Automatic Labs

ADDENDUM TEST REPORT TO 94562-8

Link
Model: 1

Tested To The Following Standards:

FCC Part 15 Subpart C 15.249
&
RSS 210 Issue 8

Report No.: 94562-8A

Date of issue: July 5, 2013

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:

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REPORT PREPARED BY:

Joyce Walker
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Project Number: 94562

DATE OF EQUIPMENT RECEIPT: June 14, 2013
DATE(S) OF TESTING: June 14 - 18, 2013

Revision History

Original: Testing of the Link, Model: 1 to FCC Part 15 Subpart C 15.249 and RSS 210 Issue 8.
Addendum A: To add clarification statements regarding 15.31e, test mode firmware and bandedge plots.

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.
1120 Fulton Place
Fremont, CA 94539

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
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

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 / 99% Occupied Bandwidth	FCC Part 15 Subpart C Section 15.247 / RSS 210 Issue 8	Pass
Field Strength of Harmonics / Radiated Spurious Emissions	FCC Part 15 Subpart C Section 15.249(a)(d) / ANSI C63.4 (2003)	Pass
Bandedge	FCC Part 15 Subpart C	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)

EQUIPMENT UNDER TEST

Link
Manuf: Automatic Labs
Model: 1
Serial: 143679

PERIPHERAL DEVICES

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

DC Power Supply
Manuf: TekPower
Model: HY1803D
Serial: 259223

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 Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.31e**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 15:51:20
Equipment: **Link** Sequence#: 1
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Fundamental of the EUT

Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
Middle Frequency: 2.442GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

The EUT is a fixed device, and It is operated at 12VDC directly from DC source such as a car battery. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from the measurement antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.

Test mode firmware installed for testing that modifies frequency based on input voltage

15.31e. According to 15.31e, the RF output power does not change when going down to 85% (10.2V) and up to 115% (13.8V)

15.249(a) RF Power Output

Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 15:51:20
Equipment: **Link** Sequence#: 1
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Fundamental of the EUT

Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa
RBW=VBW=1MHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

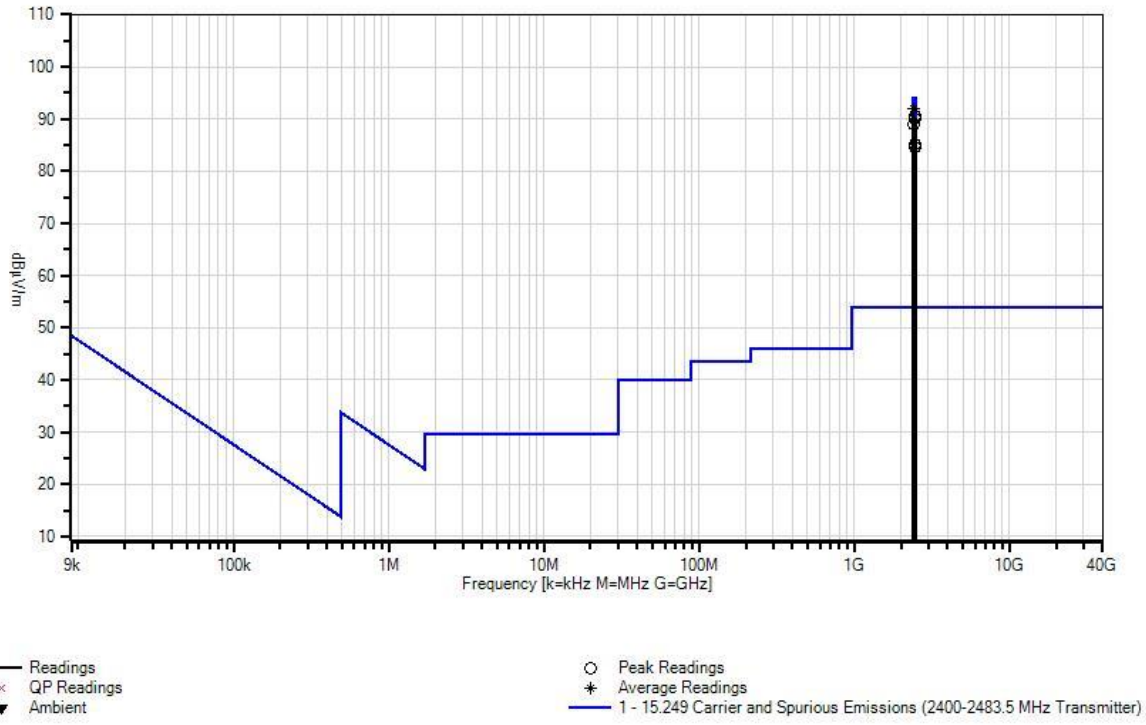
The EUT is a fixed device. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from the measurement antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage

Ext Attn: 0 dB

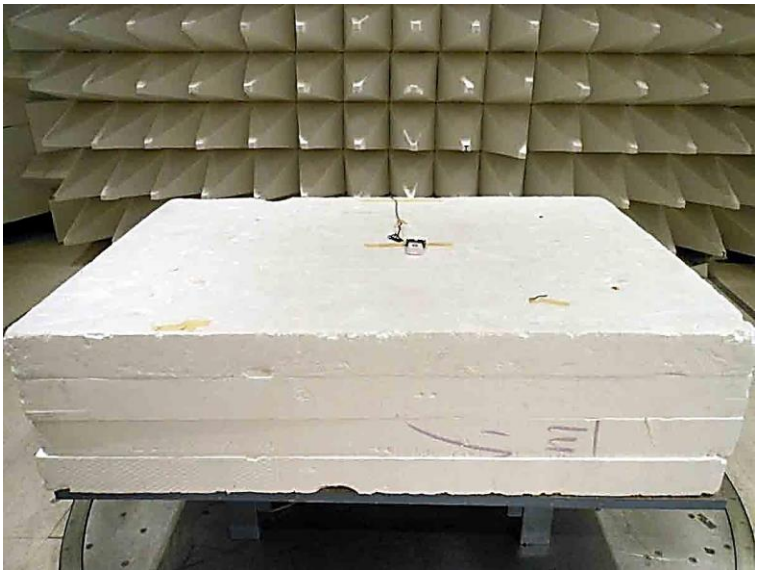
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

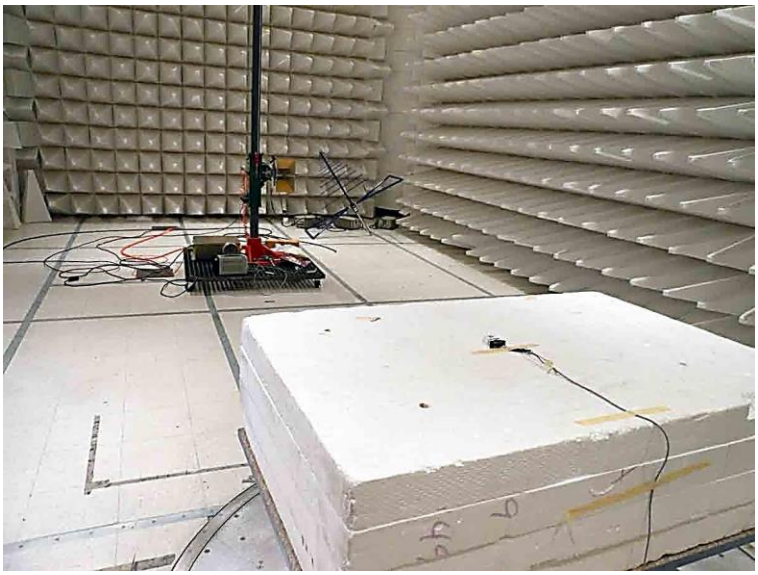
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2401.820M Ave	59.6	+28.6	+1.1	+2.7		+0.0	92.0	94.0 LOW CHANNEL	-2.0	Horiz
^	2401.820M	60.7	+28.6	+1.1	+2.7		+0.0	93.1	94.0 LOW CHANNEL	-0.9	Horiz
3	2441.903M	58.1	+28.7	+1.1	+2.7		+0.0	90.6	94.0 MIDDLE CHANNEL	-3.4	Horiz
4	2480.163M	57.5	+28.9	+1.1	+2.7		+0.0	90.2	94.0 HIGH CHANEL	-3.8	Horiz
5	2401.820M	56.7	+28.6	+1.1	+2.7		+0.0	89.1	94.0 Low Channel	-4.9	Vert
6	2480.163M	52.4	+28.9	+1.1	+2.7		+0.0	85.1	94.0 HIGH CHANNEL	-8.9	Vert
7	2441.903M	52.0	+28.7	+1.1	+2.7		+0.0	84.5	94.0 MIDDLE CHANNEL	-9.5	Vert

CKC Laboratories, Inc Date: 6/14/2013 Time: 15:51:20 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 1



Test Setup Photos





15.249 -20dBc / RSS 210 99% Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **OBW**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 15:51:20
Equipment: **Link** Sequence#: 1
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Fundamental of the EUT

Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test

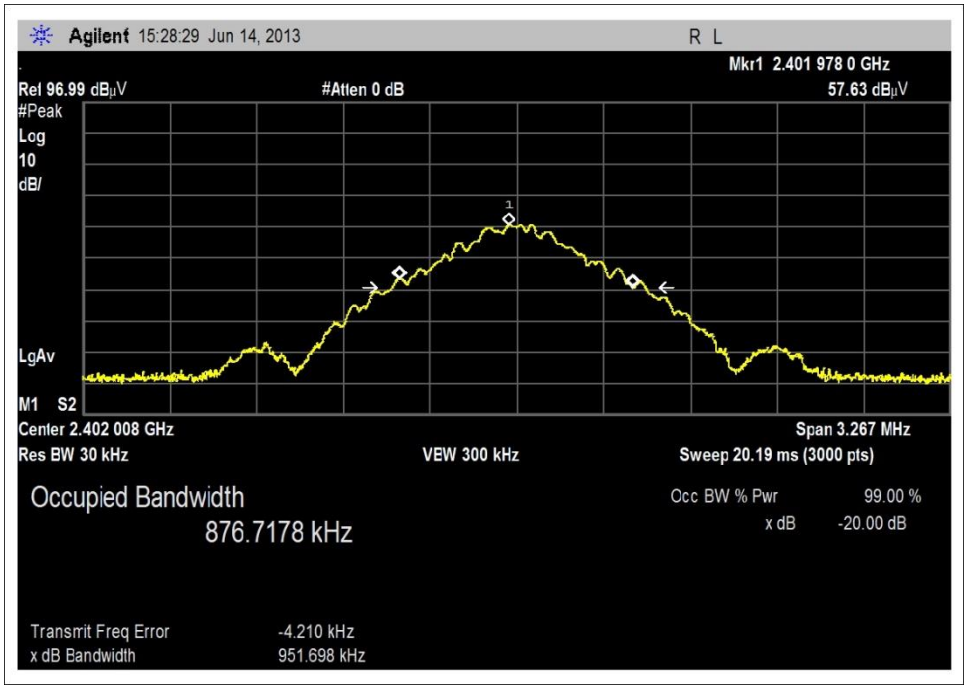
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

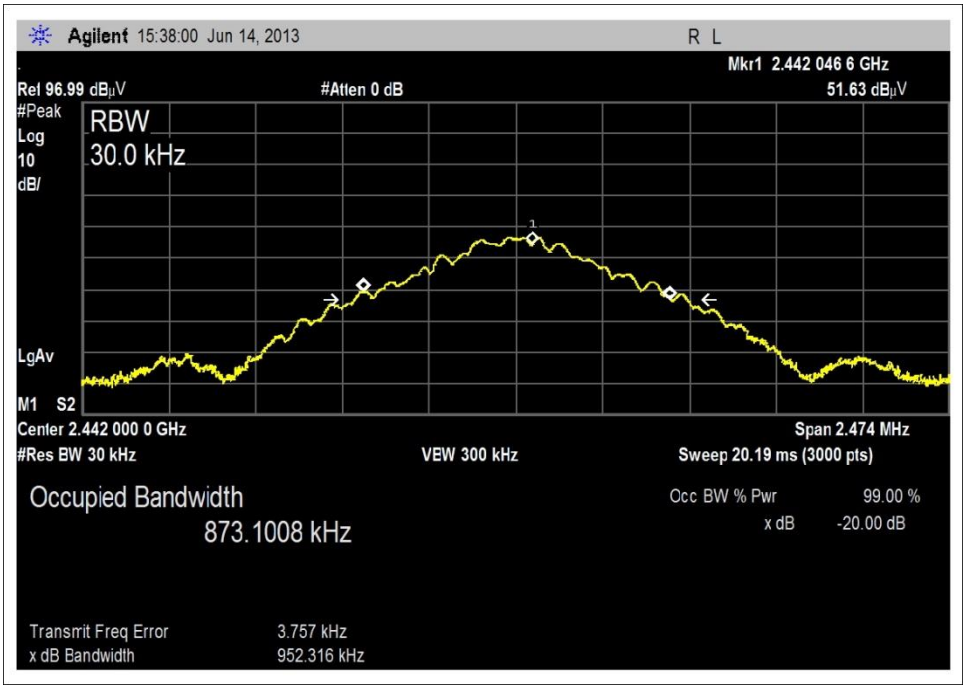
The EUT is a fixed device. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from the measurement antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.

