

Spectralux Corporation

TEST REPORT FOR

Dlink+ w/CPDLC, 14114-1-01

Tested To The Following Standards:

FCC Part 87 Subpart D

Report No.: 91600-10

Date of issue: October 4, 2012



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.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Spectralux Corporation
12335 134th Court NE
Redmond, WA 98052

REPORT PREPARED BY:

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

REPRESENTATIVE: Gary Altman
Customer Reference Number: 112583

Project Number: 91600

DATE OF EQUIPMENT RECEIPT:

September 17, 2012

DATE(S) OF TESTING:

September 17 - 20, 2012

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.

A handwritten signature in black ink that reads "Steve Behm".

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 #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	R-2296 C-2506 T-1489 G-284

SUMMARY OF RESULTS

Standard / Specification: FCC Part 87 Subpart D

Description	Test Procedure/Method	Results
Power and Emissions	FCC 87.131 / TIA / EIA 603-C	Pass
Frequency Stability	FCC 87.133 / TIA / EIA 603-C	Pass
Bandwidth of Emissions	FCC 87.135 / TIA / EIA 603-C	Pass
Emissions Limitations	FCC 87.139 / TIA / EIA 603-C	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

Dlink+ w/CPDLC

Manuf: Spectralux Corporation

Model: 14114-1-01

Serial: 1001 / B.O.M REV.G

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

EUT Labels



Dlink+ w/CPDLC, SN: 1001 / B.O.M REV.G

FCC PART 87

87.131 Power and Emissions

Test Conditions / Setup

Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 9kHz -1.36975GHz

EUT is connected to a laptop through an Ethernet cable.
Spectrum analyzer is connected to the EUT's RF port through a cable and a 20dB attenuator.
Spectrum analyzer's built in RF power measurement suite used to perform the measurements.
Values were then input into EMI test to account for the losses in the attenuator and cable.

Testing is being performed per TIA / EIA 603-C.

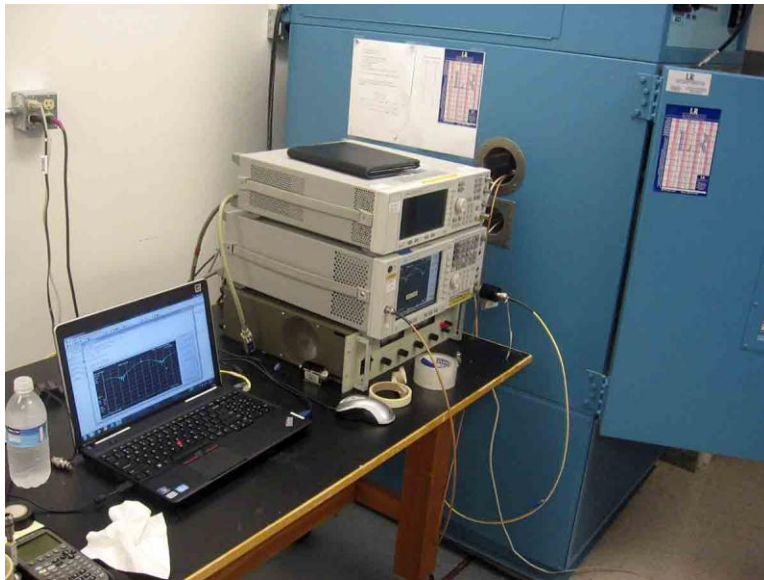
Engineer Name: A. del Angel

Test Equipment

Asset	Description	Model	Manufacturer	Cal Date	Cal Due
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
P06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013

Test Data			
Channel	% Input Voltage	Mode A Power dBm	Mode 2 Power dBm
Low	85%	41.9 dBm	41.9 dBm
	100%	41.5 dBm	41.9 dBm
	115%	42.0 dBm	41.9 dBm
Middle	85%	41.7 dBm	42.2 dBm
	100%	41.6 dBm	42.2 dBm
	115%	41.8 dBm	42.2 dBm
High	85%	41.8 dBm	42.1 dBm
	100%	41.8 dBm	42.1 dBm
	115%	41.9 dBm	42.1 dBm

Test Setup Photos



87.133 Frequency Stability

Test Conditions / Setup

Temp: -20°C - +50°C

Humidity: 34%

Pressure: 101.2kPa

Frequency Range: 118-136.975MHz

Spectrum analyzer is connected to the EUT's RF port through a cable and a 20dB attenuator.

EUT is located inside the temperature chamber and connected to a laptop outside the chamber through an Ethernet cable.

Temperature will vary from -20°C to +50°C in 10°C steps.

The EUT will be off during the temperature stabilization period (45-60Min) and after that it will be turned on for 15 min before performing the measurement. This process will be repeated for each temperature.

Testing is being performed per TIA / EIA 603-C.

Engineer Name: A. del Angel

Test Equipment

Asset	Description	Model	Manufacturer	Cal Date	Cal Due
02872	Spectrum Analyzer	E4440A	Agilent	7/23/2011	7/23/2013
02757	Temperature Chamber	F100/350-8	Bemco	1/30/2011	1/30/2013
P06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013

Test Data							
Mode A							
Temp °C	Low Freq	Mid Freq	High Freq	Low PPM	Mid PPM	High PPM	Limit PPM
-20	117.999895	127.49988	136.974875	-0.8898305	-0.9411765	-0.9125753	30
-10	117.99989	127.49988	136.974865	-0.9322034	-0.9411765	-0.9855813	30
0	117.99988	127.49988	136.97487	-1.0169492	-0.9411765	-0.9490783	30
10	117.999885	127.49988	136.974865	-0.9745763	-0.9411765	-0.9855813	30
20	117.99987	127.499865	136.974855	-1.1016949	-1.0588235	-1.0585873	30
30	117.999875	127.499865	136.974855	-1.059322	-1.0588235	-1.0585873	30
40	117.99988	127.49987	136.974865	-1.0169492	-1.0196078	-0.9855813	30
50	117.99987	127.49986	136.974855	-1.1016949	-1.0980392	-1.0585873	30

Test Data							
Mode 2							
Temp °C	Low Freq	Mid Freq	High Freq	Low PPM	Mid PPM	High PPM	Limit PPM
-20	117.999905	127.4999	136.974985	-0.8050847	-0.7843137	-0.109509	5
-10	118.00002	127.499995	136.974945	0.16949153	-0.0392157	-0.4015331	5
0	117.99997	127.499945	136.974905	-0.2542373	-0.4313725	-0.6935572	5
10	117.999955	127.499875	136.974855	-0.3813559	-0.9803922	-1.0585873	5
20	117.99989	127.499865	136.974895	-0.9322034	-1.0588235	-0.7665632	5
30	117.99988	127.499875	136.97477	-1.0169492	-0.9803922	-1.6791385	5
40	117.999805	127.499885	136.97488	-1.6525424	-0.9019608	-0.8760723	5
50	117.999895	127.5	136.974755	-0.8898305	0	-1.7886476	5

Test Setup Photos



87.135 Bandwidth of Emissions

Test Conditions / Setup

Temp: 21°C
Humidity: 34%
Pressure: 101.2kPa
Frequency Range: 9kHz -1.36975GHz

Spectrum analyzer is connected to the EUT's RF port through a 20dB attenuator.
Spectrum analyzer's built in Occupied Bandwidth measurement suite used to perform the measurements.

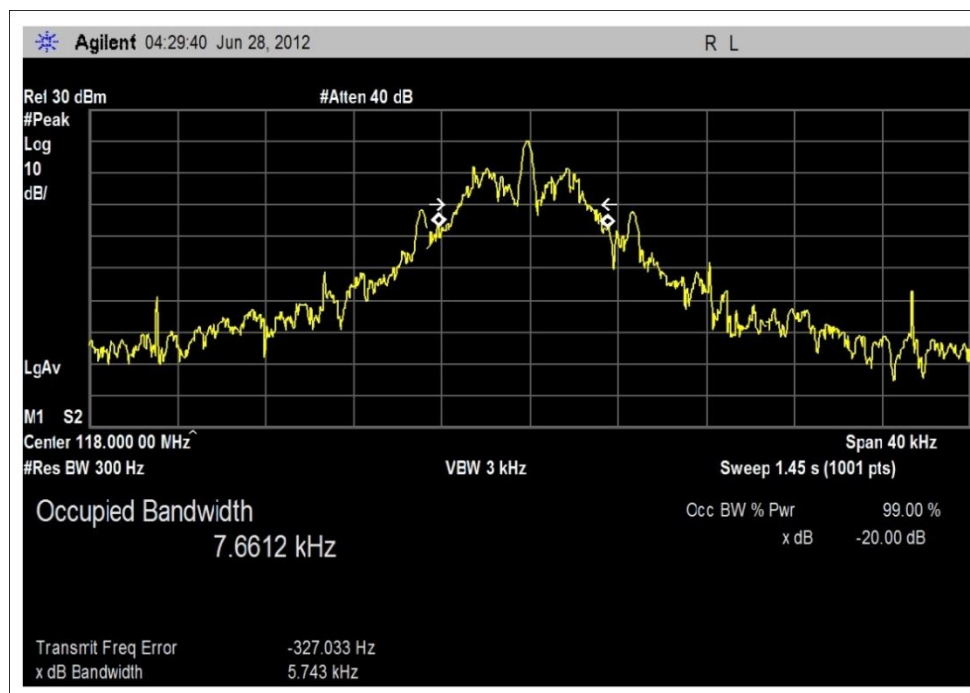
Testing is being performed per TIA / EIA 603-C.

