



**CENTRE OF TESTING SERVICE  
INTERNATIONAL**

**OPERATE ACCORDING TO ISO/IEC 17025**

# **FCC ID TEST REPORT**

**TEST REPORT NUMBER : CGZ3121115-00915-E**



**CENTRE OF TESTING SERVICE CO., LTD.**

Building F, Dachuang industrial park, No.379, Zhongshan Dadao,  
Guangzhou, China.



<b>TEST REPORT For FCC ID</b>	
<b>47 CFR PART 15 OCT, 2011</b>	
<b>Report Reference No.</b> .....	CGZ3121115-00915-E
<b>Date of issue</b> .....	14 ~21 November 2012
<b>Testing Laboratory Name</b> .....	<b>CETRE OF TESTING SERVICE CO., LTD</b>
<b>Address</b> .....	Building F, Dachuang industrial park, No.379, Zhongshan Dadao, Guangzhou, China.
<b>Testing location/ procedure</b> .....	Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/>
<b>Applicant's name</b> .....	Redwire Consulting, LLC
<b>Address</b> .....	8 Thorndike St, Everett, MA 02149 USA.
<b>Test specification</b> .....	
<b>Standard</b> .....	<b>47 CFR PART 15 OCT, 2011</b>
<b>Test Report Form No.</b> .....	CTSEMC-1.0
<b>TRF Originator</b> .....	CENTRE OF TESTING SERVICE CO., LTD
<b>Master TRF</b> .....	Dated 2009-01
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<b>Test item description</b> .....	M12
<b>Trade Mark</b> .....	Redwire
<b>Manufacturer</b> .....	Redwire Consulting, LLC
<b>Model/Type reference</b> .....	M12
<b>Ratings</b> .....	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
<b>Operating Frequency</b> .....	2405.00~2480.00MHz
<b>Result</b> .....	<b>PASSED</b>

**Compiled by:**

Kate zhang / File administrators

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Duke yang / Technique principal

**Approved by:**

Vincent yao / Manager

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## FCC ID -- T E S T R E P O R T

<b>Test Report No. :</b>	<b>CGZ3121115-00915-E</b>	<u>21 Nov. 2012</u> Date of issue
--------------------------	---------------------------	--------------------------------------

Type / Model.....	M12
EUT.....	M12
<b>Applicant.....</b>	Redwire Consulting, LLC
Address.....	8 Thorndike St, Everett, MA 02149 USA.
Telephone.....	+1-617-389-3899
Fax.....	+1-617-389-3889
Contact.....	Mariano Alvira
<b>Manufacturer.....</b>	Redwire Consulting, LLC
Address.....	8 Thorndike St, Everett, MA 02149 USA.
Telephone.....	+1-617-389-3899
Fax.....	+1-617-389-3889
Contact.....	Mariano Alvira
<b>Test report holder.....</b>	Redwire Consulting, LLC
Address.....	8 Thorndike St, Everett, MA 02149 USA.
Telephone.....	+1-617-389-3899
Fax.....	+1-617-389-3889
Contact.....	Mariano Alvira

**Test Result** according to the standards on page 3: **PASSED**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## TABLE OF CONTENTS

<b>Description</b>	<b>Page</b>
<b>1.TEST STANDARDS</b> .....	<b>5</b>
<b>2.SUMMARY</b> .....	<b>5</b>
2.1 GENERAL REMARKS.....	5
2.2 FINAL ASSESSMENT .....	5
<b>3.EQUIPMENT UNDER TEST</b> .....	<b>5</b>
3.1 POWER SUPPLY SYSTEM UTILISED .....	5
3.2 SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT) .....	5
3.3 EUT OPERATION MODE .....	5
3.4 EUT CONFIGURATION .....	6
<b>4.TEST ENVIRONMENT</b> .....	<b>7</b>
4.1 ADDRESS OF THE TEST LABORATORY .....	7
4.2 TEST FACILITY .....	7
4.3 ENVIRONMENTAL CONDITIONS .....	7
4.4 DEFINITIONS OF SYMBOLS USED IN THIS TEST REPORT .....	7
4.5 STATEMENT OF THE MEASUREMENT UNCERTAINTY .....	7
4.6 MEASUREMENT UNCERTAINTY.....	8
<b>5.SUMMARY OF STANDARDS AND RESULTS</b> .....	<b>8</b>
5.1.DESCRPTION OF STANDARDS AND RESULTS .....	8
<b>6.POWER LINE CONDUCTED EMISSION TEST</b> .....	<b>9</b>
6.1.TEST EQUIPMENT.....	9
6.2. BLOCK DIAGRAM OF TEST SETUP .....	9
6.3. POWER LINE CONDUCTED EMISSION TEST LIMITS .....	9
6.4.TEST PROCEDURE .....	9
6.5. POWER LINE CONDUCTED EMISSION TEST RESULTS .....	9
<b>7.RADIATED DISTURBANCE (ELECTRIC FIELD)</b> .....	<b>12</b>
7.1.TEST EQUIPMENT.....	12
7.2.BLOCK DIAGRAM OF TEST SETUP .....	12
7.3.RADIATED EMISSION LIMIT : .....	13
7.4.TEST PROCEDURE .....	14
7.5.RADIATED EMISSION TEST RESULTS .....	14
<b>8.BAND EDGE COMPLIANCE TEST</b> .....	<b>34</b>
8.1. TEST EQUIPMENT.....	34
8.2. TEST INFORMATION.....	34
8.3. TEST PROCEDURE.....	34

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8.4. TEST RESULTS .....34

9 20 DB BANDWIDTH TEST .....39

9.1. TEST EQUIPMENT.....39

9.2. TEST INFORMATION.....39

9.3. TEST RESULTS .....40

10.DEVIATION TO TEST SPECIFICATIONS .....41

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## 1. TEST STANDARDS

The tests were performed according to following standards:

- 47 CFR PART 15 OCT, 2011
- ANSI C63.4-2009

## 2. SUMMARY

### 2.1 GENERAL REMARKS

Date of receipt of test sample	15 November 2012
Testing commenced on	15~21 November 2012
Testing concluded on	21 November 2012

### 2.2 FINAL ASSESSMENT

The FCC requirements pertaining to the technical standards and tested operation modes are

- - fulfilled.
- ☐ - **not** fulfilled.

The equipment under test

- - fulfils the FCC requirements cited on page 1.
- ☐ - **does not** fulfil the FCC requirements cited on page 1.

## 3. EQUIPMENT UNDER TEST

### 3.1 Power supply system utilised

Power supply voltage : ■ DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ

### 3.2 Short description of the Equipment under Test (EUT)

Number of tested samples: 1

Serial number: Prototype

Test Configuration: The Modular test with test board. And the test board power supply by adapter(AC100~240V/47~63Hz).

### 3.3 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- ☐ TX- Y position
- ☐ TX- Z position
- TX- X position

Operation mode 1: Low (2405MHz) , Mid (2445MHz), High (2480MHz)

Note: X position of EUT is the worst case, so only these test results be recorded in the test report.

### 3.4 EUT configuration

#### 3.4.1. Description of configuration (EUT)

Description	:	M12
Model Number	:	M12
Operation frequency	:	2405~2480MHz ISM Band
Modulation Technology	:	Zigbee, 802.15.4, O-QPSK
Antenna	:	Integral antenna

#### 3.4.2. Tested Supporting System Details

##### 3.4.2.1. Test Board

M/N	:	N/A
S/N	:	N/A
Manufacturer	:	Redwire Consulting, LLC
Power Cord	:	N/A
FCC ID	:	N/A

##### 3.4.2.2. AC Adapter

M/N	:	KTPS10-03320WA
S/N	:	N/A
Manufacturer	:	Kaga Electronics (USA) Inc
Power Cord	:	Unshielded, With Core, 1.5m , 2Pin
FCC	:	By DoC

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## 4. TEST ENVIRONMENT

### 4.1 Address of the test laboratory

Building F, Dachuang industrial park, No.379, Zhongshan Dadao, Guangzhou, China

Tel: +86-20-85543113 (32 lines)

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### 4.2 Test facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS-Lab Code: L3394

CENTRE OF TESTING SERVICE CO., LTD has been assessed and proved to be in compliance with CNAS-CL01: 2006 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### IC-Registration No.: 8374A

The 3m Alternate Test Site of CENTRE OF TESTING SERVICE CO., LTD has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 8374 on June 06, 2011 .

#### FCC-Registration No.: 971995

CENTRE OF TESTING SERVICE CO., LTD, EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration No.791995, July 13,2012.

### 4.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35 ° C
Humidity:	25~75 %
Atmospheric pressure:	86~106 kPa

### 4.4 Definitions of symbols used in this test report

- - The black square indicates that the listed condition, standard or equipment is applicable for this report.
- - The empty square indicates that the listed condition, standard or equipment is **not** applicable for this report.

### 4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the CTS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.



## 4.6 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conduction disturbance	150kHz~30MHz	$\pm 1.22\text{dB}$	(1)
Power disturbance	30MHz~300MHz	$\pm 1.38\text{dB}$	(1)
Radiation emission (3m)	30MHz~300MHz	$\pm 3.14\text{dB}$	(1)
	300MHz~1000MHz	$\pm 3.18\text{dB}$	(1)
	1GHz~26.5GHz	$\pm 3.54\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 5. Summary of standards and results

### 5.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Radiated Emission Test	FCC Part 15 C: 15.249 FCC Part 15 : 109 ANSI C63.4-2009	PASSED
Conducted Emission Test	FCC Part 15 C: 15.207 ANSI C63.4-2009	PASSED
Band Edge Compliance Test	FCC Part 15 C: 15.249 ANSI C63.4-2009	PASSED
20 dB Bandwidth test	FCC Part 15 C: 15.249 ANSI C63.4-2009 RSS-Gen:4.6.3	PASSED
N/A is an abbreviation for Not Applicable.		

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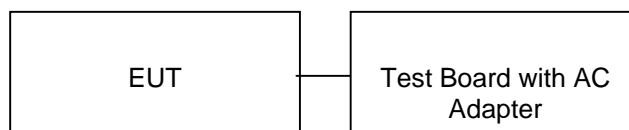
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## 6. Power Line Conducted Emission Test

### 6.1. Test Equipment

Conducted Disturbance					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESHS10	842884/012	2011/12
2	Artificial Mains	ROHDE & SCHWARZ	ESH3-Z5	832479/025	2011/12
3	Artificial Mains	ROHDE & SCHWARZ	ESH3-Z5	832479/026	2011/12
4	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100301	2011/12
5	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2011/12

### 6.2. Block Diagram of Test Setup



(EUT: M12)

### 6.3. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

### 6.4. Test Procedure

The EUT Via AC Adapter connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). This provides a 50 ohm coupling impedance for the EUT. Please refer the block diagram of the test setup and photographs. The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#1). Power on the PC and let it work normally, we use a keyboard test soft ware, let EUT working in test mode, then test it. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC Part 15C on Conducted Emission Test.

