

# ***FCC TEST REPORT***

**FCC ID** : ZIFIL-1

**Applicant** : **Foshan Ideal Lighting & Crafts Co., Ltd.**

**Address of Applicant** : Dajiwei Industrial Region, Nanhai Yanbuhexi Yanbian,  
Foshan, Guangdong, China

**Equipment Under Test (EUT) :**

Product description : Wireless Controller

Model No. : IL-1

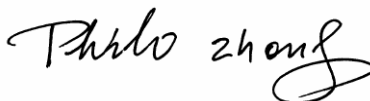
**Standards** : FCC 15 Subpart C Paragraph 15.231

**Date of Test** : May.16,2011

**Test Engineer** : Olic huang/ Engineer



**Reviewed By** : Philo zhong/Manager



PERPARED BY:

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### 3 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Periodic operation	FCC PART 15: 2008	ANSI C63.4: 2003	<b>Note</b>	PASSED
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2008	ANSI C63.4: 2003	N/A	PASSED
20dB BandWidth	FCC PART 15: 2008	ANSI C63.4: 2003	N/A	PASSED
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2008	ANSI C63.4: 2003	N/A	N/A

**Note:** denote that for more details, please refer to the section Periodic operation and Band Edge.

## **4 General Information**

### **4.1 Client Information**

Applicant: Foshan Ideal Lighting & Crafts Co., Ltd.  
Address: Dajiwei Industrial Region, Nanhai Yanbuhexi Yanbian,  
Foshan, Guangdong, China

Manufacturer: Foshan Ideal Lighting & Crafts Co., Ltd.  
Address: Dajiwei Industrial Region, Nanhai Yanbuhexi Yanbian,  
Foshan, Guangdong, China

### **4.2 General Description of E.U.T.**

Product description: Wireless Controller  
Model No.: IL-1

### **4.3 Details of E.U.T.**

Power Supply: DC Battery 12.0V, 10mA

### **4.4 Description of Support Units**

The EUT has been tested as an independent unit.

### **4.5 Standards Applicable for Testing**

The customer requested FCC tests for a Wireless Controller. The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31, Paragraph 15.33, Paragraph 15.35.

#### 4.6 Test Facility

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

- **IC – Registration No.:IC7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration IC7760A, Aug. 03, 2010.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. 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 880581, June 24, 2008. compliance

#### 4.7 Test Location

All Emissions tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen 518105, China.

## 5 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY451149 43	W2008001	9k-26.5GHz	Aug-03-10	Aug-02-11	Wws200 81596	±1dB
Trilog Broadband Antenne	SCHWARZB ECK MESS-ELEKTROM/ VULB9163	336	W2008002	30-3000 MHz	Aug-03-10	Aug-02-11		±1dB
Broad-band Horn Antenna	SCHWARZB ECK MESS-ELEKTROM/ BBHA 9120D(1201)	667	W2008003	1-18GHz	Aug-03-10	Aug-02-11		f<10 GHz: ±1dB 10GHz<f<18 GHz: ±1.5dB
Broadband Preamplifier	SCHWARZB ECK MESS-ELEKTROM/ BBV 9718	9718-148	W2008004	0.5-18GHz	Aug-03-10	Aug-02-11		±1.2dB
10m Coaxial Cable with N-male Connectors	SCHWARZB ECK MESS-ELEKTROM/ AK 9515 H	-	-	-	Aug-03-10	Aug-02-11		-
10m 50 Ohm Coaxial Cable with N-plug	SCHWARZB ECK MESS-ELEKTROM/ AK 9513				Aug-03-10	Aug-02-11		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSP0/ SP-14C				N/A	N/A		
Test Receiver	ROHDE&SC HWARZ/ ESPI	101155	W2005001	9k-3GHz	Aug-03-10	Aug-02-11	Wws200 80942	±1dB
EMI Receiver	Beijingkehuan	KH3931		9k-1GHz	Aug-03-10	Aug-02-11		
Two-Line V-Network	ROHDE&SC HWARZ/ ENV216	100115	W2005002	50Ω/50μH	Aug-03-10	Aug-02-11	Wws200 80941	±10%
Absorbing Clamp	ROHDE&SC HWARZ/ MDS-21	100205	W2005003	impandance50 Ω loss: 17 dB	Aug-03-10	Aug-02-11	Wws200 80943	±1dB
10m 50 Ohm Coaxial Cable with	SCHWARZB ECK MESS-ELEKTROM/ AK 9514				Aug-03-10	Aug-02-11		

