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## Test Report

<b>Applicant</b>	Bear River International LLC
<b>Address</b>	1011 West 400 North, Suite 110, Logan, Utah 84321, United States
<b>FCC ID Number</b>	FCC ID: ZEzb1441T
<b>Brand Name(s)</b>	None
<b>Model Number(s)/Item Number(s)</b>	B1441
<b>Product Description</b>	433 MHz Wireless Device - TX
<b>Operating Frequency</b>	433.929 MHz
<b>Rules/Standards</b>	Part 15.209 of the FCC Rules
<b>Received Date</b>	10th April, 2013
<b>Tested Date</b>	11th April, 2013
<b>Approved by</b>	Dick Chan (Director of Gakkiku)
<b>Tested by</b>	<i>Lahm peng</i> Lahm Peng (Engineer of SEM.Test)
<b>Signed by</b>	 Jandy So (Manager of SEM.Test)
<b>Report Number</b>	GKK201304100C
<b>Test Results</b>	<input checked="" type="checkbox"/> PASSED <input type="checkbox"/> FAILED

**GENERAL**

The report is written by Gakkiku Technology Company. The tested device complies with the general approval requirements of the FCC Rules and the Industry Canada as identified in this test report.

**TEST LOCATION**

The tested device was tested at the test site of the SEM.Test Compliance Service Co., Ltd., 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, 518101, Guangdong, China. The FCC Recognized 2.948 Listed Test Firm Registration Number is 994117. The Industry Canada IC OATS Filing Number/Assigned Code is 7673A.

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## 1. GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Bear River International LLC  
Address of applicant: 1011 West 400 North, Suite 110,  
Logan, Utah 84321, United States

Manufacturer: Bear River International LLC  
Address of manufacturer: 1011 West 400 North, Suite 110,  
Logan, Utah 84321, United States

#### General Description of EUT

Item	Description
Product Description:	433 MHz Wireless Device - TX
Brand Name(s):	None
Model Number(s)/Item Number(s):	B1441
Power Source:	DC 3V CR2032-Size Battery
Frequency Range:	433-434 MHz
Antenna Type:	Fixed Antenna
For more information refer to the circuit diagram form and the user's manual.	

*The test data is gathered from a production sample, provided by the manufacturer.*

### 1.2 Test Standards

The following report is prepared on behalf of the Bear River International LLC in accordance with Part 15 Subpart C, Part 15.209, 15.205 & 15.203 of the FCC Rules.

The objective is to determine compliance with Part 15 Subpart C, Part 15.209, 15.205 & 15.203 of the FCC Rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

### 1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

## 1.4 Test Methodology

All measurements contained in this report were conducted with ANSI Standard C63.4-2009, American National Standard Institute for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

## 1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

## 1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/ Unshielded	With Core/ Without Core
/	/	/	/

## 2. SUMMARY OF TEST RESULTS

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FCC RULES	DESCRIPTION OF TEST	RESULT
Part 15.203	Antenna Requirement	Compliant
Part 15.205	Restricted Band of Operation	Compliant
Part 15.209	Radiated Emission	Compliant
Part 15.209	Out of Band Emission	Compliant

### **3. Part 15.203 - ANTENNA REQUIREMENT**

#### **3.1 Standard Applicable**

According to Part 15.203 of the FCC Rules, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **3.2 Test Result**

This product has a fixed antenna, fulfill the requirement of this section.

## 4. Part 15.209 & 15.205 - RADIATED EMISSION

### 4.1 Measurement Uncertainty

Based on NIS 81, the Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 Standard Applicable

According to Part 15.209 of the FCC Rules, the field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Part 15.35 of the FCC Rules for limiting peak emissions apply.

According to Part 15.209 of the FCC Rules, the field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Part 15.209 of the FCC Rules, whichever permits the higher emission levels. The field strength of any emissions removed by more than 10 kHz from the band edges shall not exceed the general radiated emission limits in Part 15.209 of the FCC Rules. All signals exceeding 20 microvolts/meter at 3 meters shall be reported in the application for certification.

