

# SmartLabs, Inc.

TEST REPORT FOR

**INSTEON 240V 30 AMP LOAD CONTROLLER (Dual-Band)  
MODEL: 2477SA1**

**Tested To The Following Standards:**

**FCC PART 15 SUBPART C SECTIONS 15.207 & 15.249  
AND  
RSS-210 VERSION 7**

**Report No.: 90412-3**

**Date of issue: February 5, 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: 10-3JL0127-01

**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: 90412

February 1, 2010

February 1, 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 15.207 & 15.249/RSS-210**

Description	Test Procedure/Method	Results
Voltage Variation	FCC 15.31(e)	Pass
AC Conducted Emissions	FCC 15.207	Pass
Field Strength of Fundamental	FCC 15.249(a)	Pass
Field Strength of Harmonics	FCC 15.249(a)	Pass
Field Strength of Spurious Radiation	FCC 15.249(d)	Pass
Occupied Bandwidth	FCC 2.1049	Pass
FCC _ 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
None

## EQUIPMENT UNDER TEST (EUT)

The following model has been tested by CKC Laboratories:

### **240V 30A Dual-Band Load Controller with Phase Coupler, 2477SA1**

Since the time of testing the manufacturer has chosen to use the following model name in its place:

### **INSTEON 240v 30 AMP Load Controller (Dual Band), 2477SA1**

Any difference 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.

The manufacturer states that the following additional model is identical electrically to the one which was tested, or any differences between them do not affect their EMC characteristics, and therefore it meets the level of testing equivalent to the tested model:

### **INSTEON 240V 30 AMP Load Controller (Dual Band), 2477SA2**

The manufacturer plans on making two versions of the 240-volt load controller and the only difference is how the power relays are wired.

2477SA1

INSTEON 240V 30 AMP Load Controller Normally Open Relay (Dual-Band)

2477SA2

INSTEON 240V 30 AMP Load Controller Normally Closed Relay (Dual-Band)

The only difference is how the appliance connected to 240-Volt Controller operated when it fails. For example, if the product is controlling an electric water heater, you would want the 240-Volt Controller to fail with relays closed so that power continues to the water heater and the water heater's thermostat will control the water temp. For a swimming pool pump or spa, you would want the product to fail in the open state so that it does not continue to run on and on. The only difference is how the manufacturer is going to wire the power relays and the operating firmware so the relays work correctly (the operating firmware for the RF section is unchanged). The manufacturer plans to use one label and simply check a box indicating the model.

## **INSTEON 240v 30 AMP Load Controller (Dual Band)**

Manuf: SmartLabs, Inc.

Model: 2477SA1

Serial: NA

## **PERIPHERAL DEVICES**

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

### **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**

The supply voltage varied between 85% and 115% of the nominal rated supply voltage. No change in fundamental emission was observed.

### **15.31(m) Number Of Channels**

This device operates on a single channel.

### **15.33(a) Frequency Ranges Tested**

15.207 Conducted Emissions: 150kHz to 30MHz

15.249 Radiated Emissions: 9kHz to 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 #: **90412** Date: 2/1/2010  
 Test Type: **Conducted Emissions** Time: 08:50:29  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 1  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1 240V 60Hz  
 S/N: NA

***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
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

***Support Devices:***

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

***Test Conditions / Notes:***

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is connected to the LISN and powered from 240Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 21°C, Humidity: 36%, Pressure: 100kPa. Frequency = 915MHz. Modulation: FSK. Frequency range of measurement = 150 kHz to 30 MHz Frequency 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz.



