

SmartLabs, Inc.

TEST REPORT FOR

SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band), 2477D

Tested To The Following Standards:

FCC Part 15 Subpart C Sections 15.207 & 15.249
and
RSS-210 Version 7

Report No.: 90456-4

Date of issue: March 8, 2010



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.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

SmartLabs, Inc.
16542 Millikan Ave.
Irvine, CA 92606

Representative: John Lockyer
Customer Reference Number: 10-3JL0210-01

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

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 90456

February 12 ,2010
February 12 – March 3, 2010

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.
110 Olinda Place
Brea, CA 92823

Site Registration & Accreditation Information

Location	Japan	Canada	FCC
Brea D	R-1256, C-1319 & T-1660	3082D-2	100638

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Description	Test Procedure/Method	Results
Voltage Variation Power	FCC 15.31(e)	Pass
Conducted Emissions	FCC Part 15 Subpart C Section 15.207 / ANSI C63.4 (2003)	Pass
Field Strength of Fundamental	FCC Part 15 Subpart C Section 2.1046/15.249(a)	Pass
Occupied Bandwidth	FCC 2.1049	Pass
Field Strength of Harmonic Emissions	FCC Part 15 Subpart C Section 2.1053/15.249(a)	Pass
Field Strength of Spurious Emissions	FCC Part 15 Subpart C Section 2.1053/15.249(d)	Pass
Band Edge		Pass
99% Bandwidth	RSS-210 Version 7	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
Modifications made: Microcontrollers power supply changed from 5.1VDC to 3.3VDC Microcontroller clock crystal changes from 22.1184 to 5.5296MHz

EQUIPMENT UNDER TEST (EUT)

The following model was tested by CKC Laboratories:

SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band), 2477Dxx

Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model name shown on the data sheets: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band), 2477D**

EQUIPMENT UNDER TEST

SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)

Manuf: SmartLabs, Inc.

Model: 2477D

Serial: NA

PERIPHERAL DEVICES

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

100W 120V Light Bulb

Manuf: Phillips

Model: NA

Serial: NA

150W 250V Light Bulb

Manuf: Phillips

Model: NA

Serial: NA

FCC PART 15 SUBPART C

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

Temperature and Humidity During Testing

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

15.31(e) Voltage Variations

Supply voltage varied between 85% and 115% of the nominal rated supply voltage.

15.31(m) Number Of Channels

This device operates on a single channel.

15.33(a) Frequency Ranges Tested

15.207 Conducted Emissions: 150 kHz – 30 MHz

15.249 Radiated Emissions: 9 kHz – 10GHz

15.203 Antenna Requirements

The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

EUT Operating Frequency

The EUT was operating at 914.9MHz to 915.1MHz.

15.207 AC Conducted Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **FCC 15.207 (2007) Conducted Class [AVE]**
 Work Order #: **90456** Date: 2/17/2010
 Test Type: **Conducted Emissions** Time: 09:14:02
 Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 1
 Manufacturer: SmartLabs, Inc. Tested By: Shaminderjit Hundal
 Model: 2477Dxx 120V 60Hz
 S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
High Pass Filter	D5201	01/14/2009	01/14/2011	02343
LISN	1090	03/25/2009	03/25/2011	02128
6dB Attenuator	NA	10/14/2008	10/14/2010	P05887
Coaxial Cable	Cable #8	04/29/2008	04/29/2010	P01910

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)*	SmartLabs, Inc.	2477Dxx	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
100W 120V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is connected to the LISN and powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency = 915MHz. Modulation: FSK. Frequency range of measurement = 150 kHz to 30 MHz. Frequency 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz.

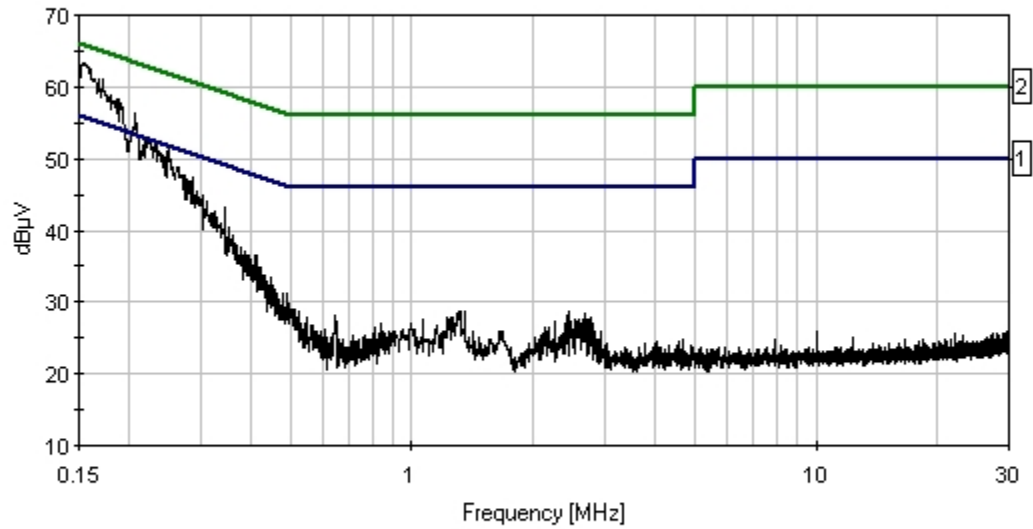
Transducer Legend:

T1=HP Filter AN 02343_013108	T2=6dB atten-P05887-101410.TRN
T3=Cable #8 ANP01910	T4=L1 Insertion Loss LISN AN02128

Measurement Data:		Reading listed by margin.						Test Lead: Black				
#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant	
1	311.438k	37.6	+0.2	+6.1	+0.1	+0.1	+0.0	44.1	49.9	-5.8	Black	
2	344.162k	36.7	+0.2	+6.1	+0.1	+0.1	+0.0	43.2	49.1	-5.9	Black	
3	352.889k	34.0	+0.2	+6.1	+0.1	+0.0	+0.0	40.4	48.9	-8.5	Black	
4	386.340k	30.7	+0.2	+6.1	+0.1	+0.0	+0.0	37.1	48.1	-11.0	Black	
5	416.155k	28.5	+0.2	+6.1	+0.1	+0.0	+0.0	34.9	47.5	-12.6	Black	
6	492.511k	24.7	+0.2	+6.1	+0.1	+0.0	+0.0	31.1	46.1	-15.0	Black	
7	477.240k	24.7	+0.2	+6.1	+0.1	+0.0	+0.0	31.1	46.4	-15.3	Black	
8	159.000k	32.2	+0.6	+6.1	+0.0	+0.1	+0.0	39.0	55.5	-16.5	Black	
Ave	^ 155.818k	55.7	+1.4	+6.1	+0.0	+0.1	+0.0	63.3	55.7	+7.6	Black	
10	1.353M	22.4	+0.1	+6.1	+0.1	+0.1	+0.0	28.8	46.0	-17.2	Black	
11	2.434M	22.1	+0.1	+6.1	+0.2	+0.2	+0.0	28.7	46.0	-17.3	Black	
12	2.672M	21.7	+0.1	+6.1	+0.2	+0.2	+0.0	28.3	46.0	-17.7	Black	
13	647.405k	21.8	+0.2	+6.1	+0.1	+0.0	+0.0	28.2	46.0	-17.8	Black	
14	547.778k	21.6	+0.2	+6.1	+0.1	+0.0	+0.0	28.0	46.0	-18.0	Black	
15	1.226M	21.5	+0.1	+6.1	+0.1	+0.1	+0.0	27.9	46.0	-18.1	Black	
16	2.774M	21.2	+0.1	+6.1	+0.2	+0.2	+0.0	27.8	46.0	-18.2	Black	
17	1.064M	21.3	+0.1	+6.1	+0.1	+0.1	+0.0	27.7	46.0	-18.3	Black	
18	2.446M	21.1	+0.1	+6.1	+0.2	+0.2	+0.0	27.7	46.0	-18.3	Black	
19	2.740M	21.1	+0.1	+6.1	+0.2	+0.2	+0.0	27.7	46.0	-18.3	Black	
20	2.714M	20.9	+0.1	+6.1	+0.2	+0.2	+0.0	27.5	46.0	-18.5	Black	
21	2.263M	20.7	+0.1	+6.1	+0.2	+0.2	+0.0	27.3	46.0	-18.7	Black	
22	991.831k	20.7	+0.1	+6.1	+0.1	+0.1	+0.0	27.1	46.0	-18.9	Black	

