

FCC PART 15.231

TEST REPORT

For

**NINGBO BAIHUANG ELECTRIC APPLIANCES  
CO., LTD.**

No.180, Yanshan Rd, Huximen, Heng He Town, Cixi, Ningbo, CHINA

**FCC ID: Q92-BH-R**

Report Type: Original Report	Product Type: Remote Control Transmitter
<b>Test Engineer:</b> Matt Yao	<i>Matt Yao</i>
<b>Report Number:</b> RKS150918001-00B	
<b>Report Date:</b> 2015-10-09	
<b>Reviewed By:</b> Jesse Huang EMC Manager	<i>Jesse Huang</i>
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	



**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The NINGBO BAIHUANG ELECTRIC APPLIANCES CO., LTD.'s product, model number: BH-R (FCC ID: Q92- BH-R) (or the "EUT") in this report was a Remote Control Transmitter, which was measured approximately:83mm\*40mm\*16mm,the input rated voltage :DC 12V, the highest operating frequency: 433.92MHz.

*Note: The product' s series model number: 9907-Remote-R They have the same appearance, structure, PCB, material and function to the testing products , and only are different for model name.*

*\*All measurement and test data in this report was gathered from production sample serial number: 20150916001 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2015-09-16.*

### Objective

This test report is prepared on behalf of NINGBO BAIHUANG ELECTRIC APPLIANCES CO., LTD. All the test measurements were performed according to the measurement procedure described in ANSI C63.10-2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

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

No related submittal(s)

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

## **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Luke Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4 .

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

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### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

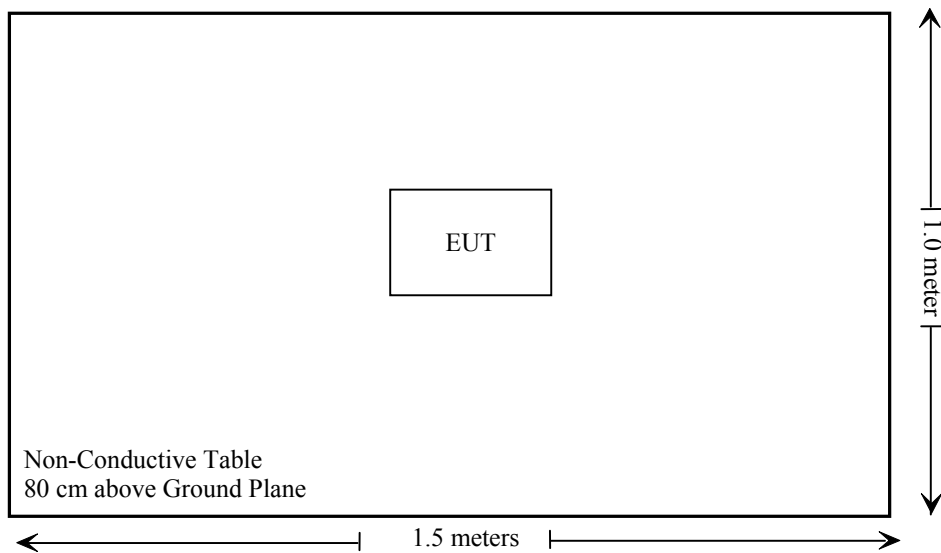
### EUT Exercise Software

No special accessories was used

### Equipment Modifications

No modification on the EUT.

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§ 15.203	Antenna Requirement	Compliance
§ 15.207 (a)	Conducted Emissions	Not Applicable
§ 15.205, § 15.209, § 15.231 (b)	Radiated Emissions	Compliance
§ 15.231 (c)	20dB Bandwidth	Compliance
§ 15.231 (a)	Deactivation time	Compliance

Not Applicable: The EUT is powered by battery only.

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

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.

### **Antenna Connected Construction**

The EUT has a PCB antenna arrangement, which was permanently attached; fulfill the requirement of this section. Please refer to EUT photos.