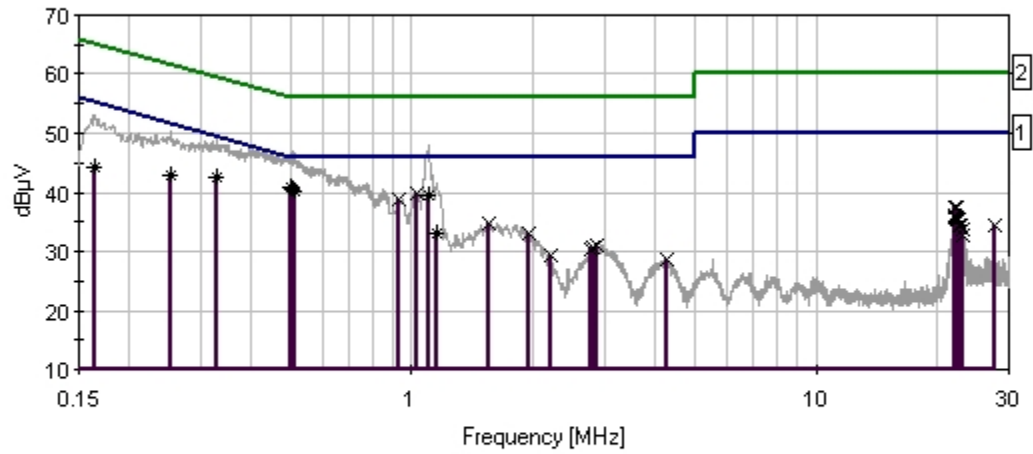
**Transducer Legend:**

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

<b>Measurement Data:</b>		Reading listed by margin.						Test Lead: Black				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant	
1	500.000k	34.3	+0.2	+6.1	+0.1	+0.0	+0.0	40.7	46.0	-5.3	Black	
	Ave											
^	499.783k	40.1	+0.2	+6.1	+0.1	+0.0	+0.0	46.5	46.0	+0.5	Black	
									see average data			
3	509.000k	34.0	+0.2	+6.1	+0.1	+0.0	+0.0	40.4	46.0	-5.6	Black	
	Ave											
4	514.000k	33.8	+0.2	+6.1	+0.1	+0.0	+0.0	40.2	46.0	-5.8	Black	
	Ave											
^	509.237k	40.5	+0.2	+6.1	+0.1	+0.0	+0.0	46.9	46.0	+0.9	Black	
									see average data			
^	513.600k	40.2	+0.2	+6.1	+0.1	+0.0	+0.0	46.6	46.0	+0.6	Black	
									see average data			
7	1.034M	33.3	+0.1	+6.1	+0.1	+0.1	+0.0	39.7	46.0	-6.3	Black	
8	1.098M	33.0	+0.1	+6.1	+0.1	+0.1	+0.0	39.4	46.0	-6.6	Black	
	Ave											
^	1.098M	41.5	+0.1	+6.1	+0.1	+0.1	+0.0	47.9	46.0	+1.9	Black	
									see average data			
10	329.000k	36.2	+0.2	+6.1	+0.1	+0.1	+0.0	42.7	49.5	-6.8	Black	
	Ave											
^	328.891k	43.1	+0.2	+6.1	+0.1	+0.1	+0.0	49.6	49.5	+0.1	Black	
									see average data			
12	928.036k	32.5	+0.1	+6.1	+0.1	+0.0	+0.0	38.8	46.0	-7.2	Black	
13	254.000k	36.6	+0.2	+6.1	+0.0	+0.1	+0.0	43.0	51.6	-8.6	Black	
	Ave											
^	253.990k	43.9	+0.2	+6.1	+0.0	+0.1	+0.0	50.3	51.6	-1.3	Black	
									see average data			
15	165.000k	37.7	+0.4	+6.1	+0.0	+0.1	+0.0	44.3	55.2	-10.9	Black	
	Ave											
^	164.544k	46.4	+0.4	+6.1	+0.0	+0.1	+0.0	53.0	55.2	-2.2	Black	
									see average data			
17	1.553M	28.4	+0.1	+6.1	+0.1	+0.1	+0.0	34.8	46.0	-11.2	Black	
18	22.148M	29.6	+0.2	+6.1	+0.4	+1.3	+0.0	37.6	50.0	-12.4	Black	
19	22.328M	29.3	+0.2	+6.1	+0.4	+1.3	+0.0	37.3	50.0	-12.7	Black	
20	1.149M	26.8	+0.1	+6.1	+0.1	+0.1	+0.0	33.2	46.0	-12.8	Black	
	Ave											
^	1.149M	35.2	+0.1	+6.1	+0.1	+0.1	+0.0	41.6	46.0	-4.4	Black	
									see average data			
22	1.957M	26.5	+0.1	+6.1	+0.1	+0.1	+0.0	32.9	46.0	-13.1	Black	

23	22.049M	28.1	+0.1	+6.1	+0.4	+1.3	+0.0	36.0	50.0	-14.0	Black
24	22.400M	27.9	+0.2	+6.1	+0.4	+1.3	+0.0	35.9	50.0	-14.1	Black
25	21.986M	27.8	+0.1	+6.1	+0.4	+1.3	+0.0	35.7	50.0	-14.3	Black
26	22.193M	27.5	+0.2	+6.1	+0.4	+1.3	+0.0	35.5	50.0	-14.5	Black
27	22.256M	27.5	+0.2	+6.1	+0.4	+1.3	+0.0	35.5	50.0	-14.5	Black
28	22.607M	27.3	+0.2	+6.1	+0.4	+1.3	+0.0	35.3	50.0	-14.7	Black
29	2.876M	24.4	+0.1	+6.1	+0.2	+0.2	+0.0	31.0	46.0	-15.0	Black
30	2.804M	24.2	+0.1	+6.1	+0.2	+0.2	+0.0	30.8	46.0	-15.2	Black
31	27.670M	26.0	+0.3	+6.1	+0.5	+1.6	+0.0	34.5	50.0	-15.5	Black
32	2.778M	23.8	+0.1	+6.1	+0.2	+0.2	+0.0	30.4	46.0	-15.6	Black
33	22.671M	26.4	+0.2	+6.1	+0.4	+1.3	+0.0	34.4	50.0	-15.6	Black
34	22.887M	26.4	+0.2	+6.1	+0.4	+1.3	+0.0	34.4	50.0	-15.6	Black
35	23.022M	25.5	+0.2	+6.1	+0.4	+1.4	+0.0	33.6	50.0	-16.4	Black
36	2.195M	23.0	+0.1	+6.1	+0.1	+0.1	+0.0	29.4	46.0	-16.6	Black
37	4.288M	22.1	+0.1	+6.1	+0.2	+0.2	+0.0	28.7	46.0	-17.3	Black
38	23.085M	24.6	+0.2	+6.1	+0.4	+1.4	+0.0	32.7	50.0	-17.3	Black

CKC Laboratories, Inc. Date: 2/1/2010 Time: 08:50:29 SmartLabs, Inc. WO#: 90412  
 FCC 15.207 (2007) Conducted Class [AVE] Test Lead: Black 240V 60Hz Sequence#: 1  
 SmartLabs, Inc. 2477SA1



- Sweep Data
- 1 - FCC 15.207 (2007) Conducted Class [AVE]
- 2 - FCC 15.207 (2007) Conducted Class [QP]
- Readings
- × Peak Readings
- \* Average Readings