### 6.5. Power Line Conducted Emission Test Results

#### 6.5.1 Test result

The requirements are	<b>Fulfilled</b>
Band width	9kHz
Frequency range	0.15kHz - 30 MHz
Min. limit margin	>21.16 dB at 0.15MHz - 30 MHz

**Remarks:** The limits are kept. For detailed results, please see the following page(s).

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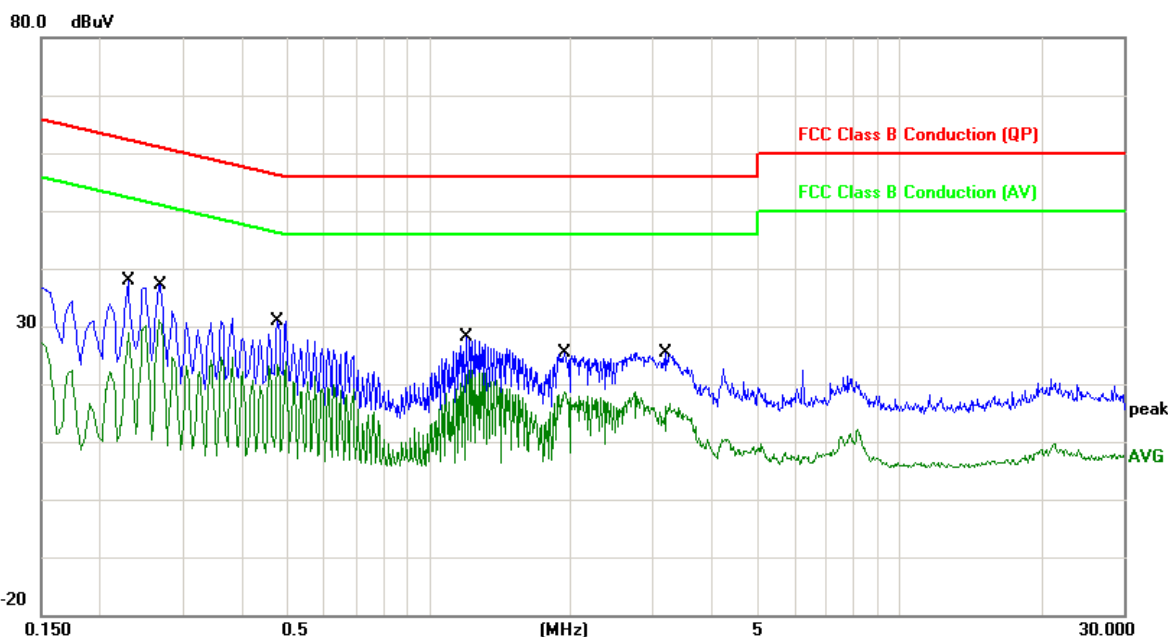
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## 6.1.7 Test protocol

Test Mode:	L	Result:	<input checked="" type="checkbox"/> - passed
Frequency range:	0.15~30MHz		<input type="checkbox"/> - not passed

EUT	M12
Firm Name	Redwire Consulting, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2300	9.99	23.97	33.96	62.45	-28.49	QP
2	0.2300	9.99	17.21	27.20	52.45	-25.25	AVG
3	0.2700	9.99	23.79	33.78	61.12	-27.34	QP
4	0.2700	9.99	19.00	28.99	51.12	-22.13	AVG
5	0.4780	10.01	17.97	27.98	56.37	-28.39	QP
6	0.4780	10.01	13.57	23.58	46.37	-22.79	AVG
7	1.2020	10.11	14.78	24.89	56.00	-31.11	QP
8	1.2020	10.11	10.07	20.18	46.00	-25.82	AVG
9	1.9460	10.08	11.65	21.73	56.00	-34.27	QP
10	1.9460	10.08	6.02	16.10	46.00	-29.90	AVG
11	3.1900	10.04	11.25	21.29	56.00	-34.71	QP
12	3.1900	10.04	2.76	12.80	46.00	-33.20	AVG

Note: Level = Reading + Factor. Margin = Level - Limit.

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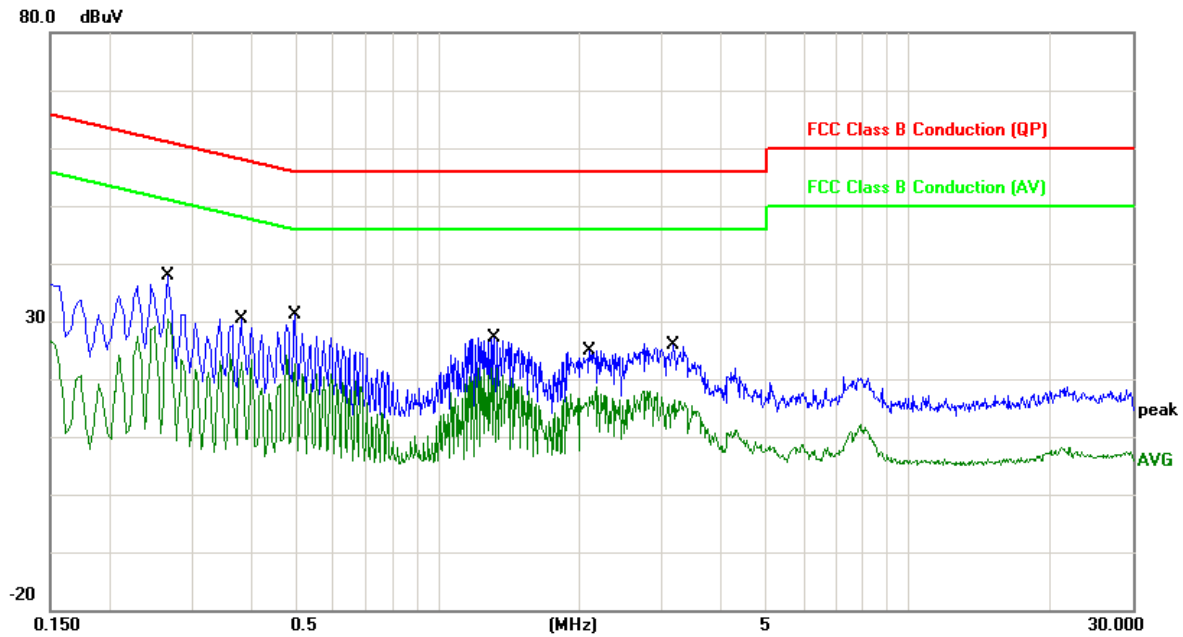
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Test Mode:	N	Result:	■ - passed
Frequency range:	0.15~30MHz		□ - not passed



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2660	9.99	24.89	34.88	61.24	-26.36	QP
2	0.2660	9.99	20.09	30.08	51.24	-21.16	AVG
3	0.3820	10.00	18.28	28.28	58.24	-29.96	QP
4	0.3820	10.00	13.59	23.59	48.24	-24.65	AVG
5	0.4980	10.01	17.19	27.20	56.03	-28.83	QP
6	0.4980	10.01	12.66	22.67	46.03	-23.36	AVG
7	1.3180	10.11	14.78	24.89	56.00	-31.11	QP
8	1.3180	10.11	10.57	20.68	46.00	-25.32	AVG
9	2.1020	10.07	12.48	22.55	56.00	-33.45	QP
10	2.1020	10.07	7.59	17.66	46.00	-28.34	AVG
11	3.1700	10.04	11.76	21.80	56.00	-34.20	QP
12	3.1700	10.04	3.33	13.37	46.00	-32.63	AVG

Note: Level = Reading + Factor. Margin = Level - Limit.

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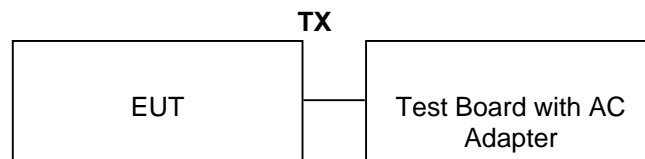
## 7. Radiated disturbance (electric field)

### 7.1. Test Equipment

Radiated disturbance (electric field)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100868	2011/12
2	Biconical Antenna	ROHDE & SCHWARZ	HK116	100221	2011/12
3	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2011/12
4	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2011/12
5	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2011/12
6	Loop Antenna	A.R.A	PLA-1030/B	1030	2011/12

### 7.2. Block Diagram of Test Setup

#### 6.2.1 Block Diagram of connection between EUT and simulators



(EUT: M12)

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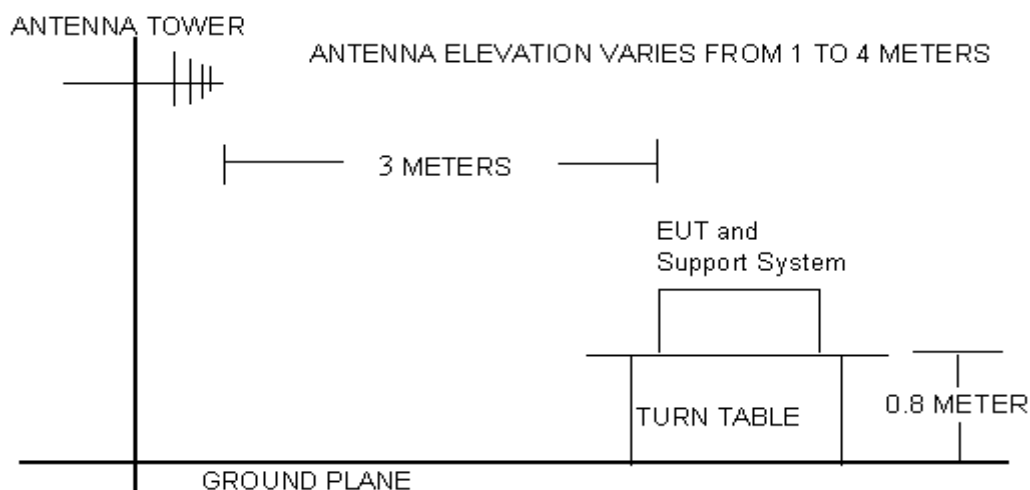
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### 7.2.2 Anechoic Chamber Setup Diagram



### 7.3. Radiated Emission Limit :

**Standard: FCC 15.249 , FCC 15.109 FCC 15.209.**

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Frequency (Hz)	Field Strength (μV/m at meter)	Measurement Distance (meter)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

- Remark:
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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#### 7.4. Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission Test.

The frequency range from 30MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.

All measurements for radiated emissions within the restricted bands were performed using a Quasi-Peak detector with 120kHz RBW below 1GHz and a Peak and Average detector with 1MHz RBW above 1GHz,

All measurements for radiated emissions within the restricted bands were performed using a Quasi-Peak detector with 300kHz VBW below 1GHz and a Peak detector with 1MHz VBW above 1GHz, A average detector with 10Hz VBW above 1GHz

Pretest x, y, z position of EUT, final, select the worst case x position test and record the test results in the report.

The test modes (TX Mode) is tested in Anechoic Chamber and all the scanning waveforms are reported on section 7.5

#### 7.5. Radiated Emission Test Results

**PASSED.**

The frequency range from 9KHz~30MHz, 30MHz to 230MHz, 230MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.