**Result:** Compliant.

## **FCC § 15.205, § 15.209, § 15.231 (b) - RADIATED EMISSIONS**

### **Applicable Standard**

FCC § 15.205, § 15.209, § 15.231 (b)

According to FCC § 15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

<b>Fundamental frequency (MHz)</b>	<b>Field Strength of Fundamental (Microvolts /meter)</b>	<b>Field Strength of spurious emissions ((Microvolts /meter)</b>
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 12500
Above 470	12500	12500

\*Linear interpolations.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the bandedges.

### **Measurement Uncertainty**

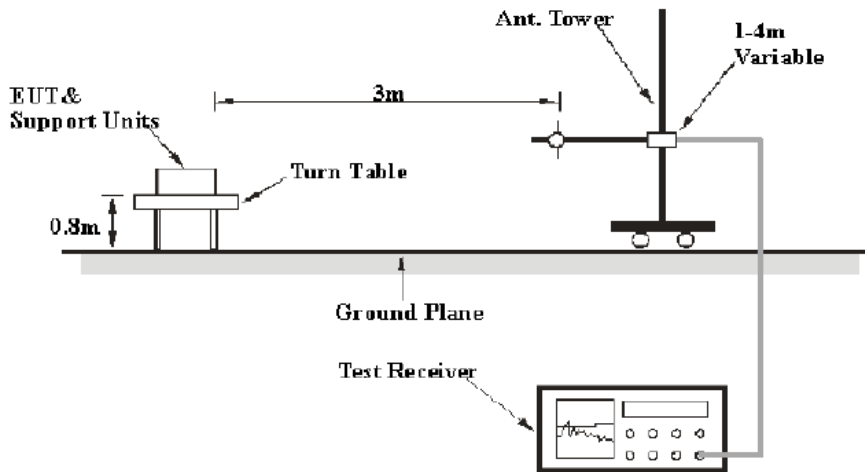
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report.

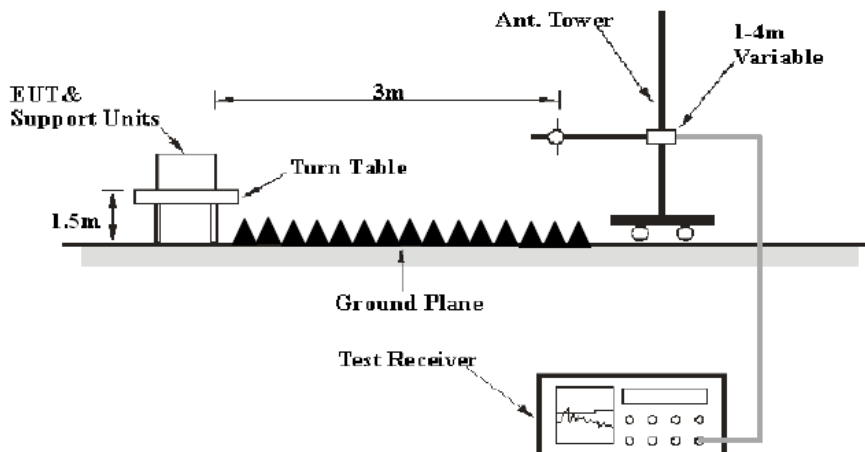


**EUT Setup**

**Below 1 GHz:**



**Above 1 GHz:**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

**EMI Test Receiver Setup**

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000MHz	100 kHz	300 kHz	100kHz	QP
1000 MHz – 5000 MHz	1MHz	3MHz	/	PK

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak detection mode above 1 GHz.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2015-9-16	2016-9-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-5-20	2016-5-19
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2014-11-7	2015-11-6
ETS	Horn Antenna	3115	6229	2014-11-7	2015-11-6
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2014-11-4	2015-11-3
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-9-16	2016-9-16
R&S	Auto test Software	EMC32	V 09.10.0	-	-

