

SmartLabs, Inc.

TEST REPORT FOR

RemoteLinc 2, 2342-2

Tested To The Following Standards:

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

Report No.: 92540-10

Date of issue: January 31, 2012



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

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

TABLE OF CONTENTS

Administrative Information	3
Test Report Information	3
Report Authorization	3
Test Facility Information	4
Site Registration & Accreditation Information	4
Summary of Results	5
Conditions During Testing.....	5
Equipment Under Test.....	6
Peripheral Devices	6
FCC Part 15 Subpart C Section 15.249	7
FCC §15.31(e) Voltage Variations	7
FCC §15.249(a) RF Power Output	10
FCC §2.1049(l) -20dBc Occupied Bandwidth	15
Bandedge	18
FCC §15.249(b)/(d) Field Strength of Spurious and Harmonic Emissions	22
RSS-210	28
99% Bandwidth	28
Supplemental Information.....	31
Measurement Uncertainty	31
Emissions Test Details.....	31

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

REPORT PREPARED BY:

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

REPRESENTATIVE: Matthew Meyer
Customer Reference Number: 12-3MM0106-01

Project Number: 92540

DATE OF EQUIPMENT RECEIPT:

January 11, 2012

DATE(S) OF TESTING:

January 11 - 13, 2012

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

A handwritten signature in black ink, reading "Steve Behm", is positioned above a horizontal line.

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 #	JAPAN	CANADA	FCC
Brea A	US0060	R-2945, C-3248 & T-1572	3082D-1	90473

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 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)	Pass
-20dBc Occupied Bandwidth	FCC Part 2.1049(l)	Pass
Bandedge	FCC Part 15 Subpart C	Pass
Field Strength of Spurious and Harmonic Emissions	FCC Part 15 Subpart C Section 15.249(b)/(d)	Pass
99% Bandwidth	RSS-210	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 was tested by CKC Laboratories: RemoteLinc 2, 24442A2

It has come to CKC Laboratories attention; the above model name should have been listed as 2444A2, and not 24442A2, however 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: RemoteLinc 2, 2342-2

EQUIPMENT UNDER TEST

RemoteLinc 2

Manuf: SmartLabs, Inc.

Model: 2342-2

Serial: NA

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

FCC PART 15 SUBPART C SECTION 15.249

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.

FCC §15.31(e) Voltage Variations

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

Customer: **SmartLabs, Inc.**

Specification: **15.31(e)**

Work Order #: **92540**

Test Type: **Maximized Emissions**

Equipment: **RemoteLinc 2**

Manufacturer: **SmartLabs, Inc.**

Model: **24442A2**

S/N: **NA**

Date: 1/11/2012

Time: 08:47:40

Sequence#: 1

Tested By: E. Wong

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
T2	AN00309	Preamplifier	8447D	5/7/2010	5/7/2012
T3	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T4	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
T5	ANP05198	Cable	8268	12/21/2010	12/21/2012
	AN00849	Horn Antenna	3115	4/23/2010	4/23/2012
	AN00786	Preamplifier	83017A	8/5/2010	8/5/2012
	AN03239	Cable	32022-2-29094K-24TC	8/30/2011	8/30/2013
	ANP05421	Cable	Sucoflex 104A	2/12/2010	2/12/2012
	ANP05563	Cable	ANDL-1-PNMMN-48	9/3/2010	9/3/2012
	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
RemoteLinc 2*	SmartLabs, Inc.	24442A2	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.
Emission profile of the EUT orientated in three orthogonal positions was evaluated. The EUT is set in constant transmit mode.

EUT operates on internal rechargeable battery power.

TX freq = 914.5-915.5 MHz

The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port; hence the evaluation is performed without the charging cable.

Frequency range of measurement = Fundamental
RBW=120 kHz,VBW=120 kHz

15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.

Test environment conditions: 16°C, 32% relative humidity, 100kPa

Test Setup Photos





FCC §15.249(a) 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 #: **92540**

Date: 1/11/2012

Test Type: **Maximized Emissions**

Time: 08:47:40

Equipment: **RemoteLinc 2**

Sequence#: 1

Manufacturer: SmartLabs, Inc.