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 #: **90412** Date: 2/1/2010  
 Test Type: **Conducted Emissions** Time: 08:59:20  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 2  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1 240V 60Hz  
 S/N: NA

**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
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

**Support Devices:**

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

**Test Conditions / Notes:**

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is connected to the LISN and powered from 240Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 21°C, Humidity: 36%, Pressure: 100kPa. 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

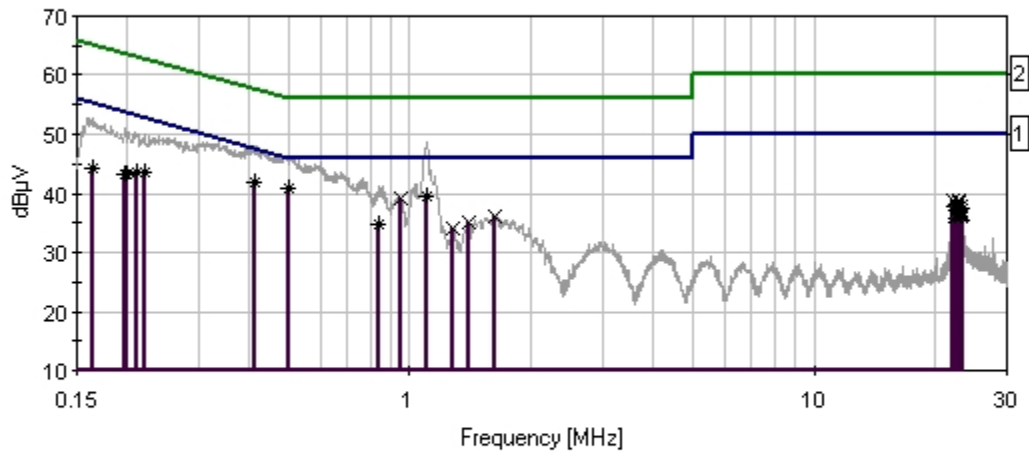
**Measurement Data:**

#	Freq MHz	Rdng dBµV	Reading listed by margin.					Test Lead: White				
			T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant	
1	501.000k	34.5	+0.2	+6.1	+0.1	+0.0	+0.0	40.9	46.0	-5.1	White	
Ave	^ 501.238k	40.0	+0.2	+6.1	+0.1	+0.0	+0.0	46.4	46.0	+0.4	White	
									see average data			
3	415.000k	35.4	+0.2	+6.1	+0.1	+0.0	+0.0	41.8	47.5	-5.7	White	
Ave	^ 415.428k	41.5	+0.2	+6.1	+0.1	+0.0	+0.0	47.9	47.5	+0.4	White	
									see average data			
5	1.098M	33.2	+0.1	+6.1	+0.1	+0.1	+0.0	39.6	46.0	-6.4	White	
Ave												

^	1.098M	42.2	+0.1	+6.1	+0.1	+0.1	+0.0	48.6	46.0	+2.6	White
									see average data		
7	949.301k	32.9	+0.1	+6.1	+0.1	+0.1	+0.0	39.3	46.0	-6.7	White
8	220.000k Ave	37.1	+0.2	+6.1	+0.0	+0.1	+0.0	43.5	52.8	-9.3	White
^	219.811k	43.6	+0.2	+6.1	+0.0	+0.1	+0.0	50.0	52.8	-2.8	White
									see average data		
10	210.000k Ave	37.2	+0.2	+6.1	+0.0	+0.1	+0.0	43.6	53.2	-9.6	White
^	209.630k	43.9	+0.2	+6.1	+0.0	+0.1	+0.0	50.3	53.2	-2.9	White
									see average data		
12	1.626M	29.7	+0.1	+6.1	+0.1	+0.1	+0.0	36.1	46.0	-9.9	White
13	200.000k Ave	36.8	+0.2	+6.1	+0.0	+0.1	+0.0	43.2	53.6	-10.4	White
^	197.268k	44.7	+0.2	+6.1	+0.0	+0.1	+0.0	51.1	53.7	-2.6	White
									see average data		
^	200.177k	44.0	+0.2	+6.1	+0.0	+0.1	+0.0	50.4	53.6	-3.2	White
									see average data		
16	197.000k Ave	36.8	+0.2	+6.1	+0.0	+0.1	+0.0	43.2	53.7	-10.5	White
17	165.000k Ave	37.8	+0.4	+6.1	+0.0	+0.0	+0.0	44.3	55.2	-10.9	White
^	164.544k	46.2	+0.4	+6.1	+0.0	+0.0	+0.0	52.7	55.2	-2.5	White
									see average data		
19	1.400M	28.6	+0.1	+6.1	+0.1	+0.1	+0.0	35.0	46.0	-11.0	White
20	841.000k Ave	28.4	+0.1	+6.1	+0.1	+0.1	+0.0	34.8	46.0	-11.2	White
^	840.840k	34.7	+0.1	+6.1	+0.1	+0.1	+0.0	41.1	46.0	-4.9	White
									see average data		
22	22.139M	30.8	+0.2	+6.1	+0.4	+1.3	+0.0	38.8	50.0	-11.2	White
23	22.887M	30.7	+0.2	+6.1	+0.4	+1.3	+0.0	38.7	50.0	-11.3	White
24	22.752M	30.6	+0.2	+6.1	+0.4	+1.3	+0.0	38.6	50.0	-11.4	White
25	22.950M	30.4	+0.2	+6.1	+0.4	+1.3	+0.0	38.4	50.0	-11.6	White
26	22.607M	30.3	+0.2	+6.1	+0.4	+1.3	+0.0	38.3	50.0	-11.7	White
27	1.281M	27.7	+0.1	+6.1	+0.1	+0.1	+0.0	34.1	46.0	-11.9	White
28	22.535M	29.8	+0.2	+6.1	+0.4	+1.3	+0.0	37.8	50.0	-12.2	White
29	23.022M	29.7	+0.2	+6.1	+0.4	+1.4	+0.0	37.8	50.0	-12.2	White
30	22.680M	29.4	+0.2	+6.1	+0.4	+1.3	+0.0	37.4	50.0	-12.6	White
31	22.463M	29.2	+0.2	+6.1	+0.4	+1.3	+0.0	37.2	50.0	-12.8	White