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the CFR47 §15.205, §15.209, § 15.231 (e), with the worst margin reading of:

**2.63 dB at 433.92 MHz in the horizontal polarization**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Matt Yao on 2015-10-08  
 Test mode: Transmitting

**Field Strength (Peak)**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB µ V/m)	FCC Part 15.231/205/209		
	Reading (dB µ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)	Comment
433.92	90.35	PK	345	2.0	H	-7.3	83.05	100.80	17.75	Fundamental
433.92	77.51	PK	147	2.0	V	-7.3	70.21	100.80	30.59	Fundamental
867.84	52.17	PK	255	1.0	H	-0.7	51.47	80.79	29.32	Harmonic
867.84	33.39	PK	136	1.0	V	-0.7	32.69	80.79	48.10	Harmonic
1301.76	45.21	PK	250	2.0	H	-3.2	42.01	74.00	31.99	Harmonic
1301.76	33.42	PK	121	2.0	V	-3.2	30.22	74.00	43.78	Harmonic

**Calculate result:**

Field Strength of Average Emission							
Frequency (MHz)	Peak Measurement @3m (dB µ V/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dB µ V/m)	FCC Part 15.231/205/209		
					Limit (dB µ V/m)	Margin (dB)	Comment
433.92	83.05	H	-4.88	79.17	80.80	2.63	Fundamental
433.92	70.21	V	-4.88	65.33	80.80	15.47	Fundamental
867.84	51.47	H	-4.88	46.59	60.79	14.20	Harmonic
867.84	32.69	V	-4.88	27.81	60.79	32.98	Harmonic
1301.76	42.01	H	-4.88	37.13	54.00	16.87	Harmonic
1301.76	30.22	V	-4.88	25.34	54.00	28.66	Harmonic

Note:

Calculate Average value based on Duty Cycle correction factor:

$$T_{on} = T_{on1}N_1 + T_{on2}N_2 + \dots + T_{onn}N_n$$

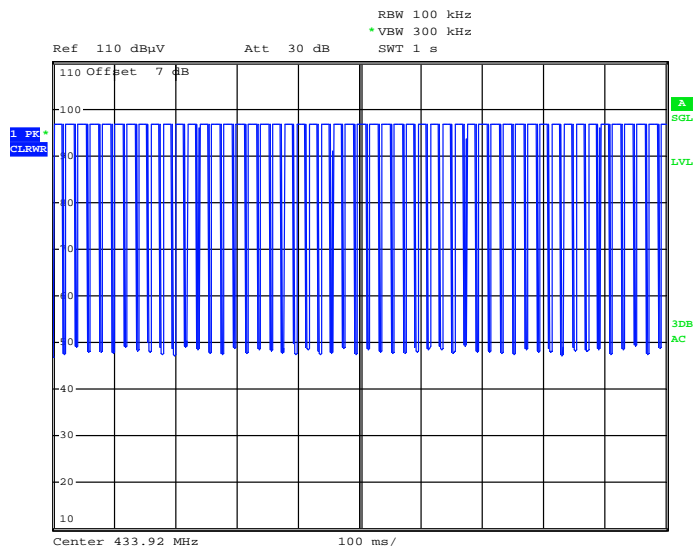
$$= 0.6 \text{ ms} * 13 + 0.3 \text{ ms} * 12 = 11.4 \text{ ms}$$

$$T_p = 20 \text{ ms}$$

$$\text{Duty cycle factor} = 20 * \log(T_{on}/T_p) = 20 * \log(11.4\text{ms}/20\text{ms}) = -4.88 \text{ dB}$$