Tested By: E. Wong

Model: 24442A2

S/N: NA

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
T2	AN00309	Preamp	8447D	5/7/2010	5/7/2012
T3	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T4	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
T5	ANP05198	Cable	8268	12/21/2010	12/21/2012
	AN00849	Horn Antenna	3115	4/23/2010	4/23/2012
	AN00786	Preamp	83017A	8/5/2010	8/5/2012
	AN03239	Cable	32022-2-29094K-24TC	8/30/2011	8/30/2013
	ANP05421	Cable	Sucoflex 104A	2/12/2010	2/12/2012
	ANP05563	Cable	ANDL-1-PNMN-48	9/3/2010	9/3/2012
	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
RemoteLinc 2*	SmartLabs, Inc.	24442A2	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.
Emission profile of the EUT orientated in three orthogonal positions was evaluated. The EUT is set in constant transmit mode.
EUT operates on internal rechargeable battery power.

TX freq = 914.5-915.5 MHz

The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port; hence the evaluation is performed without the charging cable.

Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz

15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.

Test environment conditions: 16°C, 32% relative humidity, 100kPa

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	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	915.080M	83.7	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	86.5	94.0 X	-7.5	Horiz
2	915.080M	81.3	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	84.1	94.0 Y	-9.9	Horiz
3	915.080M	80.8	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	83.6	94.0 Z	-10.4	Vert
4	915.080M	77.9	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	80.7	94.0 Z	-13.3	Horiz
5	915.080M	77.7	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	80.5	94.0 X	-13.5	Vert
6	915.080M	73.7	+0.0 +5.8	-27.1	+23.6	+0.5	+0.0	76.5	94.0 Y	-17.5	Vert

Test Setup Photos





X Axis



Y Axis



Z Axis

FCC §2.1049(I) -20dBc Occupied Bandwidth

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

Customer: **SmartLabs, Inc.**

Specification: **2.1049(I) -20dB Bandwidth**

Work Order #: **92540**

Date: 1/11/2012

Test Type: **Maximized Emissions**

Time: 08:47:40

Equipment: **RemoteLinc 2**

Sequence#: 1

Manufacturer: SmartLabs, Inc.

Tested By: E. Wong

Model: 24442A2

S/N: NA

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
T2	AN00309	Preamplifier	8447D	5/7/2010	5/7/2012
T3	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T4	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
T5	ANP05198	Cable	8268	12/21/2010	12/21/2012

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RemoteLinc 2*	SmartLabs, Inc.	24442A2	NA

