

SmartLabs, Inc.

TEST REPORT FOR

Hub II
Model: 2245-222

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s) 15.207 and 15.249

Report No.: 95716-7

Date of issue: May 19, 2014



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: Kylie Fortier
Customer Reference Number: 14-3KF0513-01

REPORT PREPARED BY:

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

Project Number: 95716

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

May 13, 2014
May 13, 2014

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/Method | Description | Results |
|-----------------------|---|---------|
| 15.207 / ANSI C63.4 | Conducted Emissions | Pass |
| 15.249(a) | RF Power Output & Harmonics | Pass |
| 15.215(c) | Occupied Bandwidth | Pass |
| 15.249(b)(d) | Field Strength of Spurious Emissions and Bandedge | 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 |
|---|
| <p>Modification:</p> <p>1 Grounded 25 MHz crystal.</p> <p>2 R71 changed to 0 ohm.</p> <p>3 Reoriented antenna</p> <p>4 Reduced antenna length</p> <p>5 Power setting = 42</p> |



EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Hub II

Manuf: SmartLabs, Inc.

Model: 2245-222

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) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

15.207 AC Conducted Emissions

Test Data

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

Customer: **SmartLabs, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **95716** Date: 5/13/2014
 Test Type: **Conducted Emissions** Time: 15:31:22
 Equipment: **Hub II** Sequence#: 2
 Manufacturer: SmartLabs, Inc. Tested By: E. Wong
 Model: 2245-222 110V 60Hz
 S/N: NA

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|-----------|----------------------------|---------------------|------------------|--------------|
| | AN02869 | Spectrum Analyzer | E4440A | 2/6/2013 | 2/6/2015 |
| T1 | ANP06084 | Attenuator | SA18N10W-06 | 12/14/2012 | 12/14/2014 |
| T2 | ANP04358 | Cable | RG142 | 3/12/2014 | 3/12/2016 |
| T3 | AN02610 | High Pass Filter | HE9615-150K-50-720B | 9/25/2013 | 9/25/2015 |
| T4 | AN00848.1 | 50uH LISN-Line 1 (L1) (dB) | 3816/2nm | 3/14/2013 | 3/14/2015 |
| | AN00848.1 | 50uH LISN-Line 2 (L2) (dB) | 3816/2nm | 3/14/2013 | 3/14/2015 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|----------|-----------------|----------|-----|
| Hub II* | SmartLabs, Inc. | 2245-222 | NA |

Support Devices:

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

Test Conditions / Notes:

The EUT is placed flat on the Styrofoam platform as intended in normal application. Connected to the EUT is a section of unterminated Ethernet cable. The EUT is set in operational mode, exercising the intended functionalities.

Freq = 915MHz.

Frequency range of measurement = 150kHz- 30MHz.

150 kHz-30 MHz; RBW=9 kHz, VBW=9kHz

Test environment conditions: 30°C, 22% Relative Humidity, 100kPa

Modification :