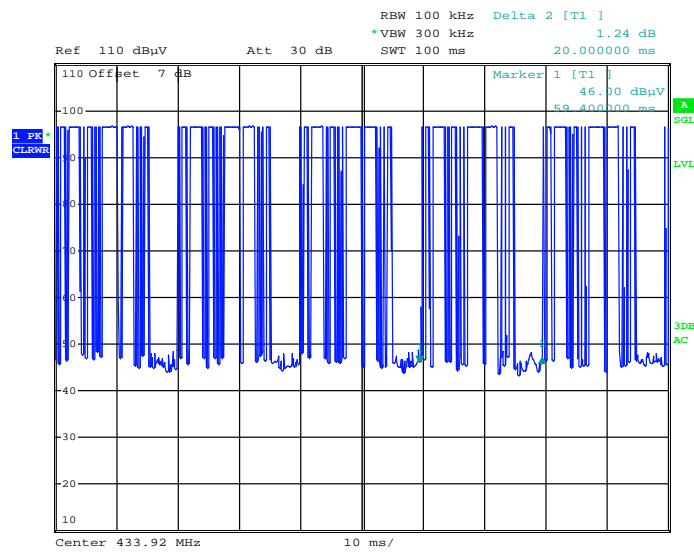
$$\text{Average} = \text{Peak} + \text{Duty Cycle factor}$$

### Duty Cycle 1



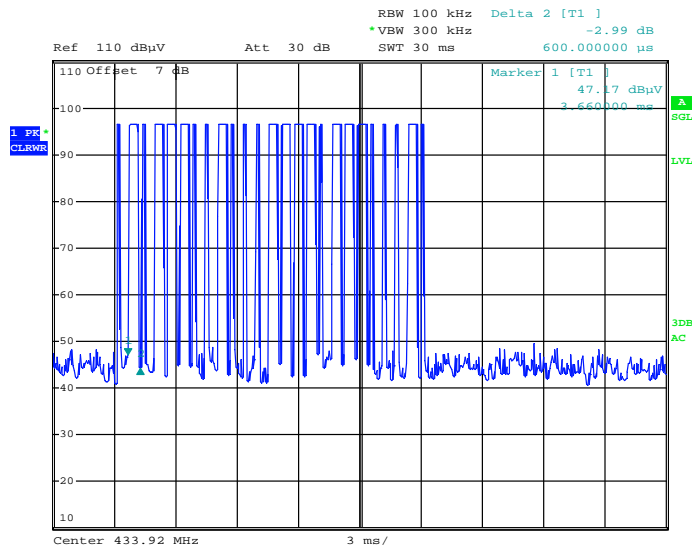
Date: 8.OCT.2015 11:44:12

### Duty Cycle 2



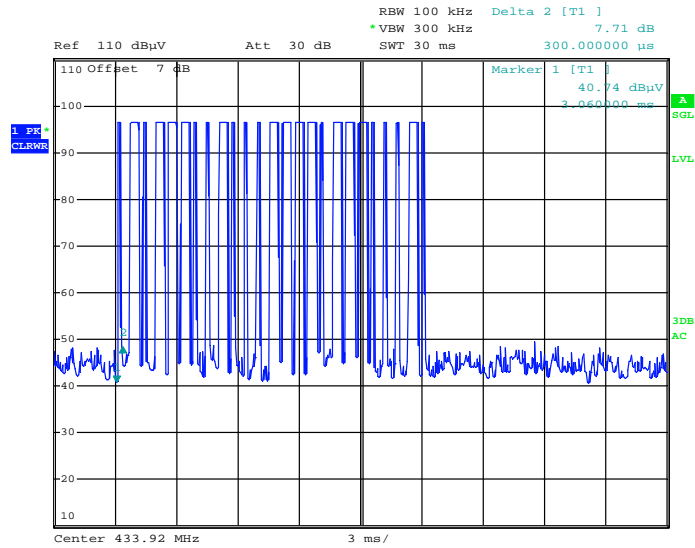
Date: 8.OCT.2015 11:44:58

### Duty Cycle 3



Date: 8.OCT.2015 11:46:15

### Duty Cycle 4



Date: 8.OCT.2015 11:45:59

**FCC § 15.231(c) – 20 dB EMISSION BANDWIDTH**

**Applicable Standard**

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**Test Procedure**

With the EUT’s antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-5-20	2016-5-19