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Test Mode:	TX -X Position Mode	Result:	<input checked="" type="checkbox"/> - passed
Frequency range:	9KHz~30MHz		<input type="checkbox"/> - not passed

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
Remark:Other frequency no specific emission form the EUT (Margin > 10dB form the applicable Limit)							

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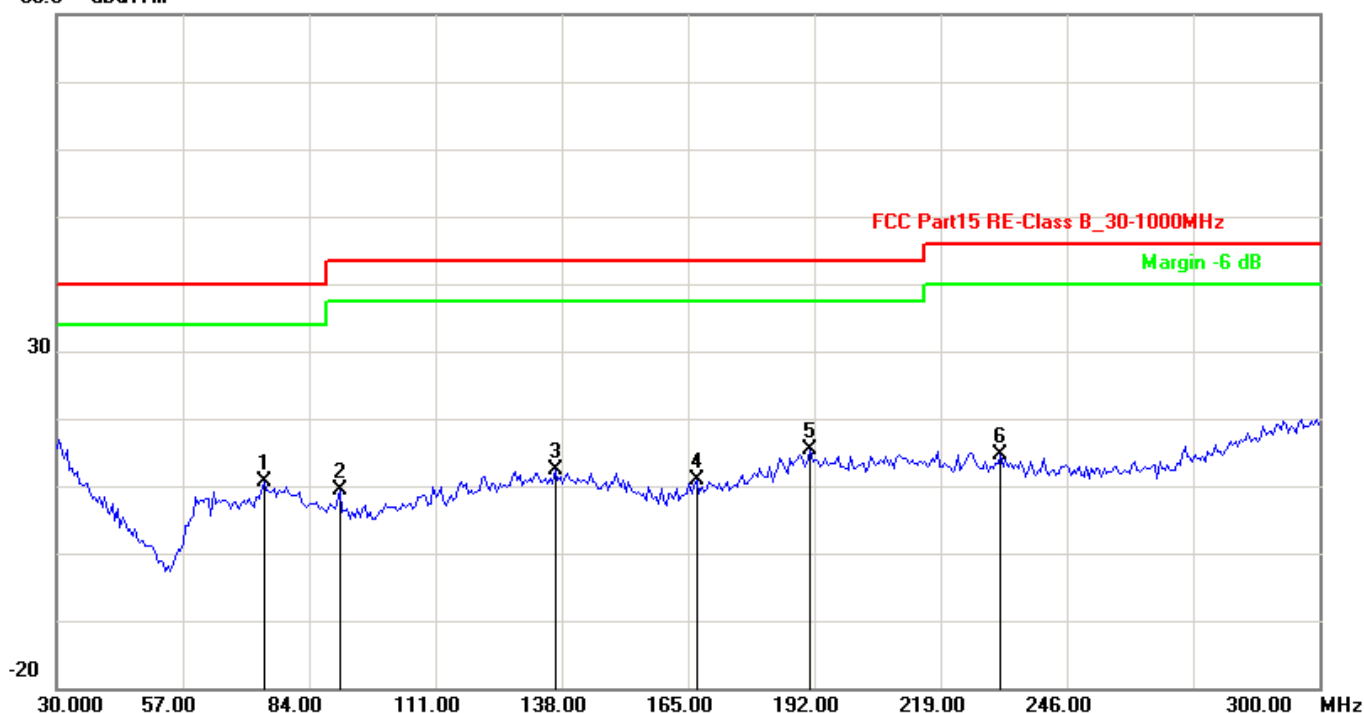
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Channel:	TX -X Position 2405MHz	Result:	■ - passed
Test point:	Horizontal		□ - not passed
Frequency range:	30MHz~1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	74.3687	-38.48	49.13	10.65	40.00	-29.35	QP
2	90.6012	-39.73	49.18	9.45	43.50	-34.05	QP
3	136.5932	-34.88	47.36	12.48	43.50	-31.02	QP
4	166.8938	-36.24	47.06	10.82	43.50	-32.68	QP
5	191.2425	-31.35	46.65	15.30	43.50	-28.20	QP
6	231.8236	-31.80	46.44	14.64	46.00	-31.36	QP

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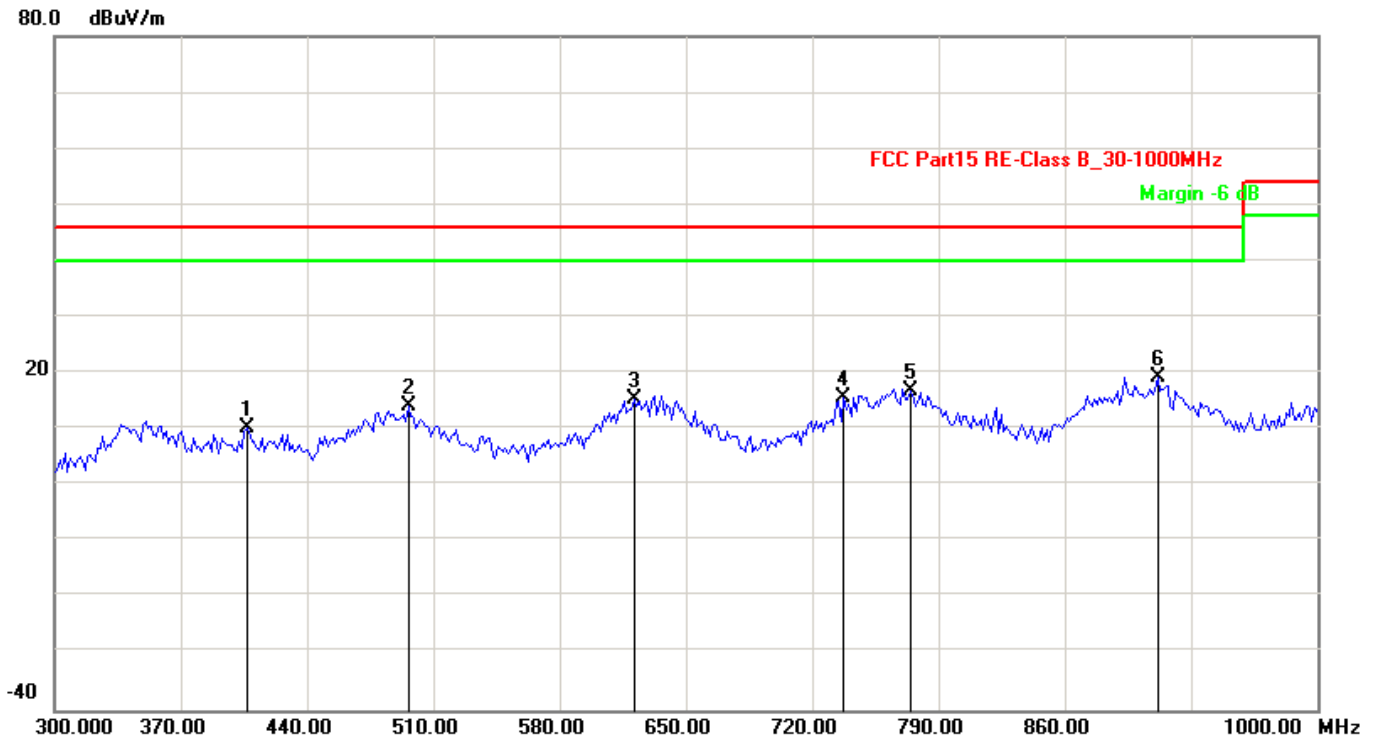
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No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	406.6132	-35.21	45.53	10.32	46.00	-35.68	QP
2	496.3928	-30.52	44.69	14.17	46.00	-31.83	QP
3	621.2425	-27.61	42.87	15.26	46.00	-30.74	QP
4	737.6754	-28.50	44.10	15.60	46.00	-30.40	QP
5	774.1483	-26.84	43.56	16.72	46.00	-29.28	QP
6	911.6232	-25.54	44.90	19.36	46.00	-26.64	QP

Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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Channel:	TX -X Position Mode 2405MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2405.000	-7.29	92.97	85.68	114.00	-28.32	peak
2	2405.000	-7.29	87.53	80.24	94.00	13.76	AVG
3	4218.437	-8.26	55.77	47.51	74.00	-26.49	peak
4	4218.437	-8.26	43.52	35.26	54.00	-18.74	AVG
5	4571.142	-7.75	55.61	47.86	74.00	-26.14	peak
6	4571.142	-7.75	42.44	34.69	54.00	-19.31	AVG
7	6026.052	-2.98	44.71	41.73	74.00	-32.27	peak
8	6026.052	-2.98	28.66	25.68	54.00	-28.32	AVG
9	6797.595	-3.85	45.57	41.72	74.00	-32.28	peak
10	6797.595	-3.85	30.22	26.37	54.00	-27.63	AVG
11	7811.623	-5.00	45.28	40.28	74.00	-33.72	peak
12	7811.623	-5.00	33.16	28.16	54.00	-25.84	AVG
13	8627.255	-5.93	45.08	39.15	74.00	-34.85	peak
14	8627.255	-5.93	31.26	25.33	54.00	-28.67	AVG
Remark: Other frequency mini margin all >10 dB of Limit							

- Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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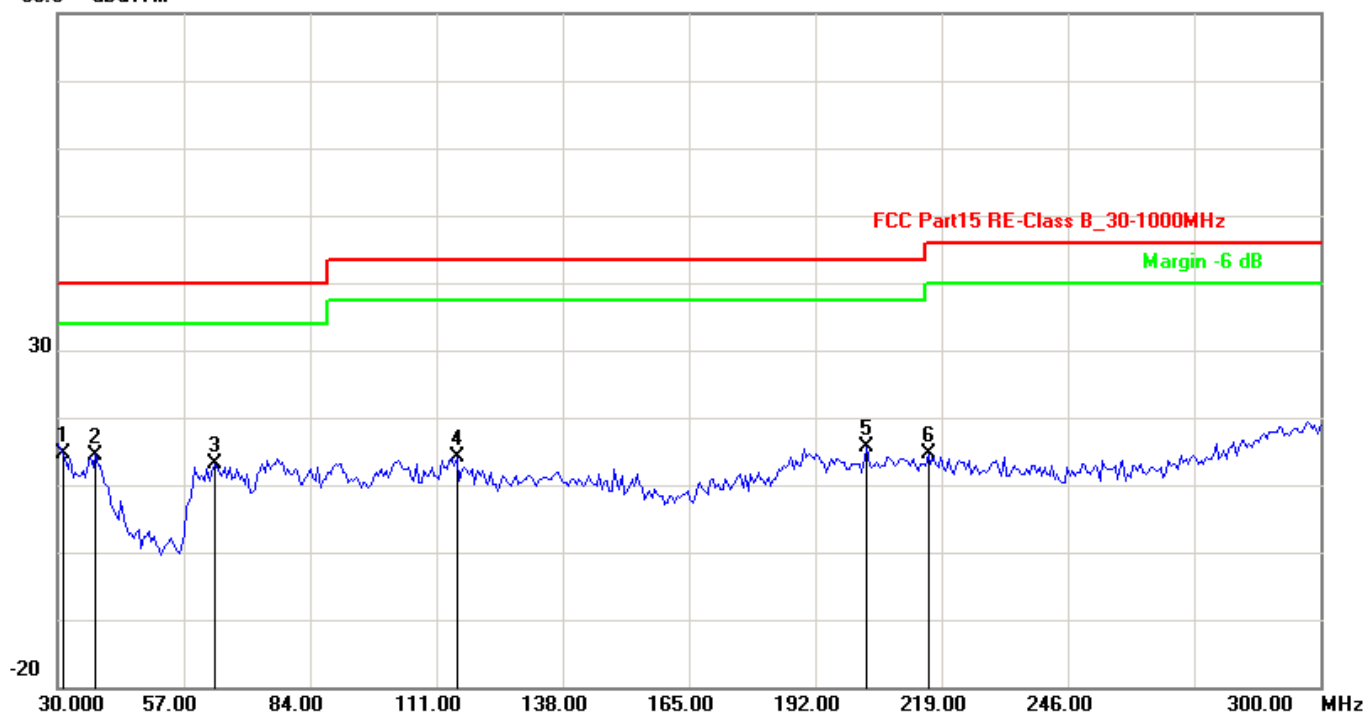
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Channel:	TX -X Position Mode 2405MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	30MHz-1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	31.0822	-34.03	48.72	14.69	40.00	-25.31	QP
2	38.1162	-40.10	54.60	14.50	40.00	-25.50	QP
3	63.5471	-40.44	53.50	13.06	40.00	-26.94	QP
4	115.4910	-37.17	51.39	14.22	43.50	-29.28	QP
5	203.1463	-31.85	47.36	15.51	43.50	-27.99	QP
6	216.1323	-31.57	46.09	14.52	46.00	-31.48	QP