1 Grounded 25 MHz crystal.

2 R71 changed to 0 ohm.

3 Reoriented antenna

4 Reduced antenna length

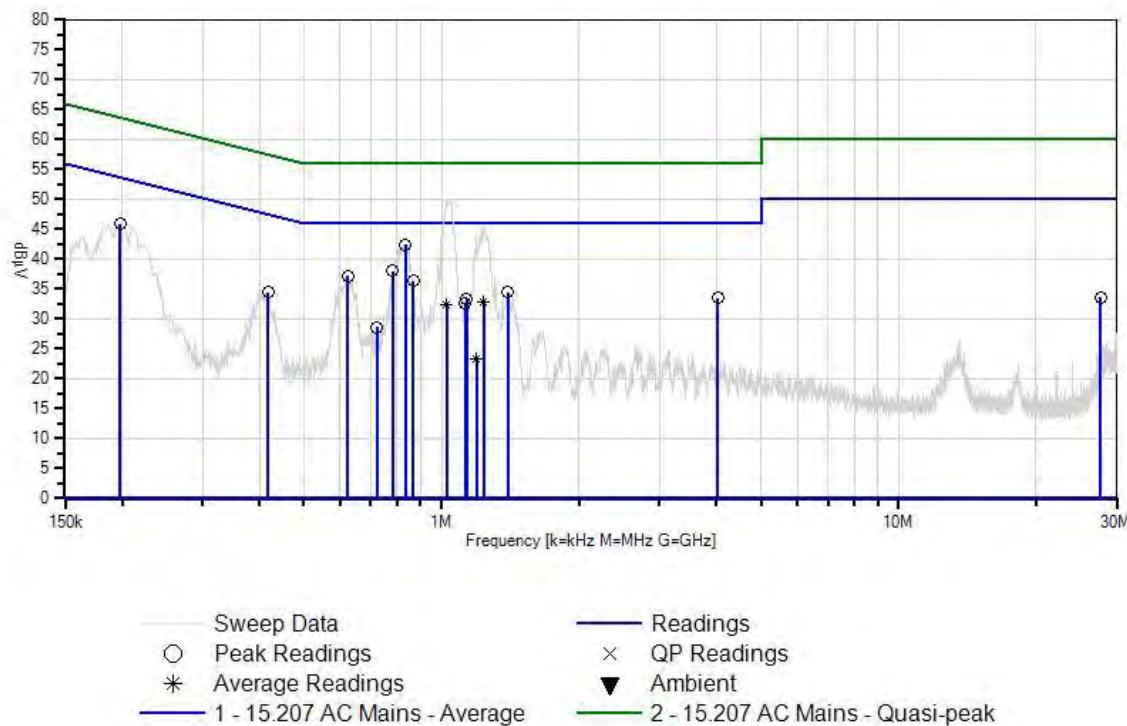
5 Power setting = 42

Ext Attn: 0 dB

| # | Freq MHz | Rdng dB μ V | Reading listed by margin. | | | | Dist Table | Corr dB μ V | Spec dB μ V | Margin dB | Polar Ant |
|----|---------------|--------------------|---------------------------|----------|----------|----------|---------------|--------------------|--------------------|--------------|--------------|
| | | | T1 dB | T2 dB | T3 dB | T4 dB | | | | | |
| 1 | 832.845k | 36.3 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 42.5 | 46.0 | -3.5 | Black |
| 2 | 197.995k | 39.8 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 45.9 | 53.7 | -7.8 | Black |
| 3 | 780.487k | 31.8 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 38.0 | 46.0 | -8.0 | Black |
| 4 | 624.137k | 30.9 | +5.8 | +0.1 | +0.3 | +0.1 | +0.0 | 37.2 | 46.0 | -8.8 | Black |
| 5 | 867.751k | 30.2 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 36.4 | 46.0 | -9.6 | Black |
| 6 | 1.396M | 28.3 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 34.5 | 46.0 | -11.5 | Black |
| 7 | 4.016M | 27.3 | +5.8 | +0.2 | +0.1 | +0.1 | +0.0 | 33.5 | 46.0 | -12.5 | Black |
| 8 | 1.137M | 27.2 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 33.4 | 46.0 | -12.6 | Black |
| 9 | 417.611k | 28.3 | +5.8 | +0.1 | +0.3 | +0.0 | +0.0 | 34.5 | 47.5 | -13.0 | Black |
| 10 | 1.239M Ave | 26.7 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 32.9 | 46.0 | -13.1 | Black |
| ^ | 1.239M | 39.4 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 45.6 | 46.0 | -0.4 | Black |
| 12 | 1.128M | 26.5 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 32.7 | 46.0 | -13.3 | Black |
| 13 | 1.026M Ave | 26.3 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 32.5 | 46.0 | -13.5 | Black |
| ^ | 1.026M | 43.6 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 49.8 | 46.0 | +3.8 | Black |

| | | | | | | | | | | | |
|-----|----------|------|------|------|------|------|------|------|------|-------|-------|
| 15 | 27.650M | 26.2 | +5.8 | +0.4 | +0.2 | +1.0 | +0.0 | 33.6 | 50.0 | -16.4 | Black |
| 16 | 722.310k | 22.4 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 28.6 | 46.0 | -17.4 | Black |
| 17 | 1.192M | 17.2 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 23.4 | 46.0 | -22.6 | Black |
| Ave | 1.192M | 38.0 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 44.2 | 46.0 | -1.8 | Black |

Date: 5/13/2014 Time: 15:31:22 SmartLabs, Inc. WO#: 95716
 15.207 AC Mains - Average Test Lead: Black 110V 60Hz Sequence#: 2 Ext ATTN: 0 dB



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

Customer: **SmartLabs, Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **95716** Date: 5/13/2014
 Test Type: **Conducted Emissions** Time: 15:36:16
 Equipment: **Hub II** Sequence#: 3
 Manufacturer: SmartLabs, Inc. Tested By: E. Wong
 Model: 2245-222 110V 60Hz
 S/N: NA

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|-----------|----------------------------|---------------------|------------------|--------------|
| | AN02869 | Spectrum Analyzer | E4440A | 2/6/2013 | 2/6/2015 |
| T1 | ANP06084 | Attenuator | SA18N10W-06 | 12/14/2012 | 12/14/2014 |
| T2 | ANP04358 | Cable | RG142 | 3/12/2014 | 3/12/2016 |
| T3 | AN02610 | High Pass Filter | HE9615-150K-50-720B | 9/25/2013 | 9/25/2015 |
| | AN00848.1 | 50uH LISN-Line 1 (L1) (dB) | 3816/2nm | 3/14/2013 | 3/14/2015 |
| T4 | AN00848.1 | 50uH LISN-Line 2 (L2) (dB) | 3816/2nm | 3/14/2013 | 3/14/2015 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|----------|-----------------|----------|-----|
| Hub II* | SmartLabs, Inc. | 2245-222 | NA |

Support Devices:

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

Test Conditions / Notes:

The EUT is placed flat on the Styrofoam platform as intended in normal application. Connected to the EUT is a section of unterminated Ethernet cable. The EUT is set in operational mode, exercising the intended functionalities.

Freq = 915MHz.

Frequency range of measurement = 150kHz- 30MHz.

150 kHz-30 MHz; RBW=9 kHz, VBW=9kHz

Test environment conditions: 30°C, 22% Relative Humidity, 100kPa

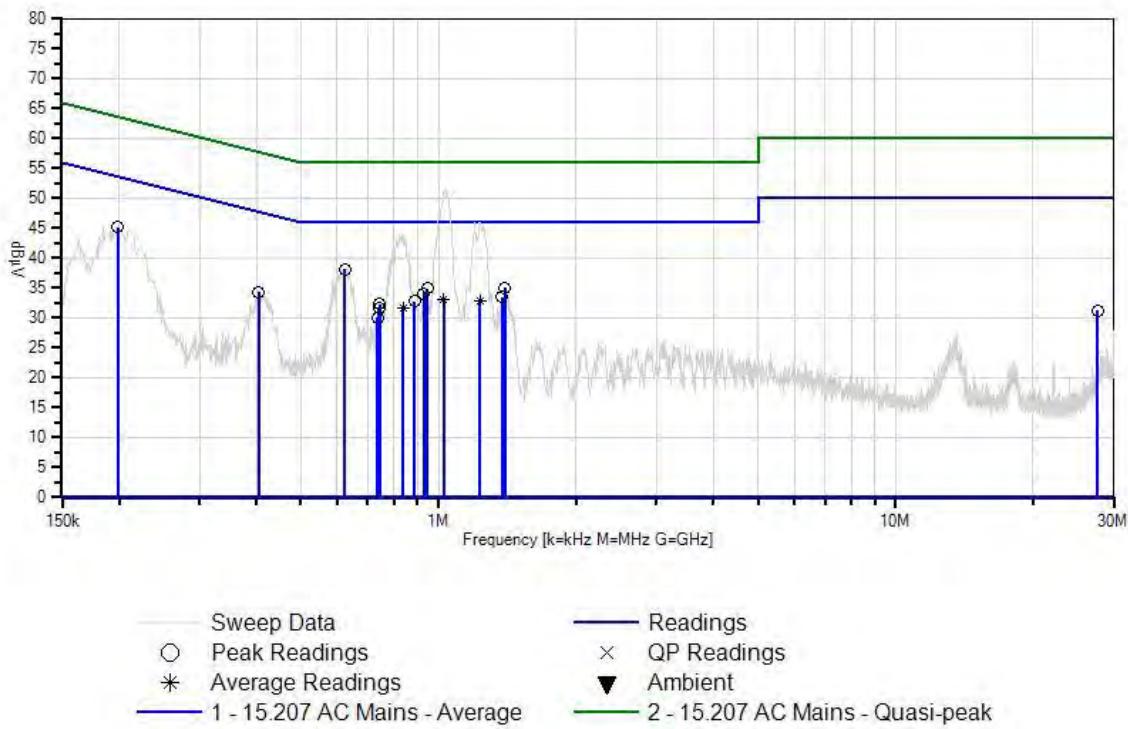
Modification :