Test mode firmware installed for testing that modifies frequency based on input voltage

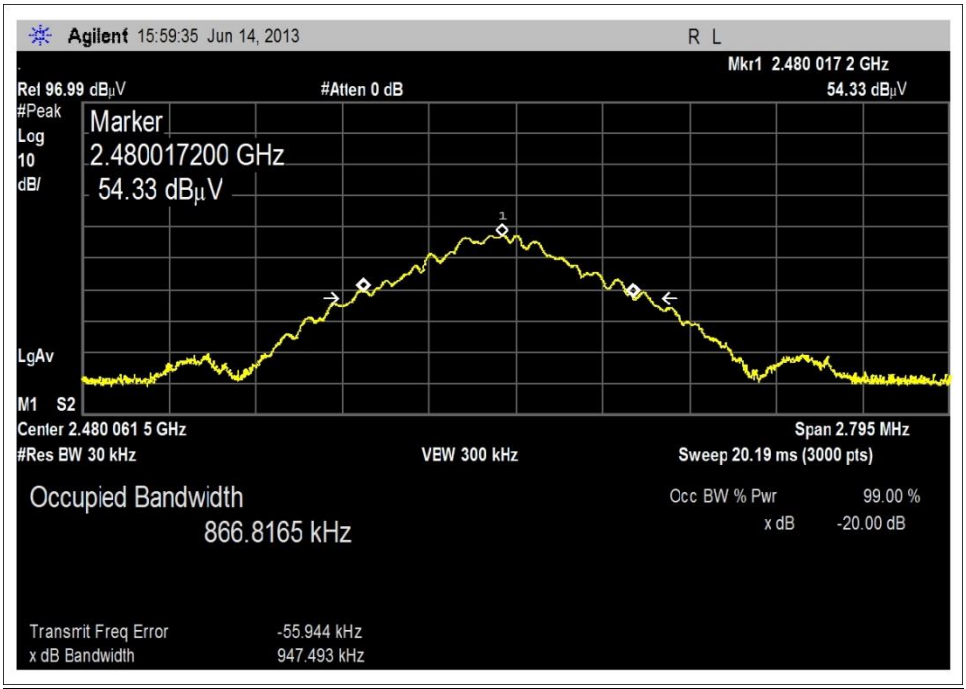
Test Plots



Low Channel



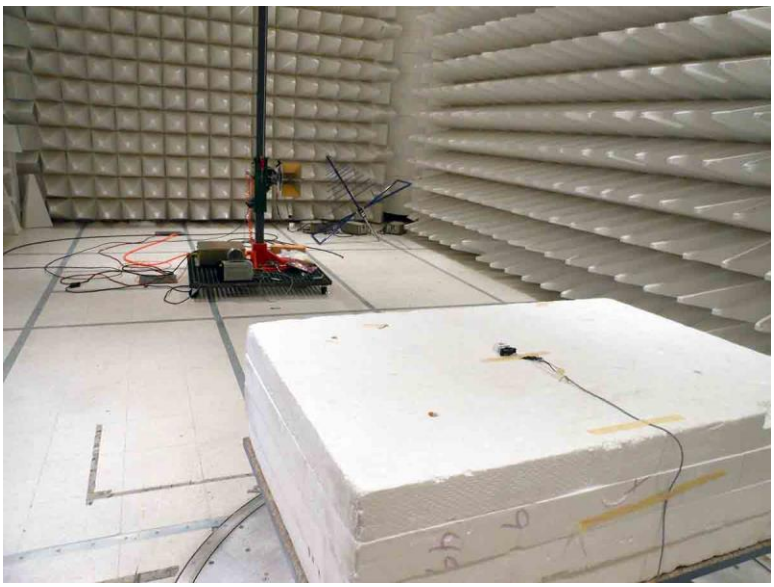
Middle Channel



High Channel

Test Setup Photos

Front Side



Back Side

15.249(a) Field Strength of Harmonics / 15.249(d) Radiated Spurious Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 15:12:19
Equipment: **Link** Sequence#: 46
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 9kHz to 30MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=200Hz from 9kHz to 150kHz
RBW=VBW=9kHz from 150kHz to 30MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

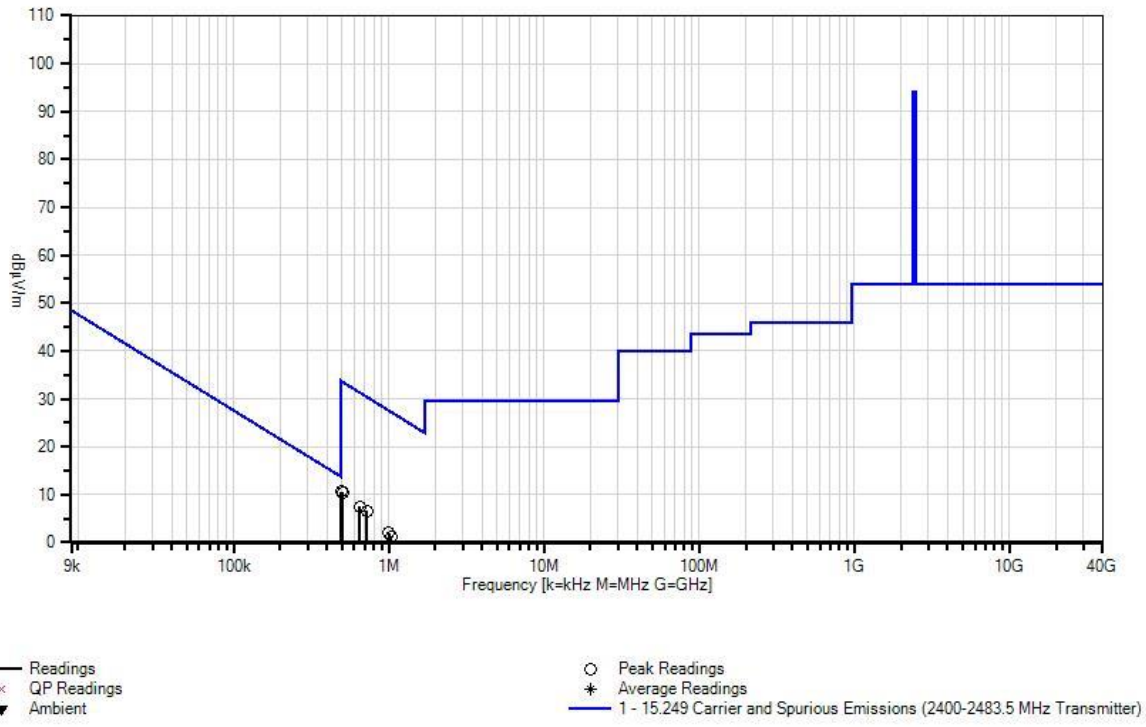
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Low Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	495.424k	40.8	+9.8	+0.1	+0.0		-40.0	10.7	33.7	-23.0	Paral
2	506.311k	40.6	+9.8	+0.1	+0.0		-40.0	10.5	33.5	-23.0	Perpe
3	649.826k	37.5	+9.9	+0.1	+0.0		-40.0	7.5	31.3	-23.8	Perpe
4	720.098k	36.7	+9.8	+0.1	+0.0		-40.0	6.6	30.4	-23.8	Paral
5	1.002M	32.2	+9.7	+0.1	+0.0		-40.0	2.0	27.5	-25.5	Perpe
6	1.037M	31.3	+9.7	+0.1	+0.0		-40.0	1.1	27.2	-26.1	Paral

CKC Laboratories, Inc Date: 6/18/2013 Time: 15:12:19 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 46



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 11:56:06
Equipment: **Link** Sequence#: 31
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 30MHz to 1000MHz

Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=120kHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage

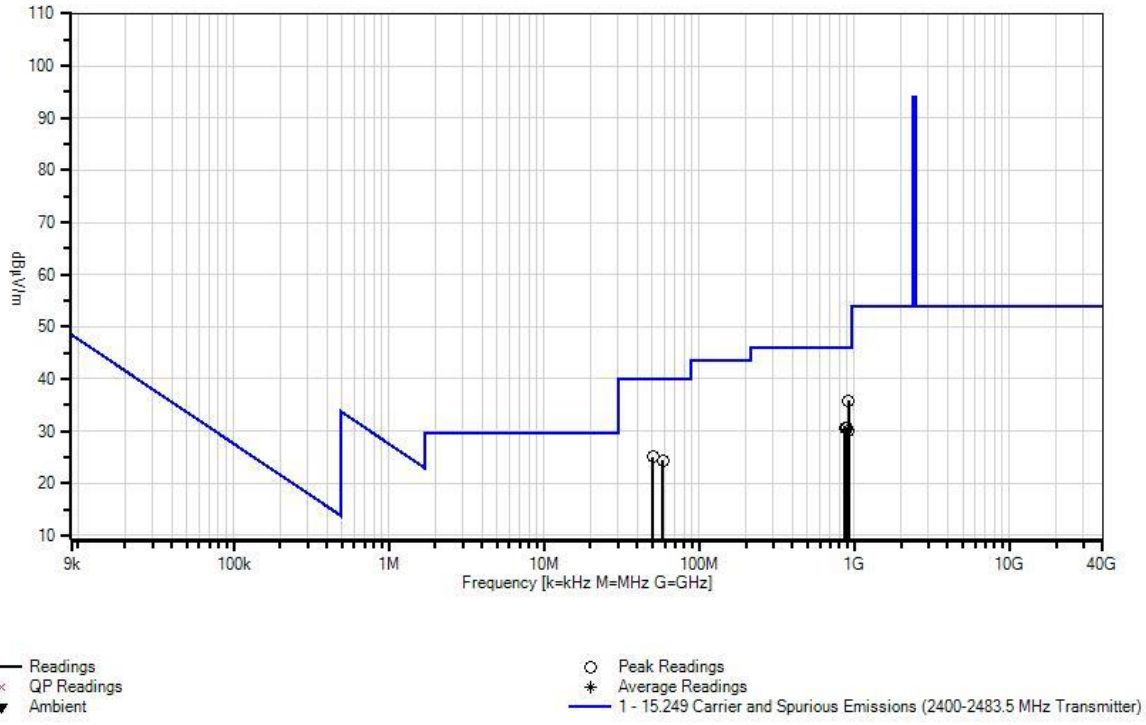
Note: Low Channel

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	915.647M	34.9	-27.1 +0.9	+22.7	+3.5	+0.9	+0.0	35.8	46.0	-10.2	Horiz
2	50.297M	42.3	-27.0 +0.2	+8.8	+0.7	+0.1	+0.0	25.1	40.0	-14.9	Vert
3	874.206M	29.6	-27.0 +0.9	+22.9	+3.4	+0.9	+0.0	30.7	46.0	-15.3	Vert
4	894.987M	29.7	-27.1 +0.9	+22.7	+3.4	+1.0	+0.0	30.6	46.0	-15.4	Horiz
5	58.416M	44.2	-27.1 +0.2	+6.2	+0.7	+0.2	+0.0	24.4	40.0	-15.6	Vert
6	907.359M	28.9	-27.1 +0.9	+23.0	+3.4	+1.0	+0.0	30.1	46.0	-15.9	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 11:56:06 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 31



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 17:36:37
Equipment: **Link** Sequence#: 10
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	6/12/2012	6/12/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 1000MHz to 12000MHz
Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa

RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

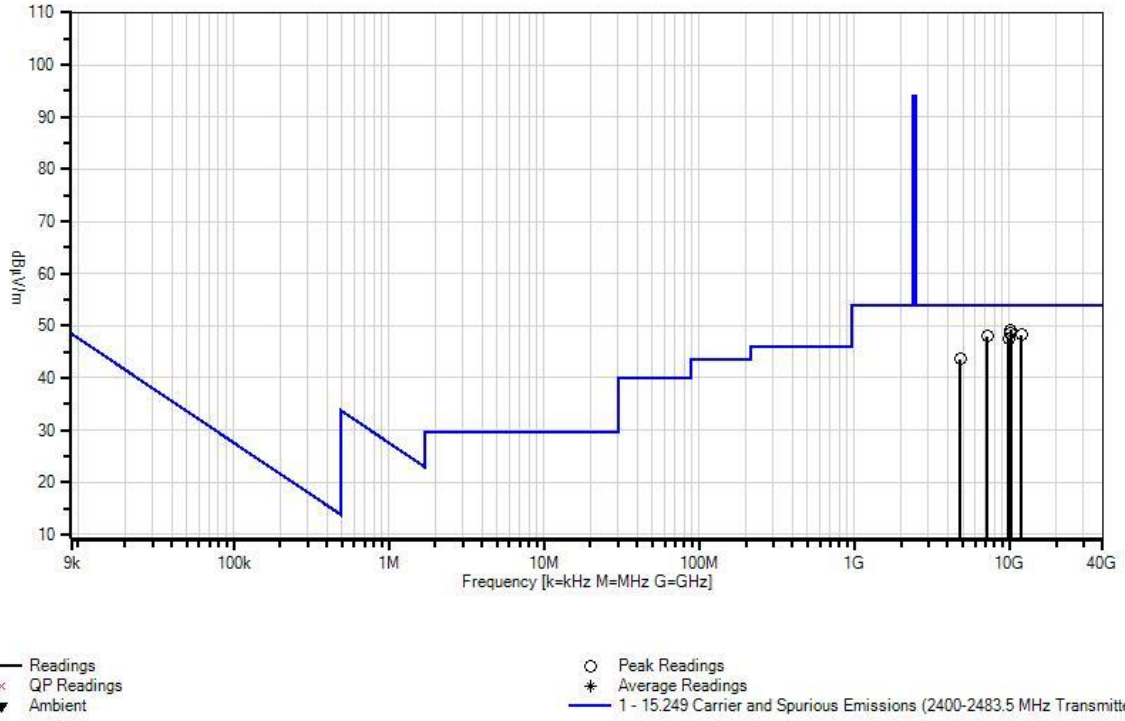
The EUT is a fixed device. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from a measuring antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Low Channel

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	10165.317 M	57.1	+39.7 +2.0	+2.3 +0.1	+6.3	-58.3	+0.0	49.2	54.0	-4.8	Vert
2	10168.832 M	56.4	+39.7 +2.0	+2.3 +0.1	+6.3	-58.3	+0.0	48.5	54.0	-5.5	Horiz
3	11992.971 M	53.5	+39.7 +2.2	+2.4 +0.3	+6.4	-56.2	+0.0	48.3	54.0	-5.7	Vert
4	7205.361M	62.3	+36.1 +1.5	+1.9 +0.2	+5.3	-59.3	+0.0	48.0	54.0	-6.0	Vert
5	9912.257M	55.5	+39.6 +1.8	+2.3 +0.1	+6.3	-58.1	+0.0	47.5	54.0	-6.5	Horiz
6	4804.996M	61.9	+33.2 +1.3	+1.5 +0.2	+3.8	-58.3	+0.0	43.6	54.0	-10.4	Horiz

CKC Laboratories, Inc Date: 6/14/2013 Time: 17:36:37 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 10



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 09:07:35
Equipment: **Link** Sequence#: 13
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANANT-AN02693-20130221	Active Horn Antenna	AMFW-5F-18002650-20-10P	2/21/2013	2/21/2015
T2	ANP00928	Cable	various	2/10/2012	2/10/2014
T3	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T4	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 12000MHz to 18000MHz

Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

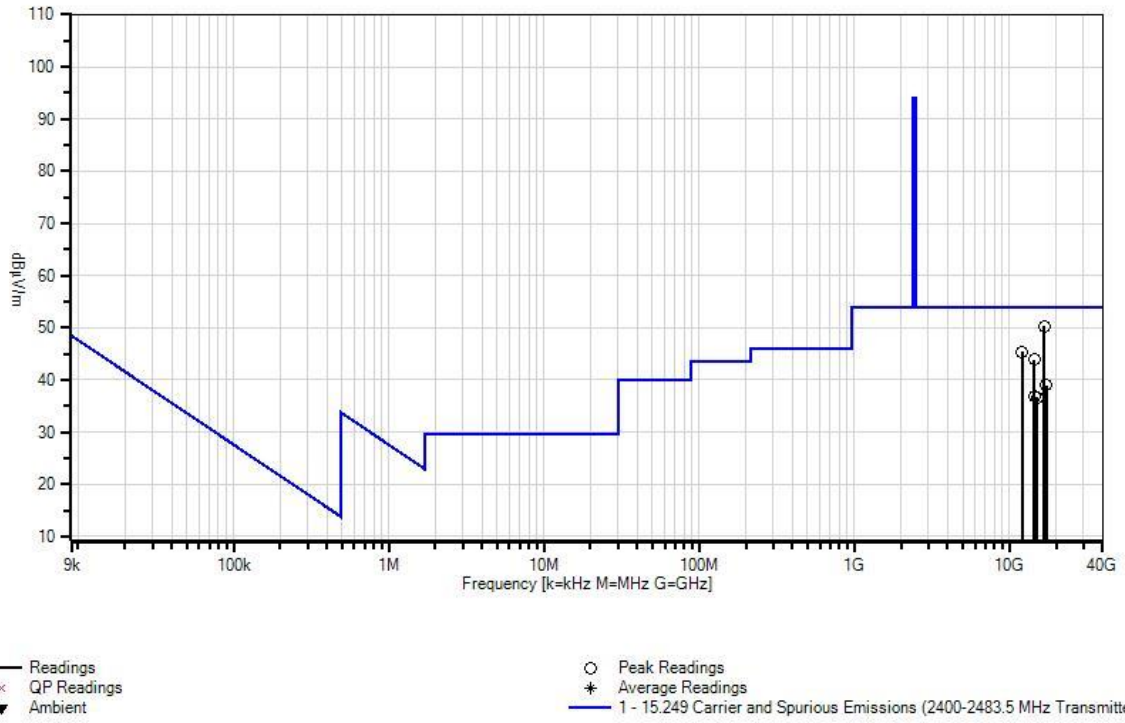
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Low Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	16812.808 M	57.9	-16.0	+0.9	+2.9	+4.6	+0.0	50.3	54.0	-3.7	Vert
2	12011.011 M	52.8	-14.7	+1.0	+2.4	+3.9	+0.0	45.4	54.0	-8.6	Vert
3	14411.409 M	51.4	-15.5	+0.9	+2.8	+4.3	+0.0	43.9	54.0	-10.1	Vert
4	17275.640 M	45.0	-14.6	+0.8	+3.1	+4.7	+0.0	39.0	54.0	-15.0	Horiz
5	14449.447 M	44.3	-15.5	+0.9	+2.9	+4.3	+0.0	36.9	54.0	-17.1	Horiz
6	15119.116 M	43.9	-15.5	+1.0	+3.0	+4.3	+0.0	36.7	54.0	-17.3	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 09:07:35 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 13



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 11:16:01
Equipment: **Link** Sequence#: 28
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T2	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T3	AN02694	Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	2/4/2013	2/4/2015
T4	ANP00929	Cable	various	2/16/2012	2/16/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 18000MHz to 25000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

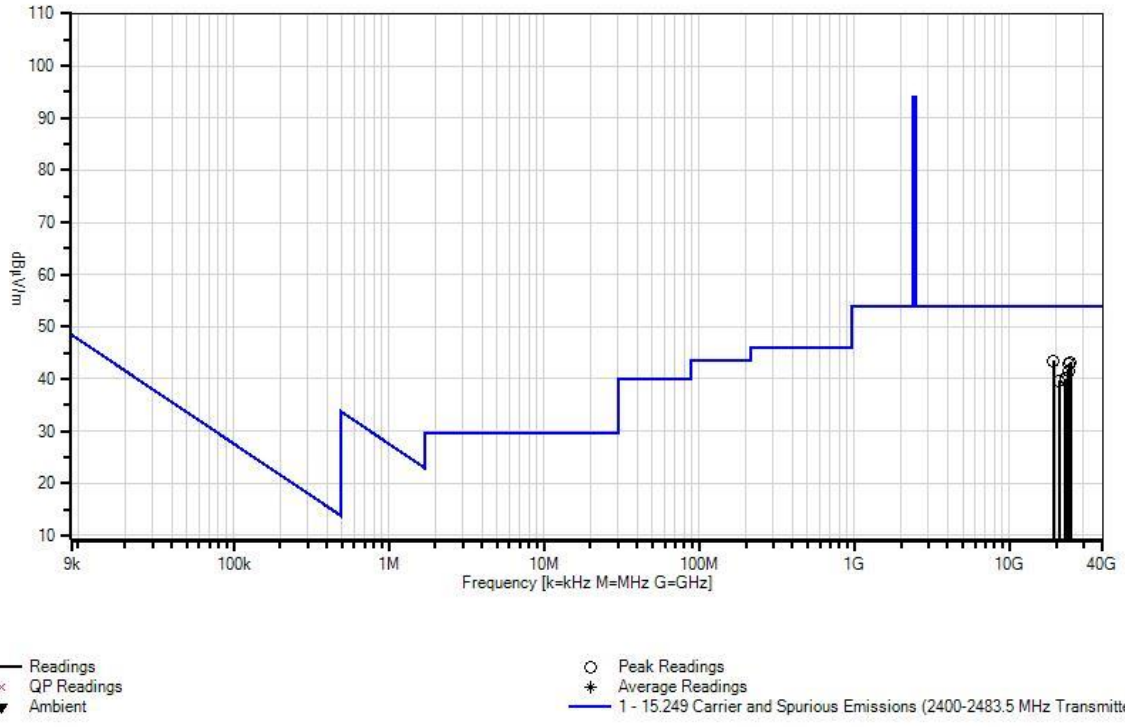
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Low Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	19217.127 M	48.1	+3.6	+4.9	-16.5	+3.3	+0.0	43.4	54.0	-10.6	Vert
2	24865.965 M	47.3	+4.3	+5.6	-16.9	+2.9	+0.0	43.2	54.0	-10.8	Horiz
3	24306.172 M	47.4	+4.5	+5.5	-17.4	+2.9	+0.0	42.9	54.0	-11.1	Vert
4	23992.766 M	46.1	+4.4	+5.5	-17.5	+3.0	+0.0	41.5	54.0	-12.5	Horiz
5	23036.781 M	45.2	+4.3	+5.4	-17.8	+2.9	+0.0	40.0	54.0	-14.0	Vert
6	20860.298 M	44.2	+4.2	+5.1	-17.0	+3.1	+0.0	39.6	54.0	-14.4	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 11:16:01 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 28



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 14:55:44
Equipment: **Link** Sequence#: 43
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 9kHz to 30MHz

Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=200Hz from 9kHz to 150kHz
RBW=VBW=9kHz from 150kHz to 30MHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

