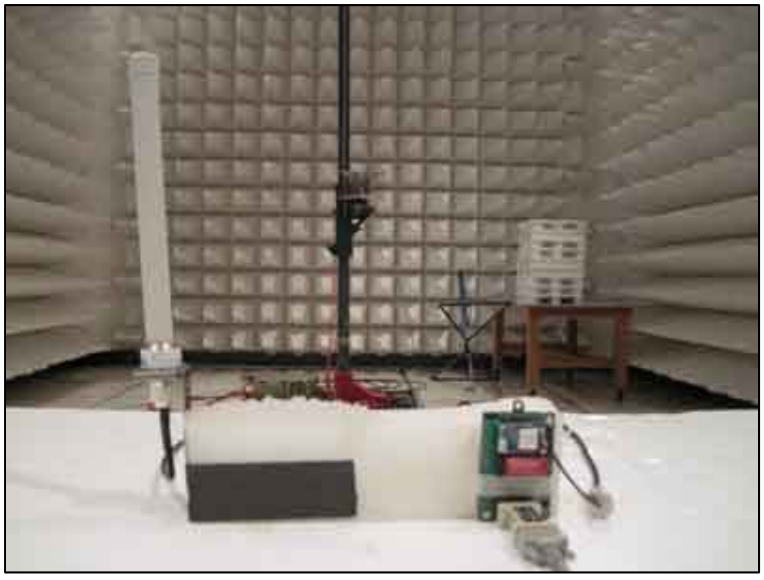
2dBi

2dBi

2dBi

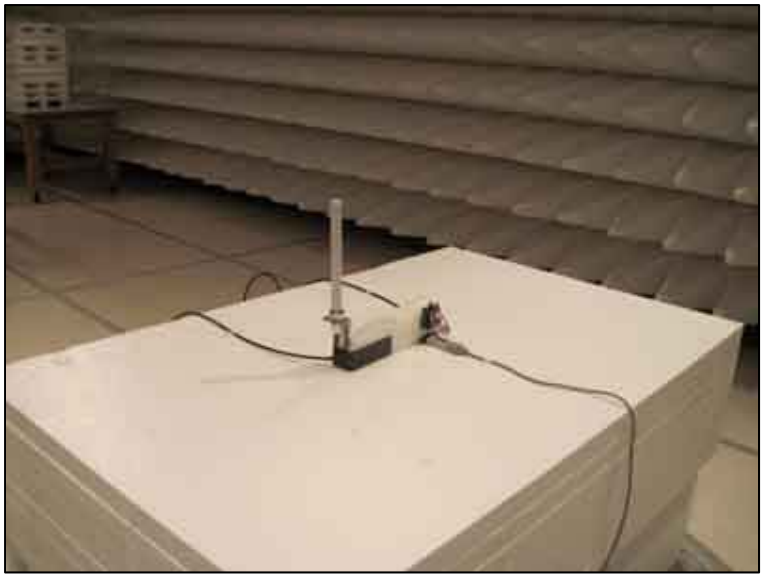


2dBi



6dBi

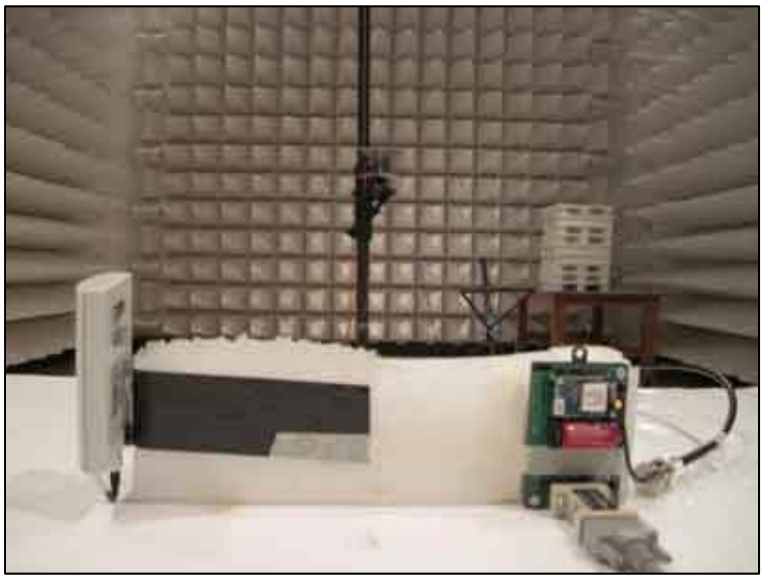
6dBi



6dBi

6dBi

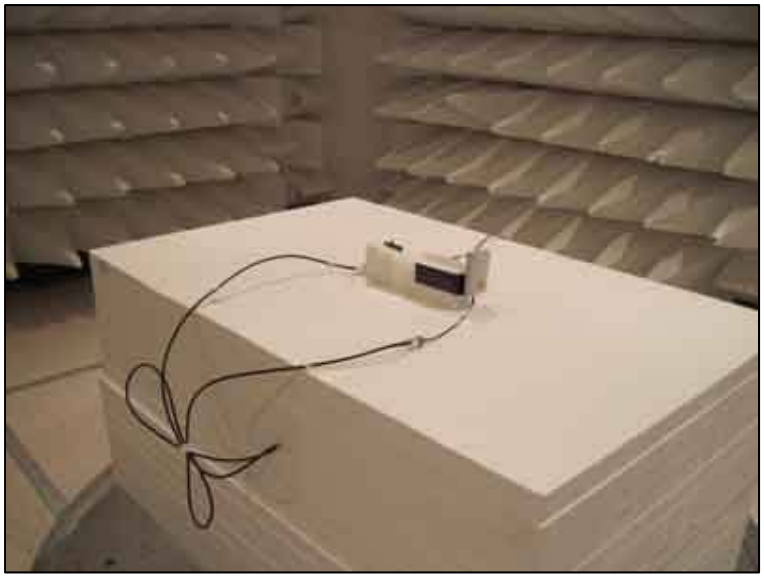
6dBi