32	23.094M	28.9	+0.2	+6.1	+0.4	+1.4	+0.0	37.0	50.0	-13.0	White
33	22.400M	28.9	+0.2	+6.1	+0.4	+1.3	+0.0	36.9	50.0	-13.1	White
34	23.139M	28.4	+0.2	+6.1	+0.4	+1.4	+0.0	36.5	50.0	-13.5	White
35	23.292M	28.3	+0.2	+6.1	+0.4	+1.4	+0.0	36.4	50.0	-13.6	White
36	22.193M	28.2	+0.2	+6.1	+0.4	+1.3	+0.0	36.2	50.0	-13.8	White
37	22.328M	28.2	+0.2	+6.1	+0.4	+1.3	+0.0	36.2	50.0	-13.8	White
38	22.562M	28.2	+0.2	+6.1	+0.4	+1.3	+0.0	36.2	50.0	-13.8	White
39	23.155M	28.0	+0.2	+6.1	+0.4	+1.4	+0.0	36.1	50.0	-13.9	White

CKC Laboratories, Inc. Date: 2/1/2010 Time: 08:59:20 SmartLabs, Inc. WO#: 90412  
 FCC 15.207 (2007) Conducted Class [AVE] Test Lead: White 240V 60Hz Sequence#: 2  
 SmartLabs, Inc. 2477SA1



- Sweep Data
- 1 - FCC 15.207 (2007) Conducted Class [AVE]
- 2 - FCC 15.207 (2007) Conducted Class [QP]
- Readings
- × Peak Readings
- \* Average Readings

**Test Setup Photos**



**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 #: **90412** Date: 2/1/2010  
 Test Type: **Maximized Emissions** Time: 10:35:33  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 3  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1  
 S/N: NA

***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
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

***Support Devices:***

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



**Test Conditions / Notes:**

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler.  
 The EUT input power is 240Vac 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: 18°C, Humidity: 45%, Pressure: 100kPa.  
 Frequency range of measurement = 902MHz to 928MHz. 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

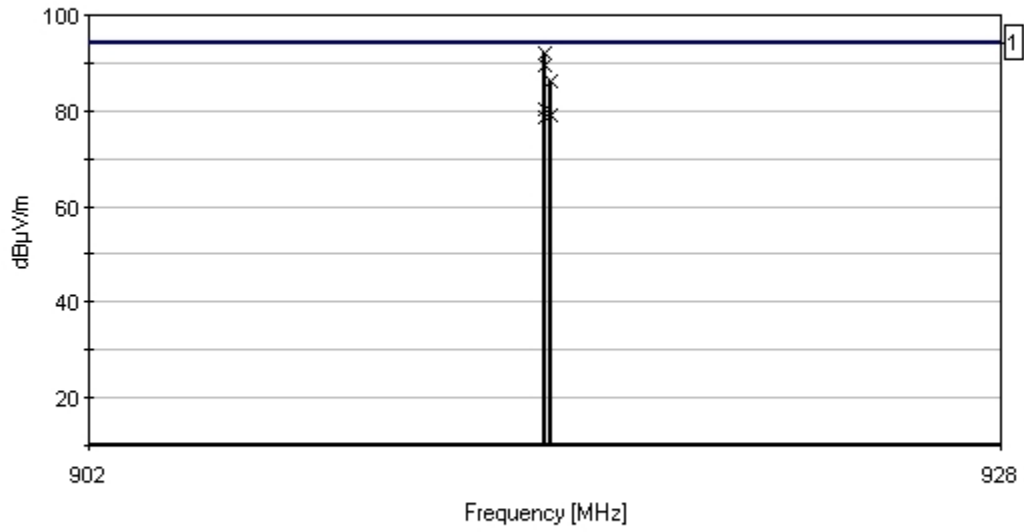
**Transducer Legend:**

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 $\mu$ V	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	914.907M	89.3	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	91.9	94.0 axis 2	-2.1	Horiz
2	914.900M	87.1	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	89.7	94.0 axis 1	-4.3	Horiz
3	915.053M	83.7	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	86.3	94.0 axis 3	-7.7	Vert
4	914.907M	77.7	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	80.3	94.0 axis 1	-13.7	Vert
5	915.057M	76.6	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	79.2	94.0 axis 2	-14.8	Vert
6	914.893M	76.1	-27.7 +22.7	+3.5	+3.3	+0.8	+0.0	78.7	94.0 axis 3	-15.3	Horiz