23	838.658k	20.5	+0.1	+6.1	+0.1	+0.1	+0.0	26.9	46.0	-19.1	Black
24	2.799M	19.4	+0.1	+6.1	+0.2	+0.2	+0.0	26.0	46.0	-20.0	Black
25	2.842M	19.3	+0.1	+6.1	+0.2	+0.2	+0.0	25.9	46.0	-20.1	Black
26	2.923M	19.3	+0.1	+6.1	+0.2	+0.2	+0.0	25.9	46.0	-20.1	Black
27	712.126k	19.1	+0.1	+6.1	+0.1	+0.0	+0.0	25.4	46.0	-20.6	Black
28	204.000k	26.1	+0.2	+6.1	+0.0	+0.1	+0.0	32.5	53.4	-20.9	Black
	Ave										
^	206.722k	49.8	+0.2	+6.1	+0.0	+0.1	+0.0	56.2	53.3	+2.9	Black
30	228.000k	21.0	+0.2	+6.1	+0.0	+0.1	+0.0	27.4	52.5	-25.1	Black
	Ave										
^	224.902k	46.4	+0.2	+6.1	+0.0	+0.1	+0.0	52.8	52.6	+0.2	Black
32	254.000k	18.5	+0.2	+6.1	+0.0	+0.1	+0.0	24.9	51.6	-26.7	Black
	Ave										
^	251.808k	45.2	+0.2	+6.1	+0.0	+0.1	+0.0	51.6	51.7	-0.1	Black
34	283.000k	14.9	+0.2	+6.1	+0.1	+0.1	+0.0	21.4	50.7	-29.3	Black
	Ave										
^	286.714k	40.9	+0.2	+6.1	+0.1	+0.1	+0.0	47.4	50.6	-3.2	Black

CKC Laboratories, Inc. Date: 2/17/2010 Time: 09:14:02 SmartLabs, Inc. WO#: 90456
 FCC 15.207 (2007) Conducted Class [AVE] Test Lead: Black 120V 60Hz Sequence#: 1
 SmartLabs, Inc. 2477Dxx



— Sweep Data
 — 1 - FCC 15.207 (2007) Conducted Class [AVE]
 — 2 - FCC 15.207 (2007) Conducted Class [QP]

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **FCC 15.207 (2007) Conducted Class [AVE]**
 Work Order #: **90456** Date: 2/17/2010
 Test Type: **Conducted Emissions** Time: 9:16:30 AM
 Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 2
 Manufacturer: SmartLabs, Inc. Tested By: Shaminderjit Hundal
 Model: 2477Dxx 120V 60Hz
 S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
High Pass Filter	D5201	01/14/2009	01/14/2011	02343
LISN	1090	03/25/2009	03/25/2011	02128
6dB Attenuator	NA	10/14/2008	10/14/2010	P05887
Coaxial Cable	Cable #8	04/29/2008	04/29/2010	P01910

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)*	SmartLabs, Inc.	2477Dxx	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
100W 120V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is connected to the LISN and powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency = 915MHz. Modulation: FSK. Frequency range of measurement = 150 kHz to 30 MHz. Frequency 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz.

Transducer Legend:

T1=HP Filter AN 02343_013108	T2=6dB atten-P05887-101410.TRN
T3=Cable #8 ANP01910	T4=L2 Insertion Loss LISN AN02128

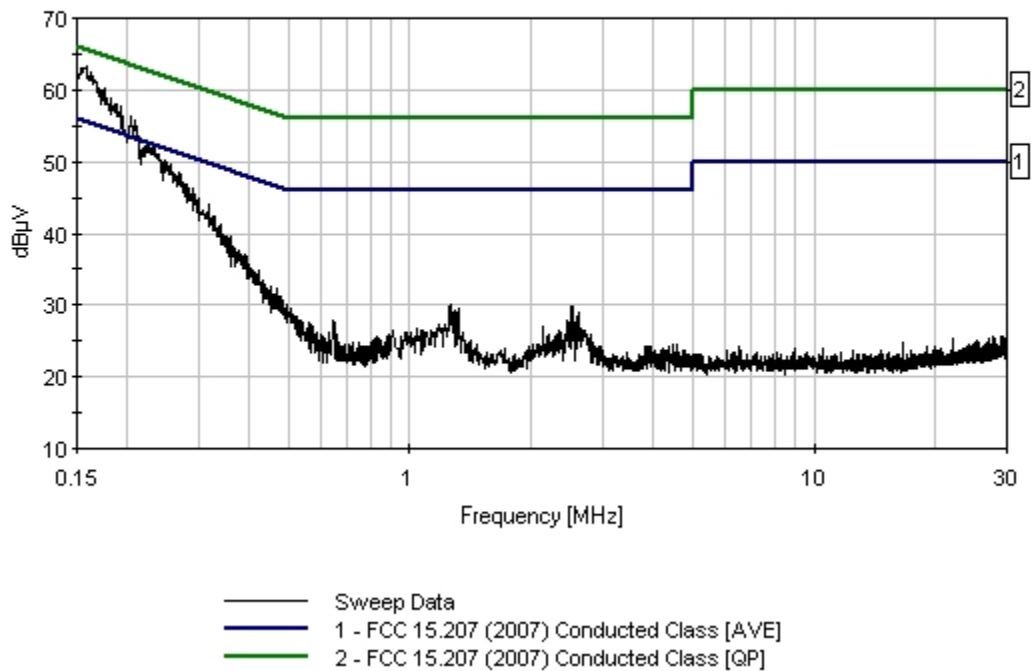
Measurement Data:

#	Freq MHz	Rdng dBμV	Reading listed by margin.					Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
			T1 dB	T2 dB	T3 dB	T4 dB						
1	292.531k	39.1	+0.2	+6.1	+0.1	+0.0	+0.0	45.5	50.5	-5.0	White	
2	300.530k	38.5	+0.2	+6.1	+0.1	+0.0	+0.0	44.9	50.2	-5.3	White	
3	316.529k	37.6	+0.2	+6.1	+0.1	+0.0	+0.0	44.0	49.8	-5.8	White	
4	327.437k	35.9	+0.2	+6.1	+0.1	+0.0	+0.0	42.3	49.5	-7.2	White	
5	360.888k	33.1	+0.2	+6.1	+0.1	+0.0	+0.0	39.5	48.7	-9.2	White	

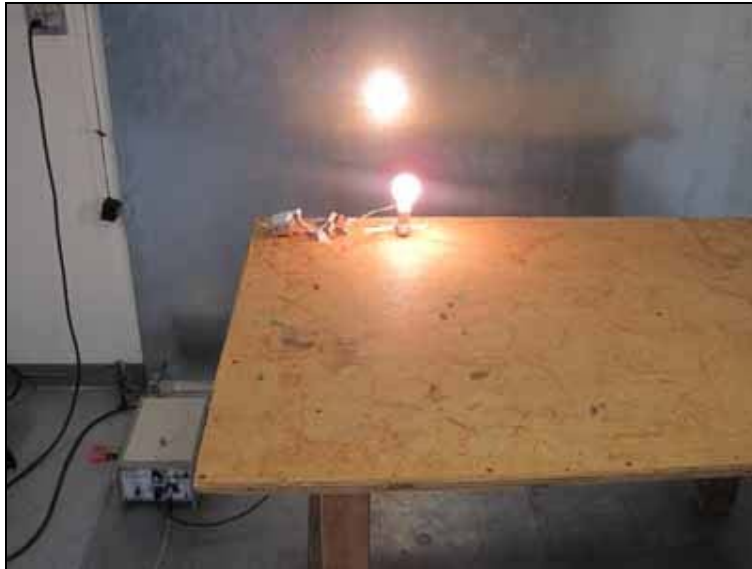
6	397.248k	30.4	+0.2	+6.1	+0.1	+0.0	+0.0	36.8	47.9	-11.1	White
7	422.700k	28.4	+0.2	+6.1	+0.1	+0.0	+0.0	34.8	47.4	-12.6	White
8	410.338k	28.3	+0.2	+6.1	+0.1	+0.0	+0.0	34.7	47.6	-12.9	White
9	432.154k	27.0	+0.2	+6.1	+0.1	+0.0	+0.0	33.4	47.2	-13.8	White
10	437.971k	26.5	+0.2	+6.1	+0.1	+0.0	+0.0	32.9	47.1	-14.2	White
11	455.424k	26.1	+0.2	+6.1	+0.1	+0.0	+0.0	32.5	46.8	-14.3	White
12	468.514k	25.8	+0.2	+6.1	+0.1	+0.0	+0.0	32.2	46.5	-14.3	White
13	457.606k	25.1	+0.2	+6.1	+0.1	+0.0	+0.0	31.5	46.7	-15.2	White
14	460.514k	25.0	+0.2	+6.1	+0.1	+0.0	+0.0	31.4	46.7	-15.3	White
15	466.332k	24.8	+0.2	+6.1	+0.1	+0.0	+0.0	31.2	46.6	-15.4	White
16	494.693k	23.8	+0.2	+6.1	+0.1	+0.0	+0.0	30.2	46.1	-15.9	White
17	1.268M	23.7	+0.1	+6.1	+0.1	+0.1	+0.0	30.1	46.0	-15.9	White
18	1.251M	23.3	+0.1	+6.1	+0.1	+0.1	+0.0	29.7	46.0	-16.3	White
19	2.514M	23.1	+0.1	+6.1	+0.2	+0.2	+0.0	29.7	46.0	-16.3	White
20	508.510k	23.2	+0.2	+6.1	+0.1	+0.0	+0.0	29.6	46.0	-16.4	White
21	1.319M	23.0	+0.1	+6.1	+0.1	+0.1	+0.0	29.4	46.0	-16.6	White
22	157.000k Ave	30.8	+1.1	+6.1	+0.0	+0.0	+0.0	38.0	55.6	-17.6	White
^	157.999k	56.4	+0.9	+6.1	+0.0	+0.0	+0.0	63.4	55.6	+7.8	White
24	207.000k Ave	25.9	+0.2	+6.1	+0.0	+0.1	+0.0	32.3	53.3	-21.0	White
^	203.086k	49.8	+0.2	+6.1	+0.0	+0.1	+0.0	56.2	53.5	+2.7	White
^	209.630k	49.3	+0.2	+6.1	+0.0	+0.1	+0.0	55.7	53.2	+2.5	White
27	184.000k Ave	26.7	+0.3	+6.1	+0.0	+0.1	+0.0	33.2	54.3	-21.1	White
^	181.997k	52.4	+0.3	+6.1	+0.0	+0.1	+0.0	58.9	54.4	+4.5	White
29	192.000k Ave	26.3	+0.2	+6.1	+0.0	+0.1	+0.0	32.7	53.9	-21.2	White
^	193.632k	51.3	+0.2	+6.1	+0.0	+0.1	+0.0	57.7	53.9	+3.8	White
31	205.000k Ave	25.7	+0.2	+6.1	+0.0	+0.1	+0.0	32.1	53.4	-21.3	White

32	232.000k	21.7	+0.2	+6.1	+0.0	+0.1	+0.0	28.0	52.4	-24.4	White
Ave											
^	232.901k	45.6	+0.2	+6.1	+0.0	+0.1	+0.0	52.0	52.3	-0.3	White
34	246.000k	20.6	+0.2	+6.1	+0.0	+0.0	+0.0	26.9	51.9	-25.0	White
Ave											
^	247.445k	43.8	+0.2	+6.1	+0.0	+0.0	+0.0	50.1	51.8	-1.7	White
36	267.000k	17.5	+0.2	+6.1	+0.0	+0.0	+0.0	23.8	51.2	-27.4	White
Ave											
^	267.079k	42.3	+0.2	+6.1	+0.0	+0.0	+0.0	48.6	51.2	-2.6	White
^	269.988k	41.9	+0.2	+6.1	+0.0	+0.0	+0.0	48.2	51.1	-2.9	White
39	270.000k	16.9	+0.2	+6.1	+0.0	+0.0	+0.0	23.2	51.1	-27.9	White
Ave											

CKC Laboratories, Inc. Date: 2/17/2010 Time: 9:16:30 AM SmartLabs, Inc. WVO#: 90456
 FCC 15.207 (2007) Conducted Class [AVE] Test Lead: White 120V 60Hz Sequence#: 2
 SmartLabs, Inc. 2477Dxx



Test Setup Photos



2.1046/15.249(a) Field Strength of Fundamental

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**

Specification: **FCC 15.249(a) Radiated Fundamental Emissions**

Work Order #: **90456** Date: 2/17/2010

Test Type: **Maximized Emissions** Time: 14:23:21

Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 3

Manufacturer: SmartLabs, Inc. Tested By: Shaminderjit Hundal

Model: 2477Dxx

S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)*	SmartLabs, Inc.	2477Dxx	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
150W 250V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Axis 1 back is on table, axis 2 side clicker is facing antenna, axis 3 standing clicker facing antenna. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency range of measurement = 913.5MHz to 916.5MHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