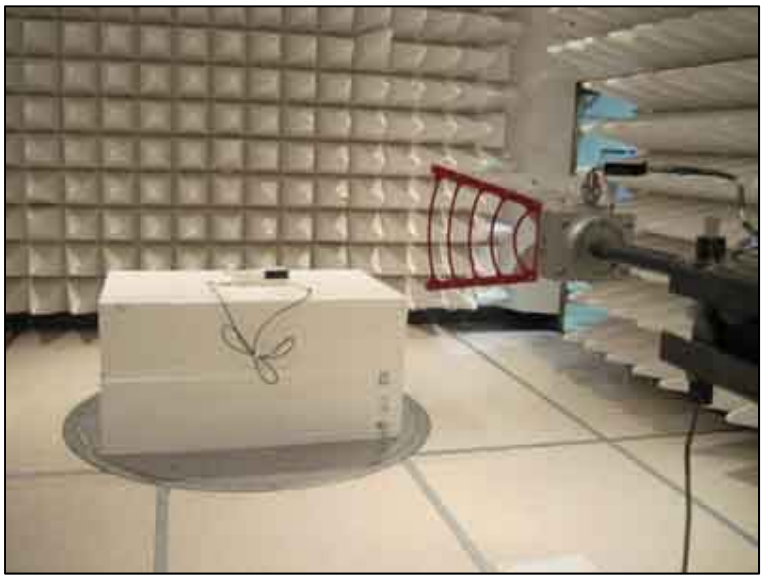
8dBi

8dBi

8dBi



8dBi



8dBi

15.247(e) Peak Power Spectral Density

Test Setup

Temp: 21°C
Humidity: 34%
Pressure: 102.4kPa
Frequency Range: 2405-2475MHz
RBW: 3 kHz
VBW: 9 kHz
Span: 300 kHz
Sweep: 100 s