### 4.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-03-28	2014-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2013-03-28	2014-03-27
Positioning Controller	C&C	CC-C-1F	N/A	2013-03-28	2014-03-27
RF Switch	EM	EMSW18	SW060023	2013-03-28	2014-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2013-03-28	2014-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-03-28	2014-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-02-25	2014-02-24
Horn Antenna	ETS	3117	00086197	2013-02-25	2014-02-24
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-02-25	2014-02-24

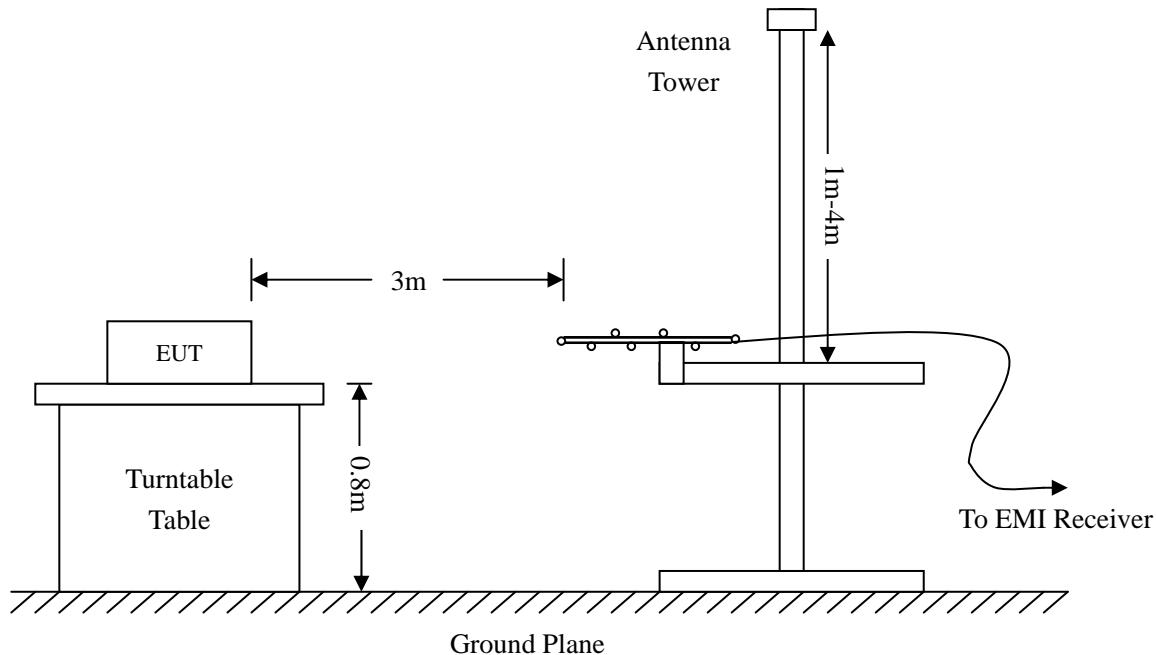
**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

#### 4.4 Test Procedure

The setup of EUT is according with per ANSI Standard C63.4-2009 measurement procedure. The specification used was with the limits of Part 15.209 & 15.205 of the FCC Rules.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:

RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:

RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

#### **4.5 Corrected Amplitude & Margin Calculation**

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Part 15. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit of Part 15}$$

#### **4.6 Environmental Conditions**

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

## 4.7 Summary of Test Results/Plots

According to the data below, the standards of Part 15.209 & 15.205 of the FCC Rules, and had the worst margin of:

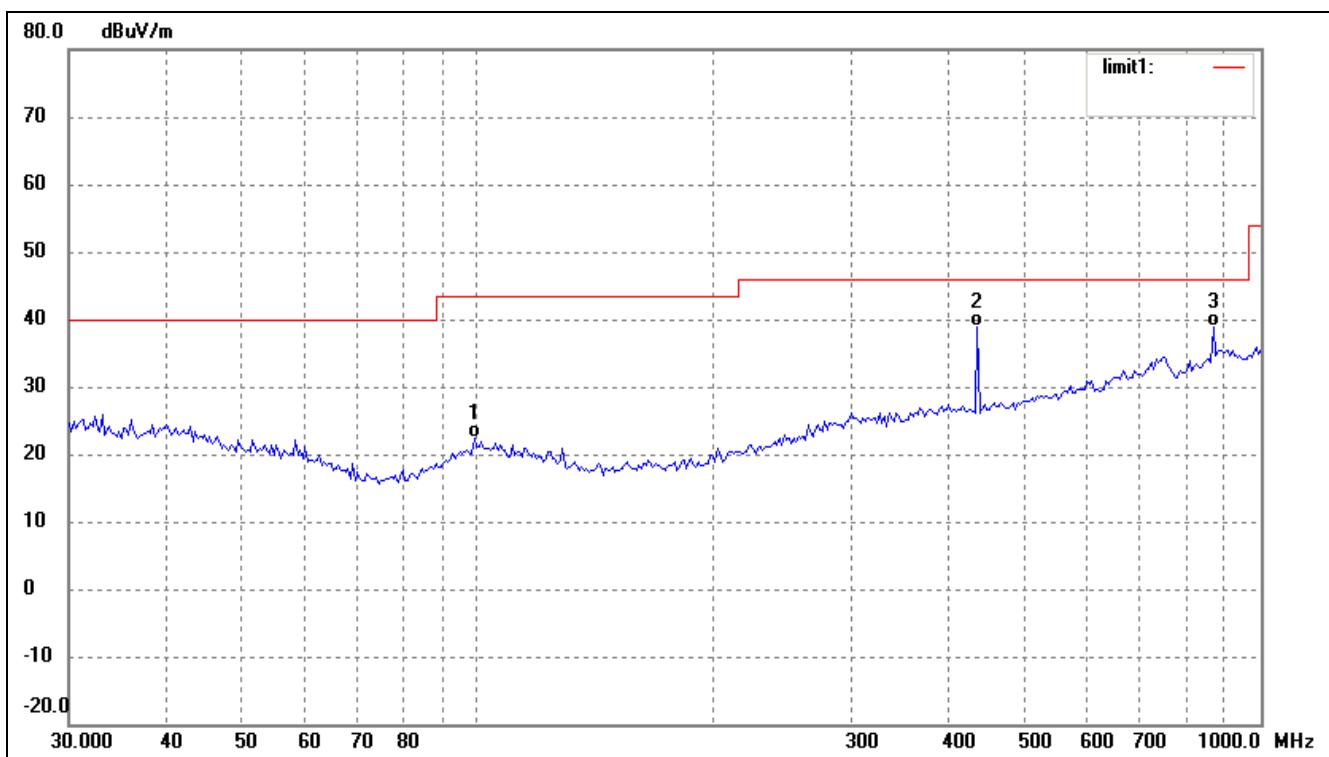
**-7.23 dB $\mu$ V at 433.9291 MHz in the Horizontal polarization, 30 MHz to 5 GHz, 3 Meters**

**Note:** This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

*Test Mode: Transmitting*

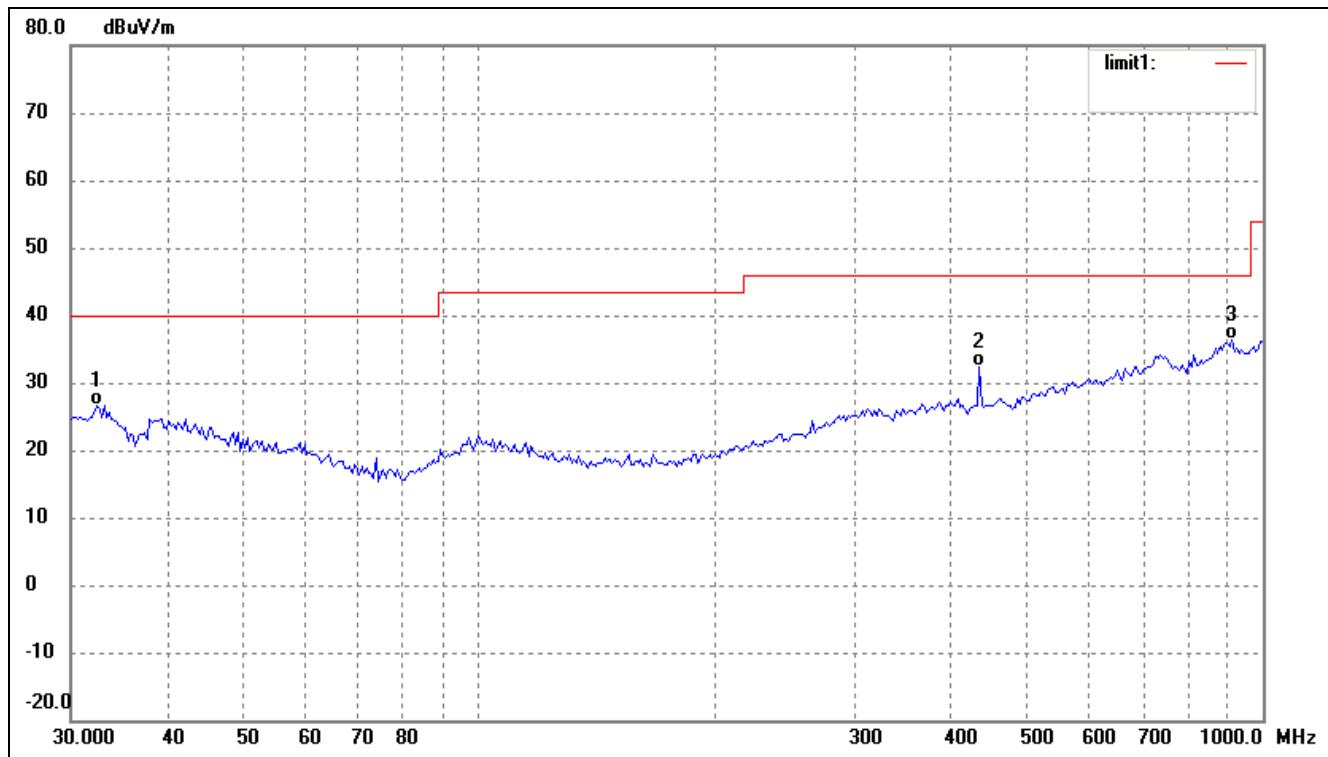
### Plot of Radiated Emissions Test (30 MHz to 1 GHz)

