SmartLabs, Inc.

TEST REPORT FOR

TriggerLinc - INSTEON Window and Door Sensor, 2843-2

Tested To The Following Standards:

FCC Part 15 Subpart C Sections 15.249
and
RSS 210 Issue 8

Report No.: 92578-10

Date of issue: March 2, 2012

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Matthew Meyer
Customer Reference Number: 12-3MM0126-01

REPORT PREPARED BY:

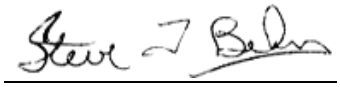
Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 92578

DATE OF EQUIPMENT RECEIPT: February 16, 2012
DATE(S) OF TESTING: February 16-21, 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.



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	CB #	Taiwan	Canada	FCC	Japan
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	R-1256 C-1319 T-1660 G-255

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 15.249 and RSS 210 Issue 8

Description	Test Procedure/Method	Results
Voltage Variation	FCC Part 15 Subpart C Section 15.31(e)	Pass
RF Power Output	FCC Part 15 Subpart C Section 15.249 (a)(b)	Pass
-20dBc Occupied Bandwidth	FCC Part 15 Subpart C	Pass
Bandedge	FCC Part 15 Subpart C	Pass
Field Strength of Spurious Emissions	FCC Part 15 Subpart C Section 15.249(d)	Pass
99% Bandwidth	RSS 210 Issue 8	Pass

Conditions During Testing

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

Summary of Conditions
Modifications during testing: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

EQUIPMENT UNDER TEST (EUT)

The following model was tested by CKC Laboratories: **INSTEON Window and Door Sensor, 2421TriggerLinc**

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: **TriggerLinc - INSTEON Window and Door Sensor, 2843-2**

EQUIPMENT UNDER TEST

TriggerLinc - INSTEON Window and Door Sensor
Manuf: SmartLabs, Inc.
Model: 2843-2
Serial: NA

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

FCC PART 15 SUBPART C

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

15.31(e) Voltage Variations

Test Conditions / Setup

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA 1.5V battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fresh battery was installed during the test.
Test environment conditions: 18° C, 39% Relative Humidity, 100kPa
Modifications during testing: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Engineer Name: D. Nguyen

Test Equipment

Asset/Serial #	Description	Model	Manufacturer	Cal Date	Cal Due
AN00010	Preamp	8447D	HP	3/19/2010	3/19/2012
AN00851	Biconilog Antenna	CBL6111C	Schaffner	3/8/2010	3/8/2012
ANP04382	Cable	LDF-50	Andrew	9/3/2010	9/3/2012
ANP05555	Cable	RG223/U	Pasternack	8/18/2010	8/18/2012
ANP05569	Cable	RG-214/U	Pasternack	8/18/2010	8/18/2012
AN02869	Spectrum Analyzer	E4440A	Agilent	2/12/2011	2/12/2013

Test Setup Photos

15.249(a)(b) RF Power Output

Test Data

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

Customer: **SmartLabs, Inc.**
Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
Work Order #: **92578** Date: 2/16/2012
Test Type: **Maximized Emissions** Time: 15:38:26
Equipment: **INSTEON Window and Door Sensor** Sequence#: 6
Manufacturer: SmartLabs, Inc. Tested By: Don Nguyen
Model: 2421TriggerLinc
S/N:

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00010	Preamp	8447D	3/19/2010	3/19/2012
T2	AN00851	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T3	ANP04382	Cable	LDF-50	9/3/2010	9/3/2012
T4	ANP05555	Cable	RG223/U	8/18/2010	8/18/2012
T5	ANP05569	Cable	RG-214/U	8/18/2010	8/18/2012
	AN02869	Spectrum Analyzer	E4440A	2/12/2011	2/12/2013

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

Function	Manufacturer	Model #	S/N
INSTEON Window and Door Sensor*	SmartLabs, Inc.	2421TriggerLinc	NA

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = fundamental frequency
RBW=120 kHz, VBW=120 kHz
Test environment conditions: 18° C, 41% Relative Humidity, 100kPa
Modification: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	914.910M	81.9	-27.5 +4.1	+23.3	+3.3	+0.6	+0.0	85.7	94.0	-8.3	Vert
2	915.070M	81.9	-27.5 +4.1	+23.3	+3.3	+0.6	+0.0	85.7	94.0	-8.3	Vert
3	914.910M	74.8	-27.5 +4.1	+23.3	+3.3	+0.6	+0.0	78.6	94.0	-15.4	Horiz