EUT's antenna port is connected to the Spectrum analyzer through a cable and a 20dB attenuator.
EUT is connected to the support laptop through a TTL RS232 adaptor.
Support laptop is setting the EUT in the proper mode (TX) and channels:
LOW: 2405MHz
MID: 2440MHz
HIGH: 2475MHz

Engineer Name: A. del Angel

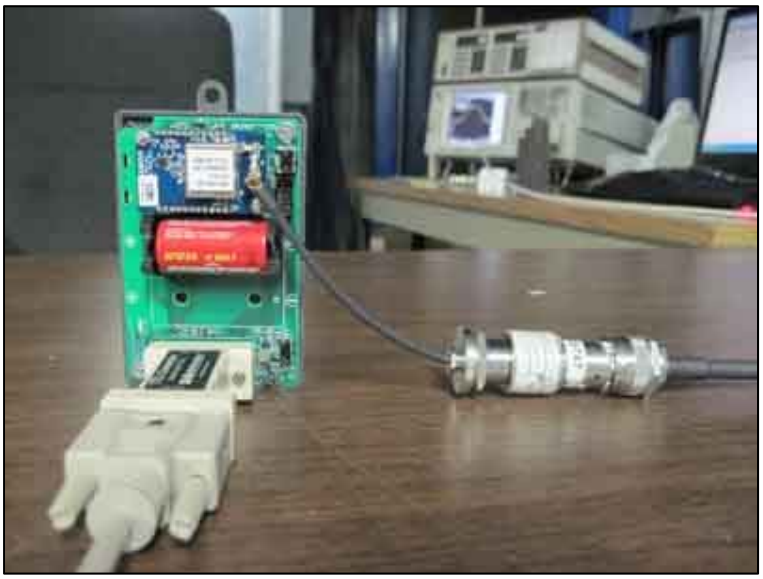
Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	E4440A	Agilent	8/25/2009	8/25/2011
P05747	Attenuator	PE7004-20	Pasternack	3/18/2010	3/18/2012
03121	Cable	32026-2-29080-84	Astrolab	10/23/2009	10/23/2011

Test Data

Frequency (MHz)	PSD (dBm)	15.247(e) Limit	Result
2405	-5.6	8dBm/3kHz*	Pass
2440	-5.3	8dBm/3kHz*	Pass
2475	-4.7	8dBm/3kHz*	Pass

Note: *The 8dBm/3kHz limit from FCC 15.247 has been modified due to the fact that one of the antenna options has a gain of 8dBi and the specified limit is for antennas with a maximum gain of 6dBi, thus the limit has been reduced by 2dBi to account for the 8dBi antenna.

Test Setup Photos



RSS-210

99% Occupied Bandwidth

Test Setup

Temp: 21°C
Humidity: 34%
Pressure: 102.4kPa
Frequency Range: 2405-2475MHz
RBW: 100 kHz
VBW: 300 kHz
Sweep: Auto