Engineer Name: A. del Angel

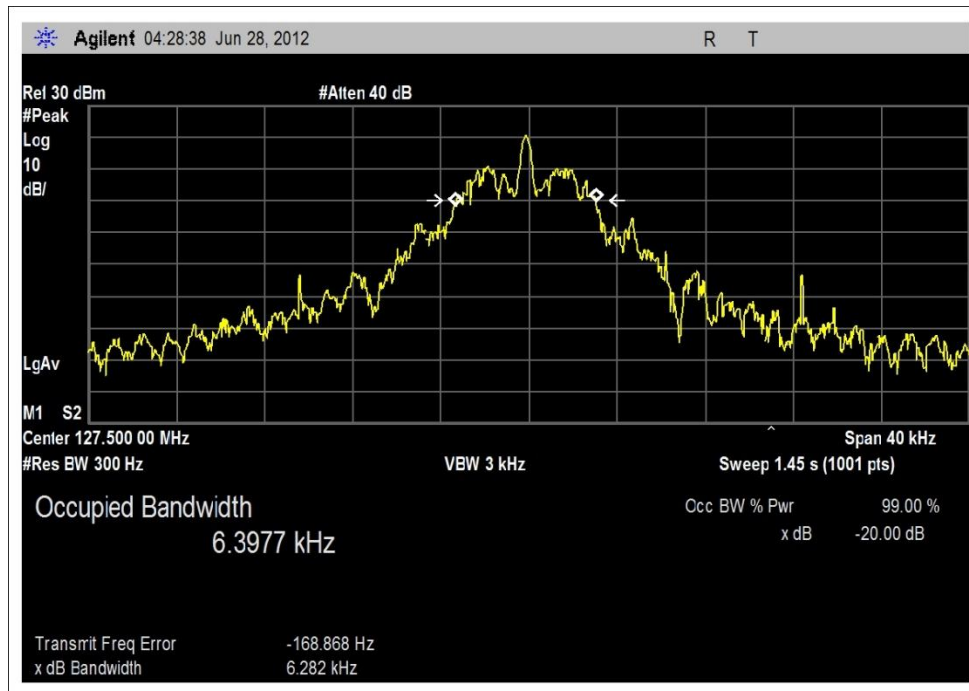
Test Equipment

Asset	Description	Model	Manufacturer	Cal Date	Cal Due
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
P06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013

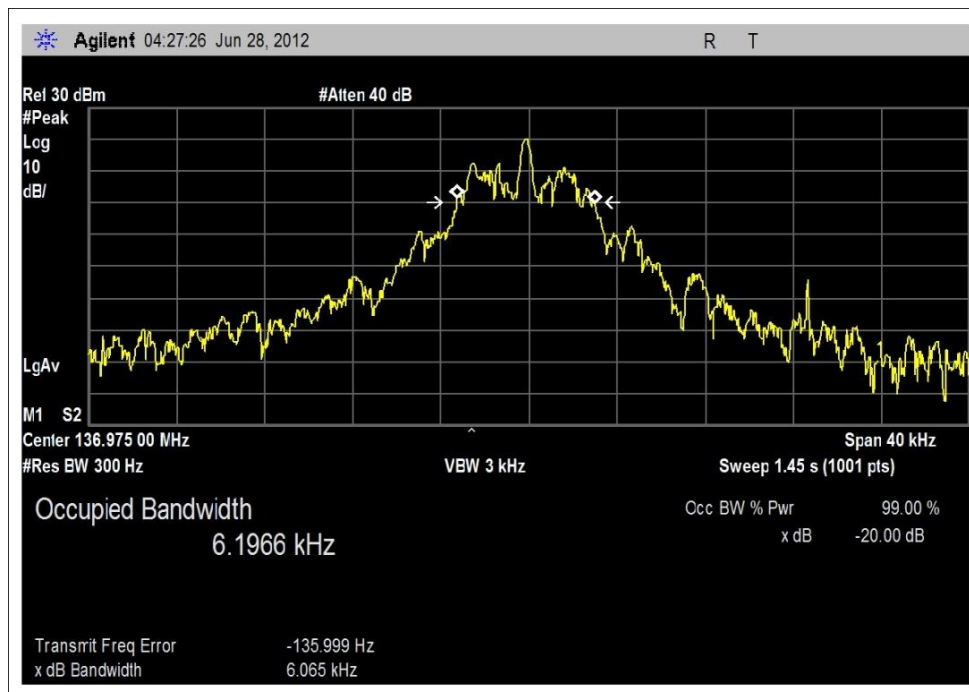
Test Data		
Mode A (A2D)		
Frequency	Bandwidth	Bandwidth Limit
Low	6.282kHz	13kHz
Middle	5.743kHz	13kHz
High	6.065kHz	13kHz



Mode A Low Channel

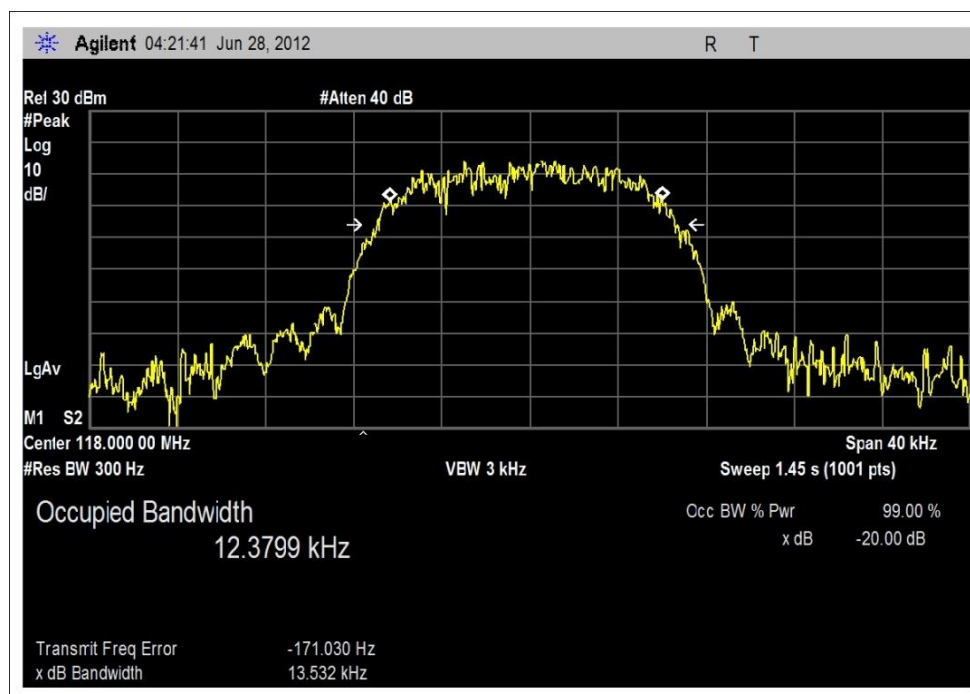


Mode A Middle Channel

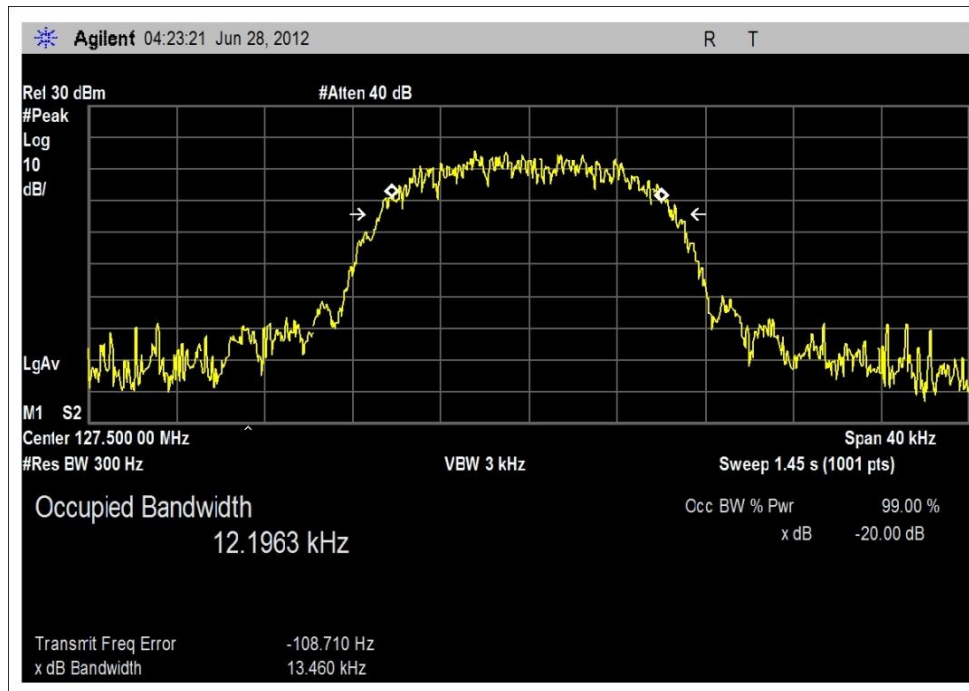


Mode A High Channel

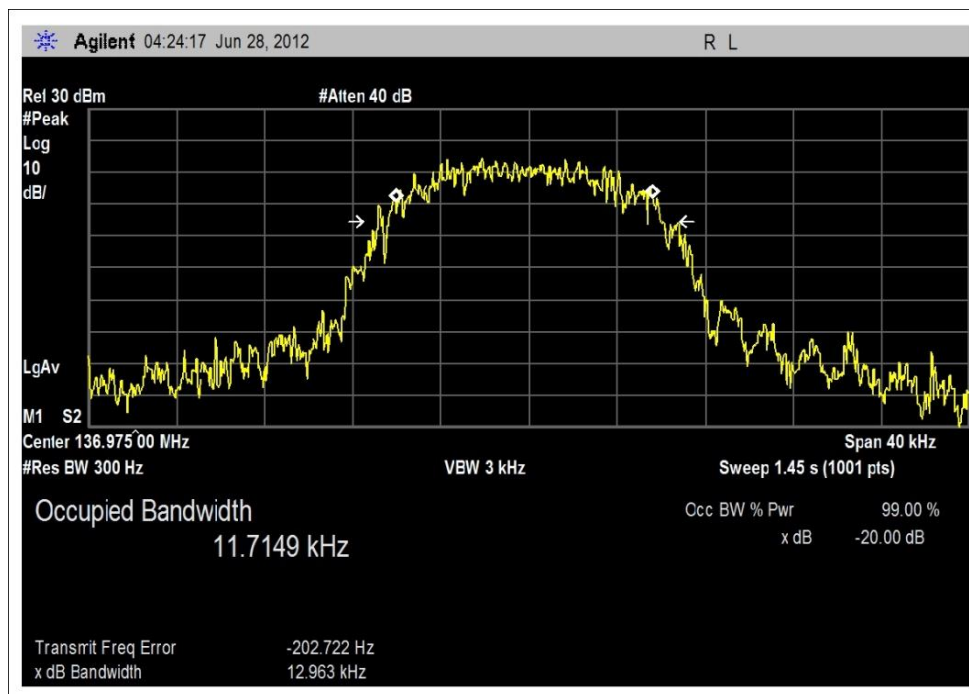
Test Data		
Mode 2 (G1D)		
Frequency	Bandwidth	Bandwidth Limit
Low	13.532kHz	14kHz
Middle	13.460kHz	14kHz
High	12.963kHz	14kHz