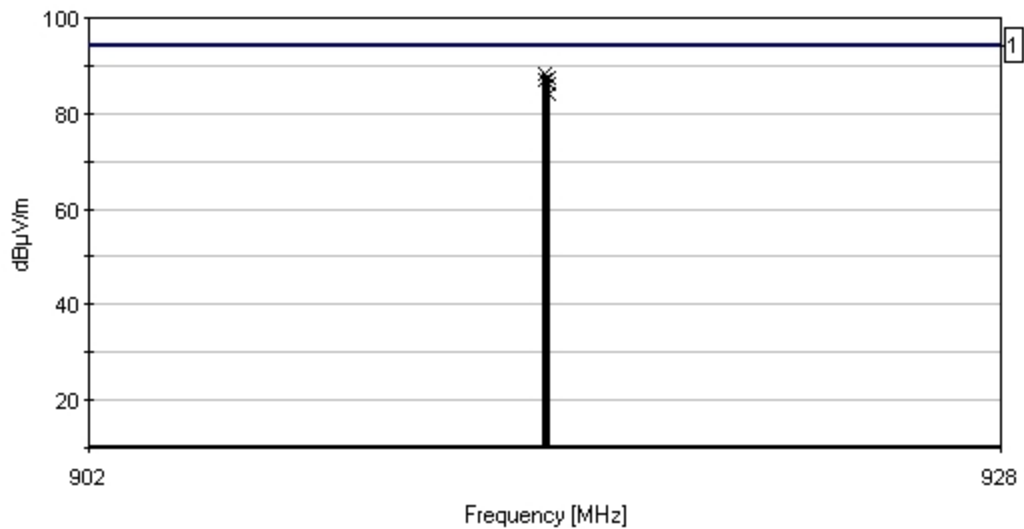
Transducer Legend:

T1=Preamplifier ANP00010 042910	T2=Cable ANP01911 41ft RG-214/U
T3=84' Heliac Cable P04382_#17	T4=Cable_P05555_SA to pre-amp
T5=Log Periodic AN00001	

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

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	914.883M	85.7	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	88.3	94.0 axis 2	-5.7	Vert
2	915.029M	84.9	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	87.5	94.0 axis 2	-6.5	Horiz
3	914.900M	84.4	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	87.0	94.0 axis 3	-7.0	Horiz
4	914.883M	84.4	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	87.0	94.0 axis 3	-7.0	Vert
5	915.042M	83.7	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	86.3	94.0 axis 1	-7.7	Vert
6	915.037M	81.4	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	84.0	94.0 axis 1	-10.0	Horiz

CKC Laboratories, Inc. Date: 2/17/2010 Time: 14:23:21 SmartLabs, Inc. WO#: 90456
FCC 15.249(a) Radiated Fundamental Emissions Test Distance: 3 Meters Sequence#: 3
SmartLabs, Inc. 2477Dxx



— Readings
— 1 - FCC 15.249(a) Radiated Fundamental Emissions
× Peak Readings

Test Setup Photos



2.1049 Occupied Bandwidth

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **2.1049 Occupied Bandwidth**
 Work Order #: **90456**

Date: 2/17/2010

Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)**

Manufacturer: SmartLabs, Inc.
 Model: 2477Dxx
 S/N: (none)

Tested By: S. Hundal

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)	SmartLabs, Inc.	2477Dxx	(none)

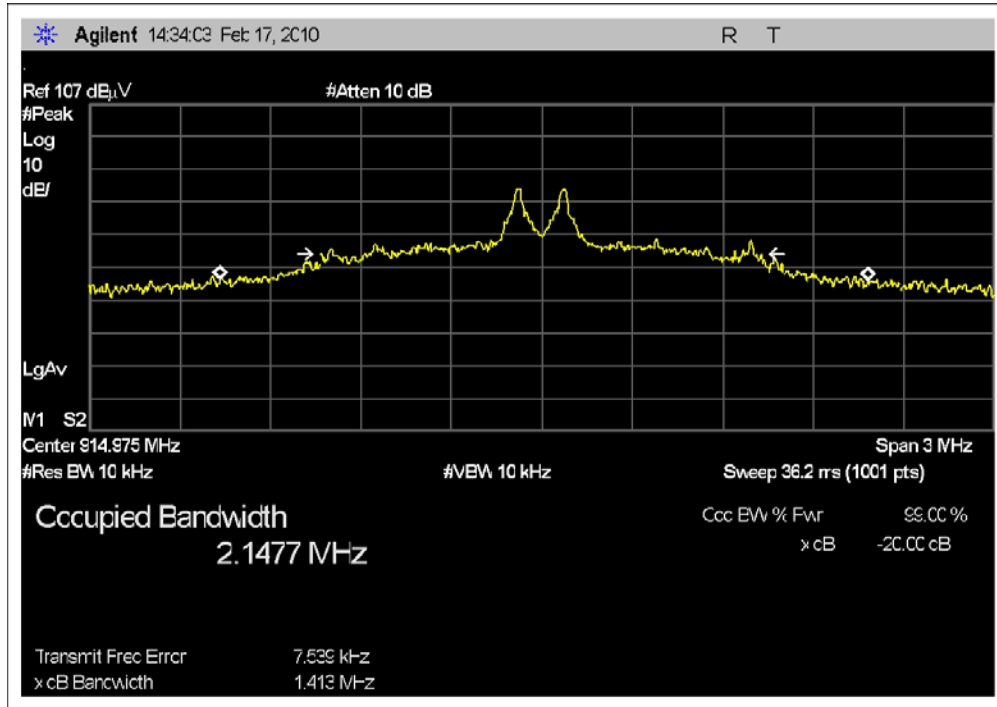
Support Devices:

Function	Manufacturer	Model #	S/N
100W 120V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency range of measurement = 913.5MHz to 916.5MHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

Test Data



Test Setup Photos



2.1053/15.249(a) Field Strength of Harmonics

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **FCC 15.249(a) Radiated Harmonic Emissions**
 Work Order #: **90456** Date: 2/17/2010
 Test Type: **Maximized Emissions** Time: 19:07:21
 Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 5
 Manufacturer: SmartLabs, Inc. Tested By: Shaminderjit Hundal
 Model: 2477Dxx
 S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Spectrum Analyzer	MY46186290	02/21/2009	02/21/2011	02869
40GHz cable	NA	09/14/2009	09/14/2011	02946
Horn Antenna	9603-4683	06/06/2008	06/06/2010	01646
Microwave Preamplifier	3123A00282	06/04/2009	06/04/2011	00787
Antenna Cable	L1-PNMNM-48	10/13/2008	10/13/2010	P05563
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
1GHz High Pass Filter	NA	11/20/2009	11/20/2011	02749
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Bicon Antenna	157	10/22/2009	10/22/2011	00206
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010
Loop Antenna	2014	06/16/2008	06/16/2010	00314

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)*	SmartLabs, Inc.	2477Dxx	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
150W 250V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Axis 1 back, axis 2 side, axis 3 bottom on table. Temperature: 20°C, Humidity: 41%, Pressure: 101kPa. Frequency range of measurement = 9 kHz to 10 GHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