Test Setup Photos

-20dBc Occupied Bandwidth

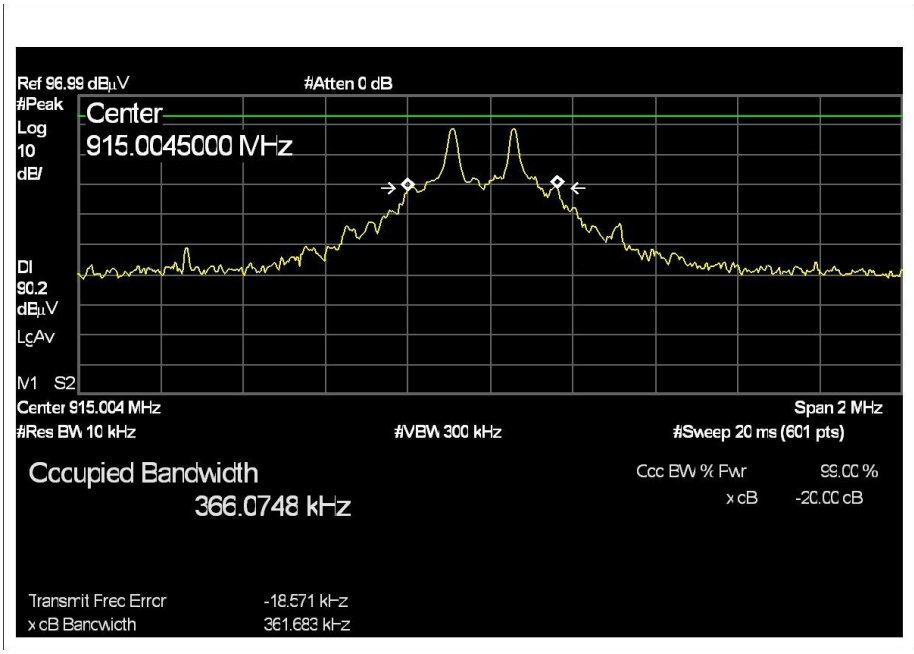
Test Conditions / Setup

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA 1.5V battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fresh battery was installed during the test.
Test environment conditions: 18° C, 39% Relative Humidity, 100kPa
Modifications during testing: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Engineer Name: D. Nguyen

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
AN00010	Preamp	8447D	HP	3/19/2010	3/19/2012
AN00851	Biconilog Antenna	CBL6111C	Schaffner	3/8/2010	3/8/2012
ANP04382	Cable	LDF-50	Andrew	9/3/2010	9/3/2012
ANP05555	Cable	RG223/U	Pasternack	8/18/2010	8/18/2012
ANP05569	Cable	RG-214/U	Pasternack	8/18/2010	8/18/2012
AN02869	Spectrum Analyzer	E4440A	Agilent	2/12/2011	2/12/2013