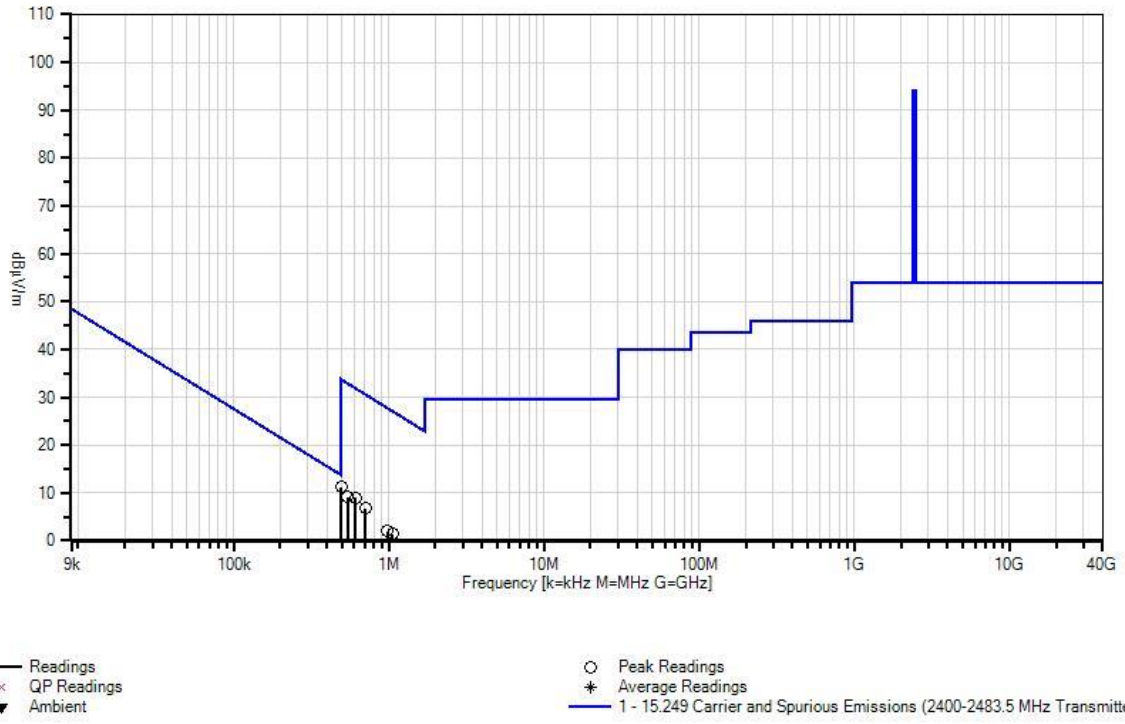
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Middle Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	492.455k	41.3	+9.8	+0.1	+0.0		-40.0	11.2	33.8	-22.6	Perpe
2	611.225k	39.1	+9.8	+0.1	+0.0		-40.0	9.0	31.9	-22.9	Paral
3	541.943k	39.3	+9.8	+0.1	+0.0		-40.0	9.2	32.9	-23.7	Paral
4	710.201k	36.8	+9.8	+0.1	+0.0		-40.0	6.7	30.6	-23.9	Paral
5	1.054M	31.6	+9.7	+0.1	+0.0		-40.0	1.4	27.1	-25.7	Perpe
6	980.404k	32.2	+9.7	+0.1	+0.0		-40.0	2.0	27.7	-25.7	Perpe

CKC Laboratories, Inc Date: 6/18/2013 Time: 14:55:44 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 43



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 13:33:44
Equipment: **Link** Sequence#: 34
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 30MHz to 1000MHz

Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa

RBW=VBW=120kHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

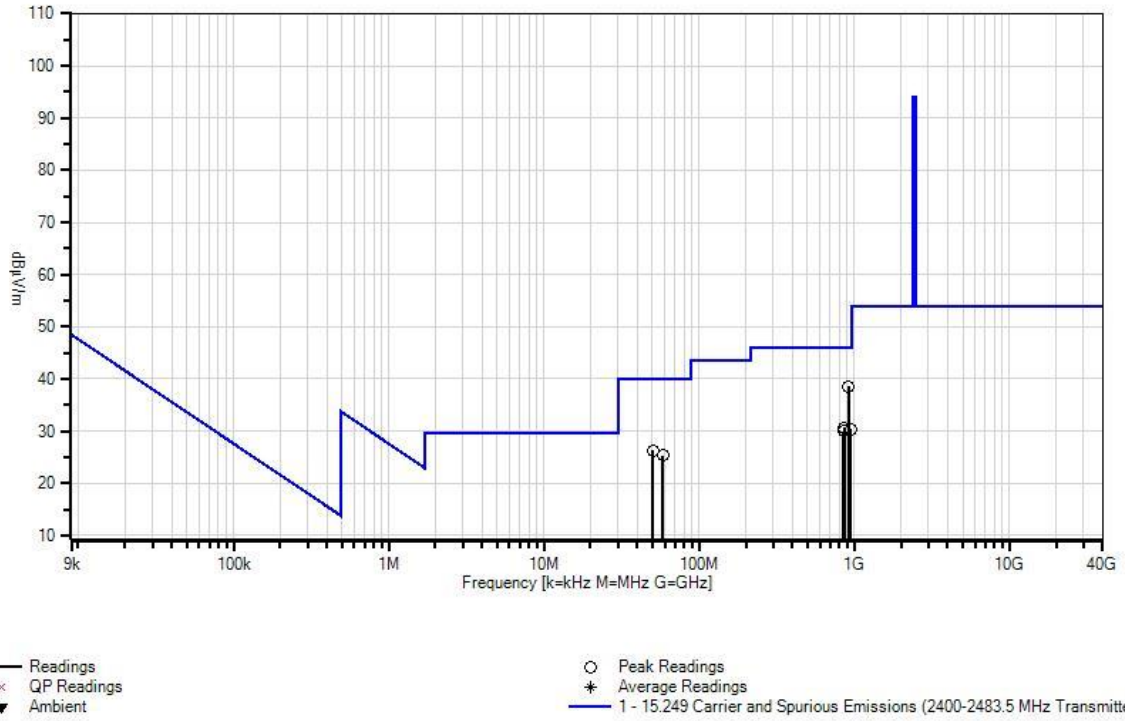
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Middle Channel

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	916.368M	37.7	-27.1 +0.9	+22.7	+3.5	+0.9	+0.0	38.6	46.0	-7.4	Vert
2	50.497M	43.6	-27.0 +0.2	+8.7	+0.7	+0.1	+0.0	26.3	40.0	-13.7	Vert
3	58.283M	45.0	-27.1 +0.2	+6.3	+0.7	+0.2	+0.0	25.3	40.0	-14.7	Vert
4	861.593M	29.5	-27.0 +0.9	+22.9	+3.3	+1.0	+0.0	30.6	46.0	-15.4	Horiz
5	948.722M	28.5	-27.1 +0.9	+23.5	+3.5	+1.0	+0.0	30.3	46.0	-15.7	Horiz
6	850.903M	29.5	-26.9 +0.9	+22.2	+3.3	+0.9	+0.0	29.9	46.0	-16.1	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 13:33:44 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 34



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 17:20:20
Equipment: **Link** Sequence#: 7
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	6/12/2012	6/12/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 1000MHz to 12000MHz
Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

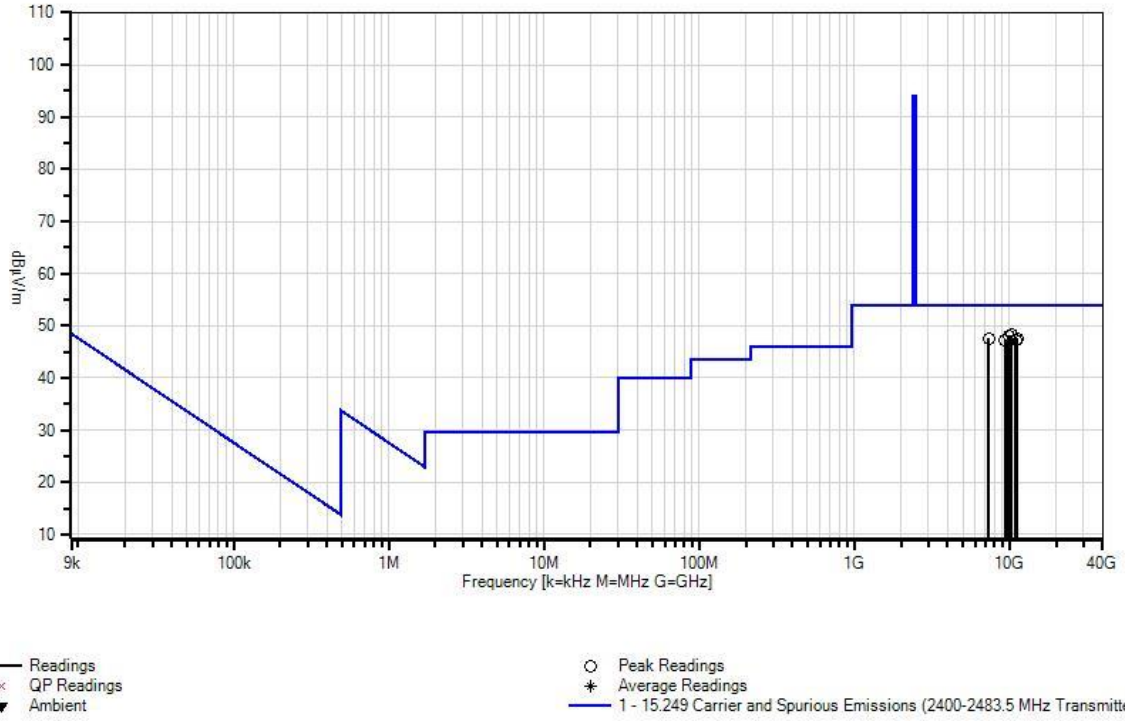
The EUT is a fixed device. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from a measuring antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Middle Channel

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	10263.729 M	56.4	+39.6 +2.0	+2.3 +0.1	+6.2	-58.4	+0.0	48.2	54.0	-5.8	Vert
2	9824.389M	55.9	+39.4 +1.7	+2.3 +0.1	+6.2	-57.7	+0.0	47.9	54.0	-6.1	Horiz
3	7324.655M	61.3	+36.6 +1.5	+1.9 +0.2	+5.4	-59.3	+0.0	47.6	54.0	-6.4	Horiz
4	11163.497 M	55.1	+38.9 +2.1	+2.3 +0.2	+6.2	-57.3	+0.0	47.5	54.0	-6.5	Horiz
5	10945.584 M	55.7	+38.7 +2.1	+2.3 +0.2	+6.1	-57.8	+0.0	47.3	54.0	-6.7	Vert
6	9328.814M	55.4	+38.4 +1.7	+2.2 +0.4	+6.2	-57.2	+0.0	47.1	54.0	-6.9	Vert

CKC Laboratories, Inc Date: 6/14/2013 Time: 17:20:20 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 7



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 10:04:30
Equipment: **Link** Sequence#: 16
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANANT-AN02693-20130221	Active Horn Antenna	AMFW-5F-18002650-20-10P	2/21/2013	2/21/2015
T2	ANP00928	Cable	various	2/10/2012	2/10/2014
T3	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T4	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 12000MHz to 18000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

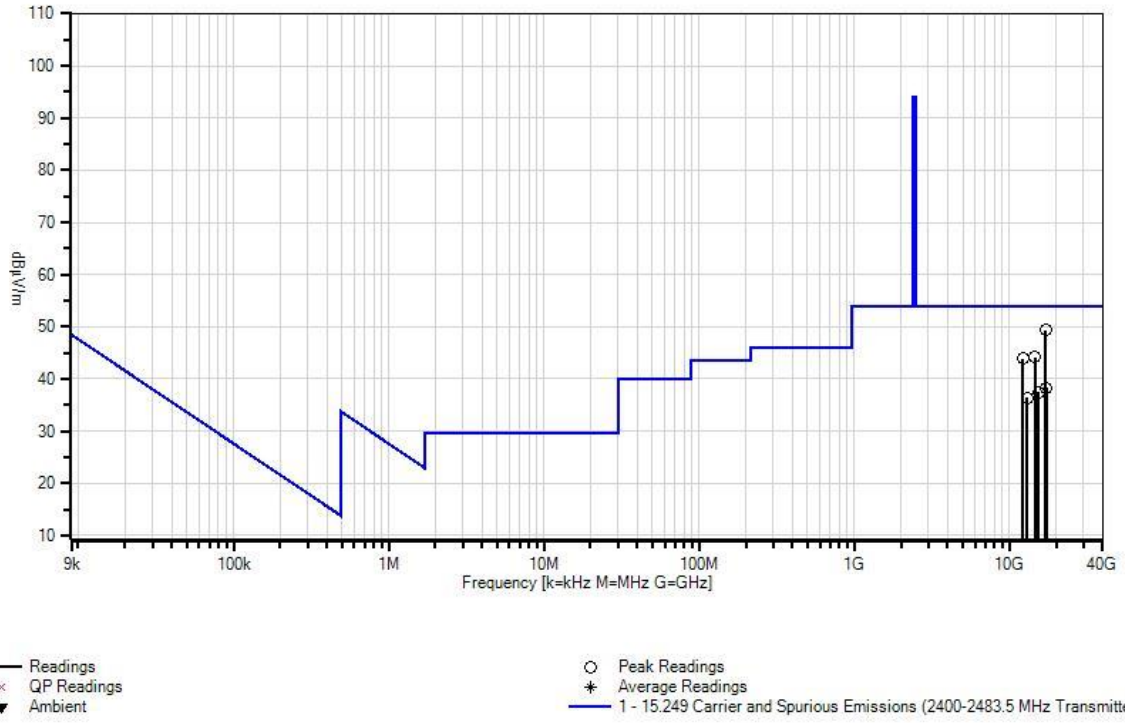
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Middle Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	17092.560 M	56.1	-15.4	+0.9	+3.0	+4.7	+0.0	49.3	54.0	-4.7	Vert
2	14652.650 M	51.4	-15.4	+0.9	+2.9	+4.3	+0.0	44.1	54.0	-9.9	Vert
3	12209.209 M	51.9	-15.3	+1.0	+2.4	+3.9	+0.0	43.9	54.0	-10.1	Vert
4	17287.580 M	44.4	-14.6	+0.8	+3.0	+4.7	+0.0	38.3	54.0	-15.7	Horiz
5	15420.417 M	44.8	-15.8	+1.0	+3.1	+4.4	+0.0	37.5	54.0	-16.5	Horiz
6	13051.050 M	44.7	-16.0	+0.9	+2.6	+4.1	+0.0	36.3	54.0	-17.7	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 10:04:30 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 16