*Horizontal*



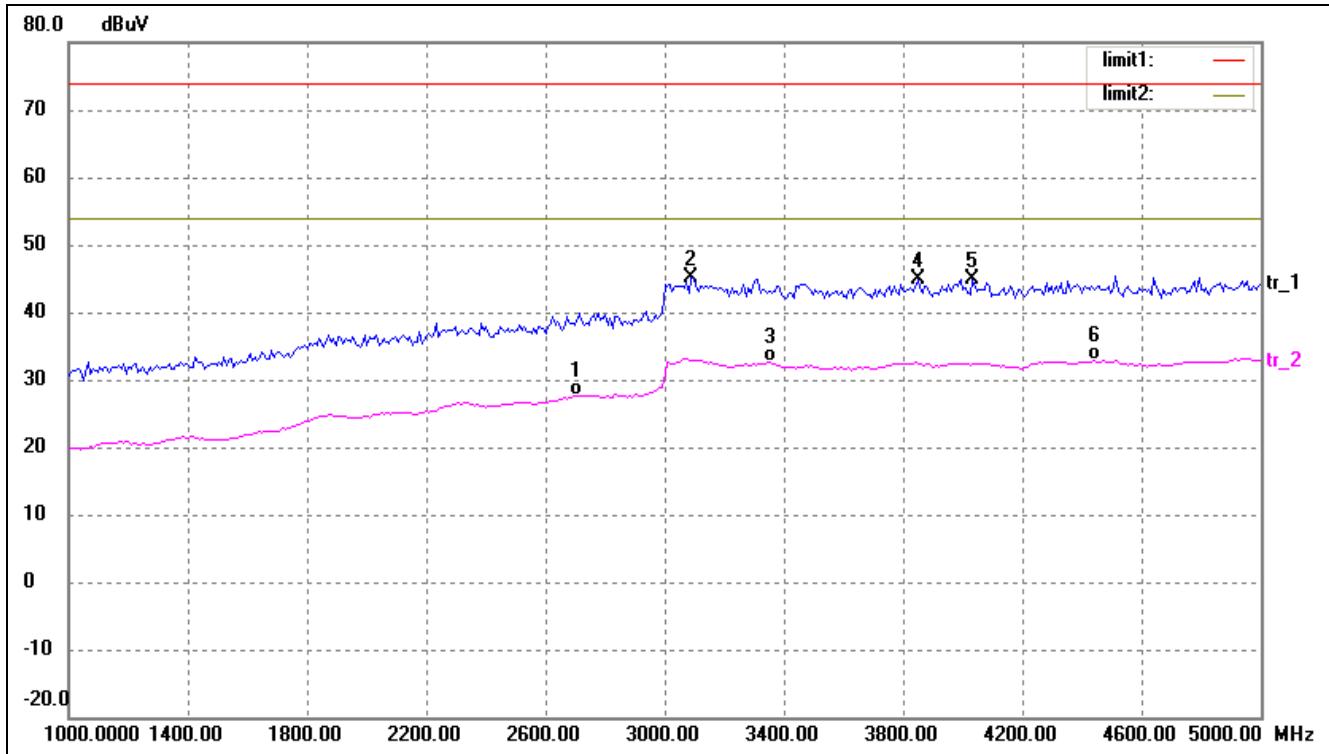
No.	Frequency (MHz)	Reading (dB $\mu$ V/m)	Correct Factor(dB)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	98.8326	15.72	6.55	22.27	43.50	-21.23	263	100	QP
2	433.9291	27.67	11.10	38.77	46.00	-7.23	54	100	QP
3	867.8582	20.22	18.54	38.76	46.00	-7.24	244	100	QP