Mode 2 Low Channel

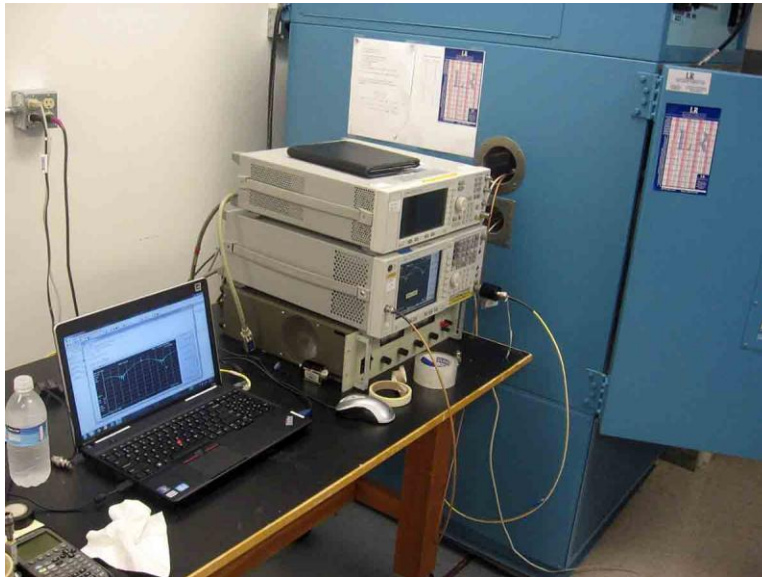


Mode 2 Middle Channel



Mode 2 High Channel

Test Setup Photos



87.139 Emissions Limitations

Spurious Emissions at Antenna Terminal

Test Data

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

Customer: **Spectralux Corporation**
 Specification: **87.139 Conducted Spurious Emissions Mask D**
 Work Order #: **91600** Date: 9/19/2012
 Test Type: **Conducted Emissions** Time: 11:12:40
 Equipment: **Dlink+ w/CPDLC** Sequence#: 4
 Manufacturer: Spectralux Corporation Tested By: Armando del Angel
 Model: 14114-1-01 28Vdc
 S/N: 1001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06123	Attenuator	18N-6	7/8/2011	7/8/2013
T2	ANP06219	Attenuator	768-10	3/22/2012	3/22/2014
T3	AN03227	Cable	32026-29080- 29080-84	5/2/2011	5/2/2013
T4	ANP05372	Cable	RG-214	5/14/2012	5/14/2014
	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
T5	ANC00063	Band Reject Filter		9/19/2012	9/19/2014
T6	ANC00064	Band Reject Filter		9/19/2012	9/19/2014
T7	ANC00065	Band Reject Filter		9/19/2012	9/19/2014
T8	AN02753	High Pass Filter	6IH40- 500/T3000-O/O	3/21/2012	3/21/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Dlink+ w/CPDLC*	Spectralux Corporation	14114-1-01	1001

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

Temp: 21°C
 Humidity: 34%
 Pressure: 101.2kPa
 Frequency Range: 9kHz -2.740.GHz

EUT is located on the test table 80cm above the ground plane.
 EUT's antenna port is terminated on a 50ohm load.
 EUT is transmitting in A2D mode.

Testing is being performed per TIA / EIA 603-C.

Ext Attn: 0 dB

Measurement Data:

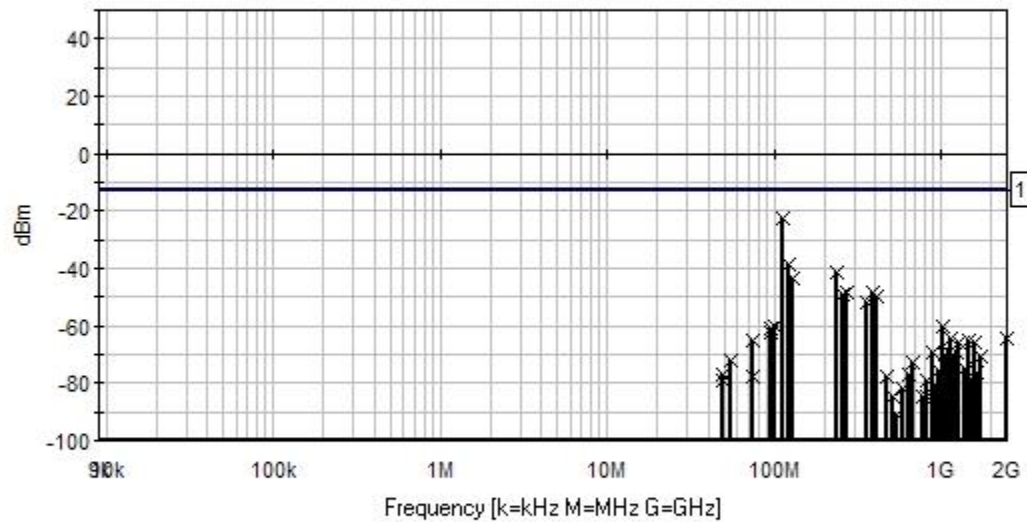
Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 T8 dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	113.860M	-68.6	+5.8 +30.0	+10.0 +0.0	+0.3 +0.0	+0.1 +0.0	+0.0	-22.4	-13.0 118MHz	-9.4	Anten
2	122.500M	-67.9	+5.8 +0.0	+10.0 +13.1	+0.3 +0.0	+0.1 +0.0	+0.0	-38.6	-13.0 128MHz	-25.6	Anten
3	236.000M	-71.3	+5.8 +13.1	+10.0 +0.0	+0.5 +0.0	+0.2 +0.0	+0.0	-41.6	-13.0 118MHz	-28.6	Anten
4	129.220M	-65.3	+5.8 +0.0	+10.0 +0.0	+0.3 +5.9	+0.1 +0.0	+0.0	-43.2	-13.0 136.975MHz	-30.2	Anten
5	273.950M	-69.1	+5.8 +0.0	+10.0 +0.0	+0.5 +3.9	+0.2 +0.0	+0.0	-48.7	-13.0 136.975MHz	-35.7	Anten
6	384.000M	-90.3	+5.8 +0.0	+10.0 +25.0	+0.6 +0.0	+0.2 +0.0	+0.0	-48.7	-13.0 128MHz	-35.7	Anten
7	256.000M	-71.7	+5.8 +0.0	+10.0 +5.9	+0.5 +0.0	+0.2 +0.0	+0.0	-49.3	-13.0 128MHz	-36.3	Anten
8	410.925M	-89.2	+5.8 +0.0	+10.1 +0.0	+0.6 +22.7	+0.2 +0.0	+0.0	-49.8	-13.0 136.975MHz	-36.8	Anten
9	354.000M	-72.8	+5.8 +4.0	+10.0 +0.0	+0.6 +0.0	+0.2 +0.0	+0.0	-52.2	-13.0 118MHz	-39.2	Anten
10	99.600M	-76.5	+5.8 +0.1	+10.0 +0.0	+0.3 +0.0	+0.1 +0.0	+0.0	-60.2	-13.0 118MHz	-47.2	Anten
11	1024.120M	-77.4	+5.8 +0.0	+9.9 +0.0	+0.9 +0.0	+0.0 +0.5	+0.0	-60.3	-13.0 128MHz	-47.3	Anten
12	96.475M	-77.2	+5.8 +0.0	+10.0 +0.2	+0.3 +0.0	+0.1 +0.0	+0.0	-60.8	-13.0 128MHz	-47.8	Anten
13	94.900M	-78.6	+5.8 +0.0	+10.0 +0.0	+0.3 +0.4	+0.1 +0.0	+0.0	-62.0	-13.0 136.975MHz	-49.0	Anten
14	1152.057M	-81.3	+5.8 +0.0	+9.9 +0.0	+1.0 +0.0	+0.0 +0.5	+0.0	-64.1	-13.0 128MHz	-51.1	Anten
15	2468.200M	-82.2	+5.8 +0.0	+10.0 +0.0	+1.6 +0.0	+0.0 +0.5	+0.0	-64.3	-13.0 128MHz	-51.3	Anten
16	74.000M	-81.7	+5.8 +0.7	+10.0 +0.0	+0.3 +0.0	+0.1 +0.0	+0.0	-64.8	-13.0 118MHz	-51.8	Anten
17	1462.600M	-82.6	+5.8 +0.0	+10.0 +0.0	+1.1 +0.0	+0.0 +0.4	+0.0	-65.3	-13.0 128MHz	-52.3	Anten
18	1592.300M	-83.2	+5.8 +0.0	+10.0 +0.0	+1.2 +0.0	+0.0 +0.3	+0.0	-65.9	-13.0 118MHz	-52.9	Anten
19	1280.864M	-83.2	+5.8 +0.0	+10.0 +0.0	+1.0 +0.0	+0.0 +0.4	+0.0	-66.0	-13.0 128MHz	-53.0	Anten
20	1095.794M	-86.2	+5.8 +0.0	+9.9 +0.0	+0.9 +0.0	+0.0 +0.5	+0.0	-69.1	-13.0 136.975MHz	-56.1	Anten
21	1232.832M	-86.6	+5.8 +0.0	+9.9 +0.0	+1.0 +0.0	+0.0 +0.4	+0.0	-69.5	-13.0 136.975MHz	-56.5	Anten
22	895.998M	-87.0	+5.8 +0.0	+10.1 +0.0	+0.9 +0.0	+0.0 +0.6	+0.0	-69.6	-13.0 128MHz	-56.6	Anten
23	1180.093M	-87.3	+5.8 +0.0	+9.9 +0.0	+1.0 +0.0	+0.0 +0.5	+0.0	-70.1	-13.0 118MHz	-57.1	Anten