Transducer Legend:

T1=84' Heliac Cable P04382_#17	T2=Preamplifier AN00787
T3=Horn Ant AN01646 060610	T4=Hi-Freq_40GHz_3ft_AN02946_0911411.TRN
T5=48' Heliac Cable 101310 P05563	

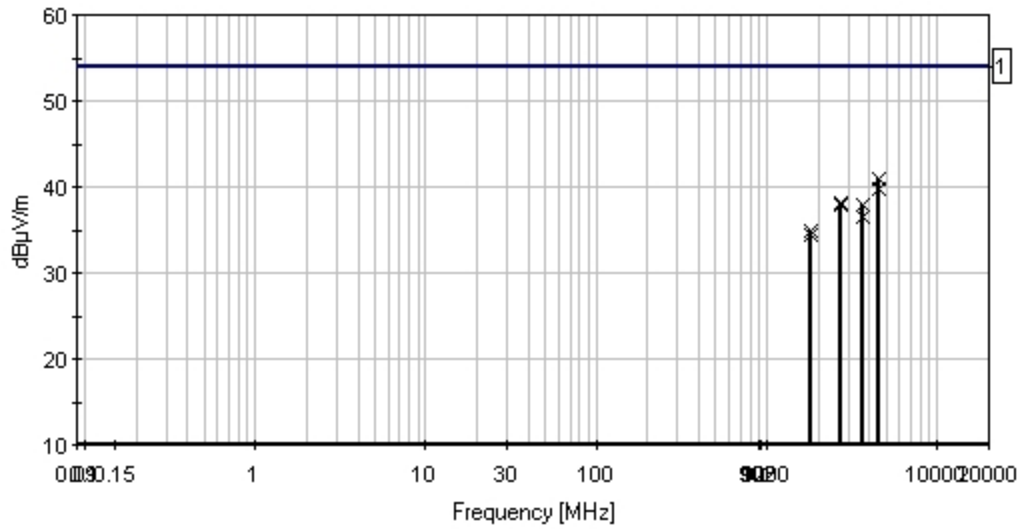
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	4574.790M	34.4	+8.5 +4.7	-40.3	+32.8	+0.8	+0.0	40.9	54.0	-13.1	Horiz
2	4575.030M	33.2	+8.5 +4.7	-40.3	+32.8	+0.8	+0.0	39.7	54.0	-14.3	Vert
3	2745.090M	38.5	+6.3 +3.4	-39.9	+29.2	+0.6	+0.0	38.1	54.0	-15.9	Vert
4	2744.850M	38.4	+6.3 +3.4	-39.9	+29.2	+0.6	+0.0	38.0	54.0	-16.0	Horiz
5	3659.820M	35.1	+7.5 +4.1	-40.2	+30.7	+0.7	+0.0	37.9	54.0	-16.1	Horiz
6	3660.060M	33.8	+7.5 +4.1	-40.2	+30.7	+0.7	+0.0	36.6	54.0	-17.4	Vert
7	1829.880M	39.7	+5.0 +2.7	-39.7	+26.6	+0.5	+0.0	34.8	54.0	-19.2	Vert
8	1829.943M	39.4	+5.0 +2.7	-39.7	+26.6	+0.5	+0.0	34.5	54.0	-19.5	Horiz

CKC Laboratories, Inc. Date: 2/17/2010 Time: 19:07:21 SmartLabs, Inc. WO#: 90456
 FCC 15.249(a) Radiated Harmonic Emissions Test Distance: 3 Meters Sequence#: 5
 SmartLabs, Inc. 2477Dxx



— Readings
 — 1 - FCC 15.249(a) Radiated Harmonic Emissions
 × Peak Readings

Test Setup Photos



2.1053/2.249(d) Field Strength of Spurious Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **FCC 15.249(d) Radiated Spurious Emissions**
 Work Order #: **90456** Date: 3/3/2010
 Test Type: **Maximized Emissions** Time: 08:56:03
 Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 6
 Manufacturer: SmartLabs, Inc. Tested By: Shaminderjit Hundal
 Model: 2477Dxx
 S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Spectrum Analyzer	MY46186290	02/21/2009	02/21/2011	02869
40GHz cable	NA	09/14/2009	09/14/2011	02946
Horn Antenna	9603-4683	06/06/2008	06/06/2010	01646
Microwave Preamplifier	3123A00282	06/04/2009	06/04/2011	00787
Antenna Cable	L1-PNMNM-48	10/13/2008	10/13/2010	P05563
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
1GHz High Pass Filter	NA	11/20/2009	11/20/2011	02749
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Bicon Antenna	157	10/22/2009	10/22/2011	00206
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010
Loop Antenna	2014	06/16/2008	06/16/2010	00314

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)*	SmartLabs, Inc.	2477Dxx	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
150W 250V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Axis 1 back, axis 2 side, axis 3 bottom on table. Temperature: 20°C, Humidity: 41%, Pressure: 101kPa. Frequency range of measurement = 9 kHz – 10 GHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

Transducer Legend:

T1=Preamplifier ANP00010 042910	T2=Cable ANP01911 41ft RG-214/U
T3=84' Heliac Cable P04382_#17	T4=Cable_P05555_SA to pre-amp
T5=Log Periodic AN00001	T6=Bicon AN00206

Measurement Data:

Reading listed by margin.

