SmartLabs, Inc.

TEST REPORT FOR

Hub II
Model: 2245-222

Tested To The Following Standards:

FCC Part 15 Subpart C Section 15.249

Report No.: 95716-17

Date of issue: February 6, 2015

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: Richard Wu
Customer Reference Number: 14-3RW1211-01

REPORT PREPARED BY:

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

Project Number: 95716

DATE OF EQUIPMENT RECEIPT: January 28, 2015
DATE(S) OF TESTING: January 28, 2015

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure	Description	Modifications*	Results
15.249(a)	Field Strength of Fundamental and Harmonics	NA	Pass

Modifications* During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
EUT was tested as received from the manufacturer.

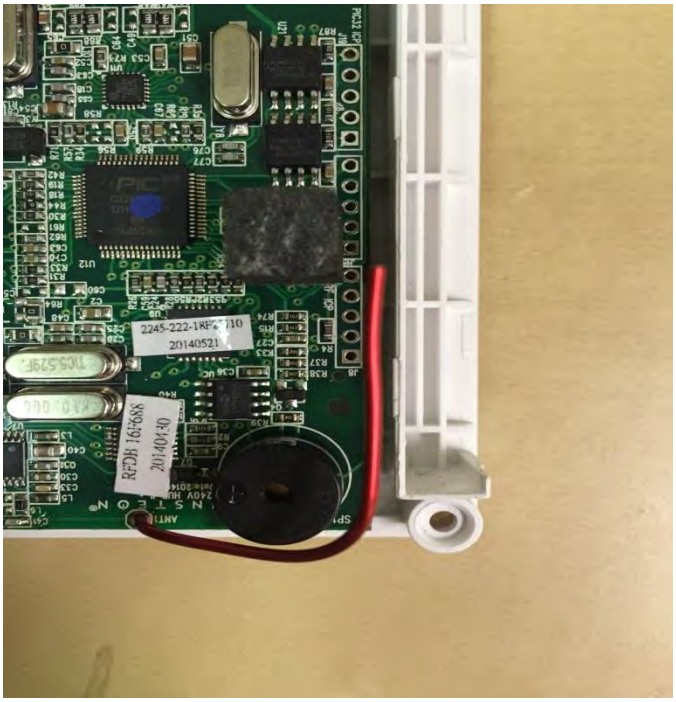
***Modifications listed above must be incorporated into all production units.**

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
The EUT was tested as received from the manufacturer.
EUT previously tested; test results found in CKC Laboratories, Inc. test report #95716-6. Since the time of original testing, the manufacturer has made the following modifications to the EUT: • Both antennae are shortened to length 55.5mm from the top surface of PCB. • Value of capacitor at position C41 is changed to 3.3pF. • Antennae are bent parallel to the board and along its front edge then bent along the outer edges. See photos of manufacturer's modifications on the following pages.