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 11:02:24
Equipment: **Link** Sequence#: 25
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T2	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T3	AN02694	Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	2/4/2013	2/4/2015
T4	ANP00929	Cable	various	2/16/2012	2/16/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 18000MHz to 25000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

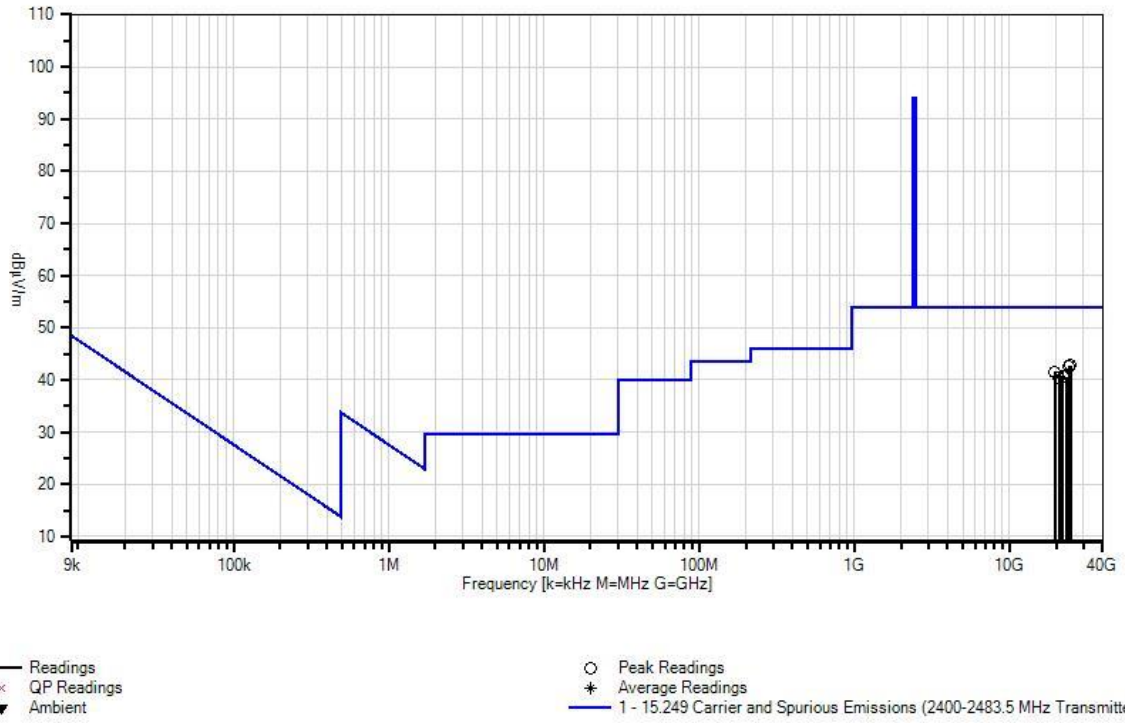
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: Middle Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	24848.225 M	46.9	+4.3	+5.6	-16.9	+2.9	+0.0	42.8	54.0	-11.2	Horiz
2	24148.483 M	47.3	+4.4	+5.5	-17.5	+2.9	+0.0	42.6	54.0	-11.4	Vert
3	19537.586 M	46.2	+3.7	+4.9	-16.6	+3.3	+0.0	41.5	54.0	-12.5	Vert
4	22048.422 M	45.6	+4.4	+5.3	-17.4	+2.9	+0.0	40.8	54.0	-13.2	Horiz
5	23261.487 M	45.7	+4.4	+5.4	-17.8	+2.9	+0.0	40.6	54.0	-13.4	Vert
6	20975.703 M	45.0	+4.2	+5.1	-17.0	+3.1	+0.0	40.4	54.0	-13.6	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 11:02:24 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 25



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 14:31:13
Equipment: **Link** Sequence#: 40
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 9kHz to 30MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=200Hz from 9kHz to 150kHz
RBW=VBW=9kHz from 150kHz to 30MHz

High Clock: 40MHz
Software Used: FCC test

Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

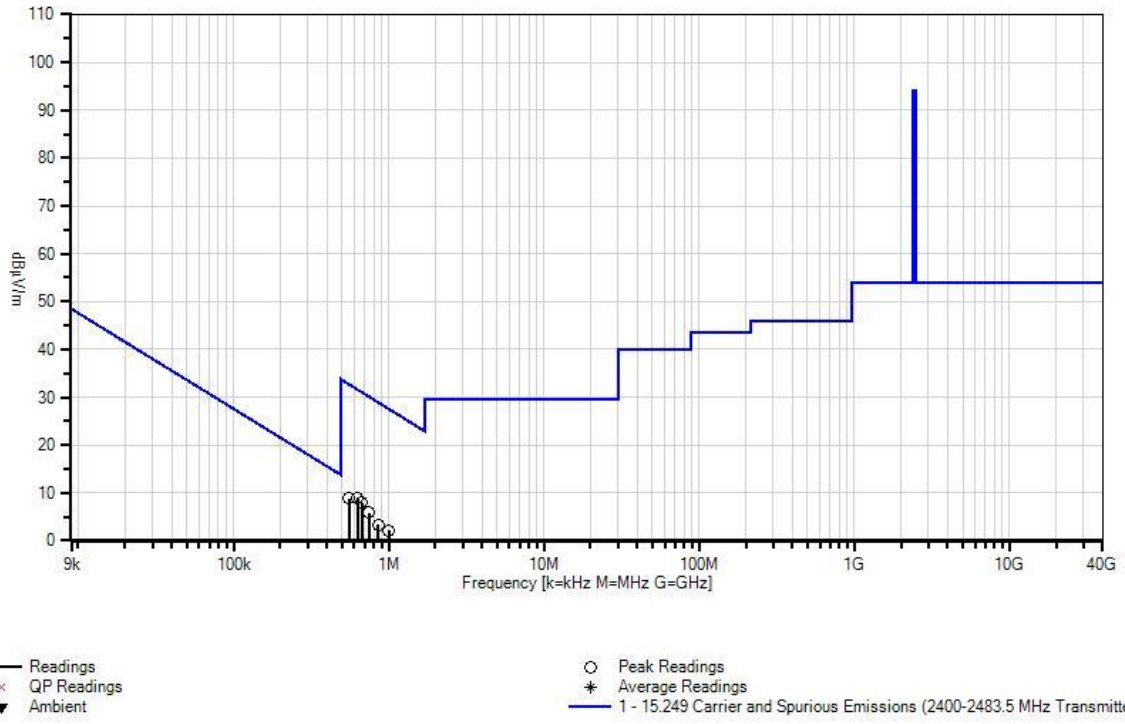
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: High Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	632.010k	39.0	+9.8	+0.1	+0.0		-40.0	8.9	31.6	-22.7	Perpe
2	672.676k	37.9	+9.9	+0.1	+0.0		-40.0	7.9	31.0	-23.1	Paral
3	557.779k	39.0	+9.8	+0.1	+0.0		-40.0	8.9	32.7	-23.8	Perpe
4	746.822k	36.1	+9.7	+0.1	+0.0		-40.0	5.9	30.1	-24.2	Perpe
5	1.001M	32.3	+9.7	+0.1	+0.0		-40.0	2.1	27.6	-25.5	Paral
6	852.476k	33.7	+9.5	+0.1	+0.0		-40.0	3.3	29.0	-25.7	Paral

CKC Laboratories, Inc Date: 6/18/2013 Time: 14:31:13 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 40



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 13:58:57
Equipment: **Link** Sequence#: 37
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 30MHz to 1000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=120kHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ

RF output power: 2dBm

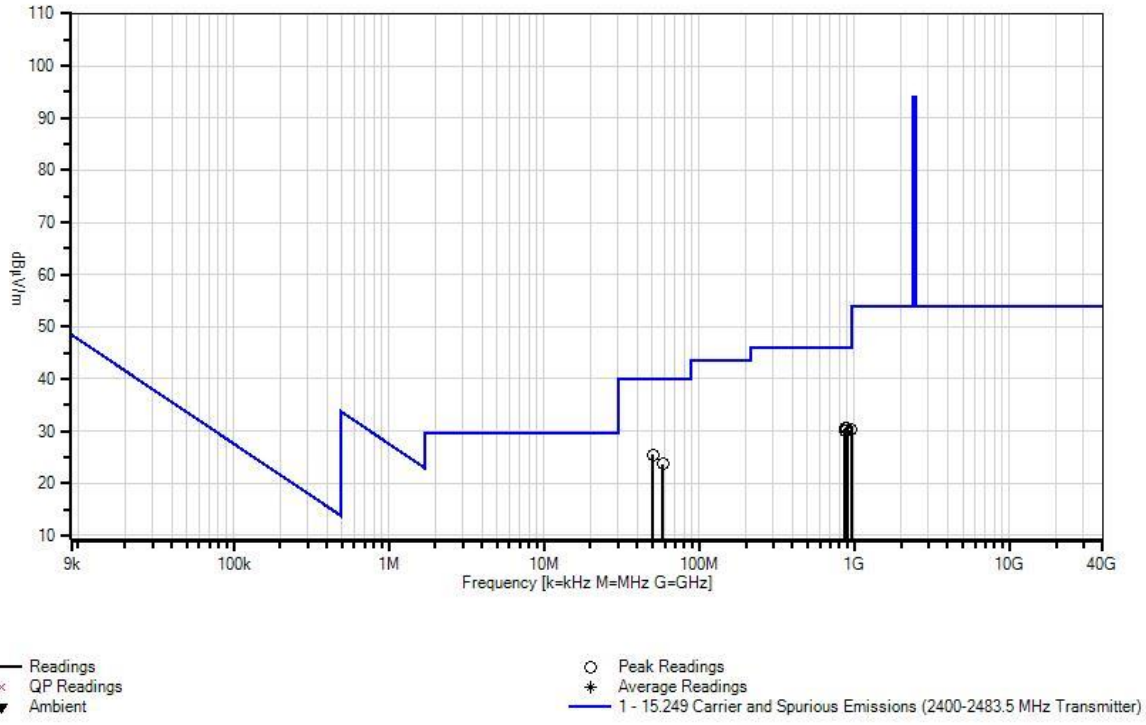
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: High Channel

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	50.364M	42.7	-27.0 +0.2	+8.8	+0.7	+0.1	+0.0	25.5	40.0	-14.5	Vert
2	900.632M	29.5	-27.1 +0.9	+23.0	+3.4	+1.0	+0.0	30.7	46.0	-15.3	Horiz
3	872.284M	29.3	-27.0 +0.9	+23.0	+3.4	+0.9	+0.0	30.5	46.0	-15.5	Horiz
4	956.047M	28.5	-27.1 +0.9	+23.5	+3.5	+1.0	+0.0	30.3	46.0	-15.7	Vert
5	866.999M	28.9	-27.0 +0.9	+22.9	+3.4	+0.9	+0.0	30.0	46.0	-16.0	Horiz
6	58.217M	43.4	-27.1 +0.2	+6.3	+0.7	+0.2	+0.0	23.7	40.0	-16.3	Vert

CKC Laboratories, Inc Date: 6/18/2013 Time: 13:58:57 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 37



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 16:52:12
Equipment: **Link** Sequence#: 4
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T4	AN03114	Preamp	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN03309	High Pass Filter	11SH10-3000/T10000-O/O	6/12/2012	6/12/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 1000MHz to 12000MHz
Temperature: 21.1°C
Humidity: 40%
Atmospheric Pressure: 101.1 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