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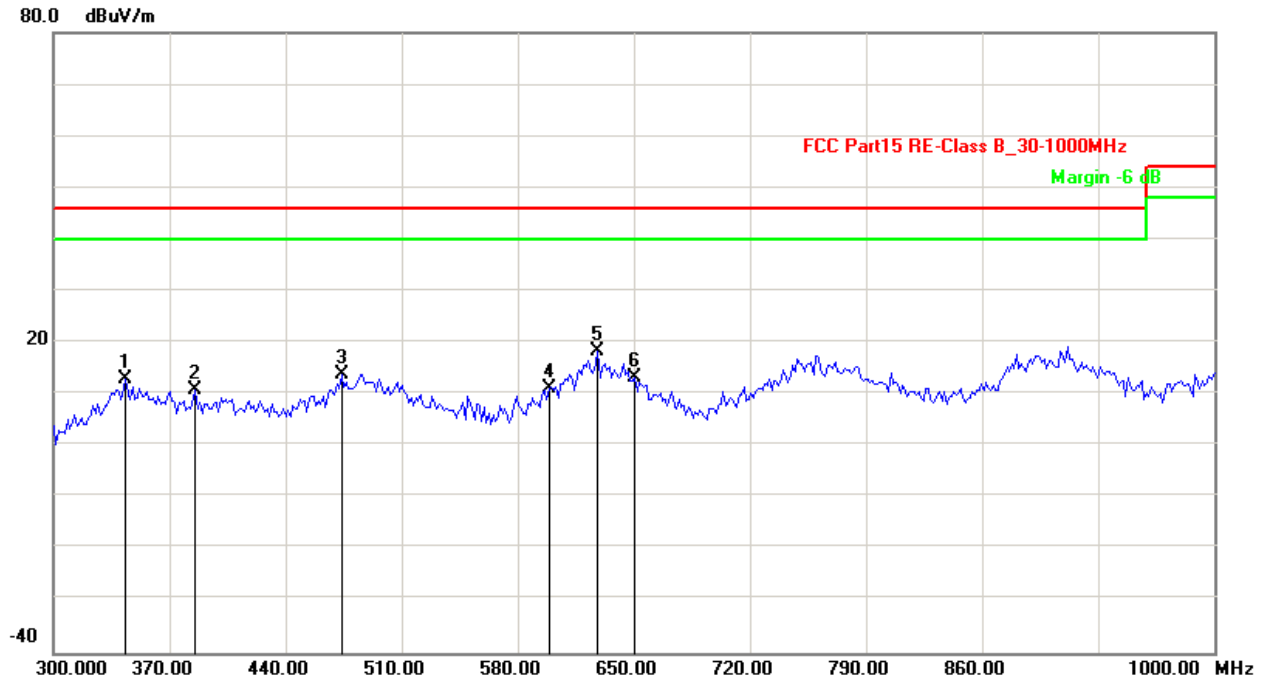
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No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	343.4870	-33.40	46.45	13.05	46.00	-32.95	QP
2	385.5711	-35.36	46.35	10.99	46.00	-35.01	QP
3	473.9479	-31.13	45.02	13.89	46.00	-32.11	QP
4	598.7976	-31.82	42.93	11.11	46.00	-34.89	QP
5	628.2565	-27.95	46.34	18.39	46.00	-27.61	QP
6	650.7014	-30.21	43.36	13.15	46.00	-32.85	QP

Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level- Limit.

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Channel:	TX -X Position Mode 2405MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2405.000	-7.51	89.82	82.31	114.00	-31.69	peak
2	2405.000	-7.51	83.42	75.91	94.00	-18.09	AVG
3	1639.279	-5.83	35.62	29.79	74.00	-44.21	peak
4	1639.279	-5.83	22.18	16.35	54.00	-37.65	AVG
5	3182.365	-10.86	34.34	23.48	74.00	-50.52	peak
6	3182.365	-10.86	21.11	10.25	54.00	-43.75	AVG
7	6797.595	-9.94	33.67	23.73	74.00	-50.27	peak
8	6797.595	-9.94	21.75	11.81	54.00	-42.19	AVG
9	7657.315	-5.89	35.92	30.03	74.00	-43.97	peak
10	7657.315	-5.89	23.55	17.66	54.00	-36.34	AVG
11	8913.828	-9.97	46.67	36.70	74.00	-37.30	peak
12	8913.828	-9.97	32.00	22.03	54.00	-31.97	AVG
13	10302.605	-5.33	46.21	40.88	74.00	-33.12	peak
14	10302.605	-5.33	33.47	28.14	54.00	-25.86	AVG

Remark: Other frequency mini margin all >10 dB of Limit

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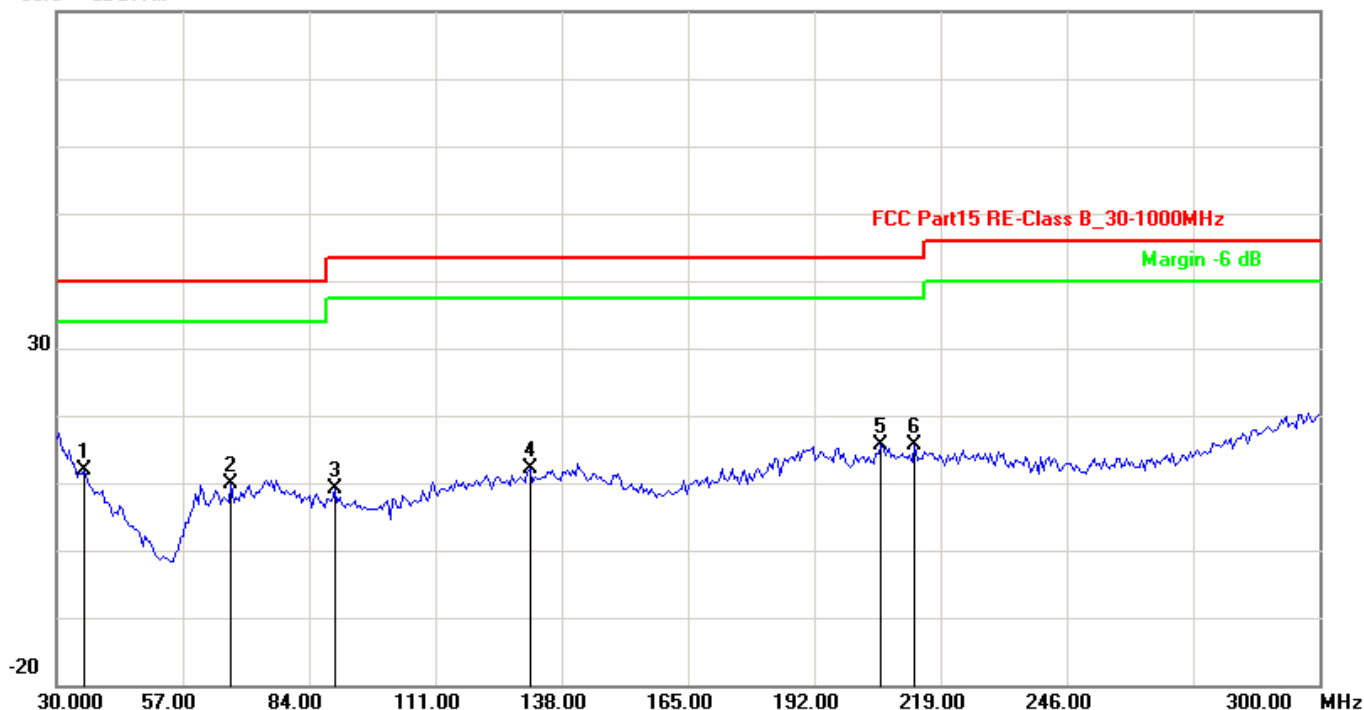
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Channel:	TX -X Position 2445MHz	Result:	■ - passed
Test point:	Horizontal		□ - not passed
Frequency range:	30MHz~1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	35.9519	-38.51	50.28	11.77	40.00	-28.23	QP
2	67.3347	-40.14	49.95	9.81	40.00	-30.19	QP
3	89.5190	-39.62	48.84	9.22	43.50	-34.28	QP
4	131.1824	-35.13	47.20	12.07	43.50	-31.43	QP
5	206.3928	-31.58	47.22	15.64	43.50	-27.86	QP
6	213.4269	-31.45	47.11	15.66	43.50	-27.84	QP