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
N-plug								
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V07451 03095	W2008012	Power: 2000VA Vol-range: 0-300V Freq_range: 10-80Hz	Aug-03-10	Aug-02-11	Wwd200 81185	Voltage distinguish: 0.025% Power_freq distinguish: 0.02Hz
Power Source	Em Test AG/Switzerland/ ACS 500	V07451 03096	W2008013	Vol-range: 0-300V Power_freq: 10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerland/DITO	V07451 03094	W2008005	Contact discharge: 500V-10KV Air discharge: 500V-16.5KV	Aug-03-10	Aug-02-11	Wwc200 82400	7.5A current will be changed in $V_m=1.5V$
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range: 9K-1GHz RF voltage: -60 dBm-+10dBm	Aug-03-10	Aug-02-11	Wws200 81890	Power_freq distinguish: 0.1Hz RFelectricity distinguish 0.1 B
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug-03-10	Aug-02-11	Wwc200 82396	150K-80MHz: $\pm 1dB$ 80-230MHz: -2-+3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range: 0.15-1000 MHz	Aug-03-10	Aug-02-11	Wwc200 82397	0.3-400 MHz: $\pm 4dB$ Other freq: $\pm 5dB$
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug-03-10	Aug-02-11	Wws200 81597	
All Modules Generator	SCHAFFNER /6150	34579	W2008006	voltage: 200V-4.4KV Pulse current: 100A-2.2KA	Aug-03-10	Aug-02-11	Wwc200 82401	voltage: $\pm 10\%$ Pulse current: $\pm 10\%$
Capacitive Coupling Clamp	SCHAFFNER / CDN 8014	25311			Aug-03-10	Aug-02-11	Wwc200 82398	-
Signal and Data Line Coupling Network	SCHAFFNER / CDN 117	25627	W2008011	1.2/50 $\mu$ S	Aug-03-10	Aug-02-11	Wwc200 82399	-
AC Power Supply	TONGYUN/ DTDGC-4				Aug-03-10	Aug-02-11	Wws200 80944	-
Exposure Level	Narda Safety TEST	M-0155	w2008022	Test freq range: 1-28	Aug-03-10	Aug-02-11	Wwd200 81191	Test uncertainty:



Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Tester ELT-400	Solutions/2304/03			400kHz				1—120kHz:±1.83%, 120 kHz-400 kHz:±4.06%
Magnetic Field Probe 100cm <sup>2</sup>	Narda Safety TEST Solutions/2300/90.10	M-1070	w2008021	Test freq range: 1—400kHz				Test uncertainly: 1Hz-10Hz: ±16.2%, 10Hz - 120kHz:±2.2%, 120 kHz-400 kHz: ±4.7%
Active Loop Antenna 10kHz-30MHz	Beijing Dazhi / ZN30900A	--	---	10kHz-30MHz	Aug-03-10	Aug-02-11		±1dB
Ipod	Apple	Serial No.:5K85004U3R0	w2008014	---	Aug-03-10	Aug-02-11	---	----

## 6 Conducted Emission Test

Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:	-----
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