Test Plots



Test Setup Photos

Bandedge

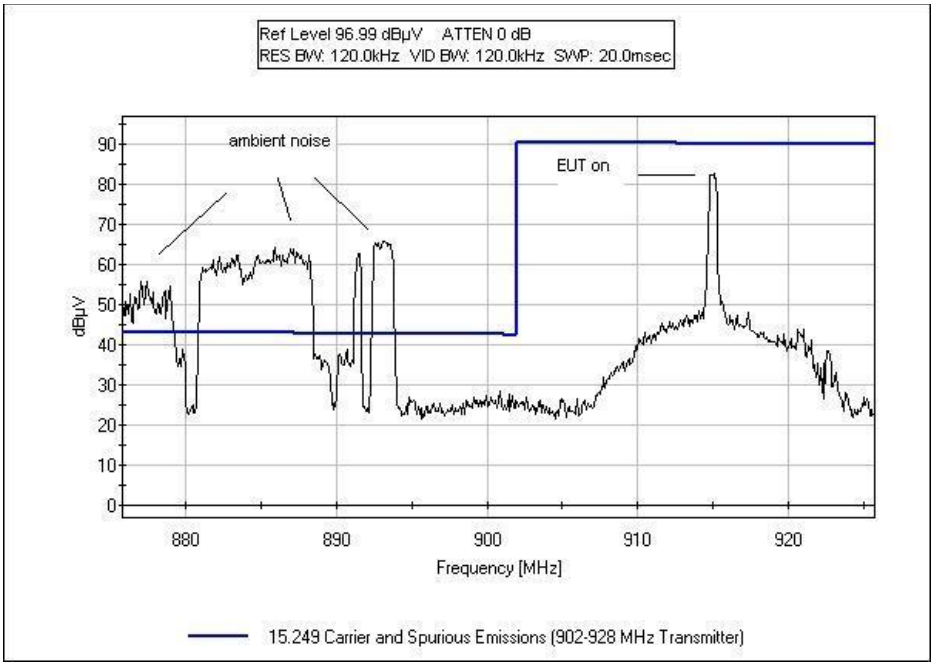
Test Conditions / Setup

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA 1.5V battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fresh battery was installed during the test.
Test environment conditions: 18° C, 39% Relative Humidity, 100kPa
Modifications during testing: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Engineer Name: D. Nguyen

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
AN00010	Preamp	8447D	HP	3/19/2010	3/19/2012
AN00851	Biconilog Antenna	CBL6111C	Schaffner	3/8/2010	3/8/2012
ANP04382	Cable	LDF-50	Andrew	9/3/2010	9/3/2012
ANP05555	Cable	RG223/U	Pasternack	8/18/2010	8/18/2012
ANP05569	Cable	RG-214/U	Pasternack	8/18/2010	8/18/2012
AN02869	Spectrum Analyzer	E4440A	Agilent	2/12/2011	2/12/2013

Test Data



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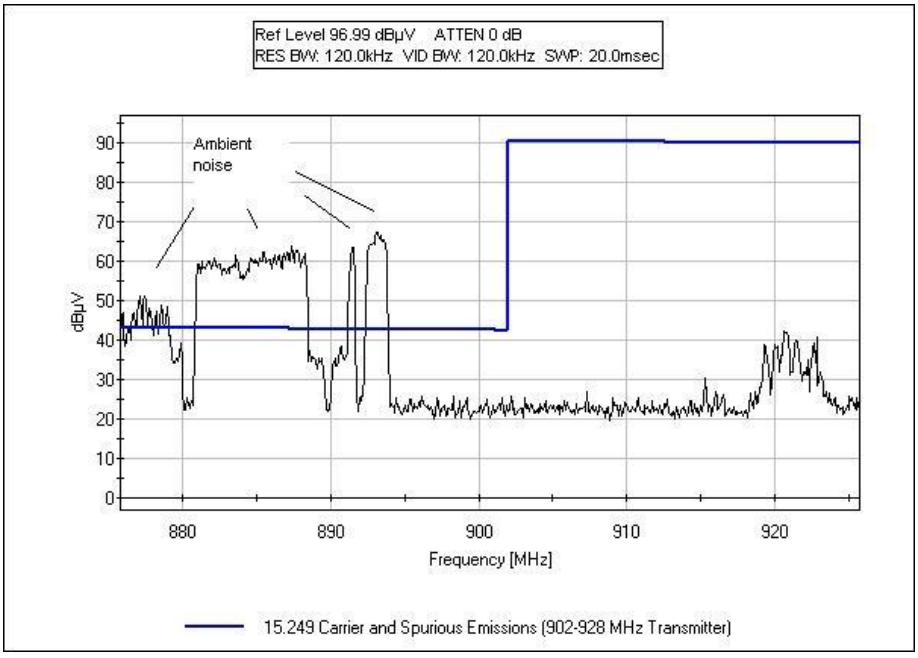