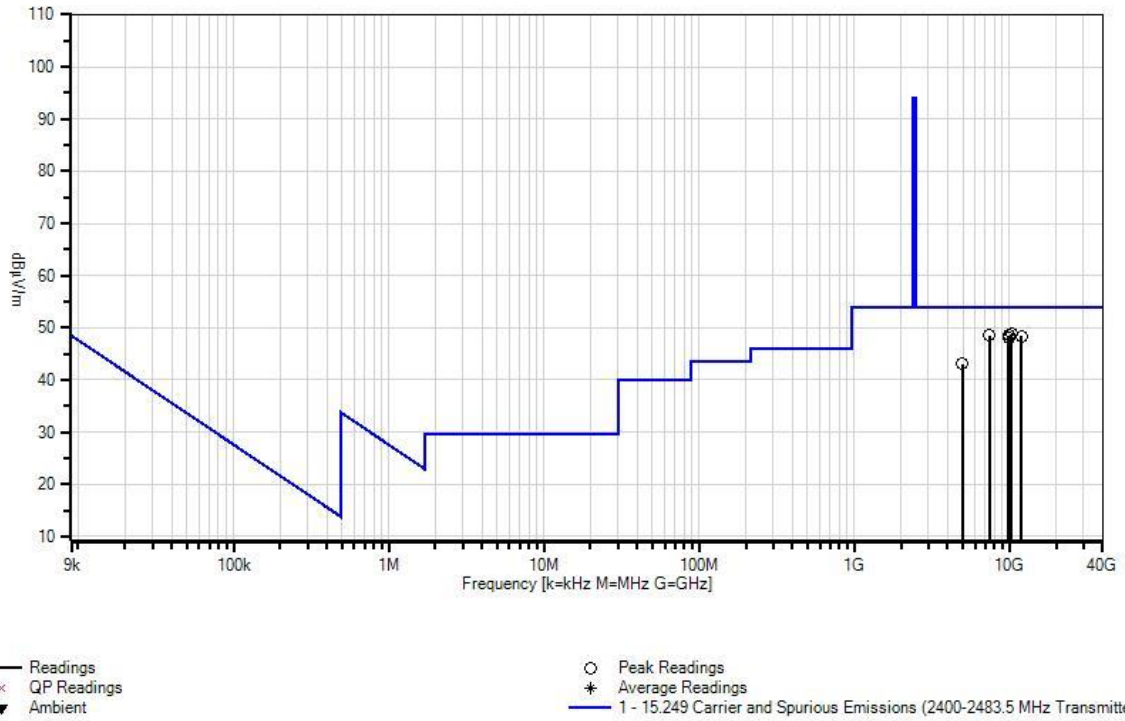
The EUT is a fixed device. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from a measuring antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: High Channel

Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	10257.250 M	57.0	+39.6 +2.0	+2.3 +0.1	+6.2	-58.4	+0.0	48.8	54.0	-5.2	Vert
2	7440.436M	62.0	+36.8 +1.5	+1.9 +0.2	+5.4	-59.3	+0.0	48.5	54.0	-5.5	Horiz
3	9918.912M	56.6	+39.6 +1.8	+2.3 +0.1	+6.3	-58.2	+0.0	48.5	54.0	-5.5	Vert
4	11938.496 M	53.6	+39.7 +2.2	+2.4 +0.3	+6.4	-56.2	+0.0	48.4	54.0	-5.6	Vert
5	9934.928M	56.2	+39.6 +1.8	+2.3 +0.1	+6.3	-58.2	+0.0	48.1	54.0	-5.9	Horiz
6	4959.958M	60.5	+33.6 +1.2	+1.6 +0.2	+3.9	-57.9	+0.0	43.1	54.0	-10.9	Horiz

CKC Laboratories, Inc Date: 6/14/2013 Time: 16:52:12 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 4



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 10:20:26
Equipment: **Link** Sequence#: 19
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANANT-AN02693-20130221	Active Horn Antenna	AMFW-5F-18002650-20-10P	2/21/2013	2/21/2015
T2	ANP00928	Cable	various	2/10/2012	2/10/2014
T3	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T4	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 12000MHz to 18000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

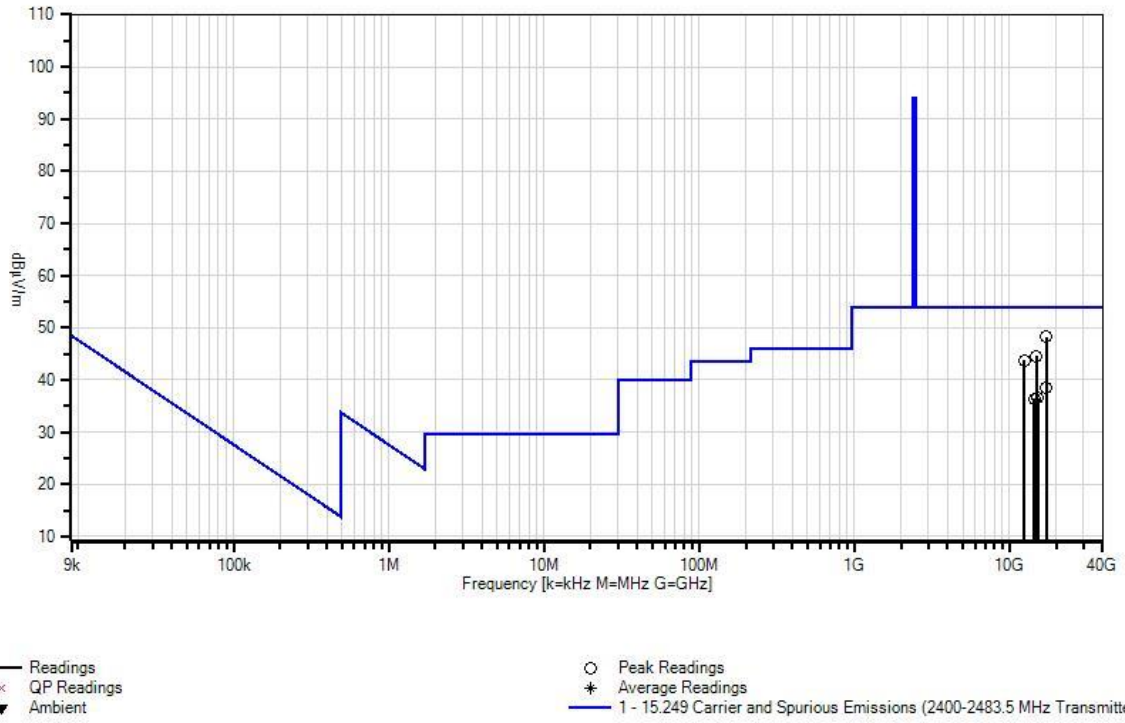
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: High Channel

Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	17359.220 M	54.4	-14.6	+0.8	+3.0	+4.7	+0.0	48.3	54.0	-5.7	Vert
2	14878.876 M	51.7	-15.4	+0.9	+3.0	+4.3	+0.0	44.5	54.0	-9.5	Vert
3	12399.399 M	51.7	-15.3	+0.9	+2.5	+4.0	+0.0	43.8	54.0	-10.2	Horiz
4	17258.725 M	44.7	-14.7	+0.8	+3.1	+4.7	+0.0	38.6	54.0	-15.4	Horiz
5	15284.281 M	43.6	-15.6	+1.0	+3.1	+4.4	+0.0	36.5	54.0	-17.5	Vert
6	14432.430 M	43.7	-15.5	+0.9	+2.9	+4.3	+0.0	36.3	54.0	-17.7	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 10:20:26 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 19



Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **94562** Date: 6/18/2013
Test Type: **Radiated Scan** Time: 10:48:13
Equipment: **Link** Sequence#: 22
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06125	Cable	32022-29094K-29094K-72TC	5/6/2013	5/6/2015
T2	ANP06126	Cable	32022-29094K-29094K-168TC	9/7/2011	9/7/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T3	AN02694	Horn Antenna-ANSI C63.5 Antenna Factors (dB)	AMFW-5F-18002650-20-10P	2/4/2013	2/4/2015
T4	ANP00929	Cable	various	2/16/2012	2/16/2014

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

Test Conditions / Notes:

Radiated Spurious Emission
Frequency Range: 18000MHz to 25000MHz
Temperature: 21.6°C
Humidity: 45%
Atmospheric Pressure: 101.5 kPa
RBW=VBW=1MHz
High Clock: 40MHz
Software Used: FCC test
Transmitter operating frequency: 2.4GHz
Number of Channel: 40
Low Frequency: 2.402GHz
High Frequency: 2.480GHZ
RF output power: 2dBm

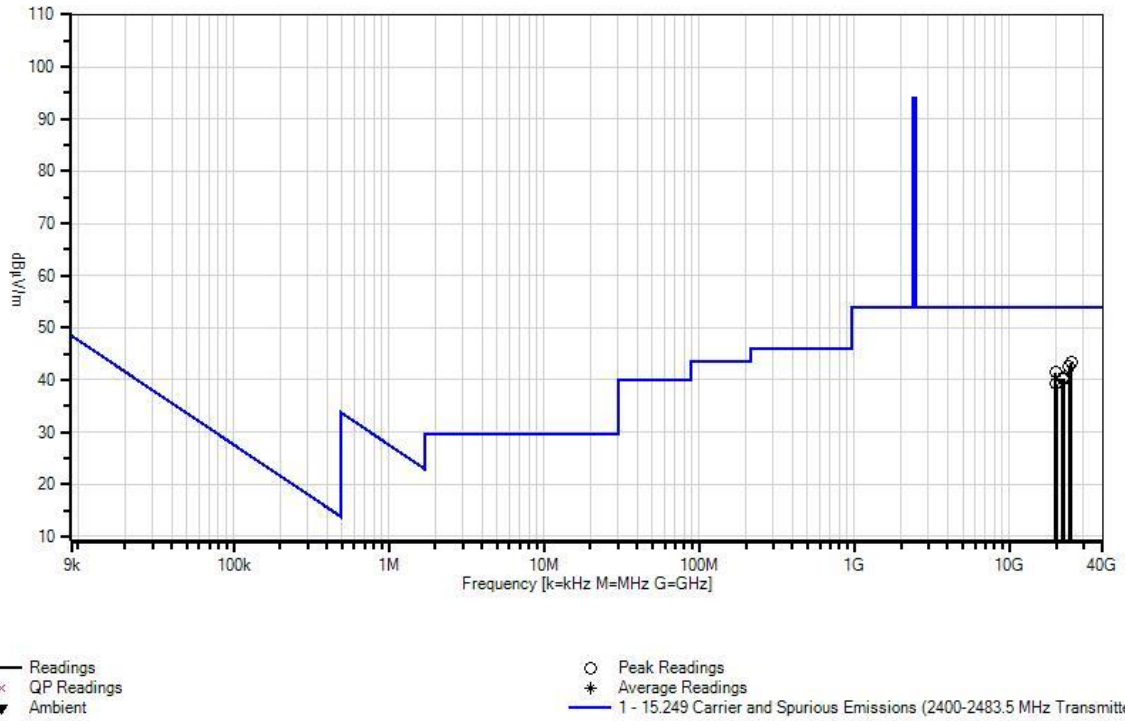
The EUT is a fixed device. It is placed on the 80 cm table and at the center of a turning table and 3meters away from the antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT.
Test mode firmware installed for testing that modifies frequency based on input voltage
Note: High Channel