- 1 Grounded 25 MHz crystal.
- 2 R71 changed to 0 ohm.
- 3 Reoriented antenna
- 4 Reduced antenna length
- 5 Power setting = 42

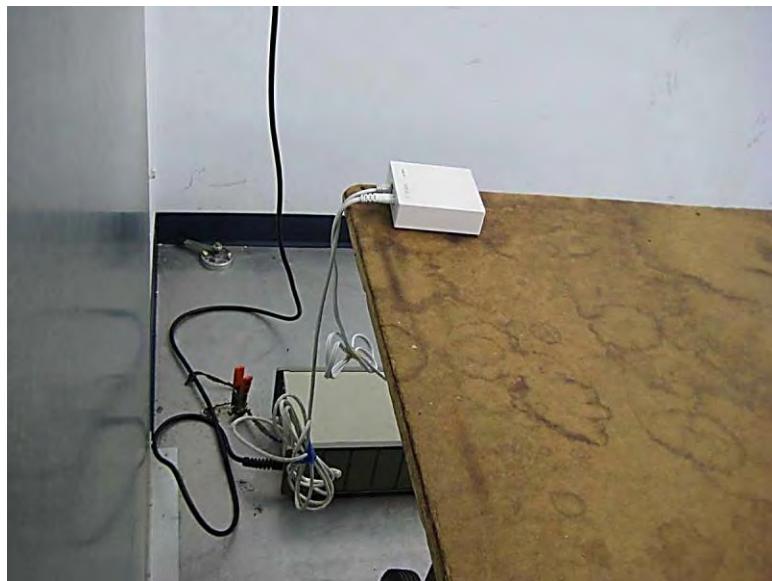
Ext Attn: 0 dB

| Measurement Data: | | | Reading listed by margin. | | | | | Test Lead: White | | | |
|--------------------------|-----------------|--------------------|---------------------------|----------|----------|----------|---------------|--------------------|--------------------|--------------|--------------|
| # | Freq MHz | Rdng dB μ V | T1 dB | T2 dB | T3 dB | T4 dB | Dist Table | Corr dB μ V | Spec dB μ V | Margin dB | Polar Ant |
| 1 | 622.683k | 32.0 | +5.8 | +0.1 | +0.3 | +0.0 | +0.0 | 38.2 | 46.0 | -7.8 | White |
| 2 | 198.722k | 39.1 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 45.2 | 53.7 | -8.5 | White |
| 3 | 1.396M | 28.9 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 35.1 | 46.0 | -10.9 | White |
| 4 | 945.249k | 28.8 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 34.9 | 46.0 | -11.1 | White |
| 5 | 928.238k | 28.0 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 34.1 | 46.0 | -11.9 | White |
| 6 | 1.379M | 27.3 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 33.5 | 46.0 | -12.5 | White |
| 7 | 1.026M Ave | 26.9 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 33.1 | 46.0 | -12.9 | White |
| ^ | 1.026M | 45.4 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 51.6 | 46.0 | +5.6 | White |
| 9 | 1.230M Ave | 26.6 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 32.8 | 46.0 | -13.2 | White |
| ^ | 1.230M | 39.9 | +5.8 | +0.1 | +0.2 | +0.1 | +0.0 | 46.1 | 46.0 | +0.1 | White |
| 11 | 885.710k | 26.7 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 32.8 | 46.0 | -13.2 | White |
| 12 | 403.794k | 28.1 | +5.8 | +0.1 | +0.3 | +0.0 | +0.0 | 34.3 | 47.8 | -13.5 | White |
| 13 | 744.126k | 26.2 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 32.3 | 46.0 | -13.7 | White |
| 14 | 836.481k Ave | 25.6 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 31.7 | 46.0 | -14.3 | White |
| ^ | 836.481k | 38.1 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 44.2 | 46.0 | -1.8 | White |
| 16 | 739.763k | 25.6 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 31.7 | 46.0 | -14.3 | White |
| 17 | 735.400k | 23.9 | +5.8 | +0.1 | +0.2 | +0.0 | +0.0 | 30.0 | 46.0 | -16.0 | White |
| 18 | 27.650M | 23.8 | +5.8 | +0.4 | +0.2 | +1.0 | +0.0 | 31.2 | 50.0 | -18.8 | White |

Date: 5/13/2014 Time: 15:36:16 SmartLabs, Inc. WO#: 95716
 15.207 AC Mains - Average Test Lead: White 110V 60Hz Sequence#: 3 Ext ATTN: 0 dB



Test Setup Photo(s)



15.249(a) RF Power Output & Harmonics

Test Data

Test Location: CKC Laboratories, Inc. • 110 North 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: 5/13/2014
 Test Type: **Radiated Scan** Time: 14:58:57
 Equipment: **Hub II** Sequence#: 1
 Manufacturer: SmartLabs, Inc. Tested By: E. Wong
 Model: 2245-222
 S/N: NA

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|-----|----------|-----------------------------------|--------------------|------------------|--------------|
| T1 | AN02869 | Spectrum Analyzer | E4440A | 2/6/2013 | 2/6/2015 |
| T2 | AN00309 | Preamp | 8447D | 3/12/2014 | 3/12/2016 |
| T3 | AN01995 | Biconilog Antenna | CBL6111C | 4/30/2014 | 4/30/2016 |
| T4 | ANP05050 | Cable | RG223/U | 1/21/2013 | 1/21/2015 |
| T5 | ANP05198 | Cable-Amplitude 15 to 45degC (dB) | 8268 | 12/11/2012 | 12/11/2014 |
| T6 | AN00314 | Loop Antenna | 6502 | 6/29/2012 | 6/29/2014 |
| T7 | AN00849 | Horn Antenna | 3115 | 3/18/2014 | 3/18/2016 |
| T8 | AN00786 | Preamp | 83017A | 6/20/2012 | 6/20/2014 |
| T9 | AN02946 | Cable | 32022-2-2909K-36TC | 7/31/2013 | 7/31/2015 |
| T10 | ANP05421 | Cable | Sucoflex 104A | 1/8/2014 | 1/8/2016 |
| T11 | ANP06661 | Cable | LDF1-50 | 4/15/2014 | 4/15/2016 |
| T12 | AN03169 | High Pass Filter | HM1155-11SS | 7/30/2013 | 7/30/2015 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|----------|-----------------|----------|-----|
| Hub II* | SmartLabs, Inc. | 2245-222 | NA |

Support Devices:

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

Test Conditions / Notes:

The EUT is placed flat on the Styrofoam platform as intended in normal application. Connected to the EUT is a section of unterminated Ethernet cable. The EUT is set in operational mode, exercising the intended functionalities.