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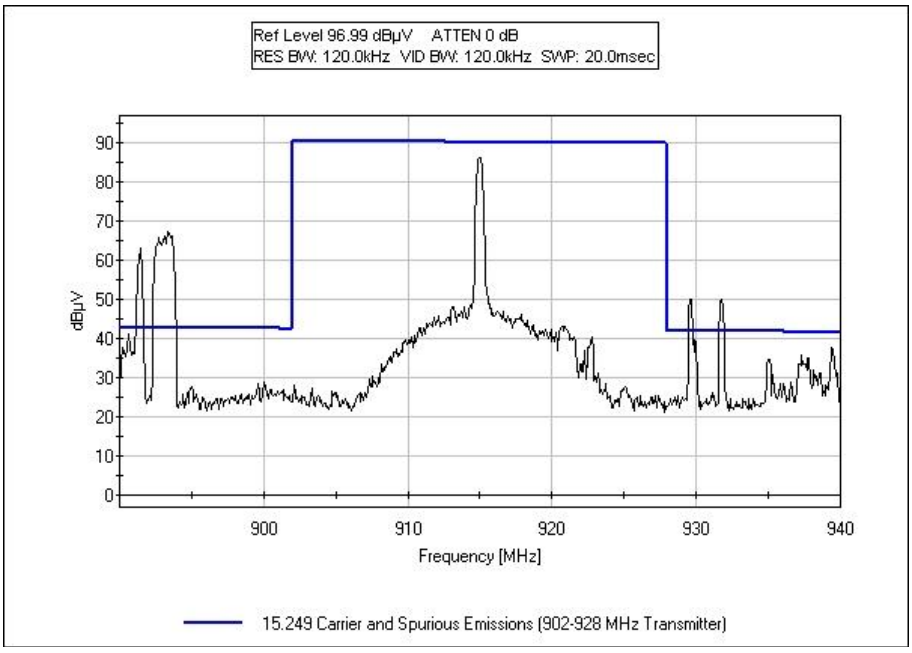

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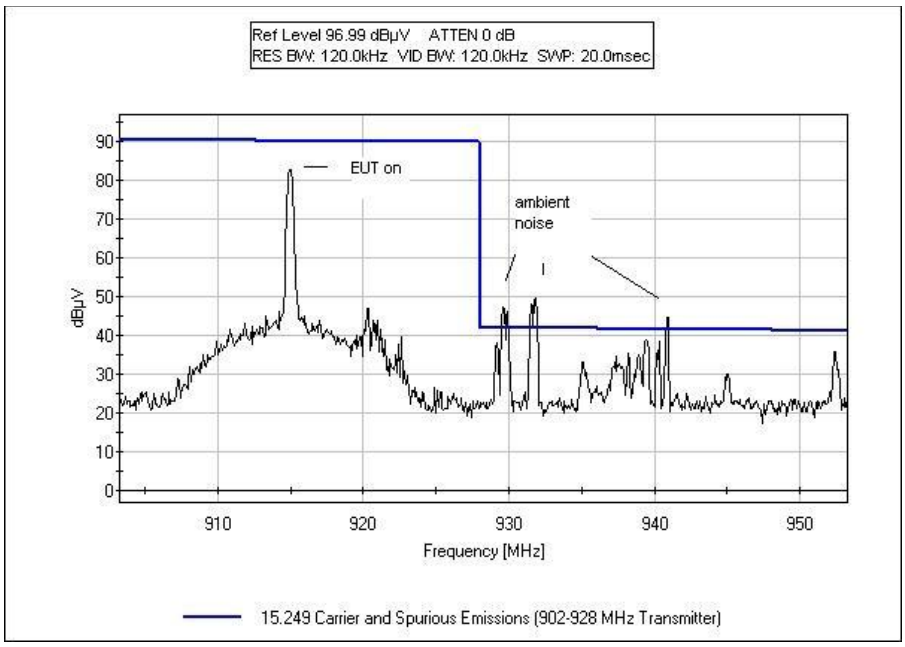
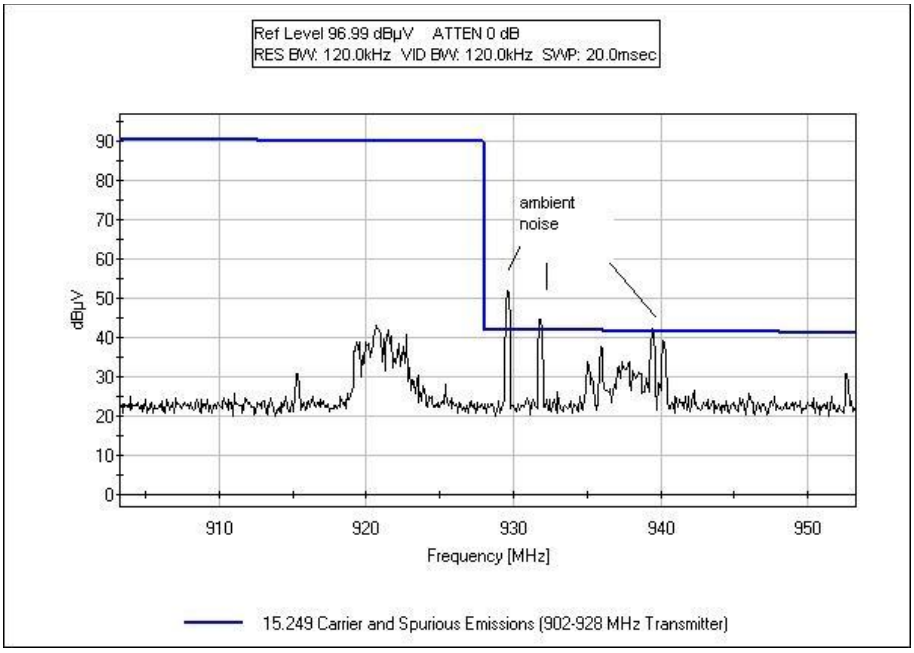