Ext Attn: 0 dB

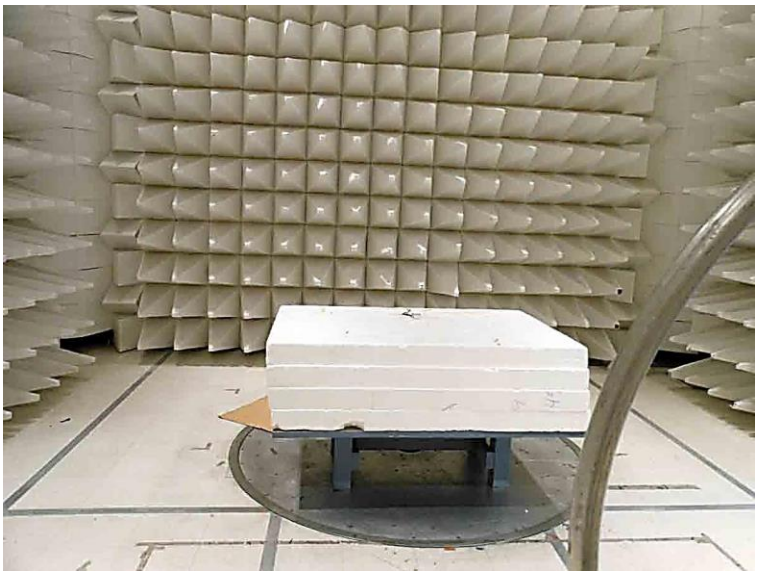
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	24994.087 M	47.4	+4.2	+5.6	-16.8	+2.9	+0.0	43.3	54.0	-10.7	Vert
2	24221.414 M	47.3	+4.4	+5.5	-17.5	+3.0	+0.0	42.7	54.0	-11.3	Horiz
3	19838.378 M	46.2	+3.8	+4.9	-16.7	+3.2	+0.0	41.4	54.0	-12.6	Vert
4	22320.776 M	45.3	+4.3	+5.3	-17.5	+2.9	+0.0	40.3	54.0	-13.7	Vert
5	22144.654 M	45.0	+4.4	+5.3	-17.4	+2.9	+0.0	40.2	54.0	-13.8	Horiz
6	20100.967 M	43.9	+3.9	+5.0	-16.8	+3.2	+0.0	39.2	54.0	-14.8	Horiz

CKC Laboratories, Inc Date: 6/18/2013 Time: 10:48:13 Automatic Labs WO#: 94562
Test Distance: 3 Meters Sequence#: 22

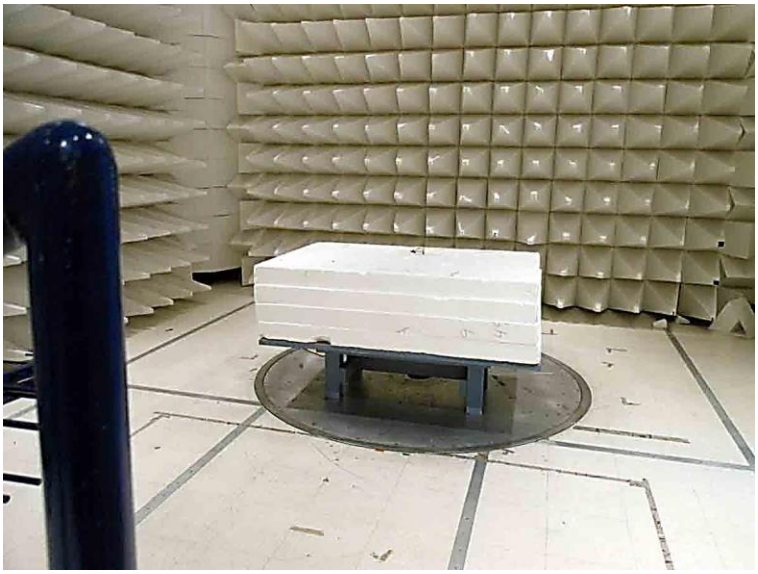


Test Setup Photos

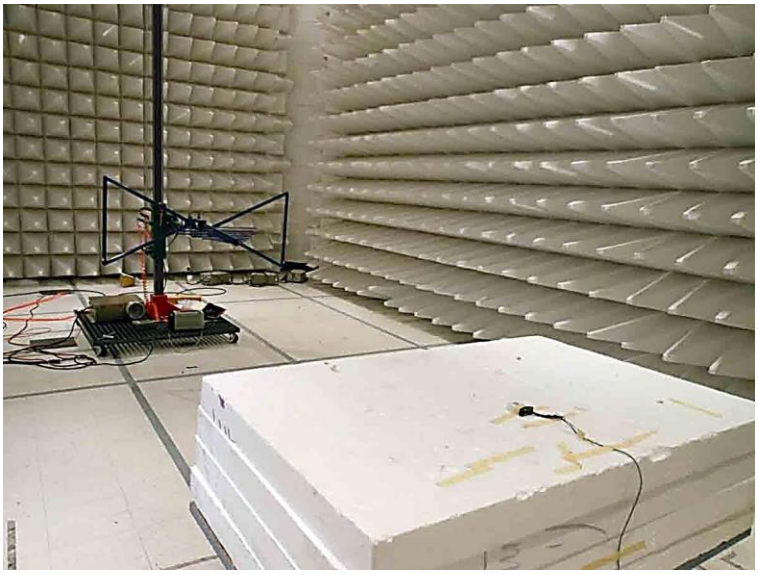


9kHz - 30MHz

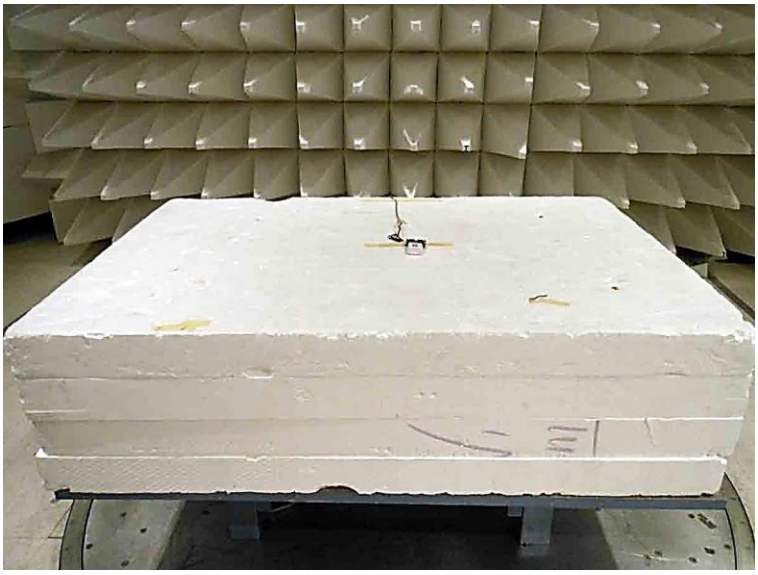
9kHz - 30MHz



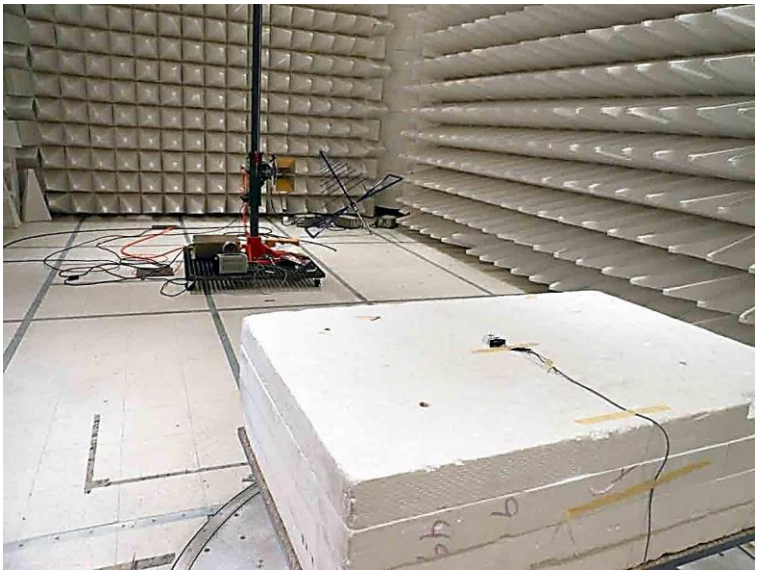
30 - 1000MHz



30 - 1000MHz

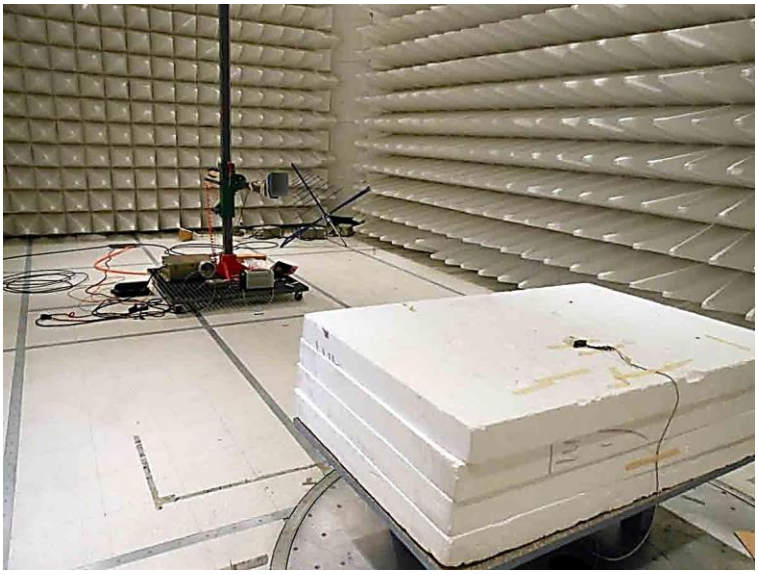


1000MHz - 12000MHz

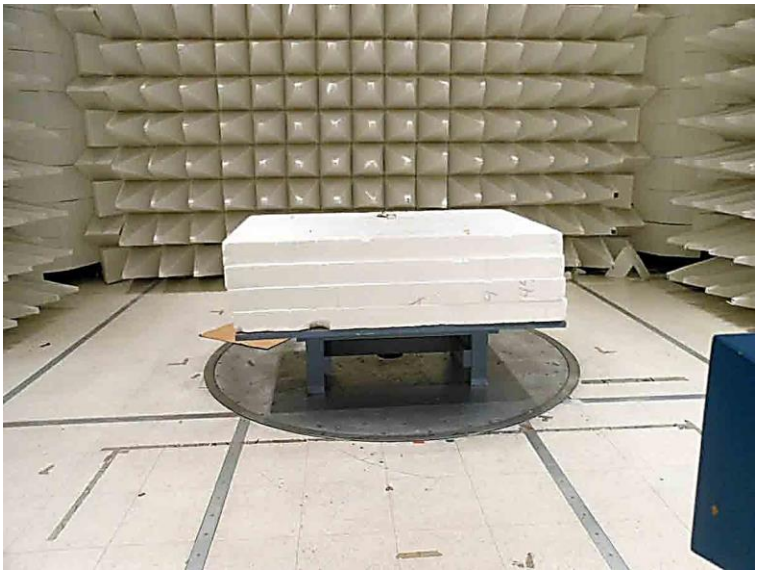


1000MHz - 12000MHz

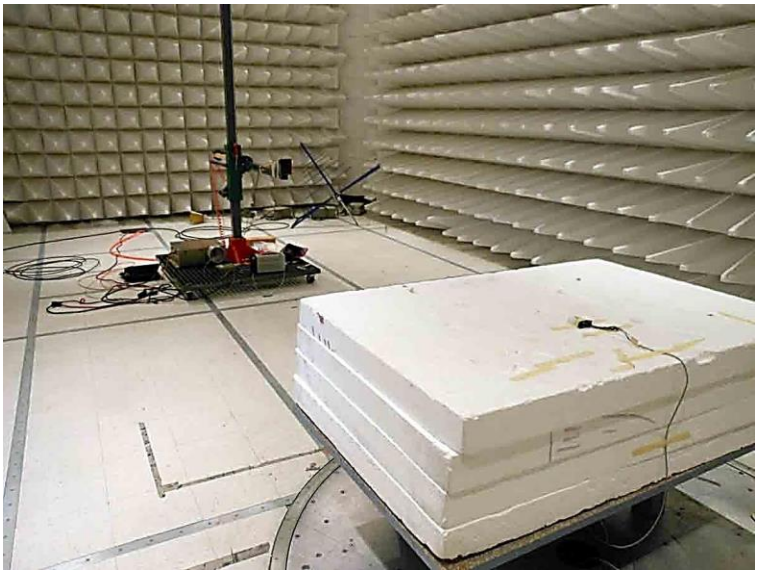
12000MHz - 18000MHz



12000MHz - 18000MHz



18000MHz - 25000MHz



18000MHz - 25000MHz

Bandedge

Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Places • Fremont, CA 94539 • (510) 249-1170

Customer: **Automatic Labs**
Specification: **Band edge**
Work Order #: **94562** Date: 6/14/2013
Test Type: **Radiated Scan** Time: 15:51:20
Equipment: **Link** Sequence#: 1
Manufacturer: Automatic Labs Tested By: Hieu Song Nguyenpham
Model: 1
S/N: 143679

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T2	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T3	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015