CKC Laboratories, Inc. Date: 2/1/2010 Time: 10:35:33 SmartLabs, Inc. WVO#: 90412  
 FCC 15.249(a) Radiated Fundamental Emissions Test Distance: 3 Meters Sequence#: 3  
 SmartLabs, Inc. 2477SA1



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

**Test Setup Photos**



**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 #: **90412** Date: 2/1/2010

Test Type: **Maximized Emissions** Time: 13:10:29

Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 5

Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto

Model: 2477SA1

S/N: NA

***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
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

**Support Devices:**

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

**Test Conditions / Notes:**

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is 240Vac 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. . Frequency range of measurement = 9kHz to 10GHz. 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	T6=1GHz HPF K&L AN02749
T7=ATT-AN00314	

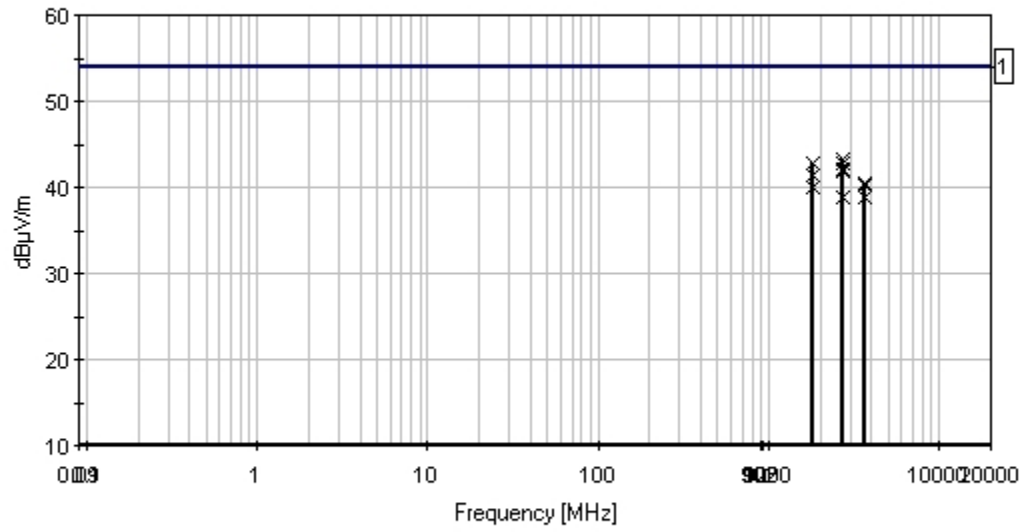
**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB $\mu$ V	T1			T2			Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
			T5 dB	T6 dB	T7 dB	T4 dB	T3 dB						
1	2745.128M	43.1	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	43.3	54.0 axis 2	-10.7	Horiz		
2	2744.682M	42.7	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	42.9	54.0 axis 2	-11.1	Vert		
3	1829.665M	47.4	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	42.9	54.0 axis 2	-11.1	Horiz		
4	2744.703M	42.5	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	42.7	54.0 axis 3	-11.3	Vert		
5	2744.973M	42.0	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	42.2	54.0 axis 1	-11.8	Horiz		
6	2745.118M	41.7	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	41.9	54.0 axis 3	-12.1	Horiz		
7	1829.672M	45.8	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	41.3	54.0 axis 3	-12.7	Horiz		
8	3659.833M	37.3	+7.5 +4.1	-40.2 +0.4	+30.7	+0.7	+0.0	40.5	54.0 axis 3	-13.5	Horiz		
9	3660.100M	37.0	+7.5 +4.1	-40.2 +0.4	+30.7	+0.7	+0.0	40.2	54.0 axis 1	-13.8	Horiz		
10	1829.908M	44.6	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	40.1	54.0 axis 2	-13.9	Vert		
11	1830.002M	44.6	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	40.1	54.0 axis 1	-13.9	Vert		
12	1830.228M	44.4	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	39.9	54.0 axis 3	-14.1	Vert		
13	1830.125M	44.4	+5.0 +2.7	-39.7 +0.4	+26.6	+0.5	+0.0	39.9	54.0 axis 1	-14.1	Horiz		
14	3659.988M	35.7	+7.5 +4.1	-40.2 +0.4	+30.7	+0.7	+0.0	38.9	54.0 axis 2	-15.1	Horiz		
15	2745.002M	38.6	+6.3 +3.4	-39.9 +0.6	+29.2	+0.6	+0.0	38.8	54.0 axis 1	-15.2	Vert		

CKC Laboratories, Inc. Date: 2/1/2010 Time: 13:10:29 SmartLabs, Inc. WO#: 90412  
 FCC 15.249(a) Radiated Harmonic Emissions Test Distance: 3 Meters Sequence#: 5  
 SmartLabs, Inc. 2477SA1



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

**Test Setup Photos**



**15.249(d) - Field Strength of Spurious Radiation**

**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 #: **90412** Date: 2/1/2010

Test Type: **Maximized Emissions** Time: 15:44:27

Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 6

Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto

Model: 2477SA1

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		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		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
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA



**Support Devices:**

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

**Test Conditions / Notes:**

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler.  
 The EUT input power is 240Vac 60Hz.  
 Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 18°C, Humidity: 45%, Pressure: 100kPa.  
 Frequency range of measurement = 9kHz 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=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
T7=Preamplifier AN00787	T8=Horn Ant AN01646 060610
T9=Hi-Freq_40GHz_3ft_AN02946_0911411.TRN	T10=48' Heliac Cable 101310 P05563
T11=1GHz HPF K&L AN02749	T12=Loop Ant_Active__AN314_061610