RIGHT ON


Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 120.0kHz SWP: 20.0msec
ambient
noise
dBµV
90
80
70
60
50
40
30
20
10
0
910
920
930
940
950
Frequency [MHz]
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)

RIGHT OFF

Test Setup Photos

15.249(d) Radiated Spurious Emissions

Test Data Sheets

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

Customer: **SmartLabs, Inc.**
Specification: **15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter)**
Work Order #: **92578** Date: 2/17/2012
Test Type: **Maximized Emissions** Time: 08:42:49
Equipment: **INSTEON Window and Door Sensor** Sequence#: 5
Manufacturer: SmartLabs, Inc. Tested By: Don Nguyen
Model: 2421TriggerLinc
S/N:

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00010	Preamp	8447D	3/19/2010	3/19/2012
T2	AN00851	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T3	ANP04382	Cable	LDF-50	9/3/2010	9/3/2012
T4	ANP05555	Cable	RG223/U	8/18/2010	8/18/2012
T5	ANP05569	Cable	RG-214/U	8/18/2010	8/18/2012
	AN02869	Spectrum Analyzer	E4440A	2/12/2011	2/12/2013
T6	AN00787	Preamp	83017A	4/8/2011	4/8/2013
T7	AN01646	Horn Antenna	3115	8/18/2010	8/18/2012
T8	AN02947	Cable	32022-29094K-29094K-72TC	8/8/2011	8/8/2013
T9	ANP05988	Cable	LDF1-50	3/12/2010	3/12/2012
T10	AN03169	High Pass Filter	HM1155-11SS	9/22/2011	9/22/2013
	AN00314	Loop Antenna	6502	6/30/2010	6/30/2012

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

Function	Manufacturer	Model #	S/N
INSTEON Window and Door Sensor*	SmartLabs, Inc.	2421TriggerLinc	