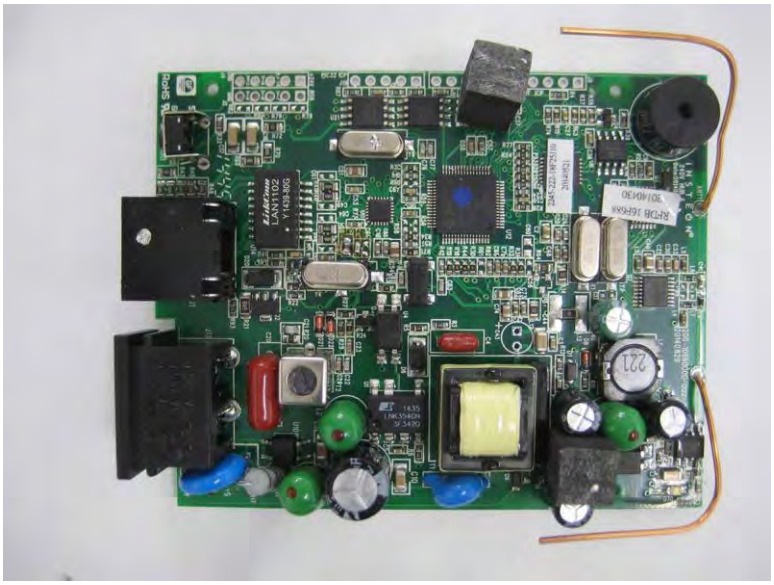
Photos of Manufacturers Modifications



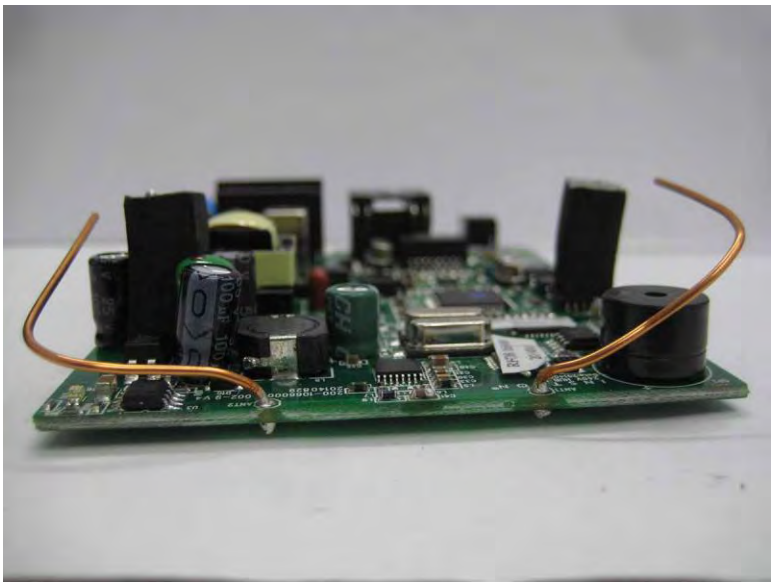
Modifications (Photo supplied by the manufacturer)

Modifications (Photo supplied by the manufacturer)

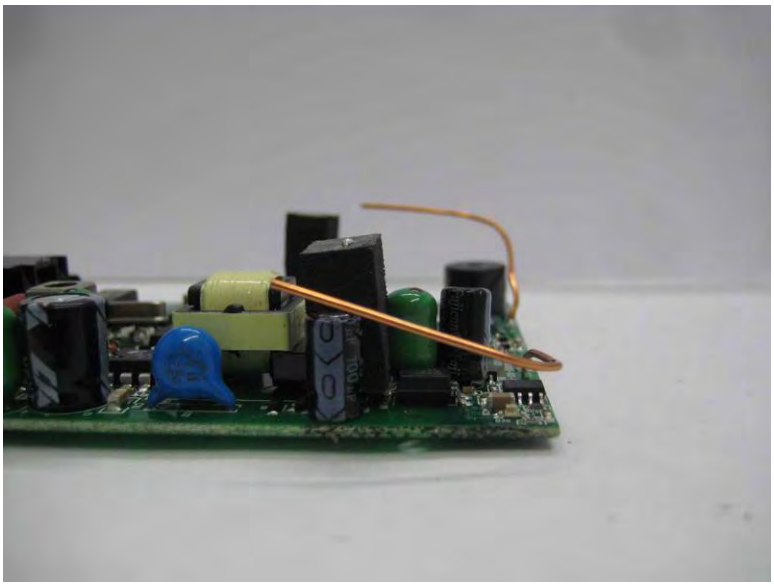
Capacitor C41 (Photo taken by CKC Laboratories)



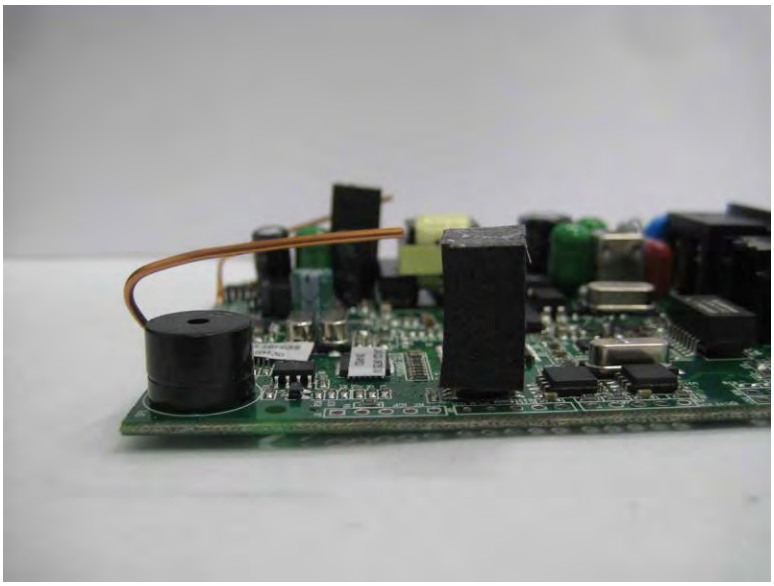
EUT Antenna, View #1 (Photo taken by CKC Laboratories)