24	1062.093M	-87.4	+5.8 +0.0	+9.9 +0.0	+0.9 +0.0	+0.0 +0.5	+0.0	-70.3	-13.0 118MHz	-57.3	Anten
25	1721.200M	-88.2	+5.8 +0.0	+9.9 +0.0	+1.2 +0.0	+0.0 +0.4	+0.0	-70.9	-13.0 136.975MHz	-57.9	Anten
26	55.625M	-91.5	+5.8 +0.0	+10.1 +0.0	+0.2 +3.3	+0.1 +0.0	+0.0	-72.0	-13.0 136.975MHz	-59.0	Anten
27	684.874M	-90.4	+5.8 +0.0	+10.0 +0.0	+0.8 +0.0	+0.0 +0.7	+0.0	-73.1	-13.0 136.975MHz	-60.1	Anten
28	1369.807M	-92.5	+5.8 +0.0	+10.0 +0.0	+1.1 +0.0	+0.0 +0.4	+0.0	-75.2	-13.0 136.975MHz	-62.2	Anten
29	958.824M	-93.0	+5.8 +0.0	+10.1 +0.0	+0.9 +0.0	+0.0 +0.5	+0.0	-75.7	-13.0 136.975MHz	-62.7	Anten
30	1643.757M	-93.6	+5.8 +0.0	+10.0 +0.0	+1.2 +0.0	+0.0 +0.4	+0.0	-76.2	-13.0 136.975MHz	-63.2	Anten
31	49.300M	-96.6	+5.8 +3.5	+10.1 +0.0	+0.2 +0.0	+0.1 +0.0	+0.0	-76.9	-13.0 118MHz	-63.9	Anten
32	639.998M	-94.5	+5.8 +0.0	+10.1 +0.0	+0.7 +0.0	+0.0 +0.8	+0.0	-77.1	-13.0 128MHz	-64.1	Anten
33	75.000M	-94.8	+5.8 +0.0	+10.0 +1.1	+0.3 +0.0	+0.1 +0.0	+0.0	-77.5	-13.0 128MHz	-64.5	Anten
34	472.002M	-94.4	+5.8 +0.1	+10.1 +0.0	+0.6 +0.0	+0.2 +0.0	+0.0	-77.6	-13.0 118MHz	-64.6	Anten
35	74.750M	-95.1	+5.8 +0.0	+10.0 +0.0	+0.3 +1.3	+0.1 +0.0	+0.0	-77.6	-13.0 136.975MHz	-64.6	Anten
36	2483.900M	-82.8	+5.8 +0.0	+10.0 +0.0	+1.6 +0.0	+0.0 +0.5	+0.0	-64.9	0.0 118MHz	-64.9	Anten
37	821.849M	-96.3	+5.8 +0.0	+10.1 +0.0	+0.8 +0.0	+0.0 +0.6	+0.0	-79.0	-13.0 136.975MHz	-66.0	Anten
38	49.550M	-99.6	+5.8 +0.0	+10.1 +0.0	+0.2 +4.3	+0.1 +0.0	+0.0	-79.1	-13.0 136.975MHz	-66.1	Anten
39	1506.782M	-96.5	+5.8 +0.0	+10.0 +0.0	+1.1 +0.0	+0.0 +0.4	+0.0	-79.2	-13.0 136.975MHz	-66.2	Anten
40	944.001M	-98.6	+5.8 +0.0	+10.1 +0.0	+0.9 +0.0	+0.0 +0.6	+0.0	-81.2	-13.0 118MHz	-68.2	Anten
41	590.000M	-99.8	+5.8 +0.0	+10.1 +0.0	+0.7 +0.0	+0.0 +1.0	+0.0	-82.2	-13.0 118MHz	-69.2	Anten
42	511.999M	-102.6	+5.8 +0.0	+10.1 +1.2	+0.7 +0.0	+0.2 +0.0	+0.0	-84.6	-13.0 128MHz	-71.6	Anten
43	825.999M	-102.1	+5.8 +0.0	+10.1 +0.0	+0.8 +0.0	+0.0 +0.6	+0.0	-84.8	-13.0 118MHz	-71.8	Anten
44	767.997M	-102.2	+5.8 +0.0	+10.1 +0.0	+0.8 +0.0	+0.0 +0.6	+0.0	-84.9	-13.0 128MHz	-71.9	Anten
45	547.900M	-108.4	+5.8 +0.0	+10.0 +0.0	+0.7 +0.0	+0.0 +1.1	+0.0	-90.8	-13.0 136.975MHz	-77.8	Anten

CKC Laboratories, Inc. Date: 9/19/2012 Time: 11:12:40 Spectralux Corporation WO#: 91600
 87.139 Conducted Spurious Emissions Mask D Test Lead:
 Antenna Port Antenna Port Sequence#: 4 Ext ATTN: 0 dB



Readings
 1 - 87.139 Conducted Spurious Emissions Mask D
 x Peak Readings

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

Customer: **Spectralux Corporation**
 Specification: **87.139 Radiated Spurious Emissions Mask K**
 Work Order #: **91600** Date: 9/19/2012
 Test Type: **Conducted Emissions** Time: 11:14:50
 Equipment: **Dlink+ w/CPDLC** Sequence#: 4
 Manufacturer: Spectralux Corporation Tested By: Armando del Angel
 Model: 14114-1-01 28Vdc
 S/N: 1001

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06123	Attenuator	18N-6	7/8/2011	7/8/2013
T2	ANP06219	Attenuator	768-10	3/22/2012	3/22/2014
T3	AN03227	Cable	32026-29080- 29080-84	5/2/2011	5/2/2013
T4	ANP05372	Cable	RG-214	5/14/2012	5/14/2014
T5	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
T6	ANC00063	Band Reject Filter		9/19/2012	9/19/2014
T7	ANC00064	Band Reject Filter		9/19/2012	9/19/2014
T8	ANC00065	Band Reject Filter		9/19/2012	9/19/2014
T9	AN02753	High Pass Filter	6IH40- 500/T3000-O/O	3/21/2012	3/21/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Dlink+ w/CPDLC*	Spectralux Corporation	14114-1-01	1001

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

Temp: 21°C Humidity: 34% Pressure: 101.2kPa Frequency Range: 9kHz -2.740.GHz EUT is located on the test table 80cm above the ground plane. EUT's antenna port is terminated on a 50ohm load. EUT is transmitting in G1D mode. Testing is being performed per TIA / EIA 603-C.
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Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