Freq = 915MHz.

Frequency range of measurement = 9 kHz -10 GHz.

9kHz -150 kHz; RBW=200Hz, 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: 30°C, 22% Relative Humidity, 100kPa

Emission profile with the EUT placed flat and upright was evaluate, worse case emission is with the EUT placed flat on the platform.

15.31(e) compliance: the supply voltage was varied between 85% and 115% of the nominal rated supply voltage, no change in the Fundamental signal level was observed.

Modification :

1 Grounded 25 MHz crystal.

2 R71 changed to 0 ohm.

3 Reoriented antenna

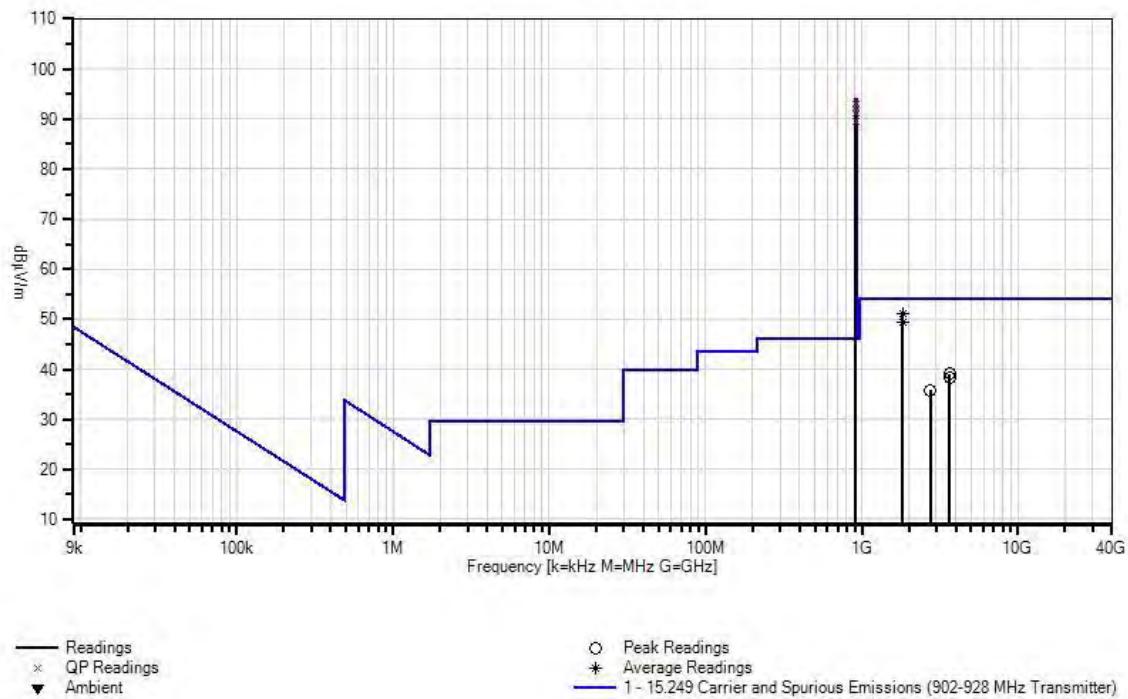
4 Reduced antenna length

5 Power setting = 42

| Measurement Data: | | | Reading listed by margin. | | | | Test Distance: 3 Meters | | | | |
|--------------------------|-----------|------|---------------------------|-----------------|-----------------|-----------------|-------------------------|----------------------|----------------------|--------------|-------------------|
| # | Freq | Rdng | T1 T5 T9 MHz | T2 T6 T10 | T3 T7 T11 | T4 T8 T12 | Dist Table | Corr dB μ V/m | Spec dB μ V/m | Margin dB | Polar |
| | | | dB μ V | dB | dB | dB | | | | | Ant |
| 1 | 914.904M | 89.9 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 92.8 | 94.0 | -1.2 | Vert |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_flat |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| ^ | 914.904M | 90.3 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 93.2 | 94.0 | -0.8 | Vert |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_flat |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| 3 | 915.062M | 89.2 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 92.1 | 94.0 | -1.9 | Vert |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_uprig |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | ht |
| ^ | 915.062M | 89.5 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 92.4 | 94.0 | -1.6 | Vert |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_uprig |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | ht |
| 5 | 914.902M | 88.3 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 91.2 | 94.0 | -2.8 | Horiz |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_uprig |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | ht |
| 6 | 1830.100M | 60.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 51.0 | 54.0 | -3.0 | Horiz |
| | | | +0.0 | +0.0 | +24.4 | -38.5 | | | | | Harmonics |
| | | | +0.5 | +0.8 | +3.5 | +0.3 | | | | | |
| ^ | 1830.100M | 62.1 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 53.1 | 54.0 | -0.9 | Horiz |
| | | | +0.0 | +0.0 | +24.4 | -38.5 | | | | | Harmonics |
| | | | +0.5 | +0.8 | +3.5 | +0.3 | | | | | |

| | | | | | | | | | | | |
|----|-----------|------|------|-------|-------|-------|------|------|------|-------|-------------------|
| 8 | 914.899M | 86.7 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 89.6 | 94.0 | -4.4 | Horiz |
| | QP | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_Flat |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| ^ | 914.902M | 88.4 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 91.3 | 94.0 | -2.7 | Horiz |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_uprig |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | ht |
| ^ | 914.899M | 87.4 | +0.0 | -27.3 | +23.7 | +0.6 | +0.0 | 90.3 | 94.0 | -3.7 | Horiz |
| | | | +5.9 | +0.0 | +0.0 | +0.0 | | | | | Fundamental_flat |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| 11 | 1830.017M | 58.5 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 49.5 | 54.0 | -4.5 | Vert |
| | Ave | | +0.0 | +0.0 | +24.4 | -38.5 | | | | | Harmonics |
| | | | +0.5 | +0.8 | +3.5 | +0.3 | | | | | |
| ^ | 1830.017M | 60.3 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 51.3 | 54.0 | -2.7 | Vert |
| | | | +0.0 | +0.0 | +24.4 | -38.5 | | | | | Harmonics |
| | | | +0.5 | +0.8 | +3.5 | +0.3 | | | | | |
| 13 | 3660.050M | 40.9 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 39.1 | 54.0 | -14.9 | Vert |
| | | | +0.0 | +0.0 | +28.6 | -38.2 | | | | | Harmonics |
| | | | +0.7 | +1.6 | +5.2 | +0.3 | | | | | |
| 14 | 3660.000M | 40.2 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 38.4 | 54.0 | -15.6 | Horiz |
| | | | +0.0 | +0.0 | +28.6 | -38.2 | | | | | Harmonics |
| | | | +0.7 | +1.6 | +5.2 | +0.3 | | | | | |
| 15 | 2744.750M | 41.3 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 35.8 | 54.0 | -18.2 | Horiz |
| | | | +0.0 | +0.0 | +26.4 | -38.7 | | | | | Harmonics |
| | | | +0.8 | +1.4 | +4.4 | +0.2 | | | | | |