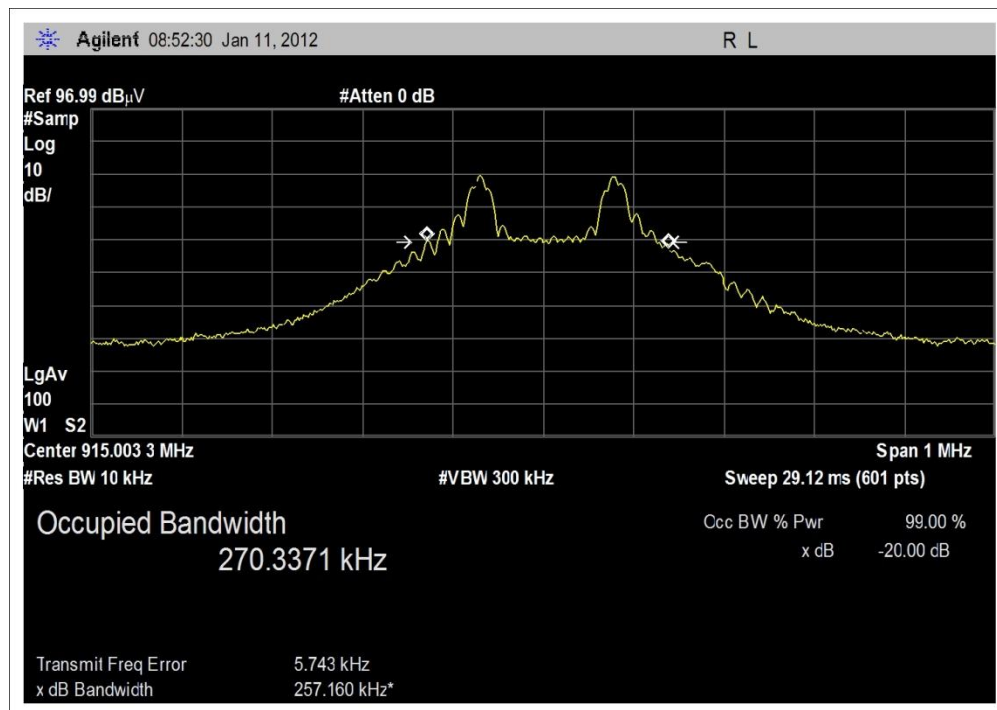
Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness.
Emission profile of the EUT orientated in three orthogonal positions was evaluated; presented data is the worst case emission. The EUT is set in constant transmit mode.
EUT operates on internal rechargeable battery power.
TX freq = 914.5-915.5 MHz
The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port; hence the evaluation is performed without the charging cable.
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.
Test environment conditions: 16°C, 32% relative humidity, 100kPa

Test Plot



Test Setup Photos



Bandedge

Test Data

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

Customer: **SmartLabs, Inc.**

Specification: **Bandedge plot**

Work Order #: **92540**

Date: 1/11/2012

Test Type: **Maximized Emissions**

Time: 08:47:40

Equipment: **RemoteLinc 2**

Sequence#: 1

Manufacturer: SmartLabs, Inc.

Tested By: E. Wong

Model: 24442A2

S/N: NA

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
T2	AN00309	Preamplifier	8447D	5/7/2010	5/7/2012
T3	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T4	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
T5	ANP05198	Cable	8268	12/21/2010	12/21/2012

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RemoteLinc 2*	SmartLabs, Inc.	24442A2	NA

Support Devices:

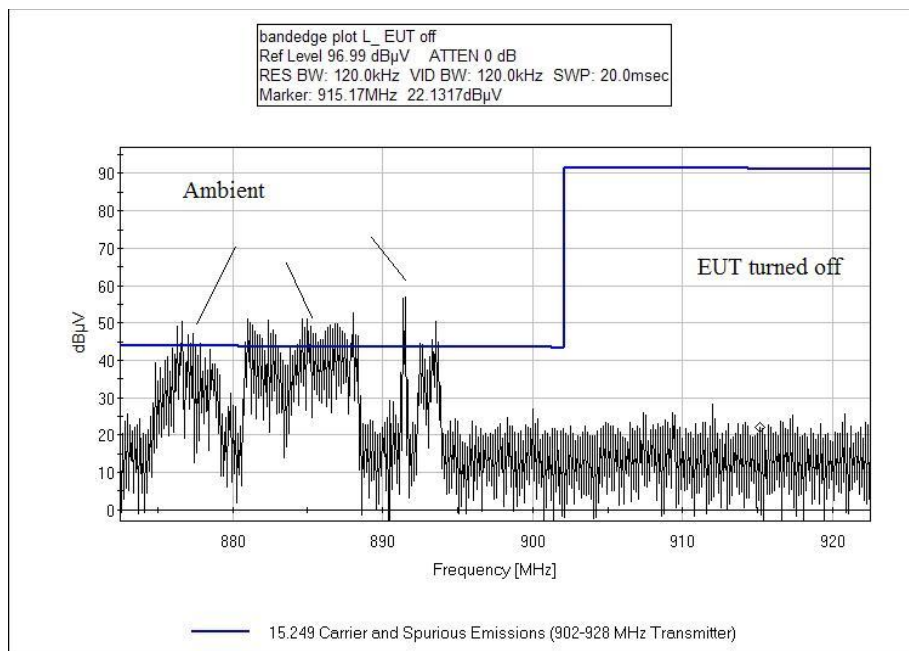
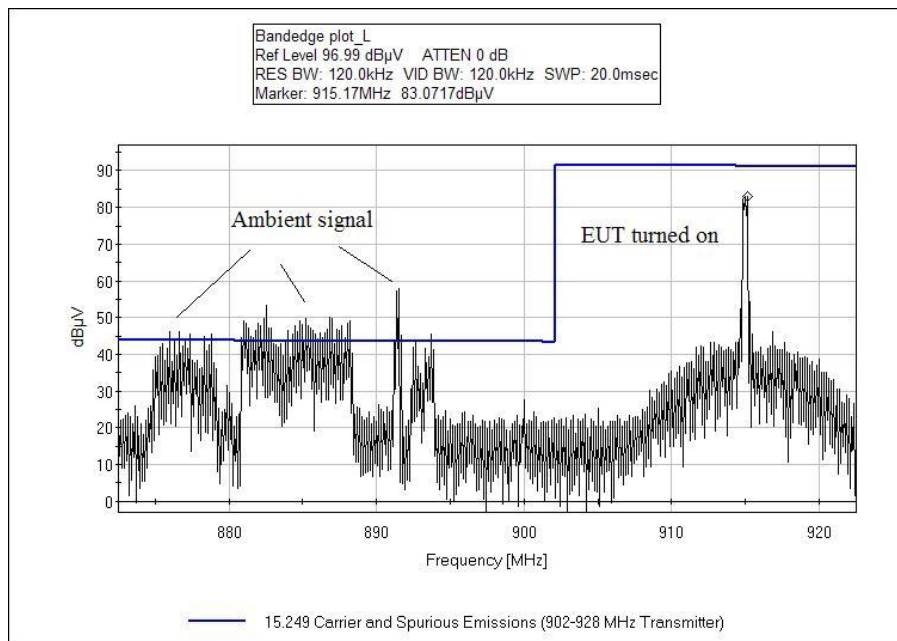
Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

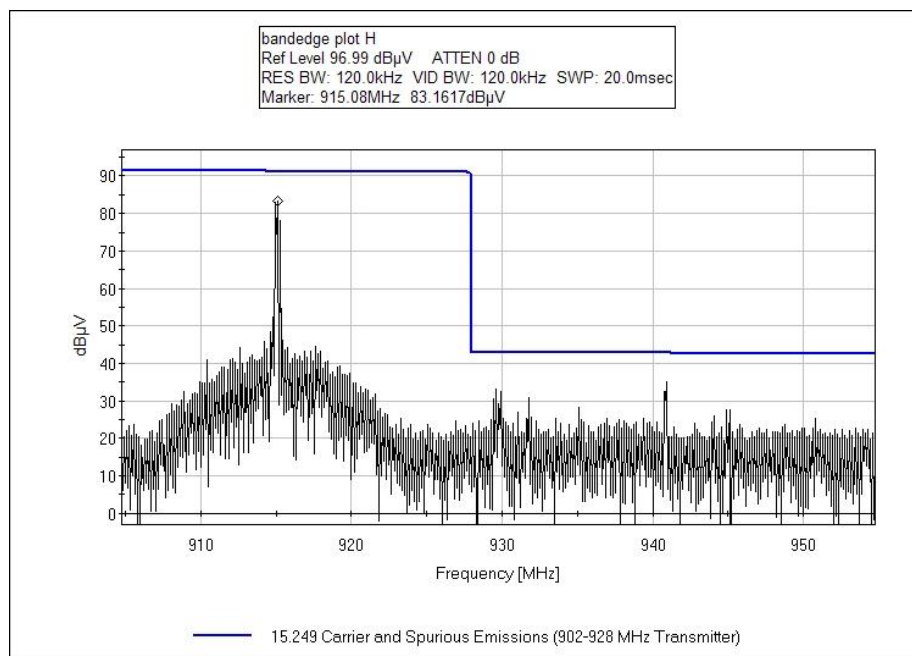
Test Conditions / Notes:

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness.
Emission profile of the EUT orientated in three orthogonal positions was evaluated; presented data is the worst case emission. The EUT is set in constant transmit mode.
EUT operates on internal rechargeable battery power.
TX freq = 914.5-915.5 MHz
The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port , hence the evaluation is performed without the charging cable.
Frequency range of measurement = Fundamental
RBW=120 kHz,VBW=120 kHz

Two plots are presented to clarify the presence of ambient signal, one plot with the Device turned on, the other with the device turned off; the captured Ambient signal is annotated on the plots.