EUT Antenna, View #2 (Photo taken by CKC Laboratories)



EUT Antenna, View #3 (Photo taken by CKC Laboratories)



EUT Antenna, View #4 (Photo taken by CKC Laboratories)

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Hub II
Manuf: SmartLabs, Inc.
Model: 2245-222
Serial: 34:24:93
FCC ID: SBP22452

PERIPHERAL DEVICES

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

Dual Speed Hub
Manuf: Netgear
Model: DS309
Serial: DS309A08000012

FCC PART 15 SUBPART C

15.249(a) Field Strength of Fundamental and Harmonics

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 #: **95716** Date: 1/28/2015
Test Type: **Maximized Emissions** Time: 12:45:47
Equipment: **Hub II** Sequence#: 1
Manufacturer: SmartLabs, Inc. Tested By: S. Yamamoto
Model: 2245-222
S/N: 34:24:93

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06661	Cable	LDF1-50	4/15/2014	4/15/2016
T2	AN00786	Preamp	83017A	4/25/2014	4/25/2016
T3	ANP06543	Cable	32022-29094K-29094K-24TC	11/20/2013	11/20/2015
T4	AN03169	High Pass Filter	HM1155-11SS	7/30/2013	7/30/2015
T5	AN00849	Horn Antenna	3115	3/18/2014	3/18/2016
T6	ANP05421	Cable	Sucoflex 104A	1/8/2014	1/8/2016
T7	AN02672	Spectrum Analyzer	E4446A	8/14/2013	8/14/2015
T8	ANP05050	Cable	RG223/U	1/15/2015	1/15/2017
T9	AN00309	Preamp	8447D	3/12/2014	3/12/2016
T10	ANP05198	Cable-Amplitude 15 to 45degC (dB)	8268	12/22/2014	12/22/2016
T11	AN01995	Biconilog Antenna	CBL6111C	4/30/2014	4/30/2016

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

Function	Manufacturer	Model #	S/N
Hub II*	SmartLabs, Inc.	2245-222	34:24:93

Support Devices:

Function	Manufacturer	Model #	S/N
Dual Speed Hub	Netgear	DS309	DS309A08000012

Test Conditions / Notes:

The equipment under test (EUT) is placed on the Styrofoam table top. Connected to the EUT Ethernet port is a remotely located dual speed hub via unshielded cat 5e cable. The EUT is set in operational mode exercising the intended functionalities. Voltage to the EUT is 120VAC 60Hz. Frequency of fundamental = 915 MHz. Frequency range of measurement = 914 MHz to 10GHz. 30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-10000 MHz;RBW=1 MHz,VBW=1 MHz. Test environment conditions: Temperature: 20°C, Relative Humidity: 41%, Atmospheric Pressure: 100kPa. ANSI C63.4 2003. Site A. Emissions from the EUT (fundamental and harmonics) were maximized and measured with the EUT oriented in three different axes (EUT placed sideways, flat, and upright vertical). Modifications: 1) Both antennae are shortened to length 55.5mm from top surface of PCB. 2) Value of capacitor at position C41 is changed to 3.3pF. 3) Antennae are bent parallel to the board and along its front edge then bent along the outer edges.