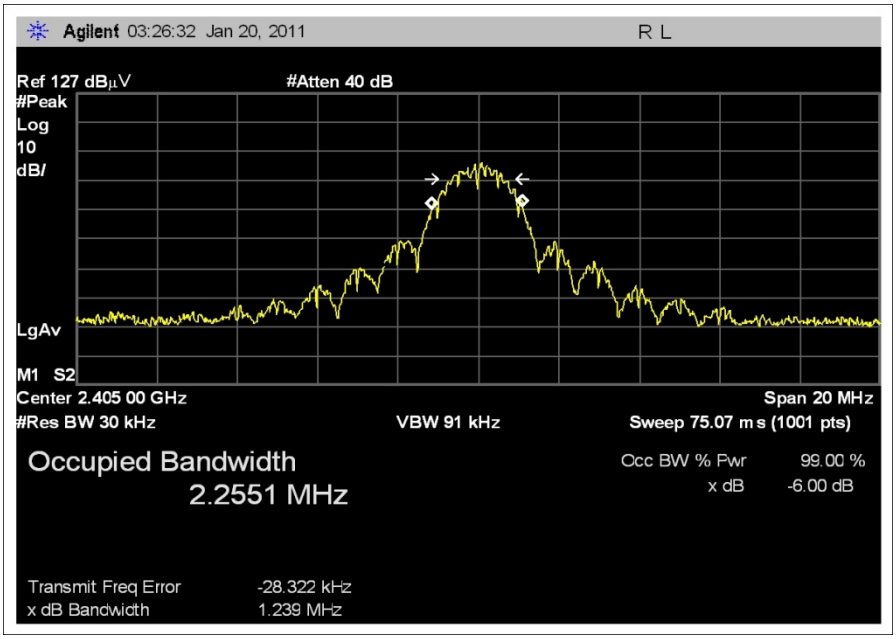
EUT's antenna port is connected to the Spectrum analyzer through a cable and a 20dB attenuator.
EUT is connected to the support laptop through a TTL RS232 adaptor.
Support laptop is setting the EUT in the proper mode (TX) and channels:
LOW: 2405MHz
MID: 2440MHz
HIGH: 2475MHz

Engineer Name: A. del Angel

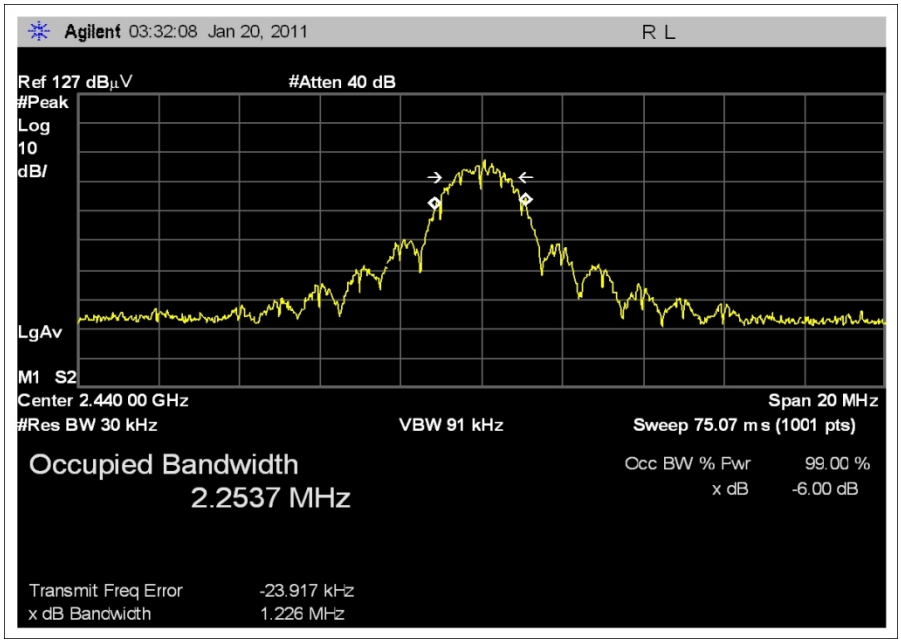
Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02872	Spectrum Analyzer	E4440A	Agilent	8/25/2009	8/25/2011
P05747	Attenuator	PE7004-20	Pasternack	3/18/2010	3/18/2012
03121	Cable	32026-2-29080-84	Astrolab	10/23/2009	10/23/2011