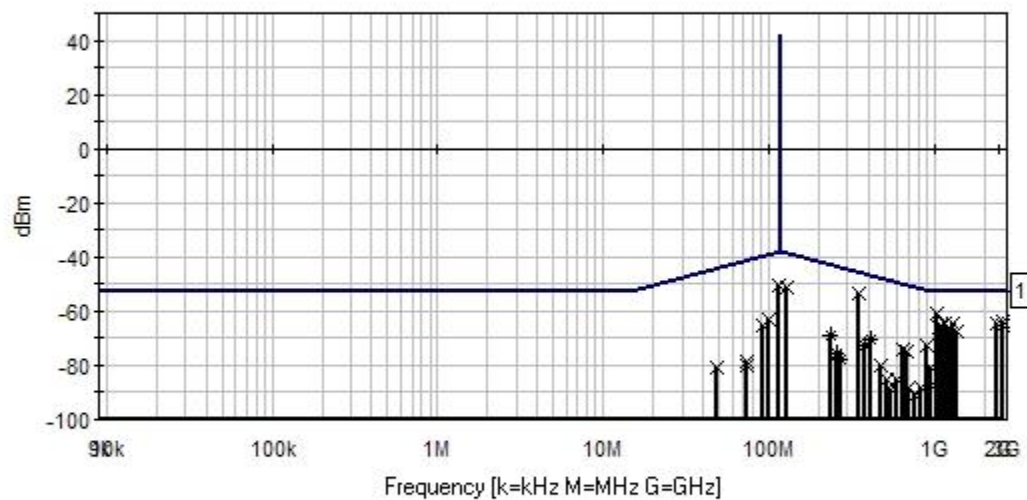
Test Lead: Antenna Port

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dBm	dBm	dB	Anten
1	354.006M	-73.9	+5.8 +0.0 +0.0	+10.0 +4.0	+0.6 +0.0	+0.2 +0.0	+0.0	-53.3	-45.9 118MHz	-7.4	Anten
2	1023.901M	-78.1	+5.8 +0.0 +0.5	+9.9 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-61.0	-53.0 128MHz	-8.0	Anten
3	2620.800M	-81.8	+5.8 +0.0 +0.5	+10.0 +0.0	+1.6 +0.0	+0.0 +0.0	+0.0	-63.9	-53.0 136.975MHz	-10.9	Anten
4	1152.105M	-81.7	+5.8 +0.0 +0.5	+9.9 +0.0	+1.0 +0.0	+0.0 +0.0	+0.0	-64.5	-53.0 128MHz	-11.5	Anten
5	2381.900M	-82.3	+5.8 +0.0 +0.5	+10.0 +0.0	+1.5 +0.0	+0.0 +0.0	+0.0	-64.5	-53.0 128MHz	-11.5	Anten
6	1278.875M	-81.9	+5.8 +0.0 +0.4	+10.0 +0.0	+1.0 +0.0	+0.0 +0.0	+0.0	-64.7	-53.0 128MHz	-11.7	Anten
7	1095.804M	-82.2	+5.8 +0.0 +0.5	+9.9 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-65.1	-53.0 136.975MHz	-12.1	Anten
8	2588.500M	-83.1	+5.8 +0.0 +0.5	+10.0 +0.0	+1.6 +0.0	+0.0 +0.0	+0.0	-65.2	-53.0 118MHz	-12.2	Anten
9	115.570M	-66.9	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +0.0	+0.1 +0.1	+0.0	-50.6	-38.1 136.975MHz	-12.5	Anten
10	129.010M	-72.5	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +0.0	+0.1 +4.9	+0.0	-51.4	-38.6 136.975MHz	-12.8	Anten
11	1063.074M	-83.2	+5.8 +0.0 +0.5	+9.9 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-66.1	-53.0 118MHz	-13.1	Anten
12	1232.775M	-83.7	+5.8 +0.0 +0.4	+9.9 +0.0	+1.0 +0.0	+0.0 +0.0	+0.0	-66.6	-53.0 136.975MHz	-13.6	Anten
13	1369.750M	-84.8	+5.8 +0.0 +0.4	+10.0 +0.0	+1.1 +0.0	+0.0 +0.0	+0.0	-67.5	-53.0 136.975MHz	-14.5	Anten
14	1180.006M	-86.3	+5.8 +0.0 +0.5	+9.9 +0.0	+1.0 +0.0	+0.0 +0.0	+0.0	-69.1	-53.0 118MHz	-16.1	Anten
15	895.996M	-90.0	+5.8 +0.0 +0.6	+10.1 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-72.6	-52.6 128MHz	-20.0	Anten

16	410.928M Ave	-110.0	+5.8 +0.0 +0.0	+10.1 +0.0	+0.6 +0.0	+0.2 +22.7	+0.0	-70.6	-47.0 136.975MHz	-23.6	Anten
^	410.928M	-91.9	+5.8 +0.0 +0.0	+10.1 +0.0	+0.6 +0.0	+0.2 +22.7	+0.0	-52.5	-47.0 136.975MHz	-5.5	Anten
18	684.879M	-91.9	+5.8 +0.0 +0.7	+10.0 +0.0	+0.8 +0.0	+0.0 +0.0	+0.0	-74.6	-50.7 136.975MHz	-23.9	Anten
19	100.000M	-79.5	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +0.1	+0.1 +0.0	+0.0	-63.2	-39.2 128MHz	-24.0	Anten
20	640.002M	-91.6	+5.8 +0.0 +0.8	+10.1 +0.0	+0.7 +0.0	+0.0 +0.0	+0.0	-74.2	-50.2 128MHz	-24.0	Anten
21	93.250M	-81.8	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +0.0	+0.1 +0.4	+0.0	-65.2	-39.7 136.975MHz	-25.5	Anten
22	383.988M Ave	-114.4	+5.8 +0.0 +0.0	+10.0 +0.0	+0.6 +25.1	+0.2 +0.0	+0.0	-72.7	-46.5 128MHz	-26.2	Anten
^	383.988M	-90.2	+5.8 +0.0 +0.0	+10.0 +0.0	+0.6 +25.1	+0.2 +0.0	+0.0	-48.5	-46.5 128MHz	-2.0	Anten
24	236.003M Ave	-98.9	+5.8 +0.0 +0.0	+10.0 +13.1	+0.5 +0.0	+0.2 +0.0	+0.0	-69.3	-43.0 118MHz	-26.3	Anten
^	236.002M	-71.8	+5.8 +0.0 +0.0	+10.0 +13.1	+0.5 +0.0	+0.2 +0.0	+0.0	-42.2	-43.0 118MHz	+0.8	Anten
26	958.830M	-98.1	+5.8 +0.0 +0.5	+10.1 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-80.8	-53.0 136.975MHz	-27.8	Anten
27	471.999M	-96.6	+5.8 +0.0 +0.0	+10.1 +0.1	+0.6 +0.0	+0.2 +0.0	+0.0	-79.8	-48.0 118MHz	-31.8	Anten
28	255.999M Ave	-98.0	+5.8 +0.0 +0.0	+10.0 +0.0	+0.5 +5.9	+0.2 +0.0	+0.0	-75.6	-43.6 128MHz	-32.0	Anten
^	255.999M	-71.6	+5.8 +0.0 +0.0	+10.0 +0.0	+0.5 +5.9	+0.2 +0.0	+0.0	-49.2	-43.6 128MHz	-5.6	Anten
30	273.949M Ave	-98.0	+5.8 +0.0 +0.0	+10.0 +0.0	+0.5 +0.0	+0.2 +3.9	+0.0	-77.6	-44.1 136.975MHz	-33.5	Anten
^	273.949M	-71.3	+5.8 +0.0 +0.0	+10.0 +0.0	+0.5 +0.0	+0.2 +3.9	+0.0	-50.9	-44.1 136.975MHz	-6.8	Anten
32	944.004M	-104.8	+5.8 +0.0 +0.6	+10.1 +0.0	+0.9 +0.0	+0.0 +0.0	+0.0	-87.4	-53.0 118MHz	-34.4	Anten

33	590.002M	-102.5	+5.8 +0.0 +1.0	+10.1 +0.0	+0.7 +0.0	+0.0 +0.0	+0.0	-84.9	-49.6 118MHz	-35.3	Anten
34	821.836M	-105.6	+5.8 +0.0 +0.6	+10.1 +0.0	+0.8 +0.0	+0.0 +0.0	+0.0	-88.3	-52.0 136.975MHz	-36.3	Anten
35	48.120M	-102.0	+5.8 +0.0 +0.0	+10.1 +0.0	+0.2 +4.7	+0.1 +0.0	+0.0	-81.1	-44.5 128MHz	-36.6	Anten
36	511.994M	-103.2	+5.8 +0.0 +0.0	+10.1 +0.0	+0.7 +1.2	+0.2 +0.0	+0.0	-85.2	-48.6 128MHz	-36.6	Anten
37	74.675M	-96.0	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +1.1	+0.1 +0.0	+0.0	-78.7	-41.3 128MHz	-37.4	Anten
38	708.005M	-105.7	+5.8 +0.0 +0.7	+10.0 +0.0	+0.8 +0.0	+0.0 +0.0	+0.0	-88.4	-50.9 118MHz	-37.5	Anten
39	74.650M	-97.5	+5.8 +0.0 +0.0	+10.0 +0.0	+0.3 +0.0	+0.1 +1.3	+0.0	-80.0	-41.3 136.975MHz	-38.7	Anten
40	768.002M	-108.3	+5.8 +0.0 +0.6	+10.1 +0.0	+0.8 +0.0	+0.0 +0.0	+0.0	-91.0	-51.5 128MHz	-39.5	Anten
41	547.901M	-106.4	+5.8 +0.0 +1.1	+10.0 +0.0	+0.7 +0.0	+0.0 +0.0	+0.0	-88.8	-49.1 136.975MHz	-39.7	Anten

CKC Laboratories, Inc. Date: 9/19/2012 Time: 11:14:50 Spectralux Corporation WO#: 91600
 87.139 Radiated Spurious Emissions Mask K Test Lead:
 Antenna Port Antenna Port Sequence#: 4 Ext ATTN: 0 dB



— Readings
 — 1 - 87.139 Radiated Spurious Emissions Mask K
 × Peak Readings
 * Average Readings