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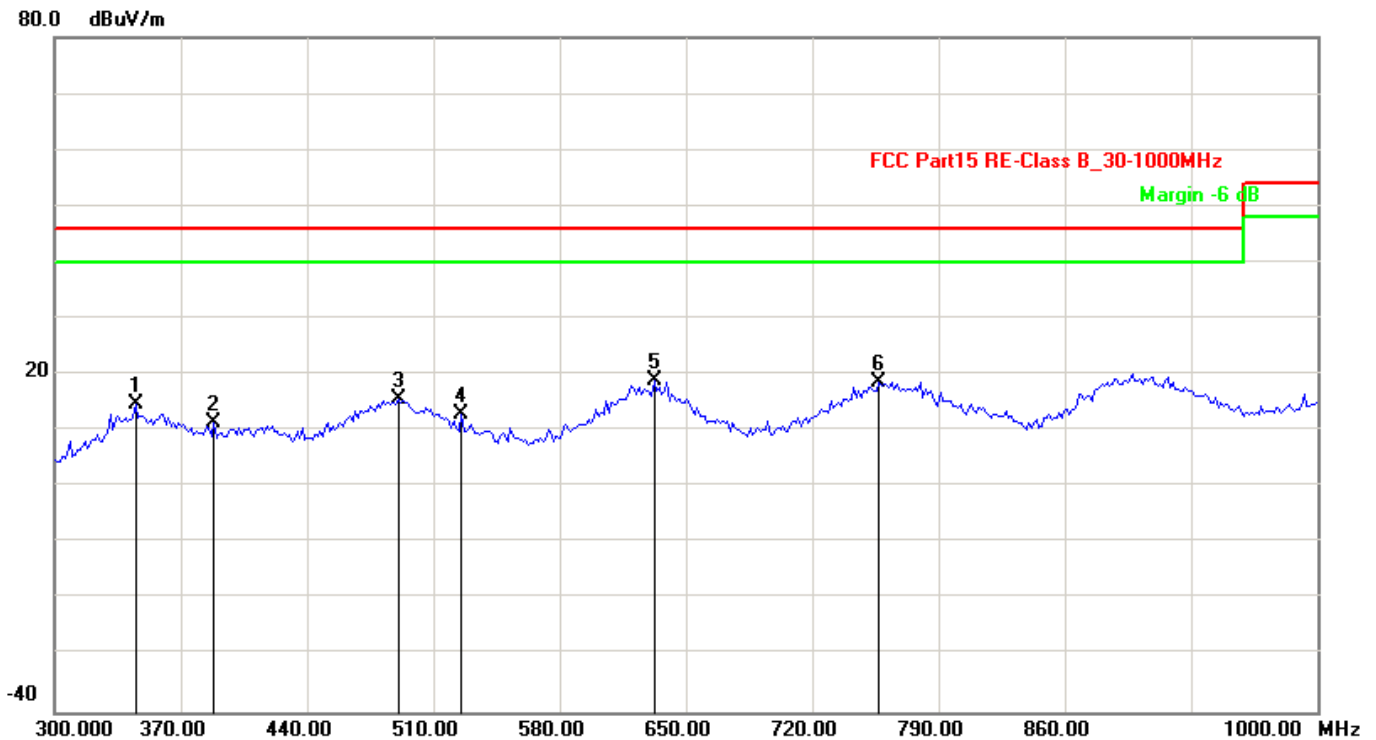
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No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	344.8898	-33.43	48.13	14.70	46.00	-31.30	QP
2	388.3768	-35.34	46.77	11.43	46.00	-34.57	QP
3	490.7816	-30.37	46.05	15.68	46.00	-30.32	QP
4	525.8517	-34.22	47.16	12.94	46.00	-33.06	QP
5	632.4649	-28.15	47.09	18.94	46.00	-27.06	QP
6	757.3146	-26.58	45.23	18.65	46.00	-27.35	QP

Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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Channel:	TX -X Position Mode 2445MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2445.000	-7.55	93.80	86.25	114.00	-27.75	peak
2	2445.000	-7.55	88.32	80.77	94.00	-13.23	AVG
3	4306.613	-6.19	55.61	49.42	74.00	-24.58	peak
4	4306.613	-6.19	42.40	36.21	54.00	-17.79	AVG
5	4659.319	-8.40	56.30	47.90	74.00	-26.10	peak
6	4659.319	-8.40	41.42	33.02	54.00	-20.98	AVG
7	6511.022	-3.52	45.04	41.52	74.00	-32.48	peak
8	6511.022	-3.52	33.64	30.12	54.00	-23.88	AVG
9	7657.315	-4.83	45.46	40.63	74.00	-33.37	peak
10	7657.315	-4.83	32.28	27.45	54.00	-26.55	AVG
11	9905.812	-5.81	47.10	41.29	74.00	-32.71	peak
12	9905.812	-5.81	32.14	26.33	54.00	-27.67	AVG
13	10787.575	-5.05	47.95	42.90	74.00	-31.10	peak
14	10787.575	-5.05	32.19	27.14	54.00	-26.86	AVG
Remark: Other frequency mini margin all >10 dB of Limit							

- Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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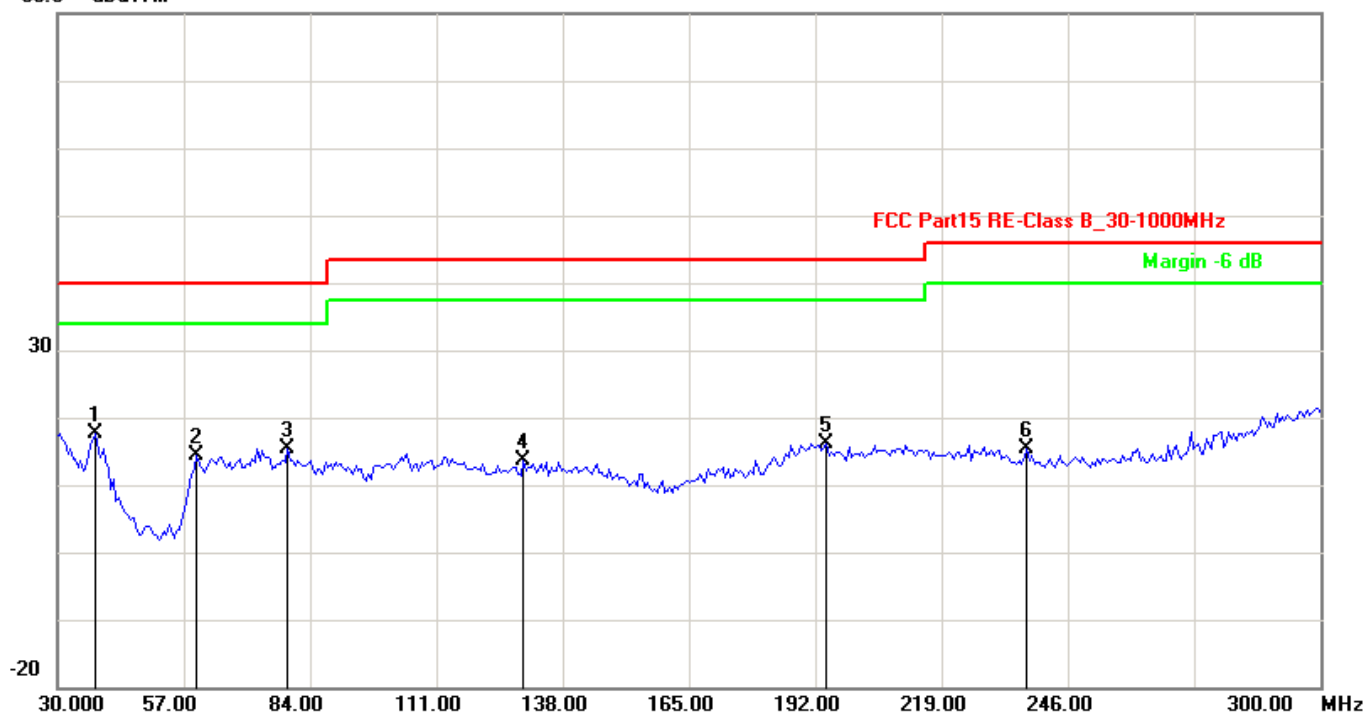
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Channel:	TX -X Position Mode 2445MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	30MHz-1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	38.1162	-40.10	57.81	17.71	40.00	-22.29	QP
2	59.7595	-41.04	55.33	14.29	40.00	-25.71	QP
3	79.2385	-38.31	53.62	15.31	40.00	-24.69	QP
4	129.5591	-35.22	48.86	13.64	43.50	-29.86	QP
5	194.4890	-31.63	47.84	16.21	43.50	-27.29	QP
6	237.2345	-32.30	47.60	15.30	46.00	-30.70	QP

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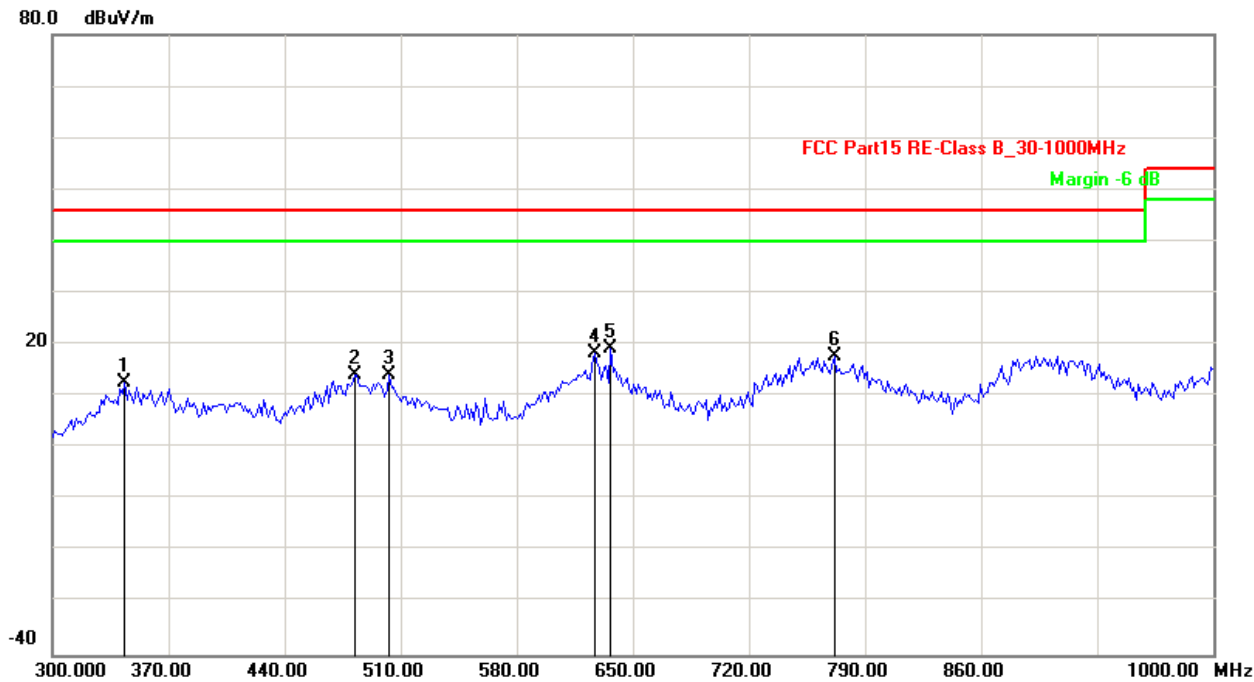
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No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	343.4870	-33.40	45.93	12.53	46.00	-33.47	QP
2	482.3647	-30.15	44.33	14.18	46.00	-31.82	QP
3	503.4068	-31.14	45.32	14.18	46.00	-31.82	QP
4	626.8537	-27.88	46.09	18.21	46.00	-27.79	QP
5	636.6733	-28.36	47.66	19.30	46.00	-26.70	QP
6	771.3427	-26.74	44.50	17.76	46.00	-28.24	QP

Note: 1. Emission level=Read level + Factor  
2. Factor=Antenna factor + Cable loss  
3.Margin=Level- Limit.