Date: 5/13/2014 Time: 14:58:57 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)





15.215(c) Occupied Bandwidth

Test Conditions / Setup

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

Customer: **SmartLabs, Inc.**
 Specification: **-20dB BW**
 Work Order #: **95716** Date: 5/13/2014
 Test Type: **Radiated Scan** Time: 14:58:57
 Equipment: **Hub II** Sequence#: 1
 Manufacturer: SmartLabs, Inc. Tested By: E. Wong
 Model: 2245-222
 S/N: NA

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|----|----------|--------------------|----------|------------------|--------------|
| T1 | AN02869 | Spectrum Analyzer | E4440A | 2/6/2013 | 2/6/2015 |
| T2 | AN00309 | Preamp | 8447D | 3/12/2014 | 3/12/2016 |
| T3 | AN01995 | Biconilog Antenna | CBL6111C | 4/30/2014 | 4/30/2016 |
| T4 | ANP05050 | Cable | RG223/U | 1/21/2013 | 1/21/2015 |
| T5 | ANP05198 | Cable-Amplitude 15 | 8268 | 12/11/2012 | 12/11/2014 |
| | | to 45degC (dB) | | | |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|----------|-----------------|----------|-----|
| Hub II* | SmartLabs, Inc. | 2245-222 | NA |

Support Devices:

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

Test Conditions / Notes:

The EUT is placed flat on the Styrofoam platform as intended in normal application. Connected to the EUT is a section of unterminated Ethernet cable. The EUT is set in operational mode, exercising the intended functionalities.

Freq = 915 MHz.

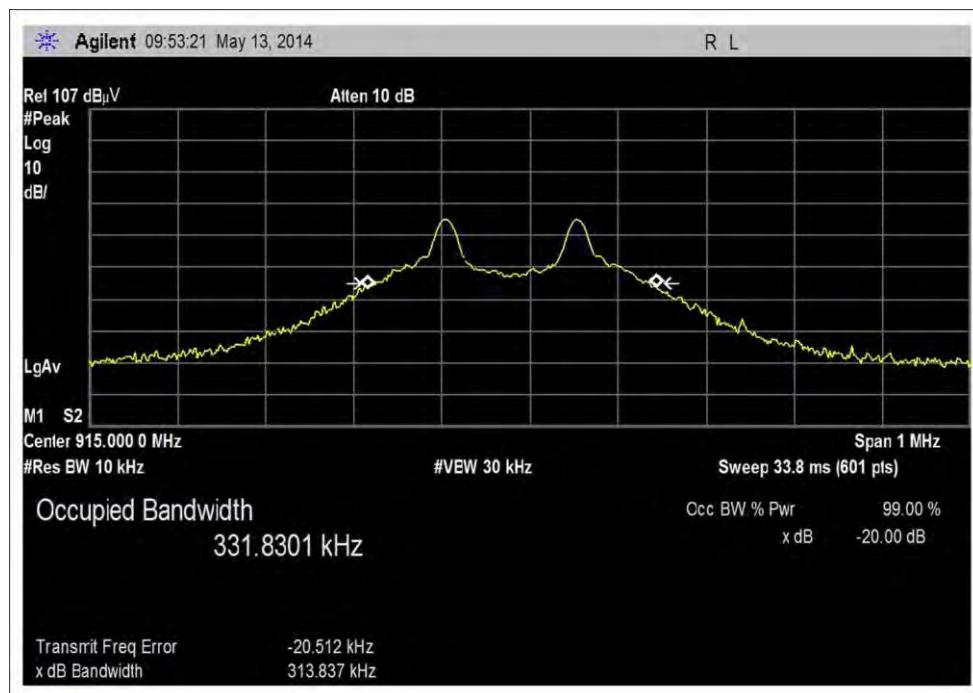
Frequency range of measurement = 9 kHz -10 GHz.

9kHz -150 kHz; RBW=200Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 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: 30°C, 22% Relative Humidity, 100kPa

Emission profile with the EUT placed flat and upright was evaluate, worse case emission is with the EUT placed flat on the platform.

Test Data



Test Setup Photo(s)



15.249(b)(d) Field Strength of Spurious Emissions and Bandedge

Test Setup / Data

Test Location: CKC Laboratories, Inc. • 110 North 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: 5/13/2014
 Test Type: **Radiated Scan** Time: 14:58:57
 Equipment: **Hub II** Sequence#: 1
 Manufacturer: SmartLabs, Inc. Tested By: E. Wong
 Model: 2245-222
 S/N: NA

Test Equipment:

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|-----|----------|-----------------------------------|--------------------|------------------|--------------|
| | AN02869 | Spectrum Analyzer | E4440A | 2/6/2013 | 2/6/2015 |
| T1 | AN00309 | Preamp | 8447D | 3/12/2014 | 3/12/2016 |
| T2 | AN01995 | Biconilog Antenna | CBL6111C | 4/30/2014 | 4/30/2016 |
| T3 | ANP05050 | Cable | RG223/U | 1/21/2013 | 1/21/2015 |
| T4 | ANP05198 | Cable-Amplitude 15 to 45degC (dB) | 8268 | 12/11/2012 | 12/11/2014 |
| | AN00314 | Loop Antenna | 6502 | 6/29/2012 | 6/29/2014 |
| T5 | AN00849 | Horn Antenna | 3115 | 3/18/2014 | 3/18/2016 |
| T6 | AN00786 | Preamp | 83017A | 6/20/2012 | 6/20/2014 |
| T7 | AN02946 | Cable | 32022-2-2909K-36TC | 7/31/2013 | 7/31/2015 |
| T8 | ANP05421 | Cable | Sucoflex 104A | 1/8/2014 | 1/8/2016 |
| T9 | ANP06661 | Cable | LDF1-50 | 4/15/2014 | 4/15/2016 |
| T10 | AN03169 | High Pass Filter | HM1155-11SS | 7/30/2013 | 7/30/2015 |

Equipment Under Test (* = EUT):

| Function | Manufacturer | Model # | S/N |
|----------|-----------------|----------|-----|
| Hub II* | SmartLabs, Inc. | 2245-222 | NA |

Support Devices:

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

Test Conditions / Notes:

The EUT is placed flat on the Styrofoam platform as intended in normal application. Connected to the EUT is a section of unterminated Ethernet cable. The EUT is set in operational mode, exercising the intended functionalities.