Test Setup Photos





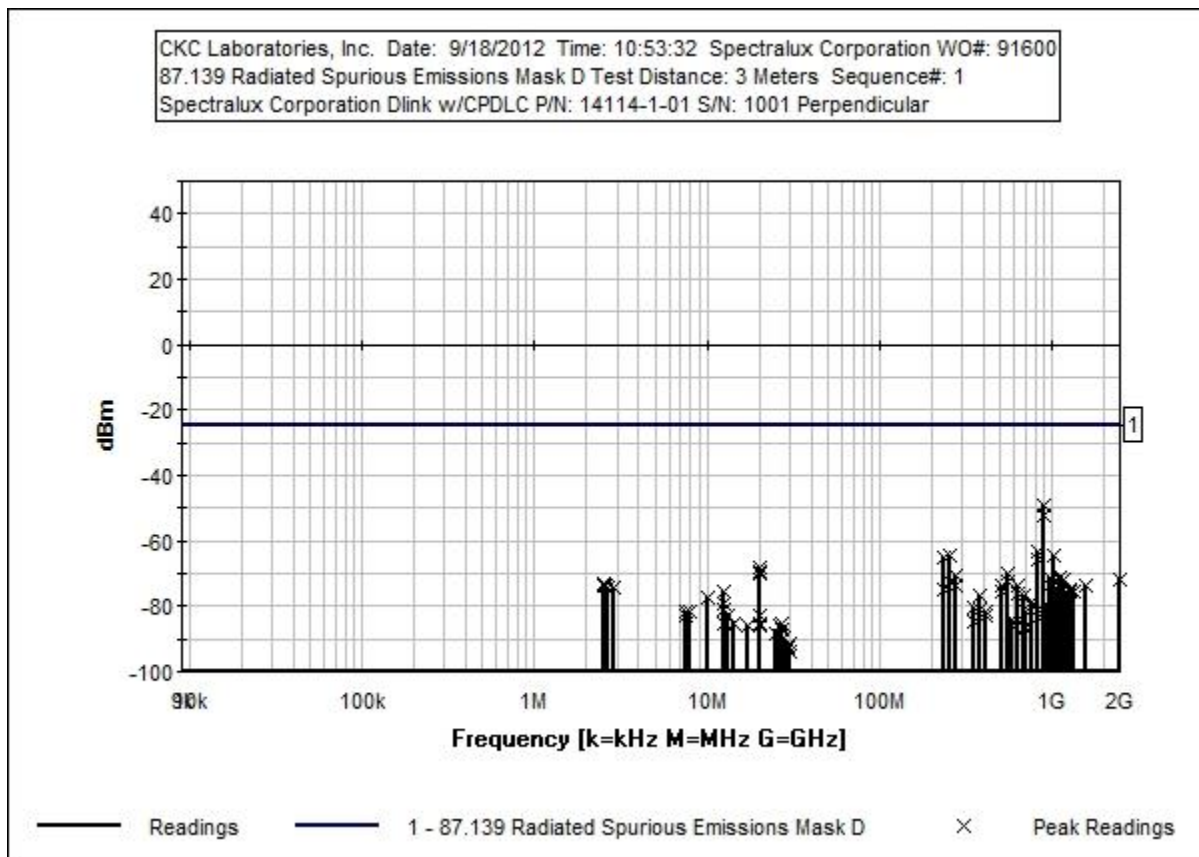
Field Strength of Spurious Radiation

Test Conditions / Setup
Temp: 21°C Humidity: 34% Pressure: 101.2kPa Frequency Range: 9kHz -2.47GHz EUT is located on the test table 80cm above the ground plane. EUT is connected to a support laptop outside the chamber which the customer is using to control it. EUT's antenna port is terminated on a 50ohm load. All measurements are maximized. Testing is being performed per TIA / EIA 603-C.

Engineer Name: A. del Angel

Test Equipment					
Asset	Description	Model	Manufacturer	Cal Date	Cal Due
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
01316	Preamp	8447D	HP	4/3/2012	4/3/2014
01993	Biconilog Antenna	CBL6111C	Chase	3/2/2012	3/2/2014
P05360	Cable	RG214	Belden	11/8/2010	11/8/2012
P05366	Cable	RG-214	Belden	10/14/2011	10/14/2013
01271	Preamp	83017A	HP	8/18/2011	8/18/2013
01467	Horn Antenna-ANSI C63.5 Calibration	3115	EMCO	10/19/2011	10/19/2013
03123	Cable	32026-2-29801-12	Astrolab	10/14/2011	10/14/2013
P05542	Cable	Heliastax	Andrews	9/27/2011	9/27/2013
00052	Loop Antenna	6502	EMCO	5/16/2012	5/16/2014

Test Data

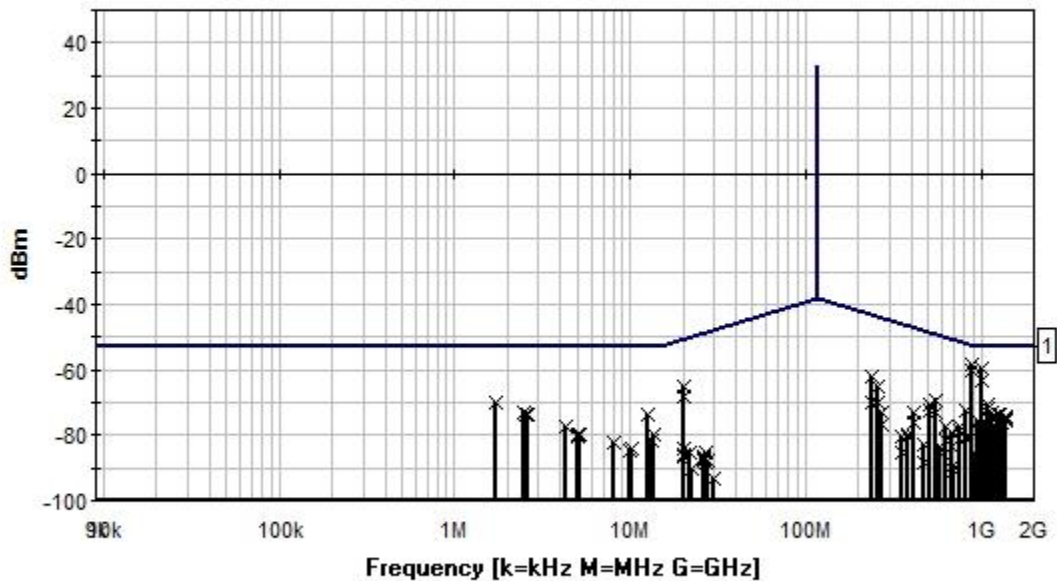


Operating Frequency: 118MHz-136.975MHz
Channels: Low, Mid and High
Highest Measured Output Power: 42.00 (dBm)= 15.85 (Watts)
Distance: 3 meters
Limit: 43+10Log(P)= 55.00 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
892.50	-37.4	Horiz	79.40
892.50	-40.4	Vert	82.40
821.85	-51.3	Horiz	93.30
255.00	-52.7	Horiz	94.70
1,020.00	-52.7	Horiz	94.70
1,020.00	-52.8	Vert	94.80
236.00	-53	Horiz	95.00
821.85	-54	Vert	96.00
547.90	-58.3	Vert	100.30
273.95	-58.8	Horiz	100.80
958.83	-59.5	Horiz	101.50
1,095.80	-59.7	Vert	101.70
1,180.00	-59.8	Vert	101.80
2,470.00	-60.3	Vert	102.30
255.00	-60.6	Vert	102.60
1,147.50	-60.6	Vert	102.60
547.90	-60.7	Horiz	102.70
637.50	-61.7	Horiz	103.70
510.00	-61.7	Horiz	103.70
1,563.00	-61.7	Vert	103.70
958.83	-62	Vert	104.00
273.95	-62.1	Vert	104.10
1,095.80	-62.4	Horiz	104.40
1,062.00	-62.6	Vert	104.60
1,147.50	-62.8	Horiz	104.80
236.00	-62.9	Vert	104.90
1,275.00	-63.3	Horiz	105.30
1,340.90	-63.6	Horiz	105.60
1,275.00	-63.8	Vert	105.80
510.00	-63.8	Vert	105.80
1,062.00	-64.2	Horiz	106.20
637.50	-64.4	Vert	106.40

1,180.00	-64.5	Horiz	106.50
1,232.78	-65.1	Vert	107.10
382.50	-65.1	Vert	107.10
684.88	-65.2	Horiz	107.20
765.00	-66.7	Vert	108.70
944.00	-67.7	Vert	109.70
765.00	-68.2	Horiz	110.20
944.00	-68.4	Horiz	110.40
354.00	-68.7	Horiz	110.70
1,232.78	-68.9	Horiz	110.90
826.00	-69.1	Horiz	111.10
708.00	-69.9	Horiz	111.90
410.93	-71	Horiz	113.00
826.00	-71.6	Vert	113.60
354.00	-72.8	Vert	114.80
590.00	-74.4	Vert	116.40
708.00	-74.5	Vert	116.50
684.88	-74.8	Vert	116.80
2,740.00	-83.9	Horiz	125.90
2,740.00	-84.5	Vert	126.50

CKC Laboratories, Inc. Date: 9/18/2012 Time: 10:06:01 Spectralux Corporation WO#: 91600
 87.139 Radiated Spurious Emissions Mask K Test Distance: 3 Meters Sequence#: 2
 Spectralux Corporation Dlink w/CPDLC P/N: 14114-1-01 S/N: 1001 Parallel

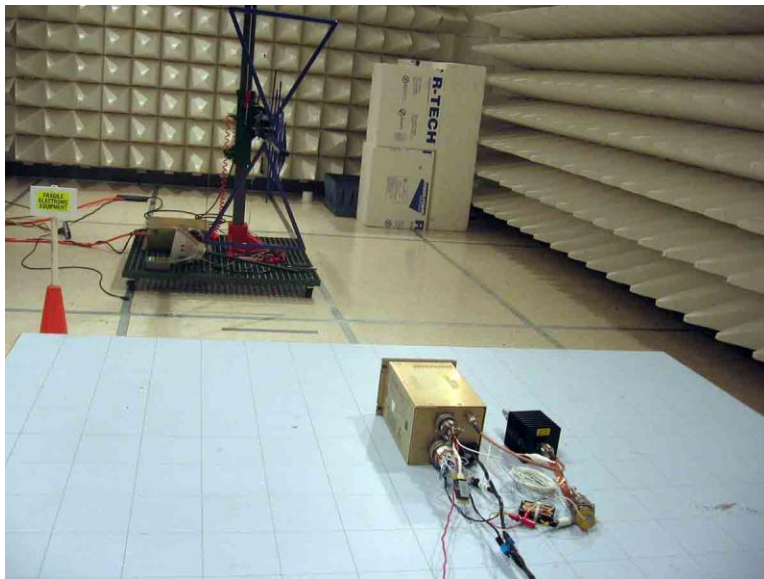
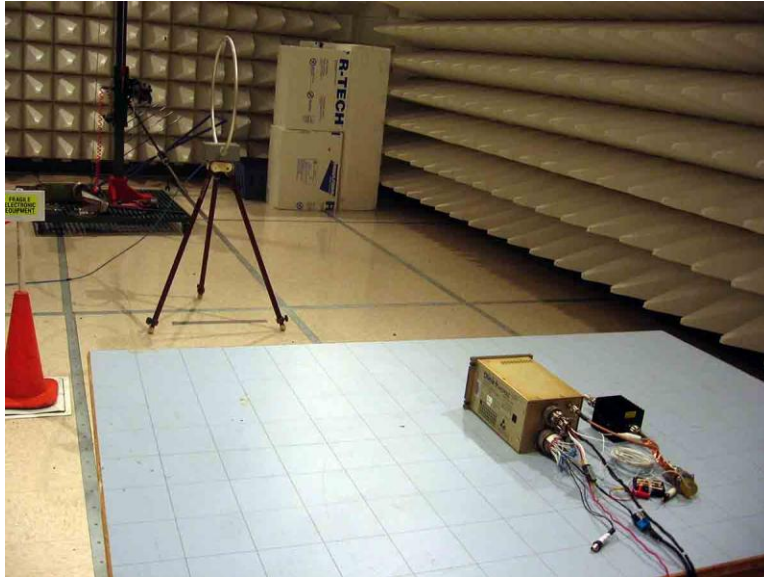