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Channel:	TX -X Position Mode 2445 MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2445.000	-7.70	90.11	82.41	114.00	-31.59	peak
2	2445.000	-7.70	84.02	76.32	94.00	-17.68	AVG
3	1617.234	-6.03	36.85	30.82	74.00	-43.18	peak
4	1617.234	-6.03	24.48	18.45	54.00	-35.55	AVG
5	1903.808	-5.84	36.33	30.49	74.00	-43.51	peak
6	1903.808	-5.84	22.17	16.33	54.00	-37.67	AVG
7	9090.180	-9.14	47.17	38.03	74.00	-35.97	peak
8	9090.180	-9.14	33.72	24.58	54.00	-29.42	AVG
9	9993.988	-5.52	46.55	41.03	74.00	-32.97	peak
10	9993.988	-5.52	35.64	30.12	54.00	-23.88	AVG
11	10501.002	-5.21	47.94	42.73	74.00	-31.27	peak
12	10501.002	-5.21	35.26	30.05	54.00	-23.95	AVG
13	11338.677	-4.73	58.25	43.52	74.00	-30.48	peak
14	11338.677	-4.73	35.47	30.74	54.00	-23.26	AVG

Remark: Other frequency mini margin all >10 dB of Limit

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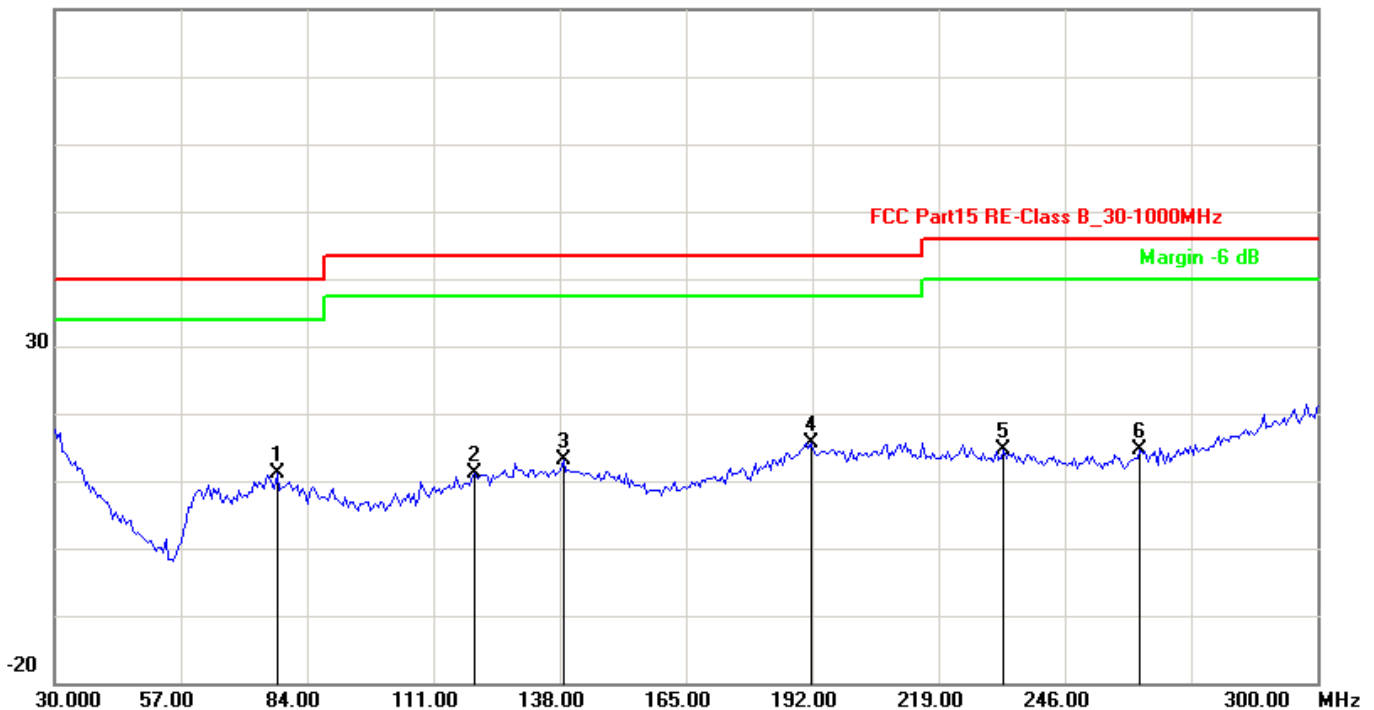
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Channel:	TX -X Position 2480MHz	Result:	■ - passed
Test point:	Horizontal		□ - not passed
Frequency range:	30MHz~1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	77.6152	-38.30	49.49	11.19	40.00	-28.81	QP
2	119.8196	-36.20	47.26	11.06	43.50	-32.44	QP
3	138.7575	-34.78	48.02	13.24	43.50	-30.26	QP
4	191.7836	-31.39	47.12	15.73	43.50	-27.77	QP
5	232.9058	-31.90	46.53	14.63	46.00	-31.37	QP
6	262.1242	-32.07	46.58	14.51	46.00	-31.49	QP

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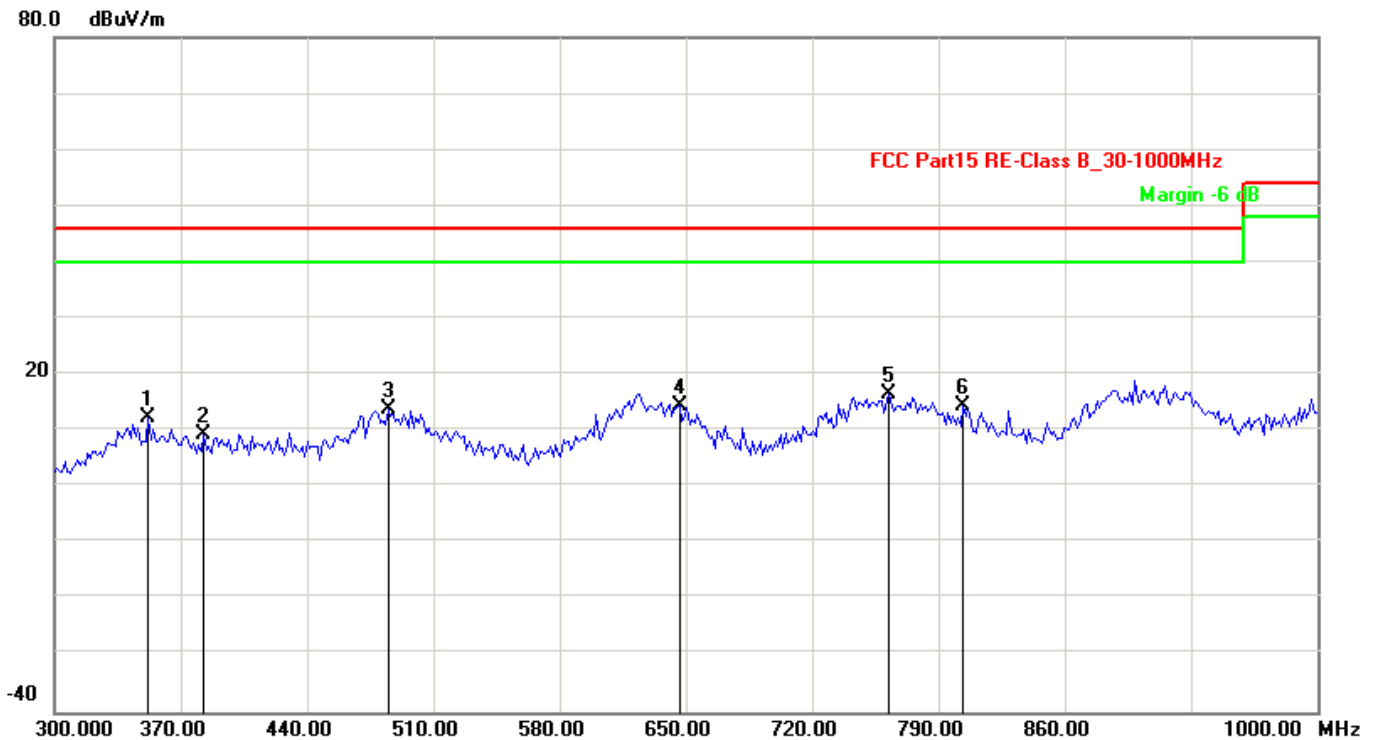
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No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	351.9038	-33.63	46.13	12.50	46.00	-33.50	QP
2	382.7655	-35.37	44.81	9.44	46.00	-36.56	QP
3	485.1703	-30.22	43.99	13.77	46.00	-32.23	QP
4	646.4930	-29.55	44.04	14.49	46.00	-31.51	QP
5	762.9259	-26.45	42.90	16.45	46.00	-29.55	QP
6	803.6072	-30.12	44.46	14.34	46.00	-31.66	QP

Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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Channel:	TX -X Position Mode 2480MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2480.000	-8.02	93.88	85.86	114.00	-28.14	peak
2	2480.000	-8.02	88.15	80.13	94.00	-13.87	AVG
3	4416.834	-6.60	55.01	48.41	74.00	-25.59	peak
4	4416.834	-6.60	41.16	34.56	54.00	-19.44	AVG
5	4791.583	-9.38	54.54	45.16	74.00	-28.84	peak
6	4791.583	-9.38	40.60	31.22	54.00	-22.78	AVG
7	5585.170	-2.65	44.05	41.40	74.00	-32.60	peak
8	5585.170	-2.65	31.79	29.14	54.00	-24.86	AVG
9	6224.449	-3.19	44.26	41.07	74.00	-32.93	peak
10	6224.449	-3.19	31.60	28.41	54.00	-25.59	AVG
11	7282.565	-4.40	45.00	40.60	74.00	-33.40	peak
12	7282.565	-4.40	30.53	26.13	54.00	-27.87	AVG
13	8935.872	-6.28	45.73	39.45	74.00	-34.55	peak
14	8935.872	-6.28	33.61	27.33	54.00	-26.67	AVG
Remark: Other frequency mini margin all >10 dB of Limit							

- Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level-Limit.