**Measurement Data:**

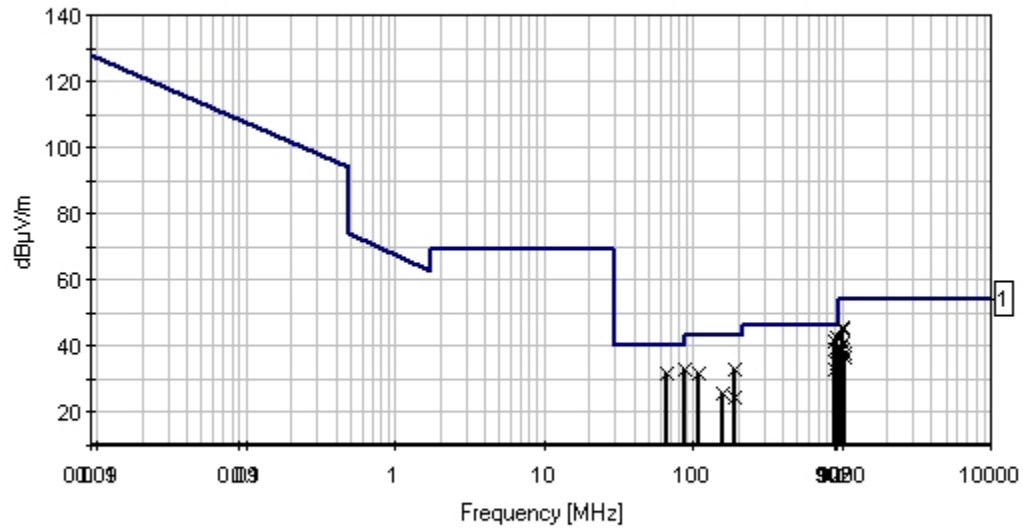
Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dB $\mu$ V	T9	T10	T11	T12	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	925.062M	39.7	-27.7	+3.5	+3.4	+0.7	+0.0	42.5	46.0	-3.5	Vert
			+22.9	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
2	905.072M	39.0	-27.8	+3.4	+3.3	+0.9	+0.0	41.4	46.0	-4.6	Vert
			+22.6	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
3	894.894M	37.1	-27.8	+3.4	+3.3	+0.9	+0.0	39.3	46.0	-6.7	Vert
			+22.4	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
4	944.908M	36.0	-27.6	+3.6	+3.4	+0.6	+0.0	39.1	46.0	-6.9	Vert
			+23.1	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0						
5	66.362M	47.4	-27.3	+0.8	+0.9	+0.2	+0.0	31.6	40.0	-8.4	Vert
			+0.0	+9.6	+0.0	+0.0					
			+0.0	+0.0	+0.0						
6	1005.070M	54.9	+0.0	+0.0	+3.5	+0.0	+0.0	45.4	54.0	-8.6	Vert
			+0.0	+0.0	-41.0	+24.2					
			+0.4	+2.0	+1.4						
7	1024.980M	54.8	+0.0	+0.0	+3.6	+0.0	+0.0	45.3	54.0	-8.7	Vert
			+0.0	+0.0	-40.9	+24.2					
			+0.4	+2.0	+1.2						

8	88.480M	49.4	-27.3 +0.0 +0.0	+0.8 +9.0 +0.0	+1.0 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0	33.1	43.5	-10.4	Vert
9	193.543M	39.6	-26.7 +0.0 +0.0	+1.4 +16.9 +0.0	+1.5 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0	33.0	43.5	-10.5	Vert
10	924.900M	31.9	-27.7 +22.9 +0.0	+3.5 +0.0 +0.0	+3.4 +0.0 +0.0	+0.7 +0.0 +0.0	+0.0	34.7	46.0	-11.3	Horiz
11	110.589M	44.4	-27.2 +0.0 +0.0	+0.9 +12.5 +0.0	+1.1 +0.0 +0.0	+0.2 +0.0 +0.0	+0.0	31.9	43.5	-11.6	Vert
12	1004.959M	50.5	+0.0 +0.0 +0.4	+0.0 +0.0 +2.0	+3.5 -41.0 +1.4	+0.0 +24.2	+0.0	41.0	54.0	-13.0	Horiz
13	944.932M	29.8	-27.6 +23.1 +0.0	+3.6 +0.0 +0.0	+3.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	32.9	46.0	-13.1	Horiz
14	894.887M	30.5	-27.8 +22.4 +0.0	+3.4 +0.0 +0.0	+3.3 +0.0 +0.0	+0.9 +0.0 +0.0	+0.0	32.7	46.0	-13.3	Horiz
15	984.917M	35.3	-27.5 +23.7 +0.0	+3.7 +0.0 +0.0	+3.5 +0.0 +0.0	+0.7 +0.0 +0.0	+0.0	39.4	54.0	-14.6	Vert
16	1025.003M	48.7	+0.0 +0.0 +0.4	+0.0 +0.0 +2.0	+3.6 -40.9 +1.2	+0.0 +24.2	+0.0	39.2	54.0	-14.8	Horiz
17	964.917M	35.7	-27.6 +23.4 +0.0	+3.6 +0.0 +0.0	+3.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	39.1	54.0	-14.9	Vert
18	984.967M	34.4	-27.5 +23.7 +0.0	+3.7 +0.0 +0.0	+3.5 +0.0 +0.0	+0.7 +0.0 +0.0	+0.0	38.5	54.0	-15.5	Horiz
19	1054.808M	47.5	+0.0 +0.0 +0.4	+0.0 +0.0 +2.0	+3.6 -40.8 +1.1	+0.0 +24.3	+0.0	38.1	54.0	-15.9	Horiz
20	1055.012M	46.3	+0.0 +0.0 +0.4	+0.0 +0.0 +2.0	+3.6 -40.8 +1.1	+0.0 +24.3	+0.0	36.9	54.0	-17.1	Vert
21	160.373M	36.8	-27.0 +0.0 +0.0	+1.2 +13.0 +0.0	+1.3 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0	25.6	43.5	-17.9	Vert
22	964.978M	32.6	-27.6 +23.4 +0.0	+3.6 +0.0 +0.0	+3.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	36.0	54.0	-18.0	Horiz
23	193.552M	31.2	-26.7 +0.0 +0.0	+1.4 +16.9 +0.0	+1.5 +0.0 +0.0	+0.3 +0.0 +0.0	+0.0	24.6	43.5	-18.9	Horiz