15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.
Test environment conditions: 16°C, 32% relative humidity, 100kPa





Test Setup Photos



FCC §15.249(b)/(d) Field Strength of Spurious and Harmonic 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 #: **92540**

Date: 1/11/2012

Test Type: **Maximized Emissions**

Time: 09:57:58

Equipment: **RemoteLinc 2**

Sequence#: 2

Manufacturer: SmartLabs, Inc.

Tested By: E. Wong

Model: 24442A2

S/N: NA

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
	AN00309	Preamp	8447D	5/7/2010	5/7/2012
	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
	ANP05198	Cable	8268	12/21/2010	12/21/2012
T1	AN00849	Horn Antenna	3115	4/23/2010	4/23/2012
T2	AN00786	Preamp	83017A	8/5/2010	8/5/2012
T3	AN03239	Cable	32022-2-29094K-24TC	8/30/2011	8/30/2013
T4	ANP05421	Cable	Sucoflex 104A	2/12/2010	2/12/2012
T5	ANP05563	Cable	ANDL-1-PNMN-48	9/3/2010	9/3/2012
T6	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
RemoteLinc 2*	SmartLabs, Inc.	24442A2	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.
Emission profile of the EUT orientated in three orthogonal positions was evaluated. The EUT is set in constant transmit mode.
EUT operates on internal rechargeable battery power.

TX freq = 914.5-915.5 MHz

The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port, hence the evaluation is performed without the charging cable.

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.

15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.

Test environment conditions: 16°C, 32% relative humidity, 100kPa

Ext Attn: 0 dB

Measurement Data:

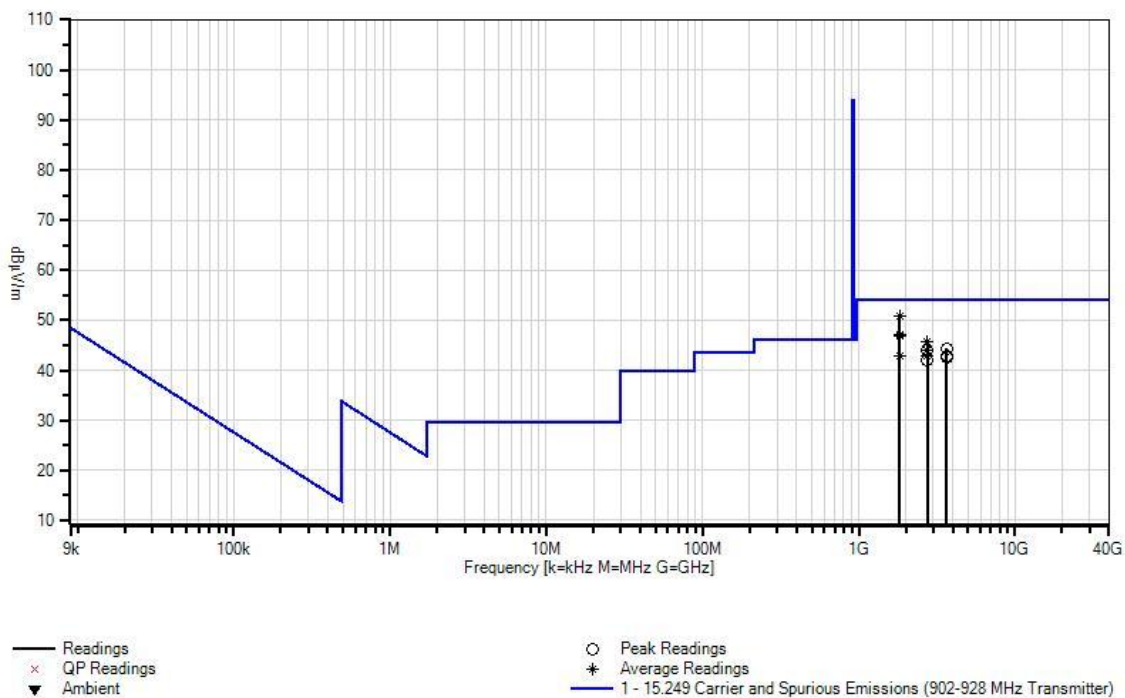
Reading listed by margin.