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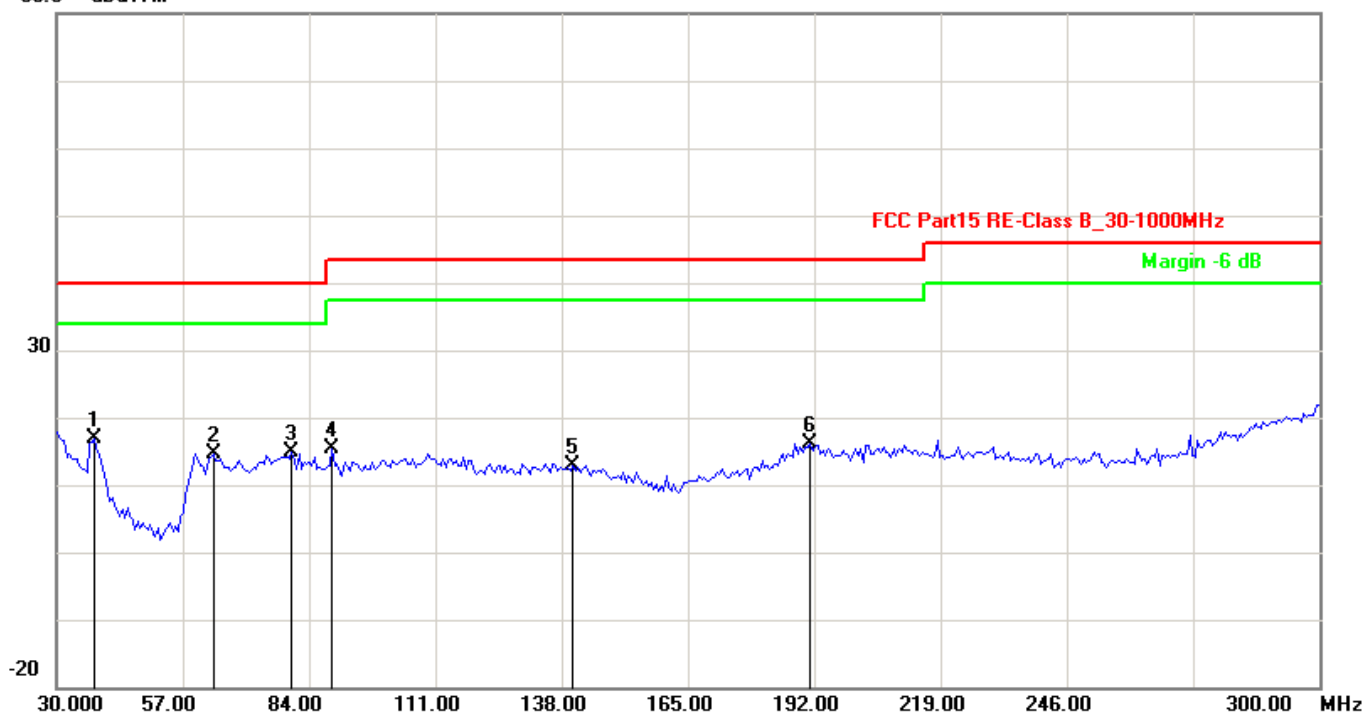
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Channel:	TX -X Position Mode 2480MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	30MHz-1000MHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	38.1162	-40.10	57.03	16.93	40.00	-23.07	QP
2	63.5471	-40.44	55.14	14.70	40.00	-25.30	QP
3	80.3206	-38.39	53.30	14.91	40.00	-25.09	QP
4	88.9780	-39.61	55.09	15.48	43.50	-28.02	QP
5	140.3808	-34.76	47.64	12.88	43.50	-30.62	QP
6	191.2425	-31.35	47.55	16.20	43.50	-27.30	QP

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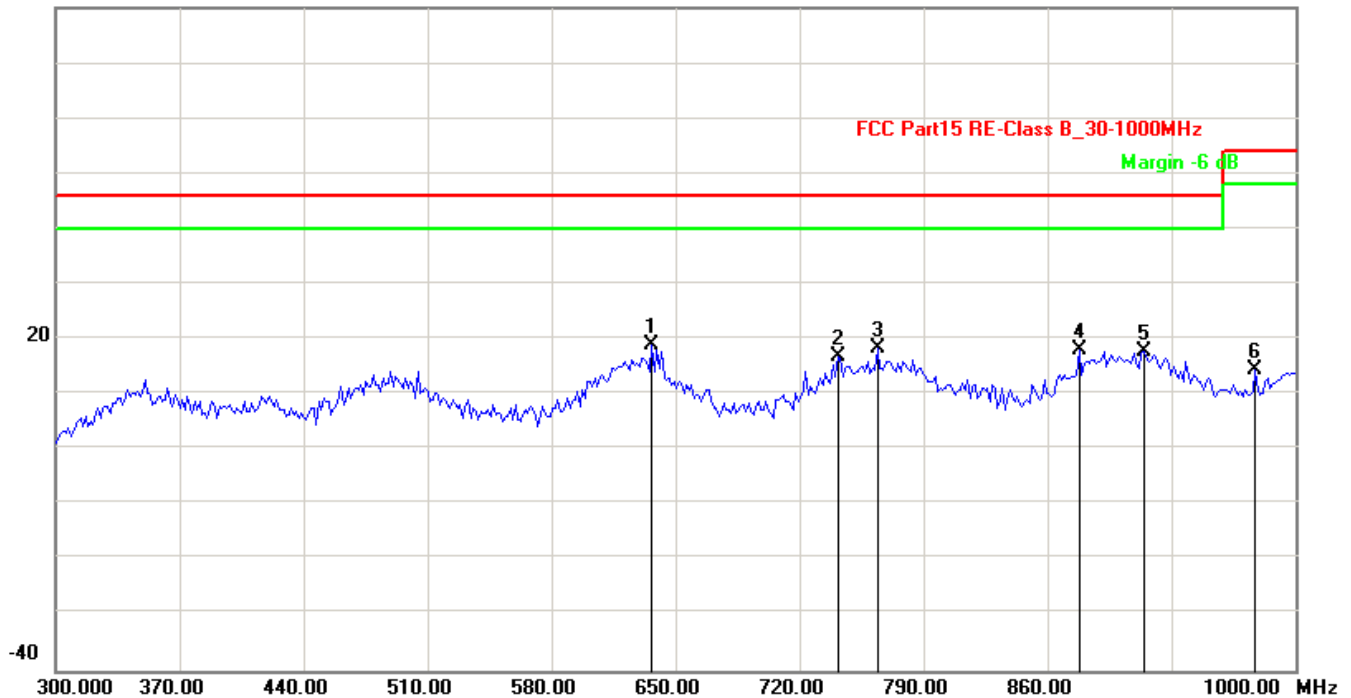
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80.0 dBuV/m



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	636.6733	-28.36	47.34	18.98	46.00	-27.02	QP
2	741.8838	-27.92	44.85	16.93	46.00	-29.07	QP
3	764.3287	-26.50	44.93	18.43	46.00	-27.57	QP
4	877.9559	-26.43	44.35	17.92	46.00	-28.08	QP
5	914.4289	-25.65	43.33	17.68	46.00	-28.32	QP
6	977.5551	-30.37	44.97	14.60	54.00	-39.40	QP

Note: 1. Emission level=Read level + Factor  
 2. Factor=Antenna factor + Cable loss  
 3. Margin=Level- Limit.

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Channel:	TX -X Position Mode 2480MHz	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz-26.5GHz		

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	2480.000	-7.82	88.84	81.02	114.00	-32.98	peak
2	2480.000	-7.82	84.51	76.69	94.00	-17.31	AVG
3	1683.367	-5.43	34.76	29.33	74.00	-44.67	peak
4	1683.367	-5.43	20.79	15.36	54.00	-38.64	AVG
5	7965.932	-4.43	36.24	31.81	74.00	-42.19	peak
6	7965.932	-4.43	22.75	18.32	54.00	-35.68	AVG
7	8494.990	-6.94	40.40	33.46	74.00	-40.54	peak
8	8494.990	-6.94	37.04	20.10	54.00	-33.90	AVG
9	9266.533	-8.31	45.37	37.06	74.00	-36.94	peak
10	9266.533	-8.31	33.65	25.34	54.00	-28.66	AVG
11	10170.341	-5.40	45.36	39.96	74.00	-34.04	peak
12	10170.341	-5.40	31.75	26.35	54.00	-27.65	AVG
13	11448.898	-4.67	48.13	43.46	74.00	-30.54	peak
14	11448.898	-4.67	35.41	30.74	54.00	-23.26	AVG

Remark: Other frequency mini margin all >10 dB of Limit

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## 8. Band Edge Compliance test

### 8.1. Test Equipment

Band Edge Compliance test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	10868	2011/12
2	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2011/12
3	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2011/12
4	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2011/12

### 8.2. Test Information

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	Duke
MODEL NO	M12

### 8.3. Test procedure

- 1、The EUT operates at TX mode. The transmitter channel are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
- 2、Max hold the trace of the setp 1, and the EUT operates at Normal test mode to verify the largest spurious emissions power.

### 8.4. Test Results

**PASSED.**

The EUT operates at TX test mode. The transmitter channel are tested to verify the band edge emissions.

Test Mode	Channel Marked Frequency	Test Result Highest Emission (dBuv/m)			
		Horizontal		Vertical	
		Peak	Average	Peak	Average
Low Channel	2390MHz	47.91	25.11	43.71	23.59
	2400MHz	58.18	33.00	53.55	30.62
High Channel	2483.5MHz	63.52	46.99	59.00	46.99
	2500MHz	45.54	23.78	40.95	23.78

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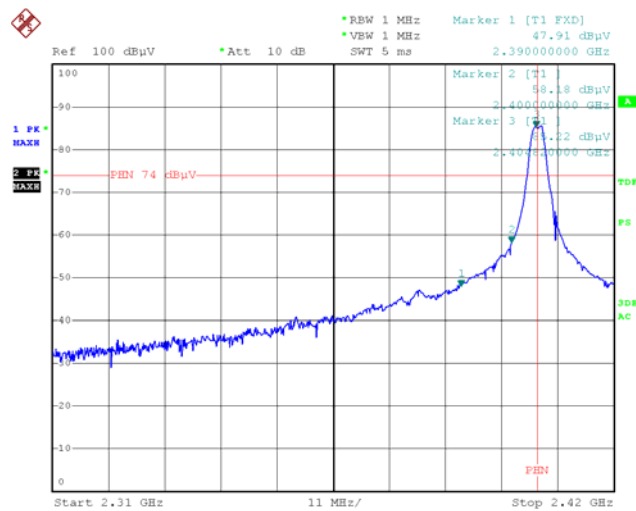
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**Band Edges(Low)**  
**Detector mode:Peak**