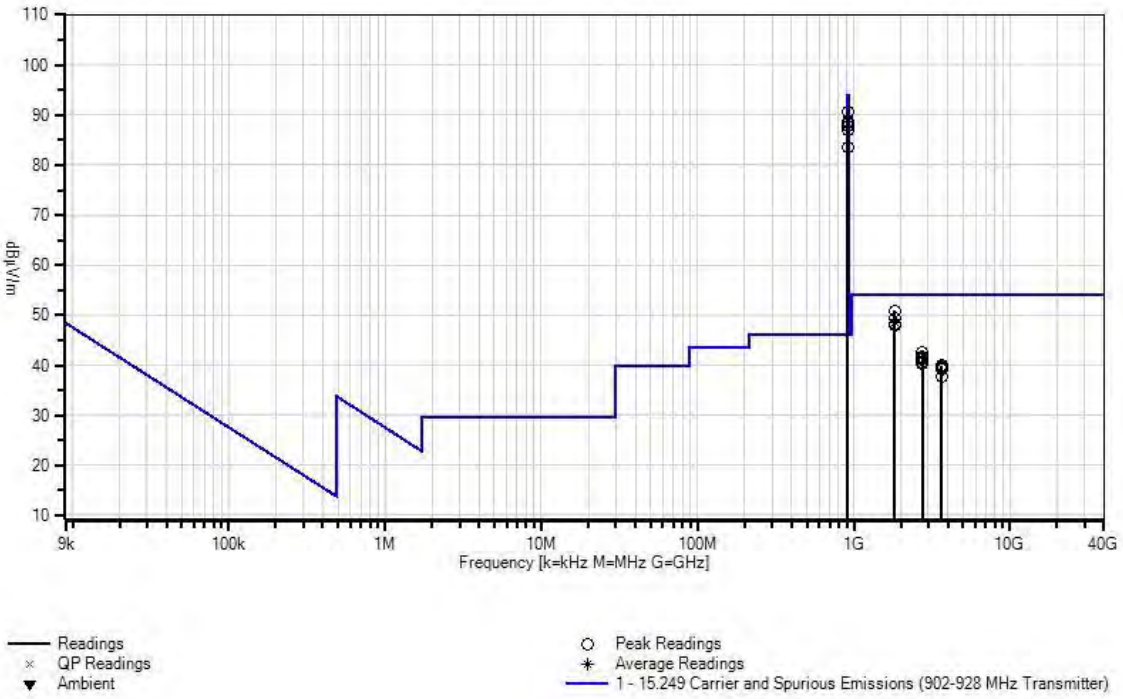
Ext Attn: 0 dB

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

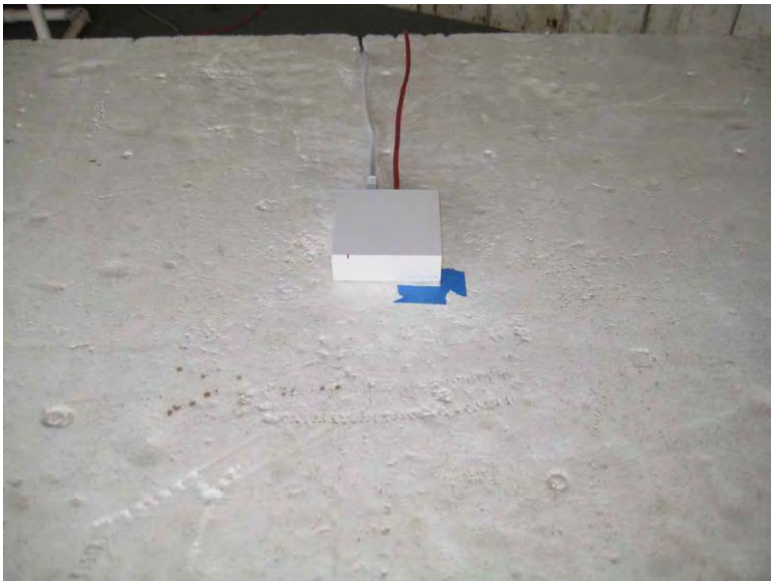
#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	1829.794M	59.8	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	50.9	54.0 EUT side	-3.1	Horiz
2	914.997M	88.4	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	90.7	94.0 EUT flat	-3.3	Horiz
3	1829.744M	58.2	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	49.3	54.0 EUT vertical	-4.7	Vert
4	1829.994M Ave	57.5	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	48.6	54.0 EUT vertical	-5.4	Horiz
^	1829.994M	59.5	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	50.6	54.0 EUT vertical	-3.4	Horiz
^	1829.944M	58.7	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	49.8	54.0 EUT flat	-4.2	Horiz
7	915.004M	86.3	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	88.6	94.0 EUT side	-5.4	Vert
8	1829.711M	57.2	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	48.3	54.0 EUT flat	-5.7	Vert
9	914.844M	86.0	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	88.3	94.0 EUT side	-5.7	Horiz
10	1829.728M	56.8	+3.5 +24.4 +0.0	-38.3 +0.8 +0.0	+0.4 +0.0 +0.0	+0.3 +0.0	+0.0	47.9	54.0 EUT side	-6.1	Vert
11	914.850M	85.4	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	87.7	94.0 EUT vertical	-6.3	Horiz