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	1830.000M Ave	57.3	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	50.7	54.0 X	-3.3	Vert
^	1830.000M	59.3	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	52.7	54.0 X	-1.3	Vert
^	1829.983M	50.5	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	43.9	54.0 Y	-10.1	Vert
4	1830.033M Ave	53.8	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	47.2	54.0 Z	-6.8	Horiz
^	1830.033M	56.0	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	49.4	54.0 Z	-4.6	Horiz
6	1829.917M Ave	53.4	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	46.8	54.0 Y	-7.2	Horiz
^	1829.917M	55.6	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	49.0	54.0 Y	-5.0	Horiz
^	1829.983M	47.7	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	41.1	54.0 X	-12.9	Horiz
9	2745.183M Ave	48.9	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	45.8	54.0 Z	-8.2	Horiz
^	2745.183M	53.3	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	50.2	54.0 Z	-3.8	Horiz
11	3659.833M	43.9	+31.3 +4.1	-37.4 +0.3	+0.4	+1.7	+0.0	44.3	54.0 Z	-9.7	Horiz
12	2744.833M Ave	47.1	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	44.0	54.0 X	-10.0	Vert
^	2744.833M	52.0	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	48.9	54.0 X	-5.1	Vert
14	2745.033M	47.1	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	44.0	54.0 Z	-10.0	Vert

15	3659.983M	42.5	+31.3 +4.1	-37.4 +0.3	+0.4	+1.7	+0.0	42.9	54.0	-11.1	Vert
16	2744.800M Ave	46.0	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	42.9	54.0	-11.1	Horiz
^	2744.800M	50.7	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	47.6	54.0	-6.4	Horiz
^	2744.767M	50.4	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	47.3	54.0	-6.7	Horiz
19	1829.883M Ave	49.5	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	42.9	54.0	-11.1	Vert
^	1829.883M	53.1	+27.2 +2.7	-38.2 +0.4	+0.3	+1.0	+0.0	46.5	54.0	-7.5	Vert
21	3659.900M	42.4	+31.3 +4.1	-37.4 +0.3	+0.4	+1.7	+0.0	42.8	54.0	-11.2	Horiz
22	3660.033M	42.2	+31.3 +4.1	-37.4 +0.3	+0.4	+1.7	+0.0	42.6	54.0	-11.4	Vert
23	2744.983M	45.0	+29.3 +3.3	-37.8 +0.3	+0.4	+1.4	+0.0	41.9	54.0	-12.1	Vert

CKC Laboratories, Inc. Date: 1/11/2012 Time: 09:57:58 SmartLabs, Inc. WO#: 92540
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Sequence#: 2 Ext
ATTN: 0 dB



Test Setup Photos





X Axis



Y Axis



Z Axis

RSS-210

99% Bandwidth

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

Customer: **SmartLabs, Inc.**

Specification: **99% Bandwidth**

Work Order #: **92540**

Date: 1/11/2012

Test Type: **Maximized Emissions**

Time: 08:47:40

Equipment: **RemoteLinc 2**

Sequence#: 1

Manufacturer: SmartLabs, Inc.