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

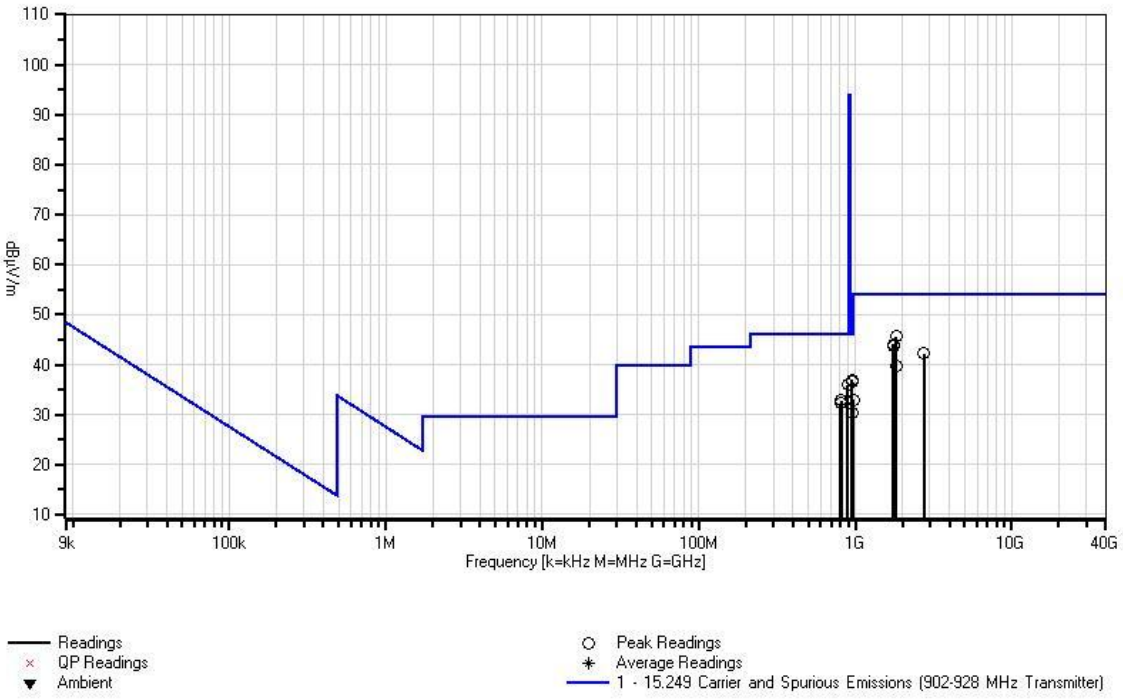
The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = 9 kHz- 10 GHz.
9 kHz -150 kHz; RBW=200 Hz, VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz; 30 MHz-1000 MHz; RBW=120 kHz, VBW=120 kHz, 1000 MHz-10000 MHz; RBW=1 MHz, VBW=1 MHz.
Test environment conditions: 18° C, 41% Relative Humidity, 100kPa
Modification: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	1829.950M	49.5	+0.0 +0.0 +3.2	+0.0 -39.4 +0.4	+4.9 +26.6	+0.0 +0.4	+0.0	45.6	54.0	-8.4	Vert
2	955.072M	32.2	-27.5 +4.2 +0.0	+24.0 +0.0 +0.0	+3.4 +0.0	+0.6 +0.0	+0.0	36.9	46.0	-9.1	Vert
3	954.922M	31.8	-27.5 +4.2 +0.0	+24.0 +0.0 +0.0	+3.4 +0.0	+0.6 +0.0	+0.0	36.5	46.0	-9.5	Vert
4	1754.990M	48.5	+0.0 +0.0 +3.2	+0.0 -39.4 +0.4	+4.7 +26.3	+0.0 +0.4	+0.0	44.1	54.0	-9.9	Vert
5	894.910M	32.5	-27.5 +4.0 +0.0	+23.0 +0.0 +0.0	+3.3 +0.0	+0.6 +0.0	+0.0	35.9	46.0	-10.1	Vert
6	1755.200M	48.0	+0.0 +0.0 +3.2	+0.0 -39.4 +0.4	+4.7 +26.3	+0.0 +0.4	+0.0	43.6	54.0	-10.4	Horiz
7	2745.000M	41.2	+0.0 +0.0 +4.3	+0.0 -39.7 +0.3	+6.3 +29.3	+0.0 +0.5	+0.0	42.2	54.0	-11.8	Vert
8	815.080M	30.9	-27.8 +3.7 +0.0	+22.2 +0.0 +0.0	+3.1 +0.0	+0.7 +0.0	+0.0	32.8	46.0	-13.2	Vert
9	804.930M	30.5	-27.8 +3.6 +0.0	+22.1 +0.0 +0.0	+3.1 +0.0	+0.7 +0.0	+0.0	32.2	46.0	-13.8	Vert
10	1830.250M	43.5	+0.0 +0.0 +3.2	+0.0 -39.4 +0.4	+4.9 +26.6	+0.0 +0.4	+0.0	39.6	54.0	-14.4	Horiz
11	955.050M	25.7	-27.5 +4.2 +0.0	+24.0 +0.0 +0.0	+3.4 +0.0	+0.6 +0.0	+0.0	30.4	46.0	-15.6	Horiz
12	975.038M	27.8	-27.4 +4.3 +0.0	+24.3 +0.0 +0.0	+3.4 +0.0	+0.6 +0.0	+0.0	33.0	54.0	-21.0	Vert