Freq = 915MHz.

Frequency range of measurement = 9 kHz -10 GHz.

9kHz -150 kHz; RBW=200Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 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: 30°C, 22% Relative Humidity, 100kPa

Emission profile with the EUT placed flat and upright was evaluate, worse case emission is with the EUT placed flat on the platform.

Modification :

1 Grounded 25 MHz crystal.

2 R71 changed to 0 ohm.

3 Reoriented antenna

4 Reduced antenna length

5 Power setting = 42

Ext Attn: 0 dB

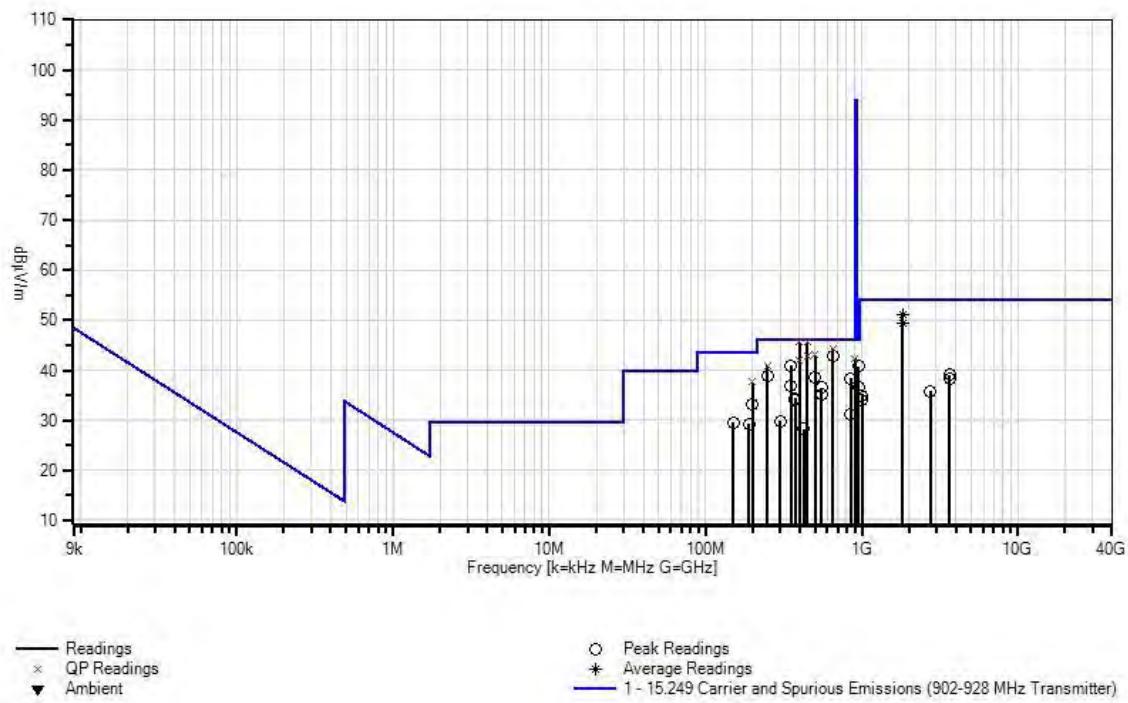
| # | Freq | Rdng | Reading listed by margin. | | | | Test Distance: 3 Meters | | | | |
|---|----------|------------|---------------------------|-------|------|------|-------------------------|--------------|--------------|--------|-------|
| | | | T1 | T2 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
| | | | T5 | T6 | T7 | T8 | | | | | |
| | | | T9 | T10 | | | | | | | |
| | MHz | dB μ V | dB | dB | dB | dB | Table | dB μ V/m | dB μ V/m | dB | Ant |
| 1 | 400.013M | 53.1 | -27.9 | +16.4 | +0.4 | +3.6 | +0.0 | 45.6 | 46.0 | -0.4 | Horiz |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 400.013M | 54.5 | -27.9 | +16.4 | +0.4 | +3.6 | +0.0 | 47.0 | 46.0 | +1.0 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 3 | 449.991M | 51.9 | -27.9 | +17.3 | +0.4 | +3.9 | +0.0 | 45.6 | 46.0 | -0.4 | Vert |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 449.991M | 52.4 | -27.9 | +17.3 | +0.4 | +3.9 | +0.0 | 46.1 | 46.0 | +0.1 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 5 | 649.994M | 46.0 | -27.4 | +20.5 | +0.5 | +4.8 | +0.0 | 44.4 | 46.0 | -1.6 | Horiz |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 649.994M | 46.6 | -27.4 | +20.5 | +0.5 | +4.8 | +0.0 | 45.0 | 46.0 | -1.0 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 7 | 499.988M | 48.3 | -27.8 | +18.1 | +0.4 | +4.1 | +0.0 | 43.1 | 46.0 | -2.9 | Vert |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 499.988M | 48.9 | -27.8 | +18.1 | +0.4 | +4.1 | +0.0 | 43.7 | 46.0 | -2.3 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |

| | | | | | | | | | | | |
|----|-----------|------|-------|-------|------|------|------|------|------|------|-------|
| 9 | 1830.100M | 60.0 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 51.0 | 54.0 | -3.0 | Horiz |
| | Ave | | +24.4 | -38.5 | +0.5 | +0.8 | | | | | |
| | | | +3.5 | +0.3 | | | | | | | |
| ^ | 1830.100M | 62.1 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 53.1 | 54.0 | -0.9 | Horiz |
| | | | +24.4 | -38.5 | +0.5 | +0.8 | | | | | |
| | | | +3.5 | +0.3 | | | | | | | |
| 11 | 449.985M | 49.1 | -27.9 | +17.3 | +0.4 | +3.9 | +0.0 | 42.8 | 46.0 | -3.2 | Horiz |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 449.985M | 50.0 | -27.9 | +17.3 | +0.4 | +3.9 | +0.0 | 43.7 | 46.0 | -2.3 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 13 | 649.983M | 44.4 | -27.4 | +20.5 | +0.5 | +4.8 | +0.0 | 42.8 | 46.0 | -3.2 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 14 | 899.976M | 39.6 | -27.3 | +23.6 | +0.6 | +5.8 | +0.0 | 42.3 | 46.0 | -3.7 | Horiz |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 899.976M | 40.5 | -27.3 | +23.6 | +0.6 | +5.8 | +0.0 | 43.2 | 46.0 | -2.8 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 16 | 400.001M | 49.4 | -27.9 | +16.4 | +0.4 | +3.6 | +0.0 | 41.9 | 46.0 | -4.1 | Vert |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 400.001M | 51.3 | -27.9 | +16.4 | +0.4 | +3.6 | +0.0 | 43.8 | 46.0 | -2.2 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 18 | 1830.017M | 58.5 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 49.5 | 54.0 | -4.5 | Vert |
| | Ave | | +24.4 | -38.5 | +0.5 | +0.8 | | | | | |
| | | | +3.5 | +0.3 | | | | | | | |
| ^ | 1830.017M | 60.3 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 51.3 | 54.0 | -2.7 | Vert |
| | | | +24.4 | -38.5 | +0.5 | +0.8 | | | | | |
| | | | +3.5 | +0.3 | | | | | | | |
| 20 | 250.005M | 53.2 | -28.0 | +12.7 | +0.3 | +2.8 | +0.0 | 41.0 | 46.0 | -5.0 | Vert |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 250.004M | 54.3 | -28.0 | +12.7 | +0.3 | +2.8 | +0.0 | 42.1 | 46.0 | -3.9 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 22 | 350.000M | 50.2 | -27.9 | +15.0 | +0.3 | +3.4 | +0.0 | 41.0 | 46.0 | -5.0 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 23 | 949.976M | 37.3 | -27.3 | +24.1 | +0.7 | +6.0 | +0.0 | 40.8 | 46.0 | -5.2 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 24 | 199.994M | 53.9 | -28.0 | +9.1 | +0.2 | +2.5 | +0.0 | 37.7 | 43.5 | -5.8 | Horiz |
| | QP | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 199.994M | 55.6 | -28.0 | +9.1 | +0.2 | +2.5 | +0.0 | 39.4 | 43.5 | -4.1 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |

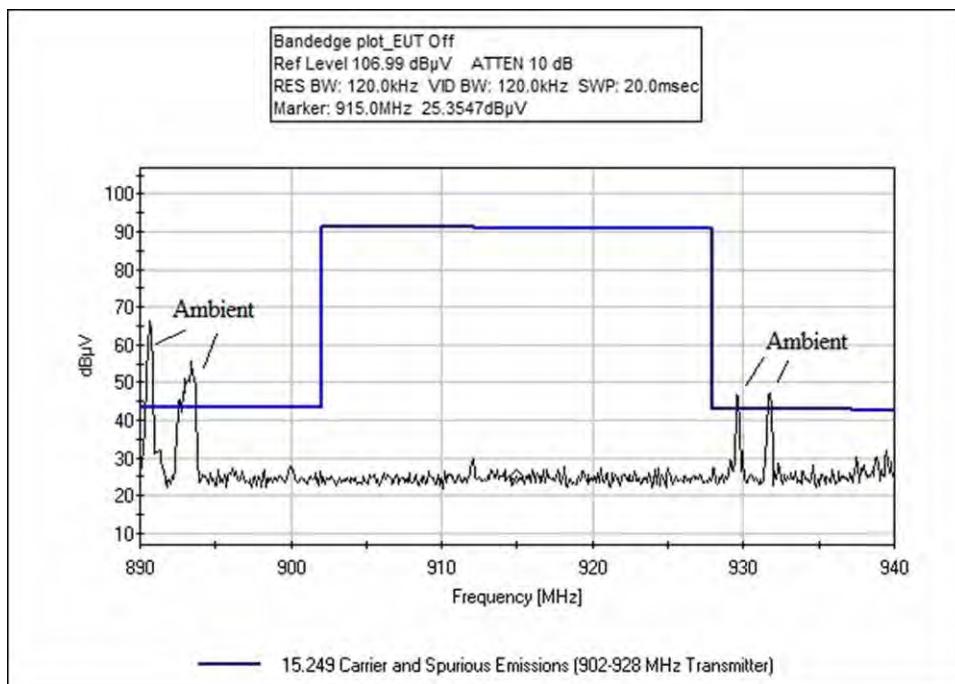
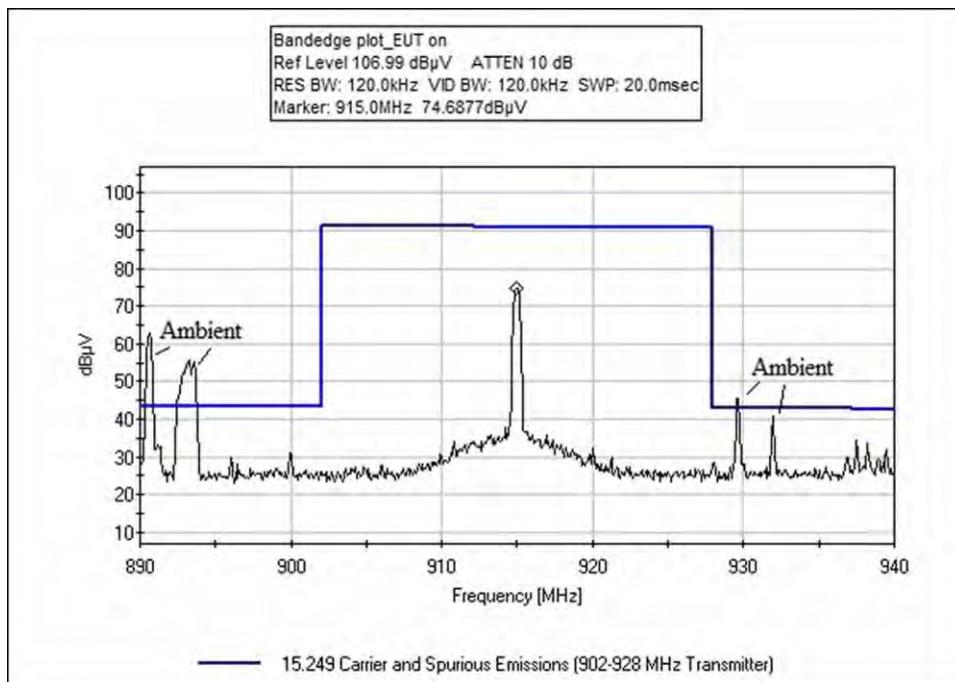
| | | | | | | | | | | | |
|----|-----------|------|-----------------------|-----------------------|----------------------|----------------------|----------------------|------|------|-------|-------|
| 26 | 249.995M | 51.2 | -28.0 +0.0 +0.0 | +12.7 +0.0 +0.0 | +0.3 +0.0 +0.0 | +2.8 +0.0 +0.0 | +0.0 +0.0 +0.0 | 39.0 | 46.0 | -7.0 | Horiz |
| 27 | 500.009M | 43.7 | -27.8 +0.0 +0.0 | +18.1 +0.0 +0.0 | +0.4 +0.0 +0.0 | +4.1 +0.0 +0.0 | +0.0 +0.0 +0.0 | 38.5 | 46.0 | -7.5 | Horiz |
| 28 | 849.990M | 36.1 | -27.2 +0.0 +0.0 | +23.2 +0.0 +0.0 | +0.7 +0.0 +0.0 | +5.6 +0.0 +0.0 | +0.0 +0.0 +0.0 | 38.4 | 46.0 | -7.6 | Vert |
| 29 | 350.003M | 46.2 | -27.9 +0.0 +0.0 | +15.0 +0.0 +0.0 | +0.3 +0.0 +0.0 | +3.4 +0.0 +0.0 | +0.0 +0.0 +0.0 | 37.0 | 46.0 | -9.0 | Vert |
| 30 | 949.970M | 33.2 | -27.3 +0.0 +0.0 | +24.1 +0.0 +0.0 | +0.7 +0.0 +0.0 | +6.0 +0.0 +0.0 | +0.0 +0.0 +0.0 | 36.7 | 46.0 | -9.3 | Vert |
| 31 | 550.002M | 40.4 | -27.7 +0.0 +0.0 | +19.0 +0.0 +0.0 | +0.4 +0.0 +0.0 | +4.4 +0.0 +0.0 | +0.0 +0.0 +0.0 | 36.5 | 46.0 | -9.5 | Horiz |
| 32 | 200.022M | 49.5 | -28.0 +0.0 +0.0 | +9.1 +0.0 +0.0 | +0.2 +0.0 +0.0 | +2.5 +0.0 +0.0 | +0.0 +0.0 +0.0 | 33.3 | 43.5 | -10.2 | Vert |
| 33 | 549.987M | 39.1 | -27.7 +0.0 +0.0 | +19.0 +0.0 +0.0 | +0.4 +0.0 +0.0 | +4.4 +0.0 +0.0 | +0.0 +0.0 +0.0 | 35.2 | 46.0 | -10.8 | Vert |
| 34 | 374.970M | 42.7 | -27.9 +0.0 +0.0 | +15.7 +0.0 +0.0 | +0.4 +0.0 +0.0 | +3.5 +0.0 +0.0 | +0.0 +0.0 +0.0 | 34.4 | 46.0 | -11.6 | Vert |
| 35 | 375.033M | 42.2 | -27.9 +0.0 +0.0 | +15.7 +0.0 +0.0 | +0.4 +0.0 +0.0 | +3.5 +0.0 +0.0 | +0.0 +0.0 +0.0 | 33.9 | 46.0 | -12.1 | Horiz |
| 36 | 149.996M | 44.3 | -28.0 +0.0 +0.0 | +11.0 +0.0 +0.0 | +0.2 +0.0 +0.0 | +2.1 +0.0 +0.0 | +0.0 +0.0 +0.0 | 29.6 | 43.5 | -13.9 | Vert |
| 37 | 189.998M | 45.5 | -28.0 +0.0 +0.0 | +9.1 +0.0 +0.0 | +0.2 +0.0 +0.0 | +2.4 +0.0 +0.0 | +0.0 +0.0 +0.0 | 29.2 | 43.5 | -14.3 | Horiz |
| 38 | 849.980M | 29.0 | -27.2 +0.0 +0.0 | +23.2 +0.0 +0.0 | +0.7 +0.0 +0.0 | +5.6 +0.0 +0.0 | +0.0 +0.0 +0.0 | 31.3 | 46.0 | -14.7 | Horiz |
| 39 | 3660.050M | 40.9 | +0.0 +28.6 +5.2 | +0.0 -38.2 +0.3 | +0.0 +0.7 +1.6 | +0.0 +0.0 +0.0 | +0.0 +0.0 +0.0 | 39.1 | 54.0 | -14.9 | Vert |
| 40 | 3660.000M | 40.2 | +0.0 +28.6 +5.2 | +0.0 -38.2 +0.3 | +0.0 +0.7 +1.6 | +0.0 +0.0 +0.0 | +0.0 +0.0 +0.0 | 38.4 | 54.0 | -15.6 | Horiz |
| 41 | 299.992M | 41.0 | -27.9 +0.0 +0.0 | +13.4 +0.0 +0.0 | +0.3 +0.0 +0.0 | +3.1 +0.0 +0.0 | +0.0 +0.0 +0.0 | 29.9 | 46.0 | -16.1 | Horiz |
| 42 | 424.979M | 35.1 | -27.9 +0.0 +0.0 | +16.9 +0.0 +0.0 | +0.4 +0.0 +0.0 | +3.8 +0.0 +0.0 | +0.0 +0.0 +0.0 | 28.3 | 46.0 | -17.7 | Horiz |

| | | | | | | | | | | | |
|----|-----------|------|-------|-------|------|------|------|------|------|-------|-------|
| 43 | 2744.750M | 41.3 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 35.8 | 54.0 | -18.2 | Horiz |
| | | | +26.4 | -38.7 | +0.8 | +1.4 | | | | | |
| | | | +4.4 | +0.2 | | | | | | | |
| 44 | 999.963M | 31.0 | -27.5 | +24.5 | +0.6 | +6.3 | +0.0 | 34.9 | 54.0 | -19.1 | Vert |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 45 | 999.956M | 30.1 | -27.5 | +24.5 | +0.6 | +6.3 | +0.0 | 34.0 | 54.0 | -20.0 | Horiz |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | | | | | | | |

Date: 5/13/2014 Time: 14:58:57 SmartLabs, Inc. WO#: 95716
 15.249 Carrier and Spurious Emissions (902-928 MHz Transmitter) Test Distance: 3 Meters Sequence#: 1 Ext
 ATTN: 0 dB



Bandedge



Test Setup Photo(s)



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 $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit.

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. 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.