*Note: Emissions attenuated more than 20 dB below the permissible value are not reported.*

*Vertical*

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	18.24	8.44	26.68	40.00	-13.32	255	100	QP
2	433.9291	21.38	11.10	32.48	46.00	-13.52	54	100	QP
3	912.8620	17.35	18.93	36.28	46.00	-9.72	79	100	QP

*Note: Emissions attenuated more than 20 dB below the permissible value are not reported.*

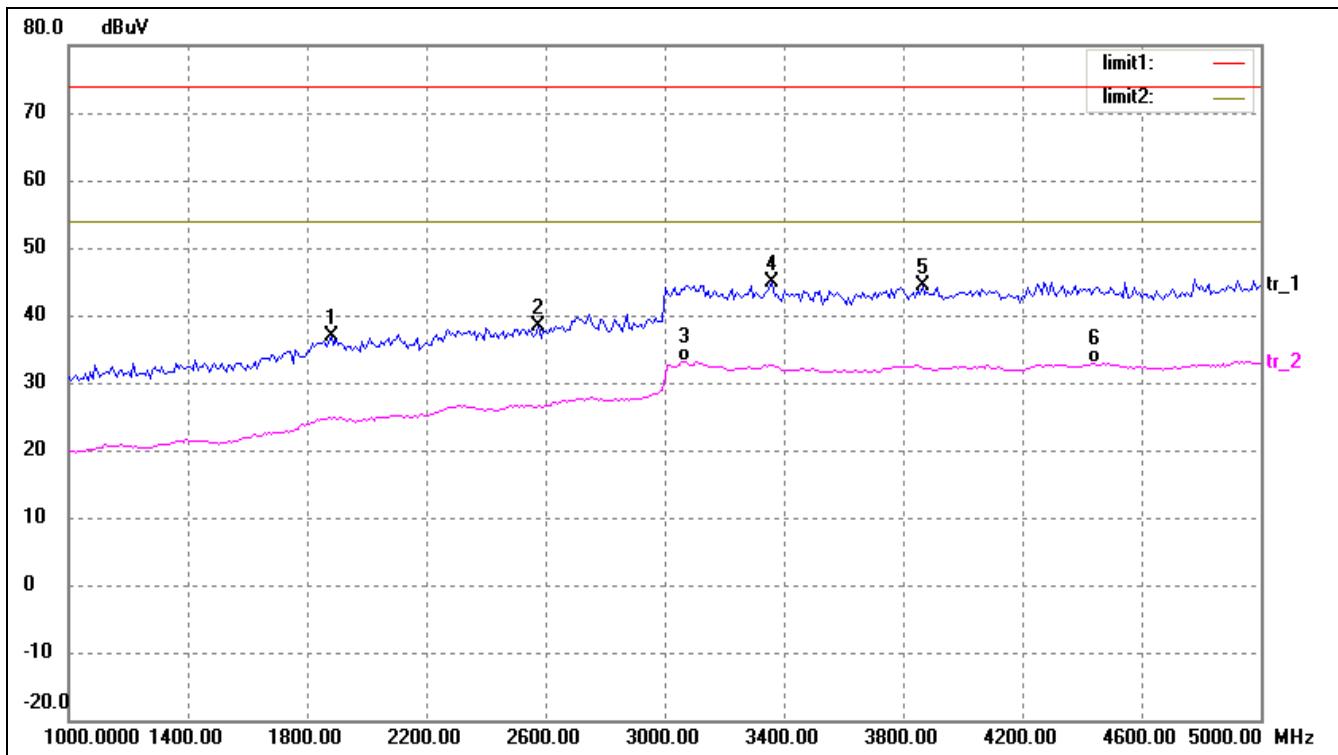
**Plot of Radiated Emissions Test (1 GHz to 5 GHz)***Horizontal*

No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	2696.000	34.32	-6.75	27.57	54.00	-26.43	125	100	Average
3	3352.000	38.68	-6.00	32.68	54.00	-21.32	30	100	Average
6	4440.000	37.76	-4.97	32.79	54.00	-21.21	54	100	Average

*Note: Emissions above 1GHz are only the base noise, and the average spurious emissions are all below the fundamental.*

Emissions attenuated more than 20 dB below the permissible value are not reported.