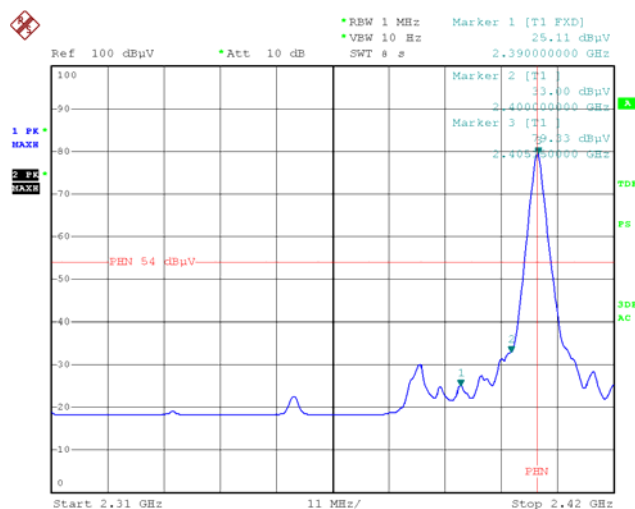
**Polarity:Horizontal**



Date: 19.NOV.2012 19:59:13

**Band Edges(CH Low)**  
**Detector mode:AVG**

**Polarity:Horizontal**



Date: 19.NOV.2012 20:03:54

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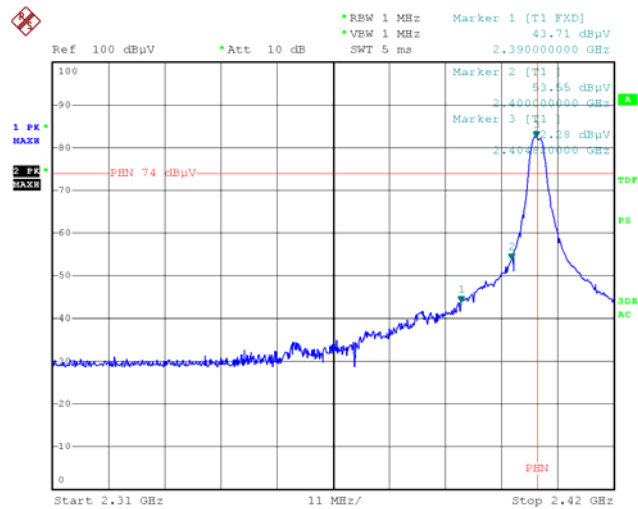
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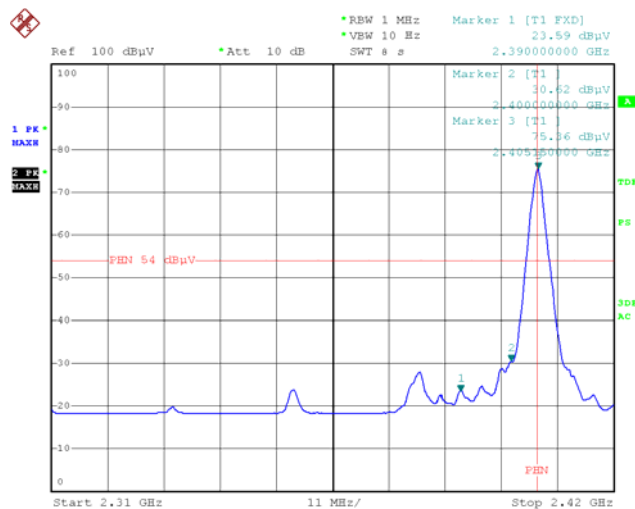
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**Band Edges(Low)**  
**Detector mode:Peak****Polarity:Vertical**

Date: 19.NOV.2012 19:56:43

**Band Edges(CH Low)**  
**Detector mode:AVG****Polarity:Vertical**

Date: 19.NOV.2012 20:05:07

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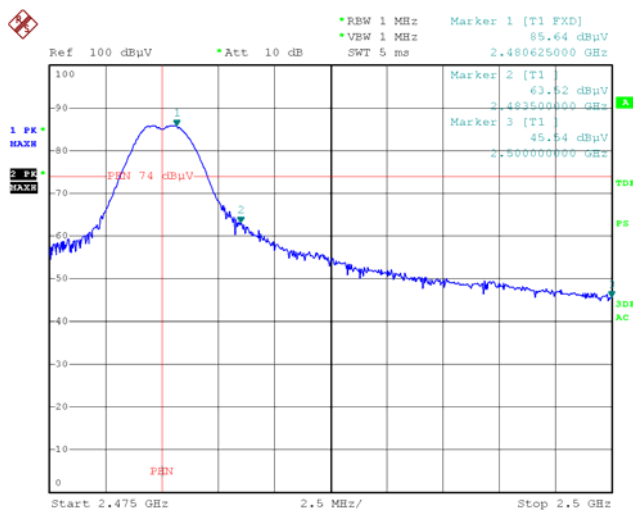
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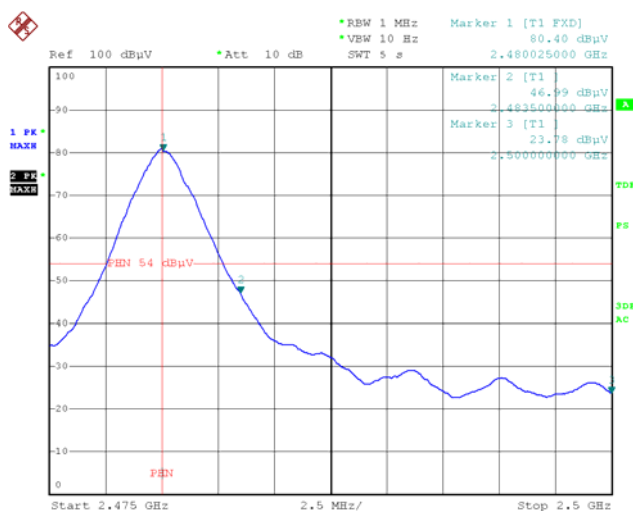
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**Band Edges(CH High)**  
**Detector mode:Peak****Polarity:Horizontal**

Date: 19.NOV.2012 20:21:55

**Band Edges(CH High)**  
**Detector mode:AVG****Polarity:Horizontal**

Date: 19.NOV.2012 20:33:52

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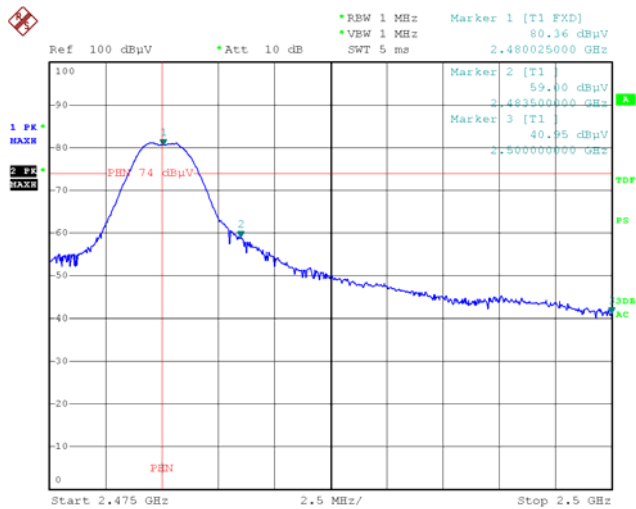
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Band Edges(CH High)  
Detector mode:Peak

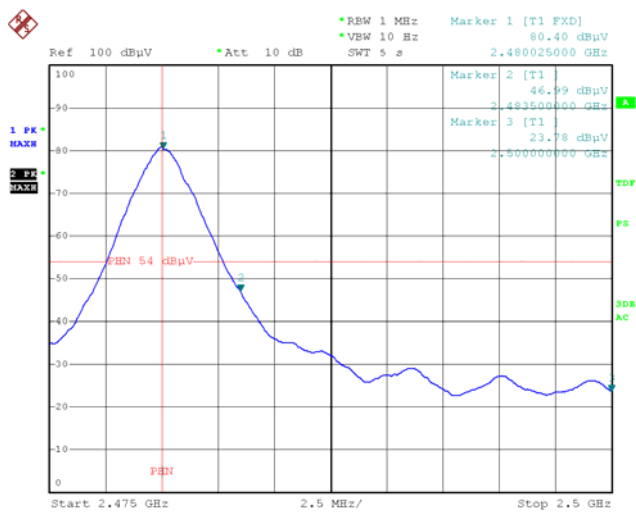
Polarity:Vertical



Date: 19.NOV.2012 20:27:09

Band Edges(CH High)  
Detector mode:AVG

Polarity:Horizontal



Date: 19.NOV.2012 20:33:52

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## 9 20 dB Bandwidth test

### 9.1. Test Equipment

20 dB Bandwidth test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	10868	2011/12
2	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2011/12
3	Biconical Antenna	ROHDE & SCHWARZ	HK116	100221	2011/12
4	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2011/12

### 9.2. Test Information

EUT	M12
Firm Name	REDWIRE CONSULTING, LLC
Operating Condition	DC 3.3V BY ADAPTER, ADAPTER AC 120V/60HZ
Test Condition	Ambient Temperature: 25°C Humidity: 56%
Test distance	3 Meter
Test Date:	15~21 November 2012
Operator	<b>Duke</b>
MODEL NO	M12

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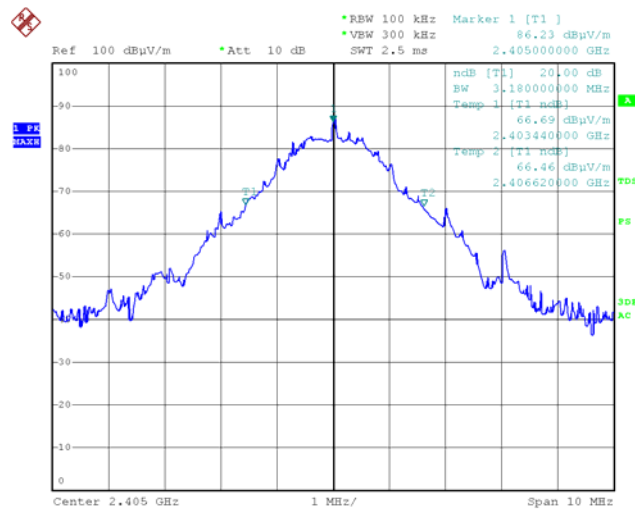
### 9.3. Test Results

**PASSED.**

The testing data was attached in the next pages.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2405	3.18
Middle	2445	3.12
High	2480	3.20

#### 20 dB Bandwidth (2405MHz)



Date: 20.NOV.2012 17:23:33

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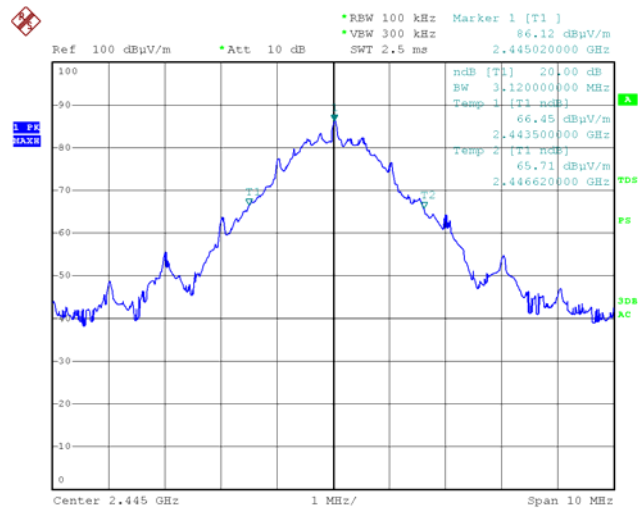
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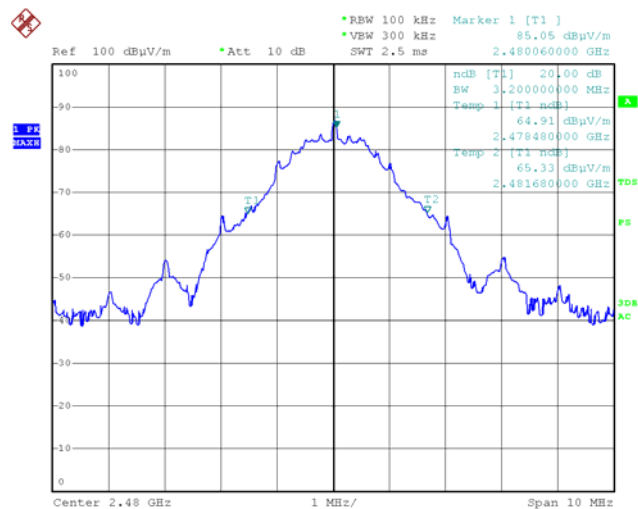
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**20 dB Bandwidth (2445MHz)**

Date: 20.NOV.2012 17:21:49

**20 dB Bandwidth (2480MHz)**

Date: 20.NOV.2012 17:25:33

**10.Deviation to test specifications**

[ NONE]

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