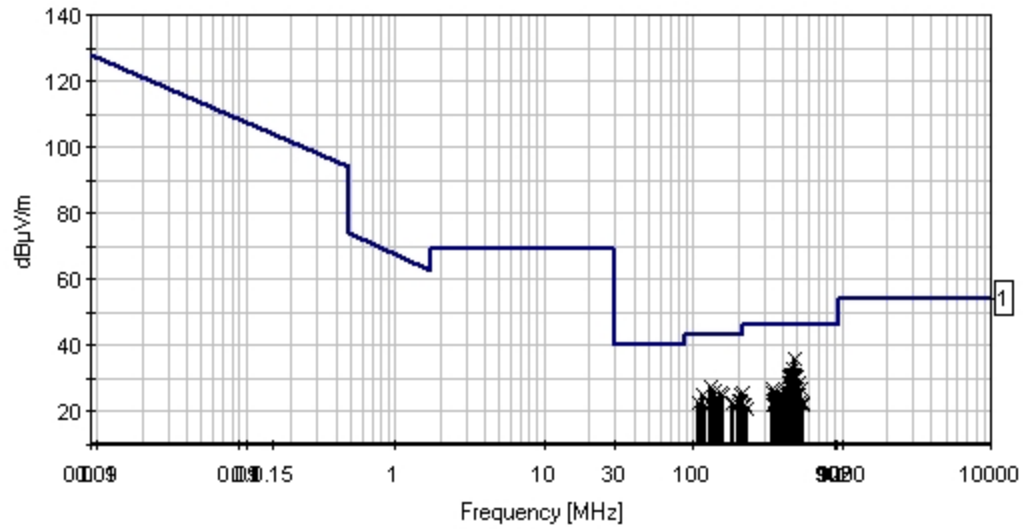
Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	486.598M	42.0	-27.8 +16.6	+2.4 +0.0	+2.4	+0.4	+0.0	36.0	46.0	-10.0	Vert
2	464.475M	39.6	-27.6 +16.3	+2.3 +0.0	+2.3	+0.3	+0.0	33.2	46.0	-12.8	Horiz
3	464.475M	39.6	-27.6 +16.3	+2.3 +0.0	+2.3	+0.3	+0.0	33.2	46.0	-12.8	Horiz
4	458.964M	37.9	-27.5 +16.2	+2.3 +0.0	+2.3	+0.3	+0.0	31.5	46.0	-14.5	Horiz
5	464.496M	37.8	-27.6 +16.3	+2.3 +0.0	+2.3	+0.3	+0.0	31.4	46.0	-14.6	Vert
6	481.085M	37.3	-27.8 +16.5	+2.4 +0.0	+2.4	+0.4	+0.0	31.2	46.0	-14.8	Vert
7	442.381M	37.3	-27.4 +16.0	+2.3 +0.0	+2.3	+0.3	+0.0	30.8	46.0	-15.2	Vert
8	453.441M	37.0	-27.4 +16.2	+2.3 +0.0	+2.3	+0.3	+0.0	30.7	46.0	-15.3	Vert
9	503.193M	36.4	-28.0 +16.8	+2.4 +0.0	+2.4	+0.4	+0.0	30.4	46.0	-15.6	Vert
10	475.555M	36.5	-27.7 +16.4	+2.4 +0.0	+2.4	+0.4	+0.0	30.4	46.0	-15.6	Vert
11	132.709M	38.9	-27.1 +0.0	+1.1 +13.2	+1.2	+0.3	+0.0	27.6	43.5	-15.9	Vert
12	508.723M	34.9	-28.0 +16.9	+2.4 +0.0	+2.4	+0.4	+0.0	29.0	46.0	-17.0	Vert
13	436.845M	35.6	-27.4 +16.0	+2.2 +0.0	+2.2	+0.3	+0.0	28.9	46.0	-17.1	Horiz
14	453.435M	35.1	-27.4 +16.2	+2.3 +0.0	+2.3	+0.3	+0.0	28.8	46.0	-17.2	Horiz
15	436.851M	35.3	-27.4 +16.0	+2.2 +0.0	+2.2	+0.3	+0.0	28.6	46.0	-17.4	Vert
16	138.239M	37.5	-27.0 +0.0	+1.1 +12.9	+1.3	+0.3	+0.0	26.1	43.5	-17.4	Vert
17	442.375M	35.0	-27.4 +16.0	+2.3 +0.0	+2.3	+0.3	+0.0	28.5	46.0	-17.5	Horiz

18	154.831M	37.6	-27.0 +0.0	+1.2 +12.6	+1.3	+0.3	+0.0	26.0	43.5	-17.5	Vert
19	215.660M	32.5	-26.7 +0.0	+1.5 +16.7	+1.6	+0.3	+0.0	25.9	43.5	-17.6	Horiz
20	458.958M	34.4	-27.5 +16.2	+2.3 +0.0	+2.3	+0.3	+0.0	28.0	46.0	-18.0	Vert
21	160.359M	36.6	-27.0 +0.0	+1.2 +13.0	+1.3	+0.3	+0.0	25.4	43.5	-18.1	Vert
22	486.608M	33.6	-27.8 +16.6	+2.4 +0.0	+2.4	+0.4	+0.0	27.6	46.0	-18.4	Vert
23	116.124M	36.8	-27.1 +0.0	+1.0 +13.1	+1.1	+0.2	+0.0	25.1	43.5	-18.4	Vert
24	486.631M	33.4	-27.8 +16.6	+2.4 +0.0	+2.4	+0.4	+0.0	27.4	46.0	-18.6	Horiz
25	210.130M	31.5	-26.7 +0.0	+1.4 +16.8	+1.5	+0.3	+0.0	24.8	43.5	-18.7	Horiz
26	342.835M	31.0	-26.9 +18.7	+2.0 +0.0	+2.0	+0.4	+0.0	27.2	46.0	-18.8	Horiz
27	348.371M	31.1	-27.0 +18.4	+2.0 +0.0	+2.0	+0.4	+0.0	26.9	46.0	-19.1	Vert
28	525.313M	32.5	-28.1 +17.1	+2.5 +0.0	+2.5	+0.3	+0.0	26.8	46.0	-19.2	Vert
29	481.101M	32.6	-27.8 +16.5	+2.4 +0.0	+2.4	+0.4	+0.0	26.5	46.0	-19.5	Horiz
30	431.315M	33.2	-27.4 +15.9	+2.2 +0.0	+2.2	+0.3	+0.0	26.4	46.0	-19.6	Horiz
31	204.600M	30.1	-26.7 +0.0	+1.4 +17.0	+1.5	+0.3	+0.0	23.6	43.5	-19.9	Vert
32	348.365M	29.9	-27.0 +18.4	+2.0 +0.0	+2.0	+0.4	+0.0	25.7	46.0	-20.3	Horiz
33	364.955M	31.0	-27.1 +17.4	+2.0 +0.0	+2.0	+0.4	+0.0	25.7	46.0	-20.3	Horiz
34	210.130M	29.8	-26.7 +0.0	+1.4 +16.8	+1.5	+0.3	+0.0	23.1	43.5	-20.4	Vert
35	110.604M	35.5	-27.2 +0.0	+0.9 +12.5	+1.1	+0.2	+0.0	23.0	43.5	-20.5	Vert
36	143.811M	34.6	-27.0 +0.0	+1.2 +12.6	+1.3	+0.3	+0.0	23.0	43.5	-20.5	Vert
37	503.221M	31.3	-28.0 +16.8	+2.4 +0.0	+2.4	+0.4	+0.0	25.3	46.0	-20.7	Horiz
38	508.751M	31.2	-28.0 +16.9	+2.4 +0.0	+2.4	+0.4	+0.0	25.3	46.0	-20.7	Horiz
39	182.480M	29.8	-26.8 +0.0	+1.3 +16.5	+1.4	+0.4	+0.0	22.6	43.5	-20.9	Vert
40	475.571M	30.9	-27.7 +16.4	+2.4 +0.0	+2.4	+0.4	+0.0	24.8	46.0	-21.2	Horiz
41	370.485M	30.4	-27.2 +17.1	+2.0 +0.0	+2.0	+0.4	+0.0	24.7	46.0	-21.3	Horiz
42	398.135M	31.9	-27.4 +15.6	+2.1 +0.0	+2.1	+0.3	+0.0	24.6	46.0	-21.4	Horiz
43	121.664M	33.2	-27.1 +0.0	+1.0 +13.6	+1.2	+0.2	+0.0	22.1	43.5	-21.4	Vert