CKC Laboratories, Inc. Date: 2/1/2010 Time: 15:44:27 SmartLabs, Inc. WO#: 90412  
 FCC 15.249(d) Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 6  
 SmartLabs, Inc. 2477SA1



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

**Test Setup Photos**



## FCC 2.1049 - Occupied Bandwidth

### Test Data Sheets

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 #: **90412** Date: 2/1/2010  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler**  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1  
 S/N: NA

***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):***

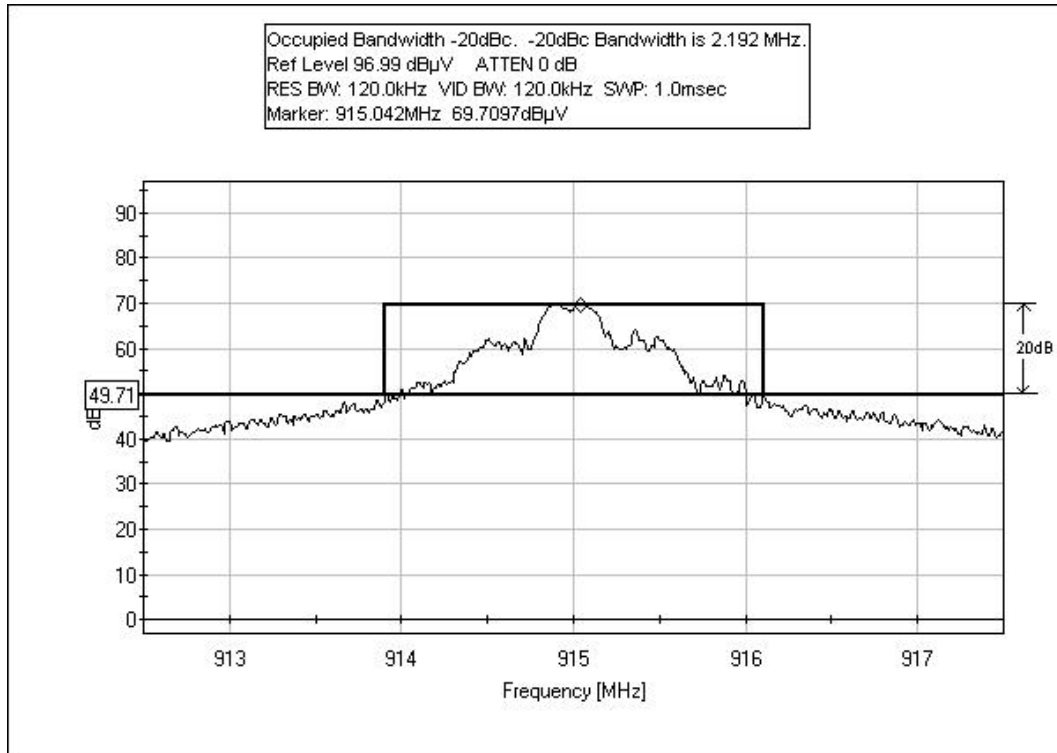
Function	Manufacturer	Model #	S/N
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

***Support Devices:***

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

***Test Conditions / Notes:***

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is powered from 240Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 18°C, Humidity: 45%, Pressure: 100kPa. Frequency range of measurement = 912.5MHz to 917.5MHz. 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 Setup Photos**



**Band Edge Compliance**

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

Customer: **SmartLabs, Inc.**  
 Specification: **Band Edge Compliance**  
 Work Order #: **90412** Date: 2/1/2010  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler** Sequence#: 3  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1  
 S/N: NA