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Matt Yao on 2015-10-08*

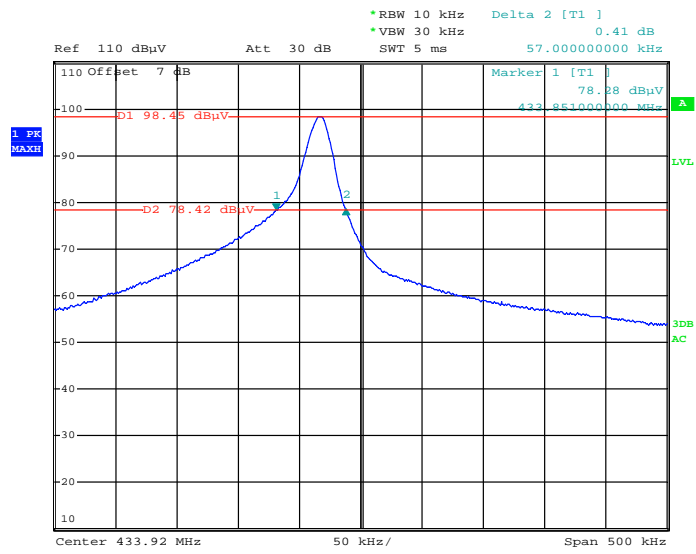
*Test Mode: Transmitting*

*Please refer to following table and plot.*

Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	57	1084.8	Pass

Note: Limit = 0.25% \* center frequency = 0.25% \* 433.92 MHz = 1084.8 kHz  
 20dB bandwidth = 57 kHz < 1084.8 kHz

### 20 dB Emission Bandwidth



Date: 8.OCT.2015 11:47:25

**FCC § 15.231(a)(2) - DEACTIVATION TESTING**

**Applicable Standard**

Per FCC § 15.231(a) (2), a transmitter activated automatically shall cease transmission within 5 seconds after activation.

**Test Procedure**

1. Set center frequency of spectrum analyzer=operating frequency.
2. Set the spectrum analyzer as RBW=100kHz, VBW=100kHz, Span=0Hz.
3. Repeat above procedures until all frequency measured was complete.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2014-11-4	2015-11-3

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements, traceable to traceable to National Primary Standards and International System of Units (SI).

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Matt Yao on 2015-10-08.*

*Test Mode: Transmitting*

**Test Result:** Compliant, please refer to following plot

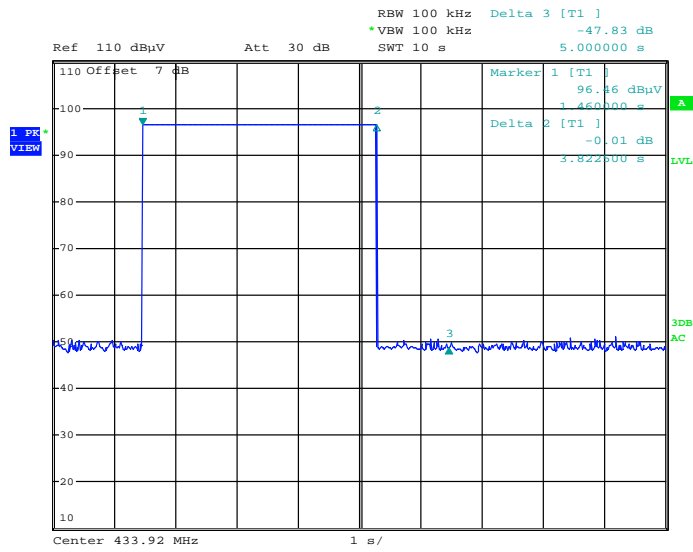
Transmission period	Limit	Result
3.82 s	< 5 s	Pass

Note:

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation



### Transmission time



Date: 8.OCT.2015 11:49:16

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