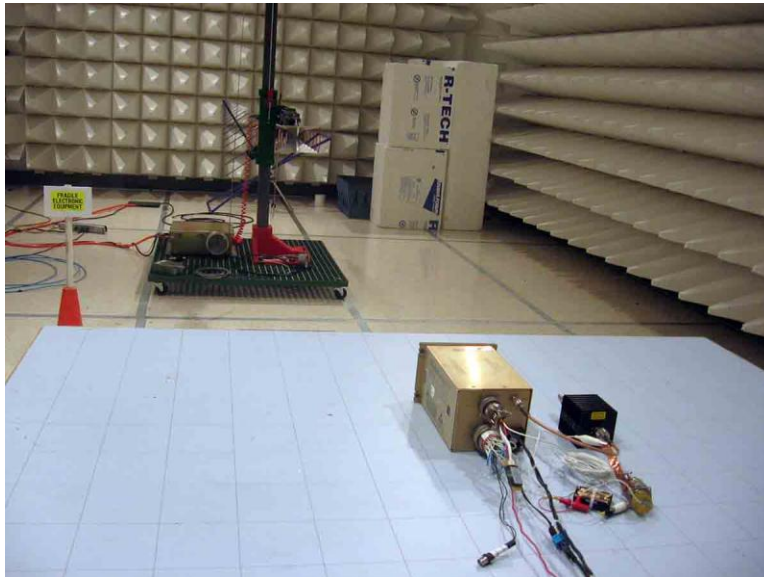
Readings 1 - 87.139 Radiated Spurious Emissions Mask K × Peak Readings

Emissions Mask K					
Freq in MHz	Reading in dBm	Limit in dBm	Margin in dBm	Notes	Polarization
892.502	-58.6	-52.6	-6	127.5MHz	Horiz
1020	-59.6	-53	-6.6	127.5MHz	Vert
236	-50	-43	-7	118MHz	Horiz
892.502	-60.3	-52.6	-7.7	127.5MHz	Vert
547.899	-57.3	-49.1	-8.2	136.975MHz	Horiz
2.445	-61.5	-53	-8.5	127.5MHz	Parallel
2.515	-61.7	-53	-8.7	136.975MHz	Parallel
12.5	-61.9	-53	-8.9	136.975MHz	Perpendicular
12.5	-62	-53	-9	118MHz	Perpendicular
2.58	-62.1	-53	-9.1	136.975MHz	Perpendicular
255	-53	-43.6	-9.4	127.5MHz	Horiz
1020	-63.1	-53	-10.1	127.5MHz	Horiz
510.001	-58.9	-48.6	-10.3	127.5MHz	Horiz
1373.6	-63.4	-53	-10.4	127.5MHz	Horiz
1396	-63.6	-53	-10.6	136.975MHz	Horiz
958.824	-63.7	-53	-10.7	136.975MHz	Vert
1061.979	-64.3	-53	-11.3	118MHz	Horiz
1306.6	-64.6	-53	-11.6	118MHz	Vert
1179.984	-64.7	-53	-11.7	118MHz	Horiz
547.899	-61	-49.1	-11.9	136.975MHz	Vert
1180.003	-64.9	-53	-11.9	118MHz	Vert
510.001	-60.5	-48.6	-11.9	127.5MHz	Vert
4.348	-65.6	-53	-12.6	118MHz	Parallel
1062	-65.8	-53	-12.8	118MHz	Vert
958.824	-66.9	-53	-13.9	136.975MHz	Horiz
765.001	-65.8	-51.5	-14.3	127.5MHz	Vert
410.924	-61.3	-47	-14.3	136.975MHz	Horiz
5.045	-67.7	-53	-14.7	118MHz	Perpendicular
13.75	-67.7	-53	-14.7	136.975MHz	Perpendicular
255	-58.5	-43.6	-14.9	127.5MHz	Vert
765.001	-66.5	-51.5	-15	127.5MHz	Horiz
5.005	-68	-53	-15	127.5MHz	Parallel

5.23	-68.2	-53	-15.2	127.5MHz	Perpendicular
637.501	-65.5	-50.2	-15.3	127.5MHz	Horiz
235.999	-58.4	-43	-15.4	118MHz	Vert
5.035	-68.5	-53	-15.5	118MHz	Parallel
826	-68.5	-52	-16.5	118MHz	Horiz
13.13	-69.8	-53	-16.8	127.5MHz	Perpendicular
273.949	-61	-44.1	-16.9	136.975MHz	Horiz
684.874	-67.6	-50.7	-16.9	136.975MHz	Horiz
826	-69.1	-52	-17.1	118MHz	Vert
410.924	-64.1	-47	-17.1	136.975MHz	Vert
8.025	-70.5	-53	-17.5	136.975MHz	Parallel
1095.8	-70.9	-53	-17.9	136.975MHz	Vert
1095.8	-71.7	-53	-18.7	136.975MHz	Horiz
10.18	-72.1	-53	-19.1	118MHz	Parallel
637.501	-69.6	-50.2	-19.4	127.5MHz	Vert
1147.55	-73.1	-53	-20.1	127.5MHz	Vert
10.04	-73.1	-53	-20.1	127.5MHz	Parallel
821.849	-72.3	-52	-20.3	136.975MHz	Vert
821.849	-72.4	-52	-20.4	136.975MHz	Horiz
1232.775	-73.7	-53	-20.7	136.975MHz	Vert
1275.05	-73.7	-53	-20.7	127.5MHz	Horiz
1275.05	-73.8	-53	-20.8	127.5MHz	Vert
684.874	-71.6	-50.7	-20.9	136.975MHz	Vert
273.949	-65.1	-44.1	-21	136.975MHz	Vert
1369.75	-74	-53	-21	136.975MHz	Horiz
944	-74.1	-53	-21.1	118MHz	Vert
944	-74.2	-53	-21.2	118MHz	Horiz
1369.75	-74.5	-53	-21.5	136.975MHz	Vert
382.501	-68.1	-46.5	-21.6	127.5MHz	Horiz
590	-71.9	-49.6	-22.3	118MHz	Horiz
382.501	-68.8	-46.5	-22.3	127.5MHz	Vert
354	-68.6	-45.9	-22.7	118MHz	Horiz

Test Setup Photos





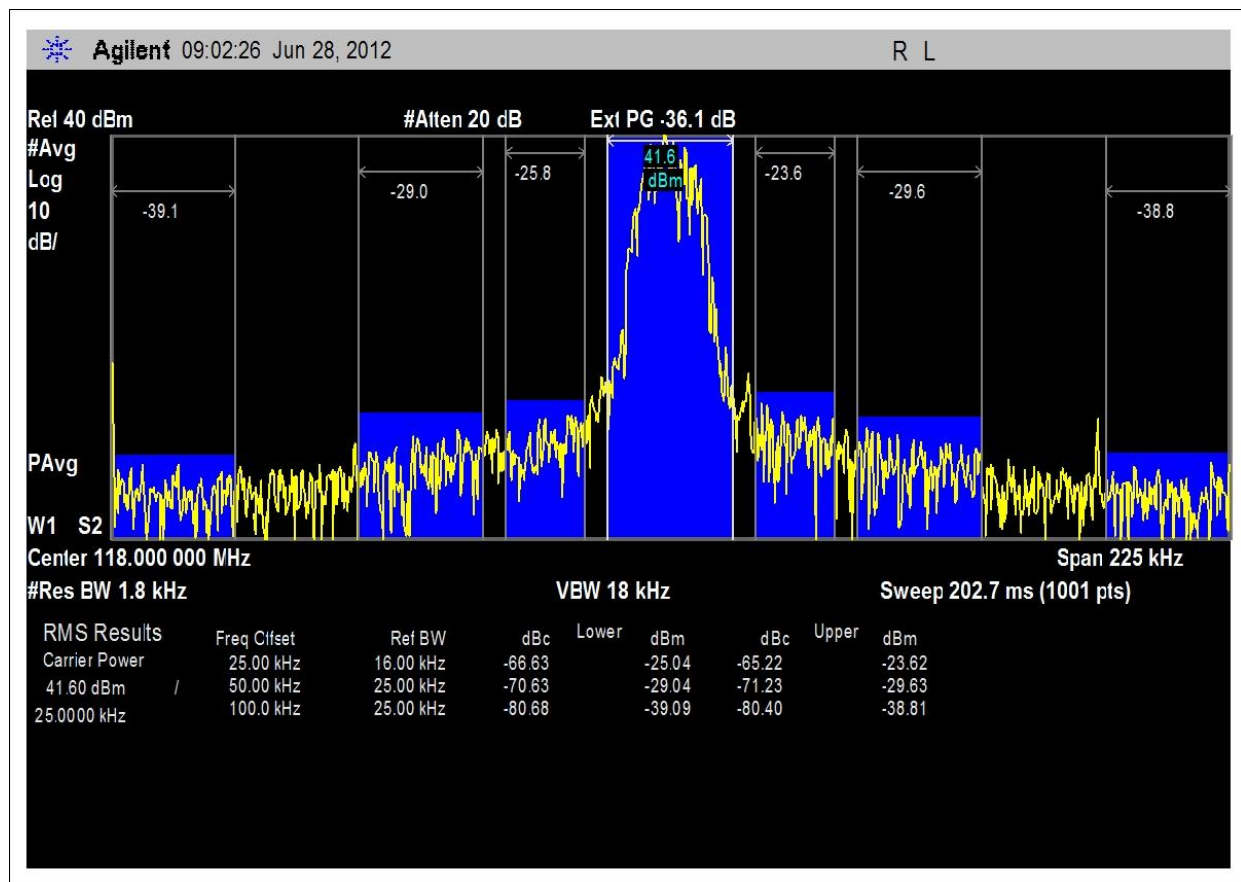
Adjacent Channel Power

Test Conditions / Setup	
Temp: 21°C Humidity: 34% Pressure: 101.2kPa Frequency Range: 118MHz – 127.5MHz – 136.975MHz	
EUT is connected to a laptop through an Ethernet cable which is exercising it. Spectrum analyzer is connected to RF port through 36dB of external attenuation. Spectrum analyzer's built in adjacent channel power measurement suite used to perform the measurements. Only Mode 2 (G1D) has adjacent channel power requirements.	
Testing is being performed per TIA / EIA 603-C.	