**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):**

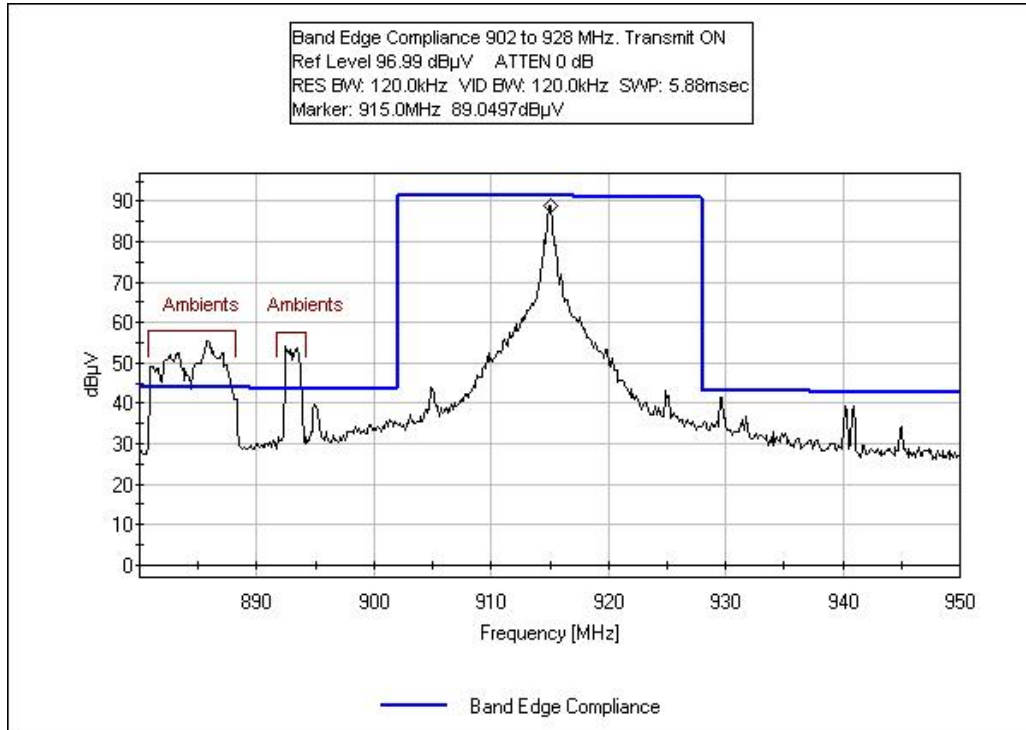
Function	Manufacturer	Model #	S/N
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

**Support Devices:**

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

**Test Conditions / Notes:**

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is powered from 240Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 18°C, Humidity: 45%, Pressure: 100kPa. Frequency range of measurement = 870MHz to 950MHz. 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 Setup Photos**



**RSS-210 99% - Bandwidth**

**Test Data Sheets**

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 #: **90412** Date: 2/1/2010  
 Equipment: **240V 30A Dual-Band Load Controller with Phase Coupler**  
 Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto  
 Model: 2477SA1  
 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):***

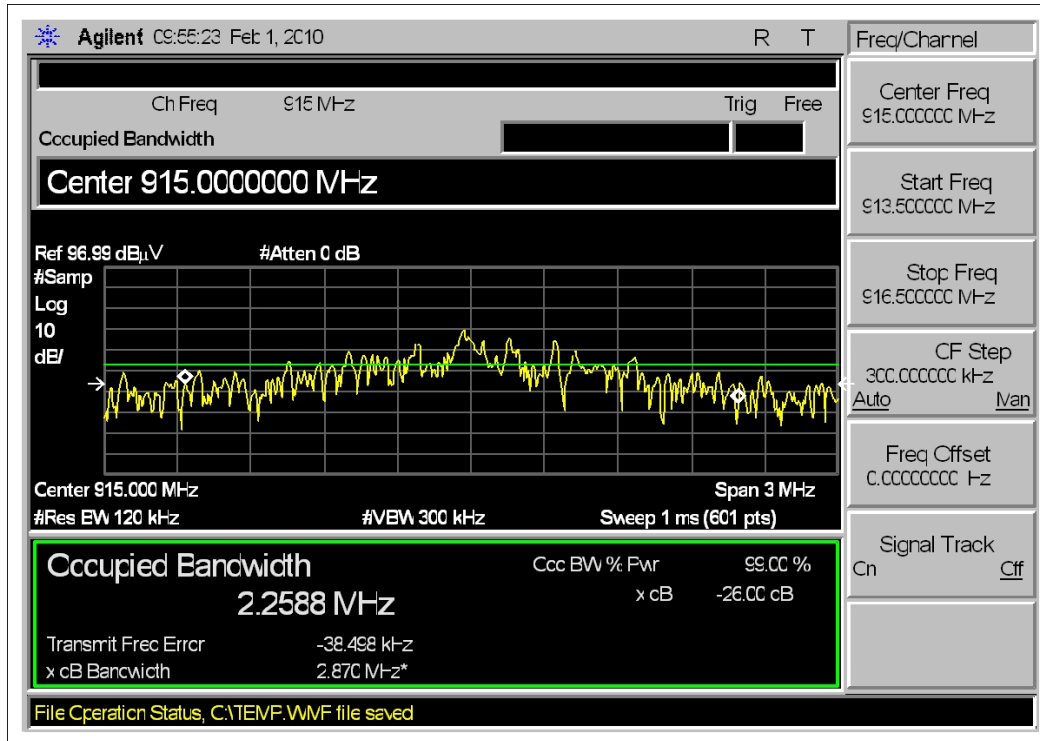
Function	Manufacturer	Model #	S/N
240V 30A Dual-Band Load Controller with Phase Coupler*	SmartLabs, Inc.	2477SA1	NA

***Support Devices:***

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

***Test Conditions / Notes:***

The equipment under test (EUT) is a 240V 30A Dual-Band Load Controller with Phase Coupler. The EUT input power is powered from 240Vac 60Hz. Connected to the EUT as a load is a 250V 150W light bulb. Temperature: 18°C, Humidity: 45%, Pressure: 100kPa. 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 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 $\mu$ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB $\mu$ V/m)

### TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. 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. When conducted emissions testing was performed, a 10 dB external attenuator was used with internal offset correction in the analyzer.

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.