Tested By: E. Wong

Model: 24442A2

S/N: NA

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	8/9/2010	8/9/2012
T2	AN00309	Preamplifier	8447D	5/7/2010	5/7/2012
T3	AN01995	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T4	ANP05050	Cable	RG223/U	3/21/2011	3/21/2013
T5	ANP05198	Cable	8268	12/21/2010	12/21/2012

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RemoteLinc 2*	SmartLabs, Inc.	24442A2	NA

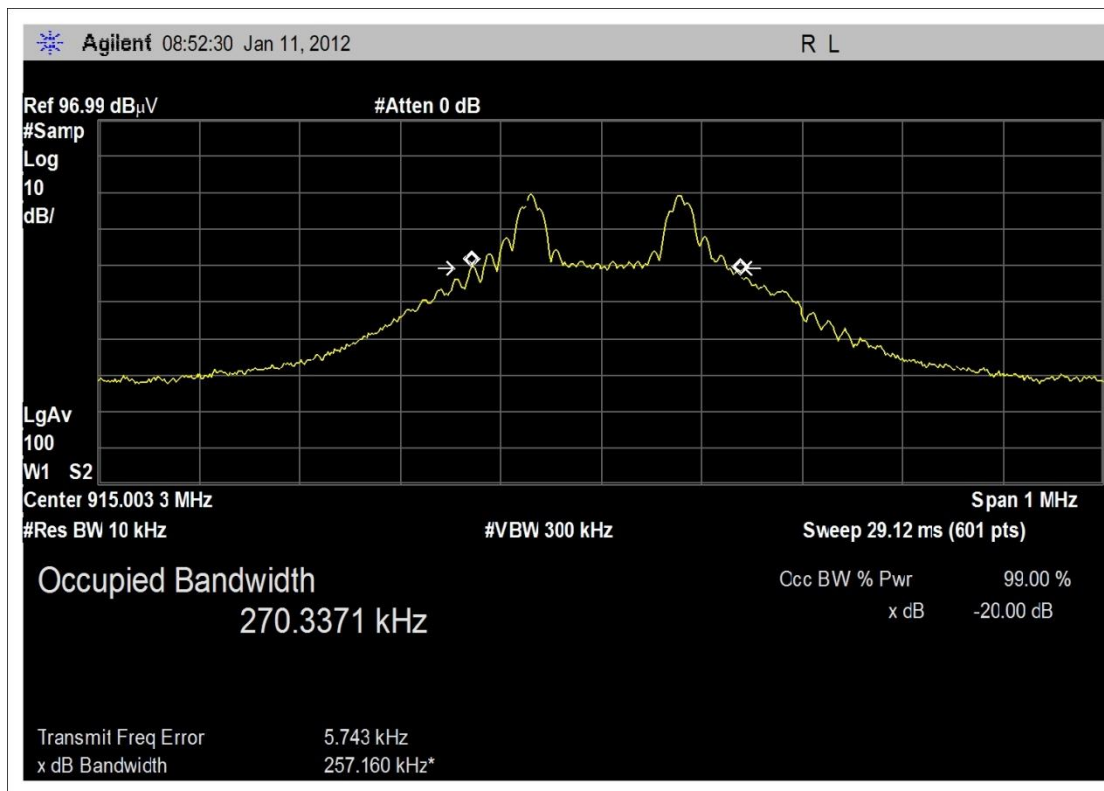
Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

Test Conditions / Notes:

The EUT is placed on the wooden table lined with Styrofoam of 10 cm thickness.
Emission profile of the EUT orientated in three orthogonal positions was evaluated; presented data is the worst case emission. The EUT is set in constant transmit mode.
EUT operates on internal rechargeable battery power.
TX freq = 914.5-915.5 MHz
The EUT power is designed to be mechanically switched off during charge cycle via dedicated USB charging port, hence the evaluation is performed without the charging cable.
Frequency range of measurement = Fundamental
RBW=120 kHz, VBW=120 kHz
15.31(e) A fully charged EUT simulates a fresh battery being installed during the test.
Test environment conditions: 16°C, 32% relative humidity, 100kPa

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

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

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

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

CORRECTION FACTORS

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

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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