Engineer Name: A. del Angel

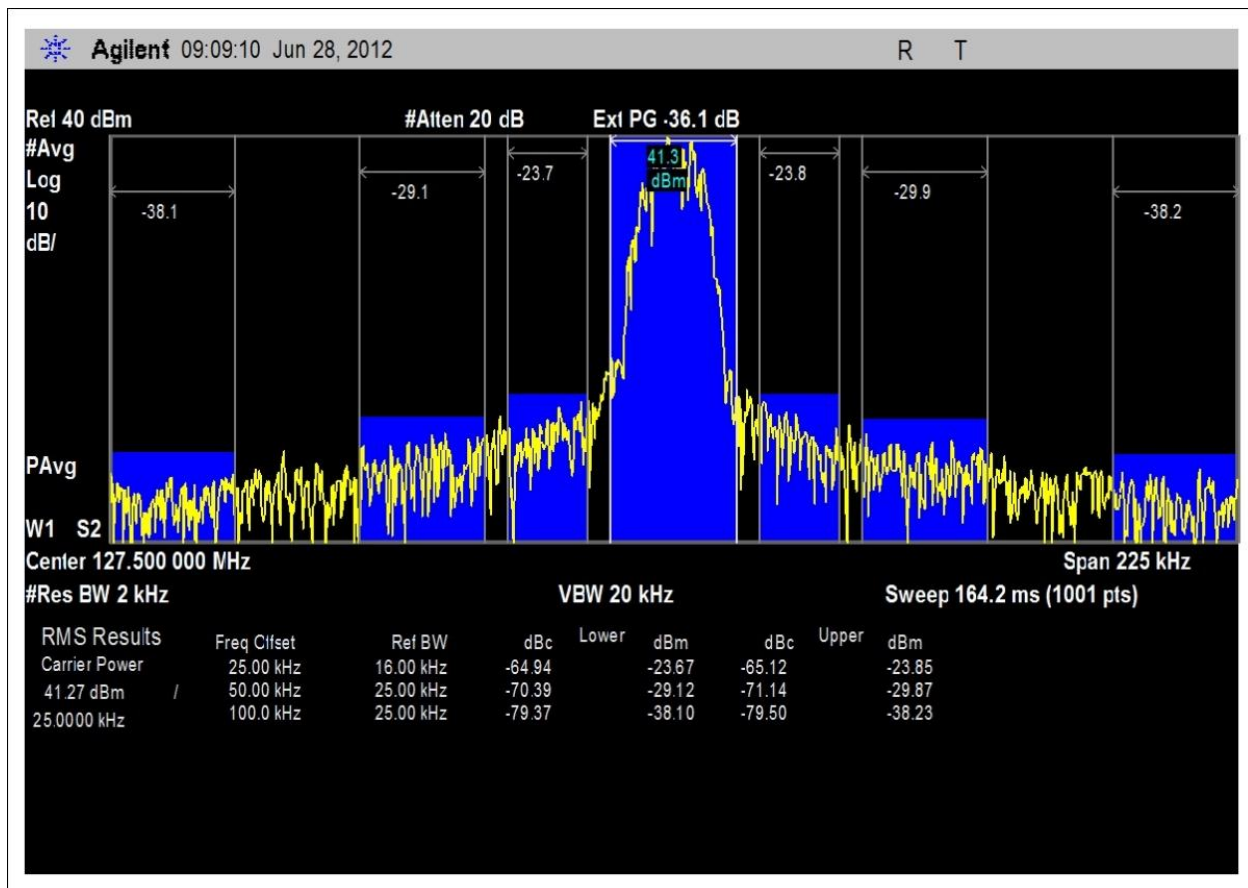
Test Equipment					
Asset	Description	Model	Manufacturer	Cal Date	Cal Due
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
P06131	Attenuator	18N20W-20	Inmet	8/18/2011	8/18/2013
P06219	Attenuator	768-10	Narda	3/22/2012	3/22/2014
P06123	Attenuator	18N-6	Aeroflex	7/8/2011	7/8/2013

Test Data							
Mode A (G1D)							
	118MHz		127.5MHz		136.975MHz		
Channel	Lower	Upper	Lower	Upper	Lower	Upper	Mask K Limit
1 st	-25.04dBm	-23.62dBm	-23.67dBm	-23.85dBm	-25.18dBm	-23.74dBm	-18dBm
2 nd	-29.04dBm	-29.63dBm	-29.12dBm	-29.87dBm	-29.66dBm	-30.70dBm	-28dBm
4 th	-39.09dBm	-38.81dBm	-38.10dBm	-38.23dBm	-38.19dBm	-38.25dBm	-38dBm



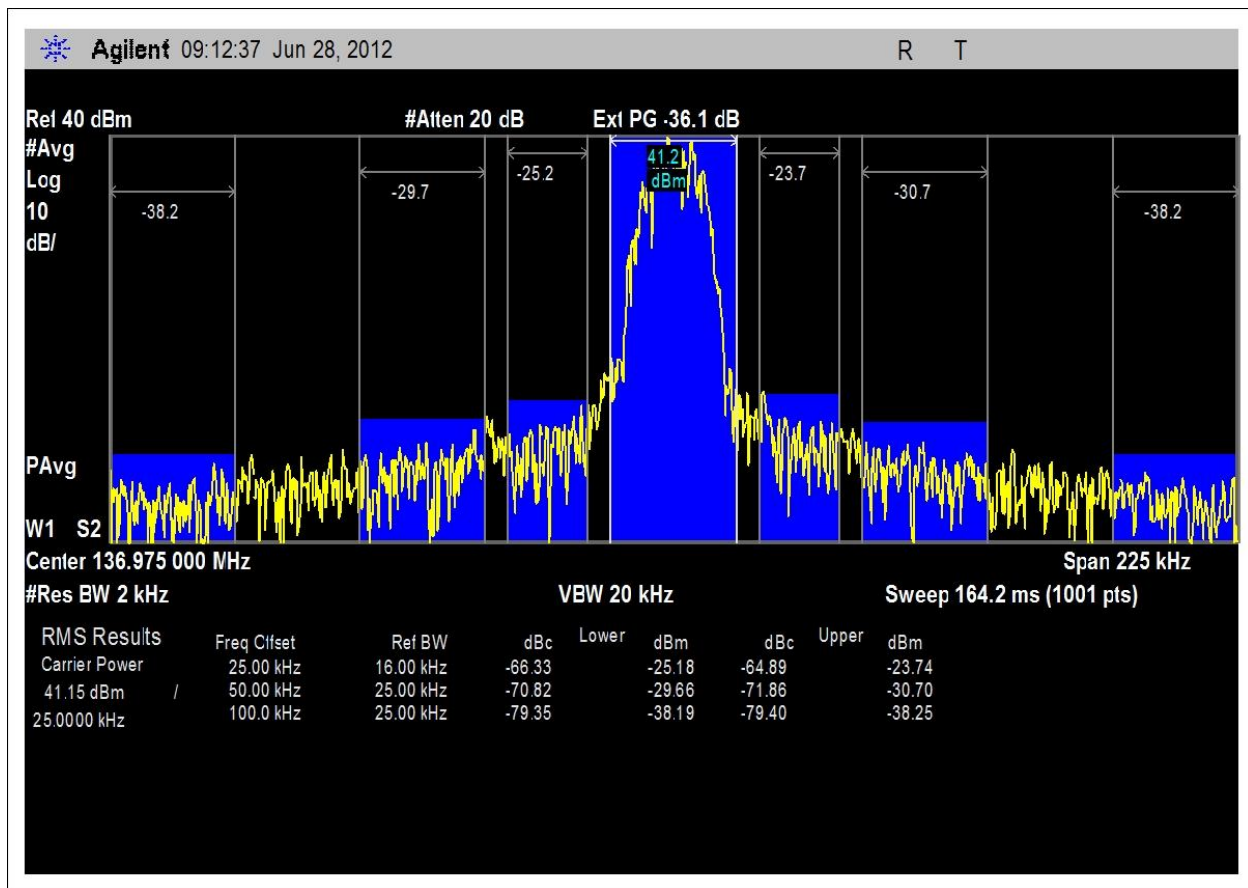
118 MHz

Note: The date on the screen capture is a default date. Date of actual testing was 9/20/12.



127.5 MHz

Note: The date on the screen capture is a default date. Date of actual testing was 9/20/12.



136.975

Note: The date on the screen capture is a default date. Date of actual testing was 9/20/12.

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

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

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

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

CORRECTION FACTORS

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

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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