12	915.006M	84.7	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	87.0	94.0 EUT flat	-7.0	Vert
13	914.996M	81.3	+0.0 +0.0 -27.3	+0.0 +0.0 +5.5	+0.0 +0.0 +23.7	+0.0 +0.4	+0.0	83.6	94.0 EUT vertical	-10.4	Vert
14	2744.790M	48.7	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	42.7	54.0 EUT vertical	-11.3	Vert
15	2744.863M	47.6	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	41.6	54.0 EUT flat	-12.4	Horiz
16	2744.913M	47.5	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	41.5	54.0 EUT vertical	-12.5	Horiz
17	2744.556M	47.1	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	41.1	54.0 EUT side	-12.9	Horiz
18	2744.972M	46.5	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	40.5	54.0 EUT side	-13.5	Vert
19	2744.843M	46.2	+4.4 +26.4 +0.0	-38.9 +1.4 +0.0	+0.5 +0.0 +0.0	+0.2 +0.0	+0.0	40.2	54.0 EUT flat	-13.8	Vert
20	3659.796M	41.9	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	40.0	54.0 EUT vertical	-14.0	Vert
21	3659.573M	41.7	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	39.8	54.0 EUT side	-14.2	Horiz
22	3659.469M	41.6	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	39.7	54.0 EUT flat	-14.3	Vert
23	3659.700M	41.4	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	39.5	54.0 EUT vertical	-14.5	Horiz
24	3659.737M	41.0	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	39.1	54.0 EUT side	-14.9	Vert
25	3659.449M	39.7	+5.2 +28.6 +0.0	-38.1 +1.6 +0.0	+0.5 +0.0 +0.0	+0.3 +0.0	+0.0	37.8	54.0 EUT flat	-16.2	Horiz

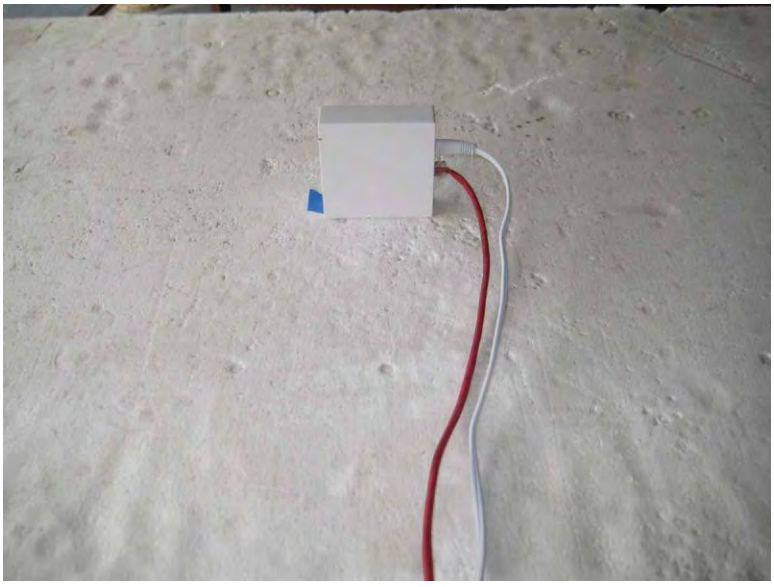
CKC Laboratories, Inc. Date: 1/28/2015 Time: 12:45:47 SmartLabs, Inc. WO#: 95716
15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Sequence#: 1 Ext
ATTN: 0 dB



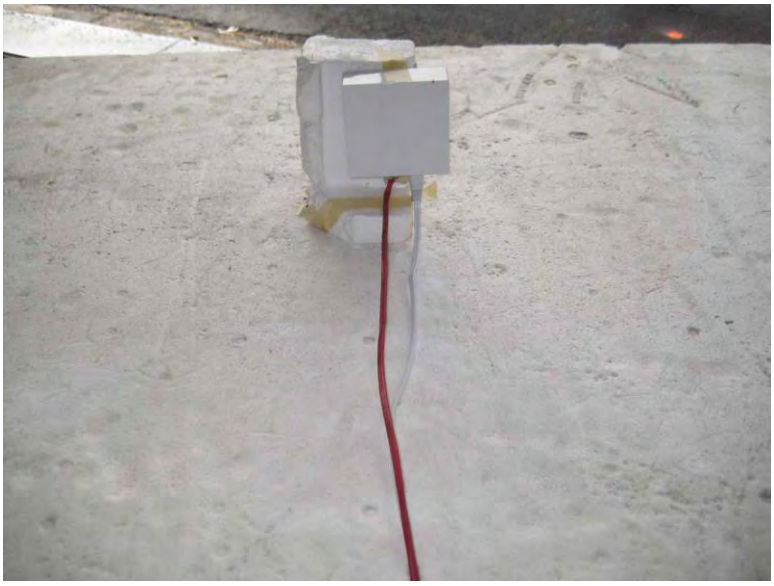
Test Setup Photo(s)



Flat



Side View



Vertical

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

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	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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