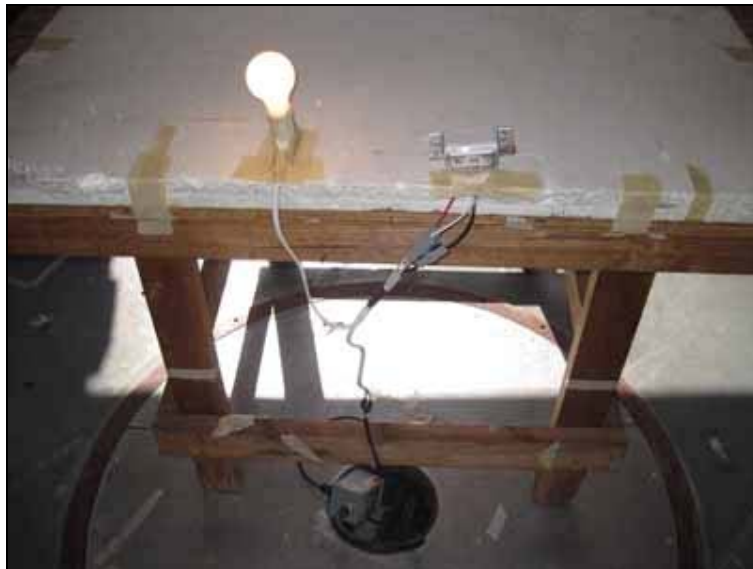
44	364.961M	29.8	-27.1 +17.4	+2.0 +0.0	+2.0	+0.4	+0.0	24.5	46.0	-21.5	Vert
45	204.600M	28.4	-26.7 +0.0	+1.4 +17.0	+1.5	+0.3	+0.0	21.9	43.5	-21.6	Horiz
46	132.710M	33.2	-27.1 +0.0	+1.1 +13.2	+1.2	+0.3	+0.0	21.9	43.5	-21.6	Horiz
47	370.491M	29.9	-27.2 +17.1	+2.0 +0.0	+2.0	+0.4	+0.0	24.2	46.0	-21.8	Vert
48	420.255M	30.9	-27.4 +15.8	+2.2 +0.0	+2.2	+0.3	+0.0	24.0	46.0	-22.0	Horiz
49	414.725M	30.7	-27.4 +15.7	+2.2 +0.0	+2.2	+0.3	+0.0	23.7	46.0	-22.3	Horiz
50	392.605M	30.6	-27.3 +15.9	+2.1 +0.0	+2.1	+0.3	+0.0	23.7	46.0	-22.3	Horiz
51	359.431M	28.1	-27.1 +17.7	+2.0 +0.0	+2.0	+0.4	+0.0	23.1	46.0	-22.9	Vert
52	431.321M	29.8	-27.4 +15.9	+2.2 +0.0	+2.2	+0.3	+0.0	23.0	46.0	-23.0	Vert
53	552.963M	28.0	-28.1 +17.6	+2.6 +0.0	+2.6	+0.3	+0.0	23.0	46.0	-23.0	Vert
54	519.783M	28.5	-28.0 +17.0	+2.5 +0.0	+2.5	+0.4	+0.0	22.9	46.0	-23.1	Vert
55	414.731M	29.8	-27.4 +15.7	+2.2 +0.0	+2.2	+0.3	+0.0	22.8	46.0	-23.2	Vert
56	547.433M	27.4	-28.1 +17.5	+2.6 +0.0	+2.6	+0.3	+0.0	22.3	46.0	-23.7	Vert
57	342.841M	26.0	-26.9 +18.7	+2.0 +0.0	+2.0	+0.4	+0.0	22.2	46.0	-23.8	Vert
58	359.425M	26.9	-27.1 +17.7	+2.0 +0.0	+2.0	+0.4	+0.0	21.9	46.0	-24.1	Horiz
59	221.190M	28.5	-26.7 +0.0	+1.5 +16.6	+1.6	+0.3	+0.0	21.8	46.0	-24.2	Horiz
60	420.261M	28.7	-27.4 +15.8	+2.2 +0.0	+2.2	+0.3	+0.0	21.8	46.0	-24.2	Vert
61	387.075M	28.4	-27.3 +16.2	+2.1 +0.0	+2.1	+0.3	+0.0	21.8	46.0	-24.2	Horiz
62	398.141M	29.0	-27.4 +15.6	+2.1 +0.0	+2.1	+0.3	+0.0	21.7	46.0	-24.3	Vert
63	409.201M	28.7	-27.4 +15.6	+2.1 +0.0	+2.1	+0.3	+0.0	21.4	46.0	-24.6	Vert
64	226.720M	27.7	-26.7 +0.0	+1.5 +16.4	+1.6	+0.4	+0.0	20.9	46.0	-25.1	Horiz
65	138.240M	29.6	-27.0 +0.0	+1.1 +12.9	+1.3	+0.3	+0.0	18.2	43.5	-25.3	Horiz

CKC Laboratories, Inc. Date: 3/3/2010 Time: 08:56:03 SmartLabs, Inc. WO#: 90456
 FCC 15.249(d) Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 6
 SmartLabs, Inc. 2477Dxx



— Readings
 — 1 - FCC 15.249(d) Radiated Spurious Emissions
 × Peak Readings

Test Setup Photos



Band Edge

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **Band Edge Compliance**
 Work Order #: **90456** Date: 2/17/2010
 Test Type: **Maximized Emissions** Time: 10:35:33
 Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)** Sequence#: 3
 Manufacturer: SmartLabs, Inc. Tested By: S. Hundal
 Model: 2477Dxx
 S/N: (none)

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)	SmartLabs, Inc.	2477Dxx	(none)