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

Function	Manufacturer	Model #	S/N
Link*	Automatic Labs	1	143679

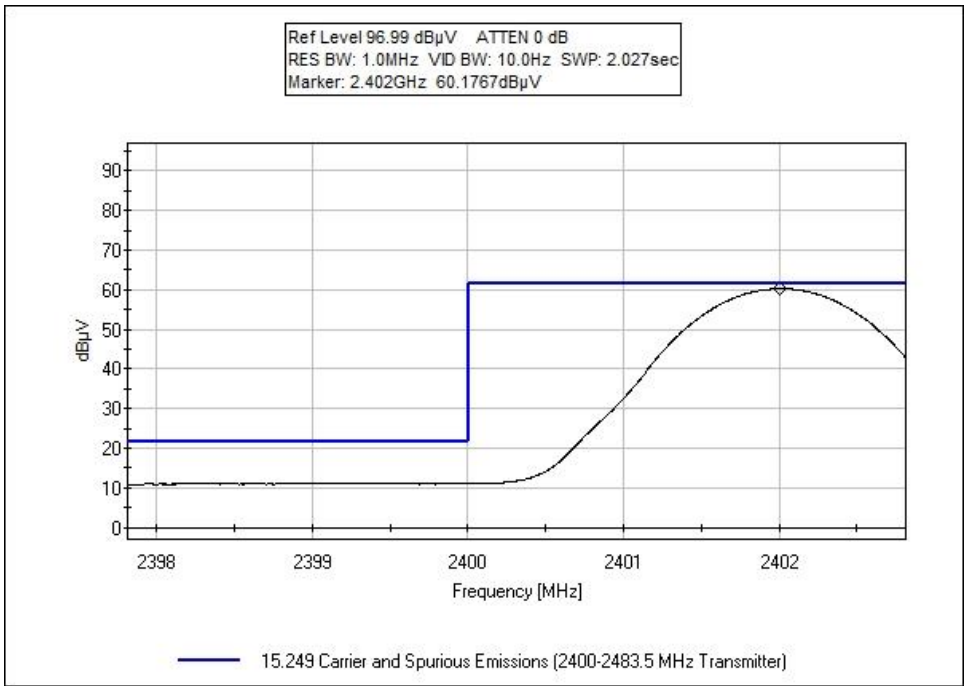
Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	TekPower	HY1803D	259223

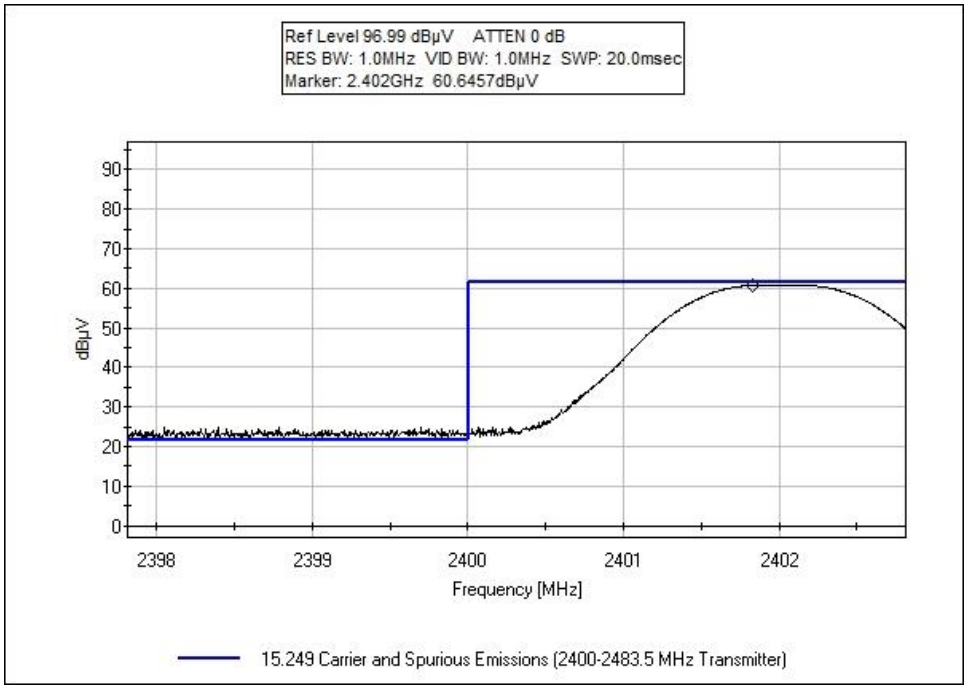
Test Conditions / Notes:

Fundamental of the EUT Temperature: 21.1°C Humidity: 40% Atmospheric Pressure: 101.1 kPa RBW=VBW=1MHz High Clock: 40MHz Software Used: FCC test Transmitter operating frequency: 2.4GHz Number of Channel: 40 Low Frequency: 2.402GHz Middle Frequency: 2.442GHz High Frequency: 2.480GHZ RF output power: 2dBm The EUT is a fixed device, and It is operated at 12VDC directly from DC source such as a car battery. It is placed on the 80 cm table, at the center of a turning table and 3 meters away from the measurement antenna. The EUT is connected to DC power supply which is outside of the chamber in order to control a transmitting operating frequency of the EUT. Test mode firmware installed for testing that modifies frequency based on input voltage

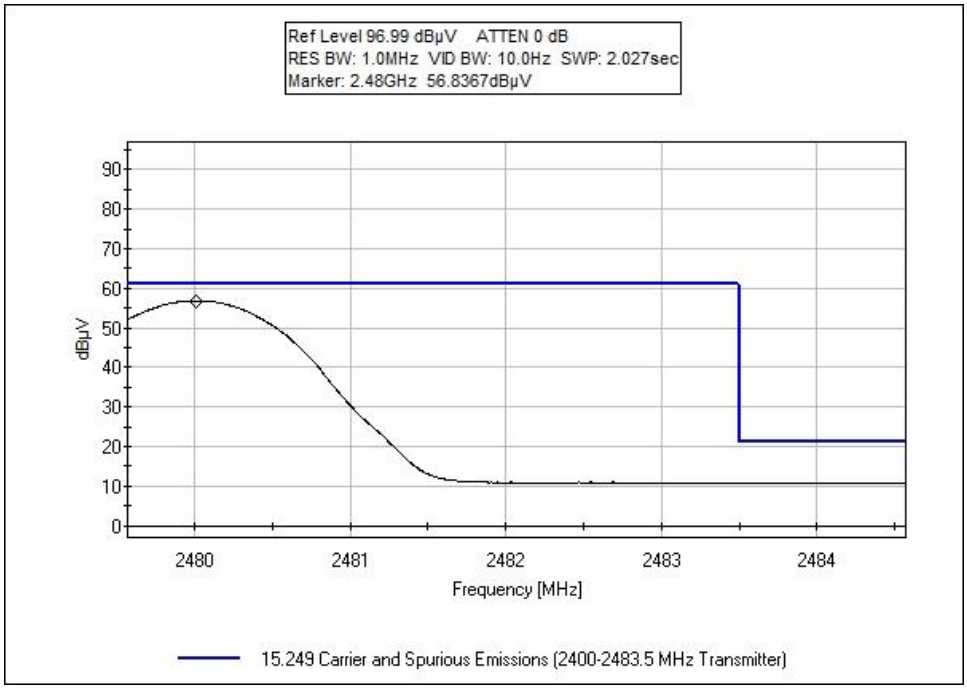
Test Plots



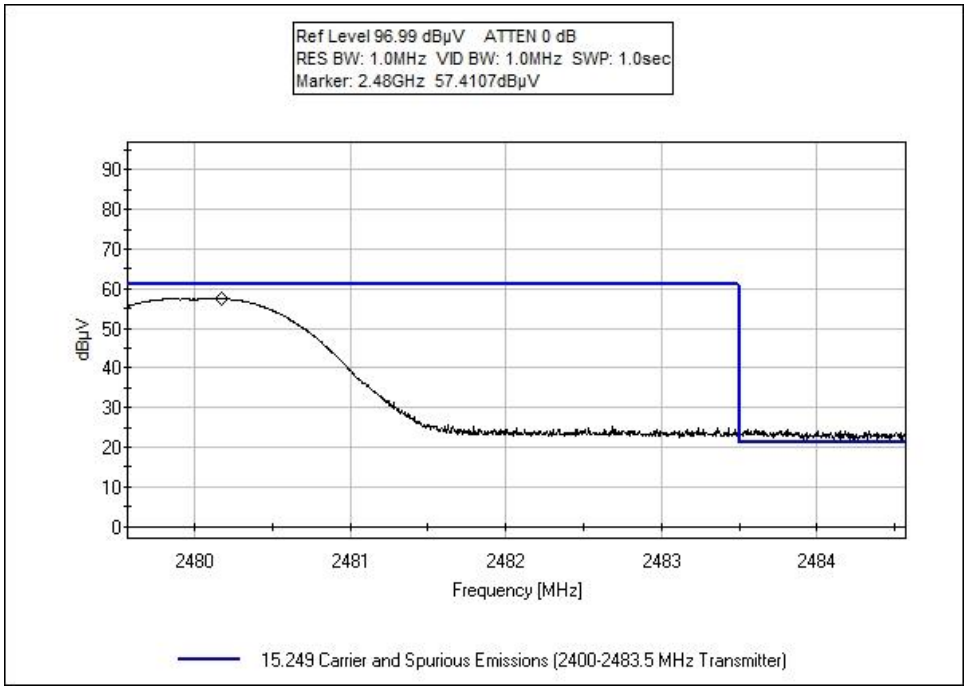
Band Edge-Low channel-AVE



Band Edge-Low channel-PEAK (Average limit shown)

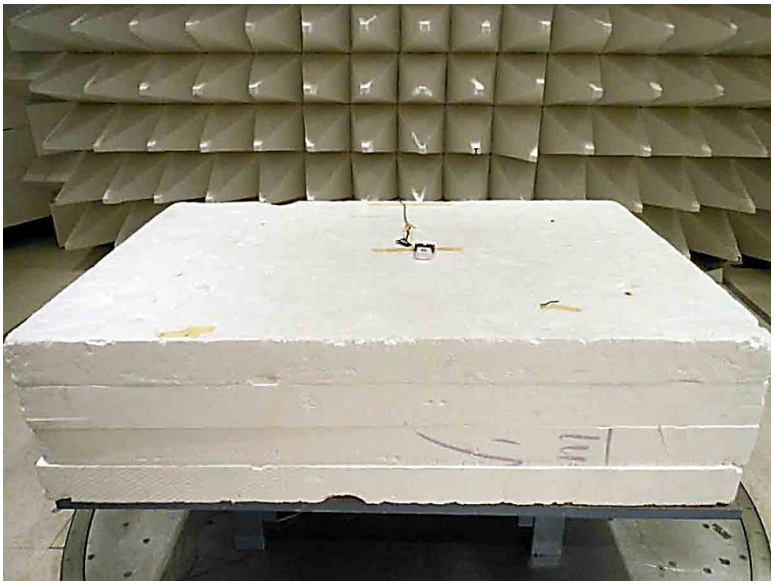


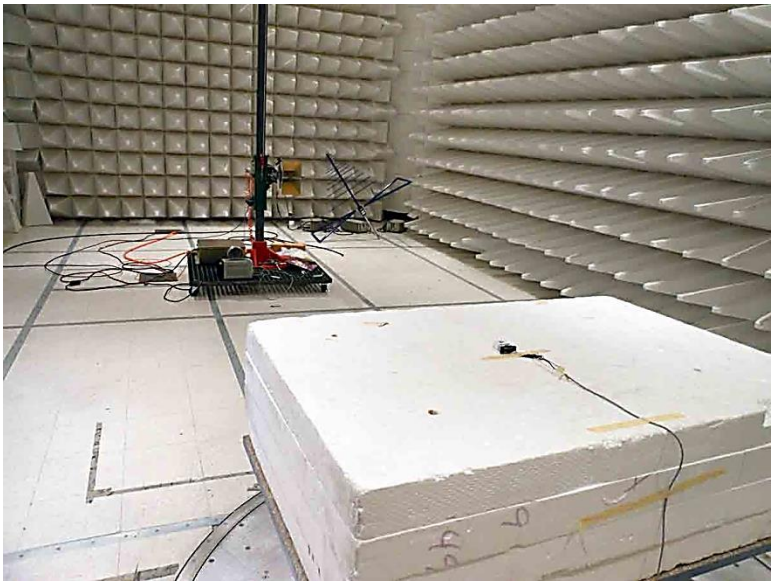
Band Edge-High channel-AVE



Band Edge-High channel-PEAK (Average limit shown)

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	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.