Test Data

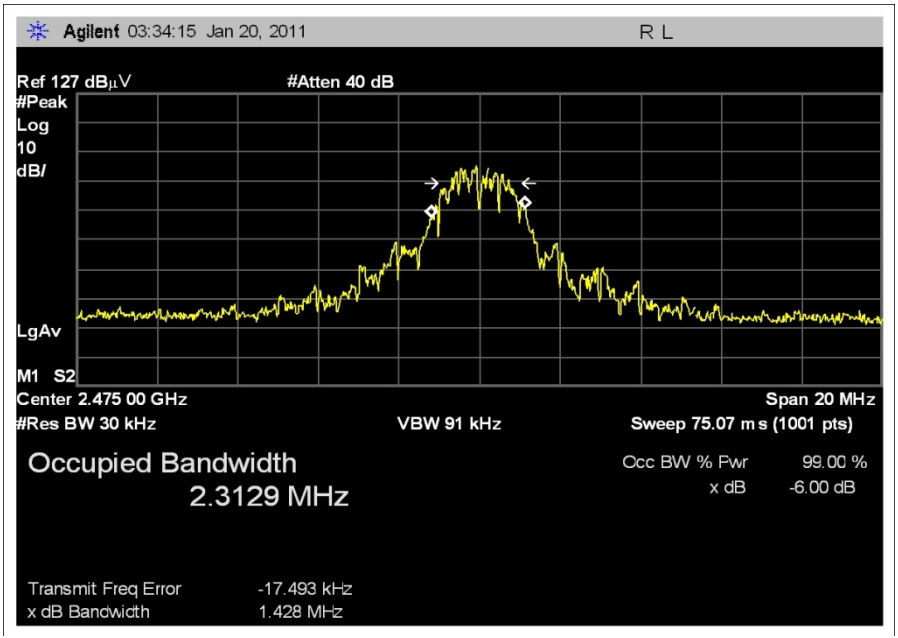
Frequency (MHz)	99% Bandwidth (kHz)	RSS-210 99% Bandwidth Limit	Result
2405	2255	>500kHz	Pass
2440	2253	>500kHz	Pass
2475	2312	>500kHz	Pass


Agilent 03:26:32 Jan 20, 2011
R L
Ref 127 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 2.405 00 GHz
Span 20 MHz
#Res BW 30 kHz
VBW 91 kHz
Sweep 75.07 ms (1001 pts)
Occupied Bandwidth
2.2551 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -28.322 kHz
x dB Bandwidth 1.239 MHz

Low

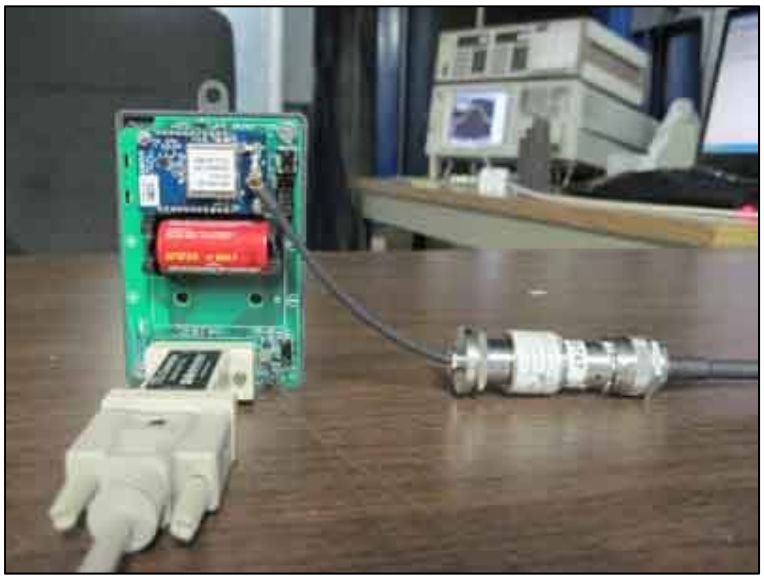

Agilent 03:32:08 Jan 20, 2011
R L
Ref 127 dBµV
#Atten 40 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 2.440 00 GHz
Span 20 MHz
#Res BW 30 kHz
VBW 91 kHz
Sweep 75.07 ms (1001 pts)
Occupied Bandwidth
2.2537 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -23.917 kHz
x dB Bandwidth 1.226 MHz

Mid



High

Test Setup Photos



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

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. 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	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 "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "QP" or an "Ave" on the appropriate rows of the data sheets. 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/receiver readings recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients 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

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. 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.