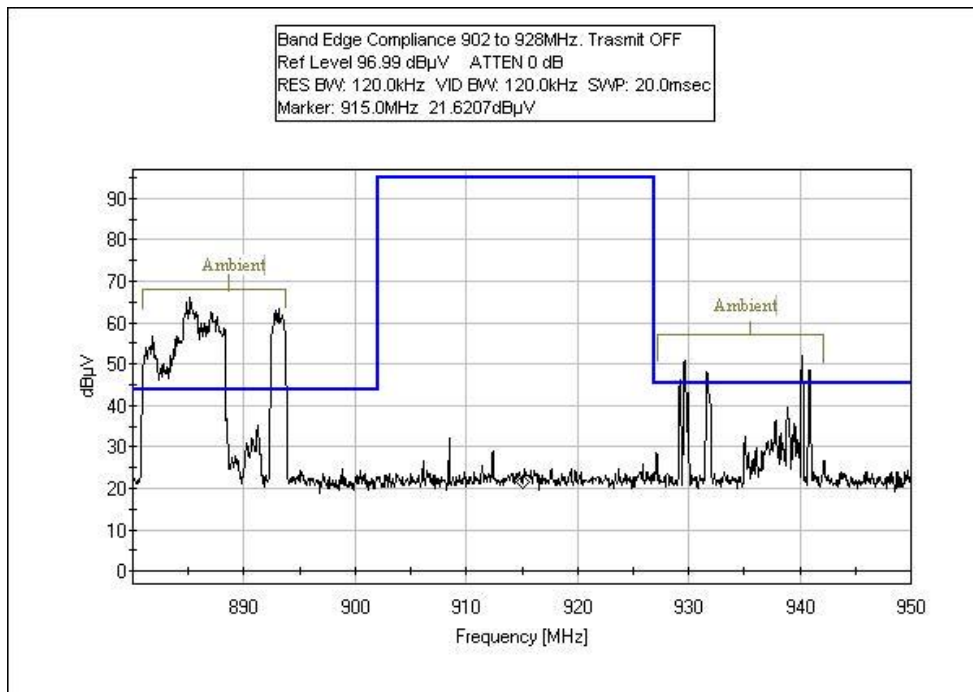
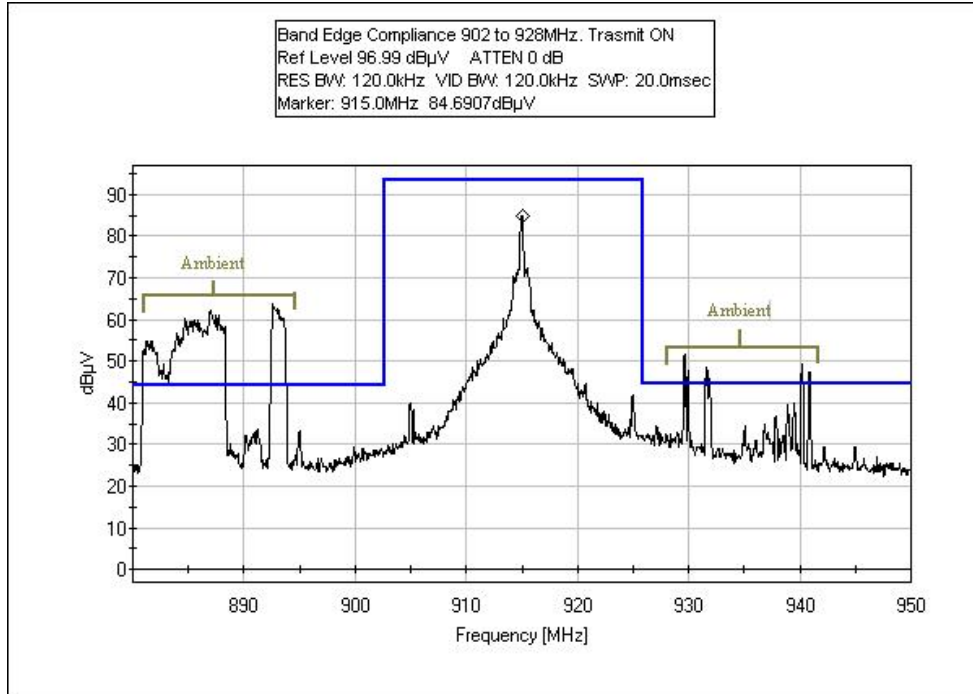
Support Devices:

Function	Manufacturer	Model #	S/N
100W 120V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency range of measurement = 913.5MHz to 916.5MHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

Test Plots



Test Setup Photos



99% Bandwidth/RSS-210

Test Location: CKC Laboratories, Inc. • 110 N Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **SmartLabs, Inc.**
 Specification: **RSS-210 Occupied Bandwidth**
 Work Order #: **90456**

Date: 2/17/2010

Equipment: **SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)**

Manufacturer: SmartLabs, Inc.
 Model: 2477Dxx
 S/N: (none)

Tested By: S. Hundal

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer RF Section	2928A04874	09/16/2008	09/16/2010	02462
Spectrum Analyzer Display Section	3001A18430	09/16/2008	09/16/2010	02472
Quasi Peak Adapter	3303A01884	09/16/2008	09/16/2010	01437
Log Periodic Antenna	463	10/23/2009	10/23/2011	00001
Antenna Cable	Cable #9	11/11/2009	11/11/2011	P01911
10m Position Cable	Cable #17	09/22/2008	09/22/2010	P04382
Preamplifier Cable	Cable #22	08/19/2008	08/19/2010	P05555
Preamplifier	2727A05392	04/29/2008	04/29/2010	00010

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band)	SmartLabs, Inc.	2477Dxx	(none)

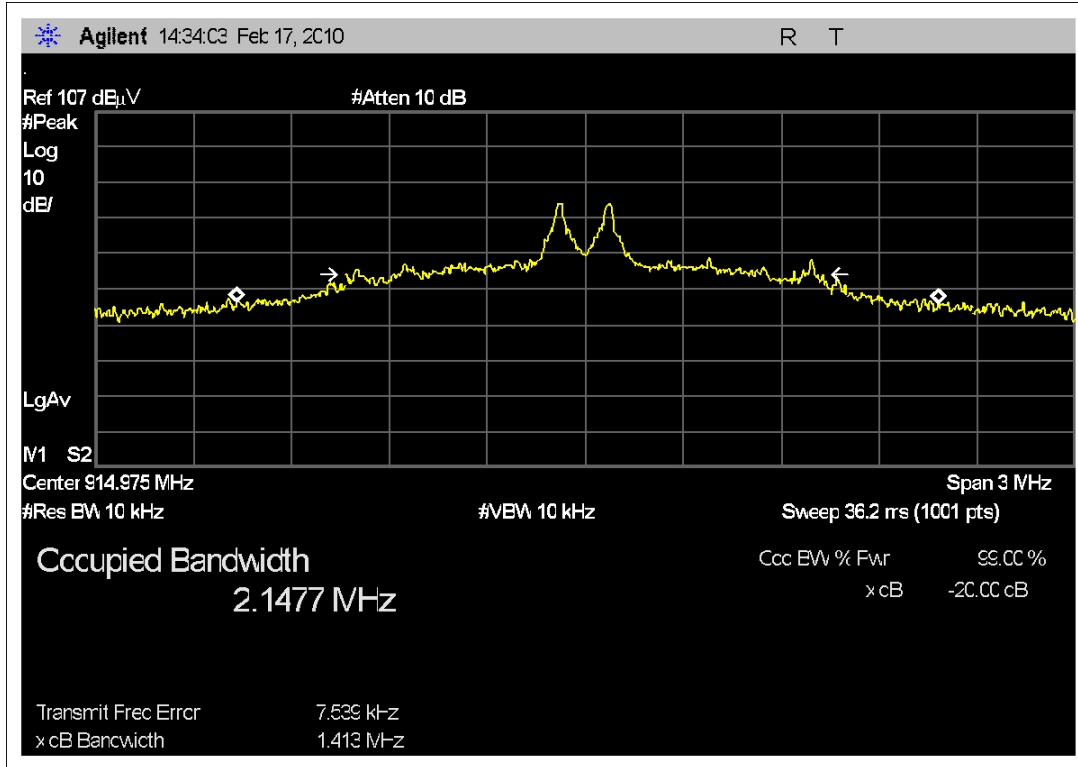
Support Devices:

Function	Manufacturer	Model #	S/N
150W 250V Light Bulb	Phillips	NA	NA

Test Conditions / Notes:

The equipment under test (EUT) is a SwitchLinc™ - INSTEON Dimmer Switch (Dual-Band). The EUT input power is powered from 120Vac 60Hz. Connected to the EUT as a load is a 120V 100W light bulb. Temperature: 21°C, Humidity: 30%, Pressure: 101kPa. Frequency range of measurement = 913.5MHz to 916.5MHz. Operating range of device 914.9MHz to 915.1MHz. EUT set at 915.0MHz. Modulation FSK.

Test Data



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	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. When conducted emissions testing was performed, a 10 dB external attenuator was used with internal offset correction in the analyzer.

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.