CKC Laboratories, Inc. Date: 2/17/2012 Time: 08:42:49 SmartLabs, Inc. WO#: 92578
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Sequence#: 5 Ext
ATTN: 0 dB



Test Setup Photos

RSS-210

99 % Bandwidth

Test Conditions / Setup

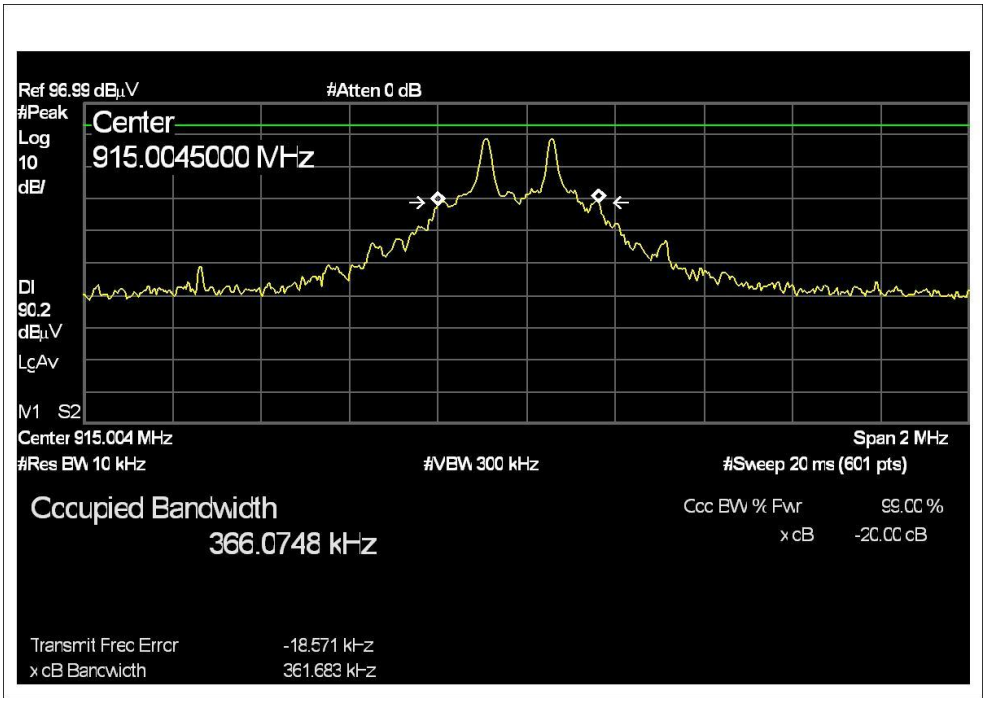
The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness. EUT is installed in fixed position. EUT is installed with fresh AA 1.5V battery. The EUT is set in constant transmit mode.
TX freq = 914.5-915.5 MHz
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fresh battery was installed during the test.
Test environment conditions: 18° C, 39% Relative Humidity, 100kPa
Modifications during testing: change cap C15 from 3 to 100pf, change R11 and R12 from 0 to 10 ohms, C5 from 27 to 22pf.

Engineer Name: D. Nguyen

Test Equipment

Asset/Serial #	Description	Model	Manufacturer	Cal Date	Cal Due
AN00010	Preamp	8447D	HP	3/19/2010	3/19/2012
AN00851	Biconilog Antenna	CBL6111C	Schaffner	3/8/2010	3/8/2012
ANP04382	Cable	LDF-50	Andrew	9/3/2010	9/3/2012
ANP05555	Cable	RG223/U	Pasternack	8/18/2010	8/18/2012
ANP05569	Cable	RG-214/U	Pasternack	8/18/2010	8/18/2012
AN02869	Spectrum Analyzer	E4440A	Agilent	2/12/2011	2/12/2013

Test Data


Ref 96.99 dBµV
#Atten 0 dB
#Peak
Log
10
dB/
Center
915.0045000 MHz
Dl
90.2
dBµV
LcAv
M1 S2
Center 915.004 MHz
Span 2 MHz
#Res BW 10 kHz
#VBW 300 kHz
#Sweep 20 ms (601 pts)
Cccupied Bandwidth
366.0748 kHz
Ccc BW % Pwr 99.CC %
x cB -2C.CC cB
Transmit Frec Error -18.571 kHz
x cB Bandwidth 361.683 kHz

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 dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	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.