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Degree (°)	Height (cm)	Remark
3	3064.000	39.34	-6.19	33.15	54.00	-20.85	34	100	Average
6	4440.000	37.91	-4.97	32.94	54.00	-21.06	127	100	Average

*Note: Emissions above 1GHz are only the base noise, and the average spurious emissions are all below the fundamental.*

*Emissions attenuated more than 20 dB below the permissible value are not reported.*

**Conclusion:** Test was carried out with frequency range from 30 MHz to the tenth harmonic of the Fundamental and found the harmonics or unwanted emissions value less than the fundamental. It fits to the requirements of FCC 15.209(c).

## 5. Part 15.209 - OUT OF BAND EMISSIONS

### 5.1 Standard Applicable

According to Part 15.209 of the FCC Rules, the field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Part 15.209 of the FCC Rules, whichever permits the higher emission levels. The field strength of any emissions removed by more than 10 kHz from the band edges shall not exceed the general radiated emission limits in Part 15.209 of the FCC Rules. All signals exceeding 20 microvolts/meter at 3 meters shall be reported in the application for certification.

### 5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-03-28	2014-03-27
Attenuator	ATTEN	ATS100-4-20	/	2013-03-28	2014-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2013-03-28	2014-03-27
Positioning Controller	C&C	CC-C-1F	N/A	2013-03-28	2014-03-27
RF Switch	EM	EMSW18	SW060023	2013-03-28	2014-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2013-03-28	2014-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-03-28	2014-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-02-25	2014-02-24
Horn Antenna	ETS	3117	00086197	2013-02-25	2014-02-24
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-02-25	2014-02-24

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 5.3 Test Procedure

As the radiation test, set the RBW=1kHz VBW=3kHz, observed the outside band of 433MHz to 434MHz, than mark the higher-level emission for comparing with the FCC Rules.

A small sample of the transmitter output was fed into the spectrum analyzer and the above photo was taken. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 5 kHz per division.

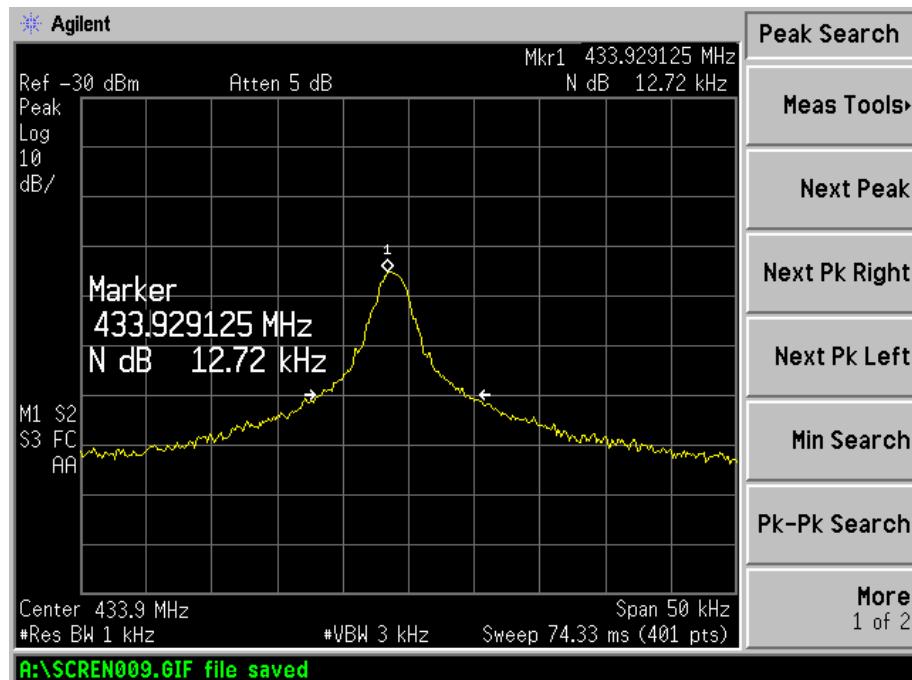
## 5.4 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1022 mbar

## 5.5 Summary of Test Results/Plots

**Test Result: Passed**

**Refer to attached Plot of Occupied Bandwidth Test**



\*\*\*\*\* END OF REPORT \*\*\*\*\*