### 6.1 Test Equipment

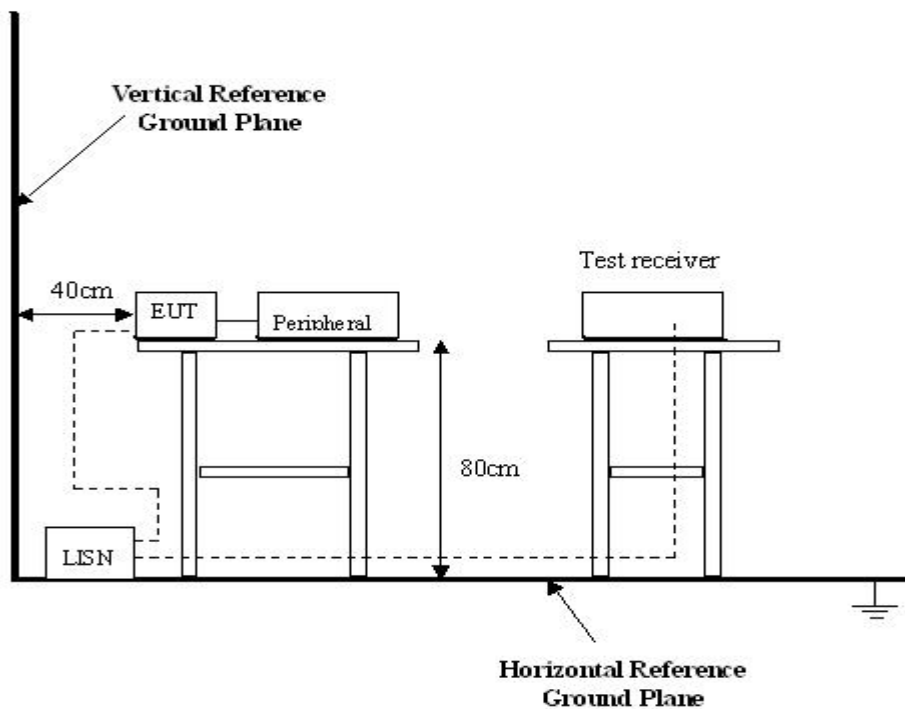
Please refer to Section 5 this report.

### 6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4: 2003. The frequency spectrum from 150kHz to 30MHz was investigated.
2. The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 6.3 Conducted Test Setup

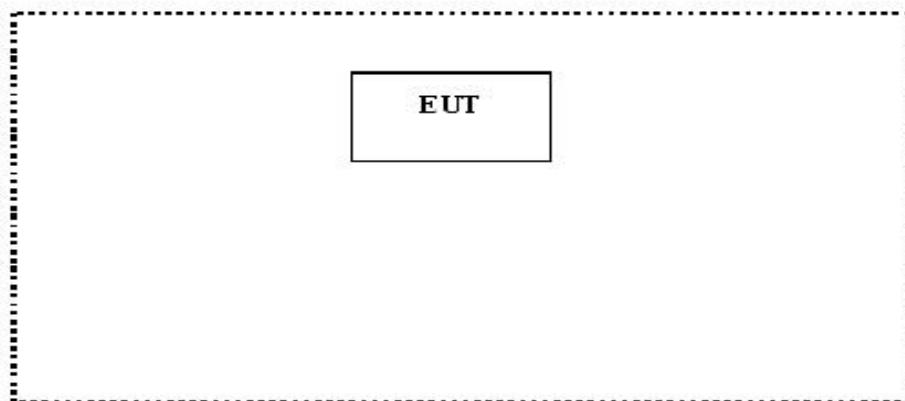
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



### 6.4 EUT Operating Condition

Operating condition is according to ANSI C63.4: 2003.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



## 6.5 Conducted Emission Limits

66-56 dB $\mu$ V between 0.15MHz & 0.5MHz

56 dB $\mu$ V between 0.5MHz & 5MHz

60 dB $\mu$ V between 5MHz & 30MHz

**Note:** In the above limits, the tighter limit applies at the band edges.

## 6.6 Conducted Emission Test Data

Own to the EUT operation with battery, The test not performed.

## 7 Radiation Emission Test

Product Name:	Wireless Controller
Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Test Date:	May.16,2011
Frequency Range:	30MHz to 5GHz
Measurement Distance:	3m

### 7.1 Test Equipment

Please refer to Section 5 this report.

### 7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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.

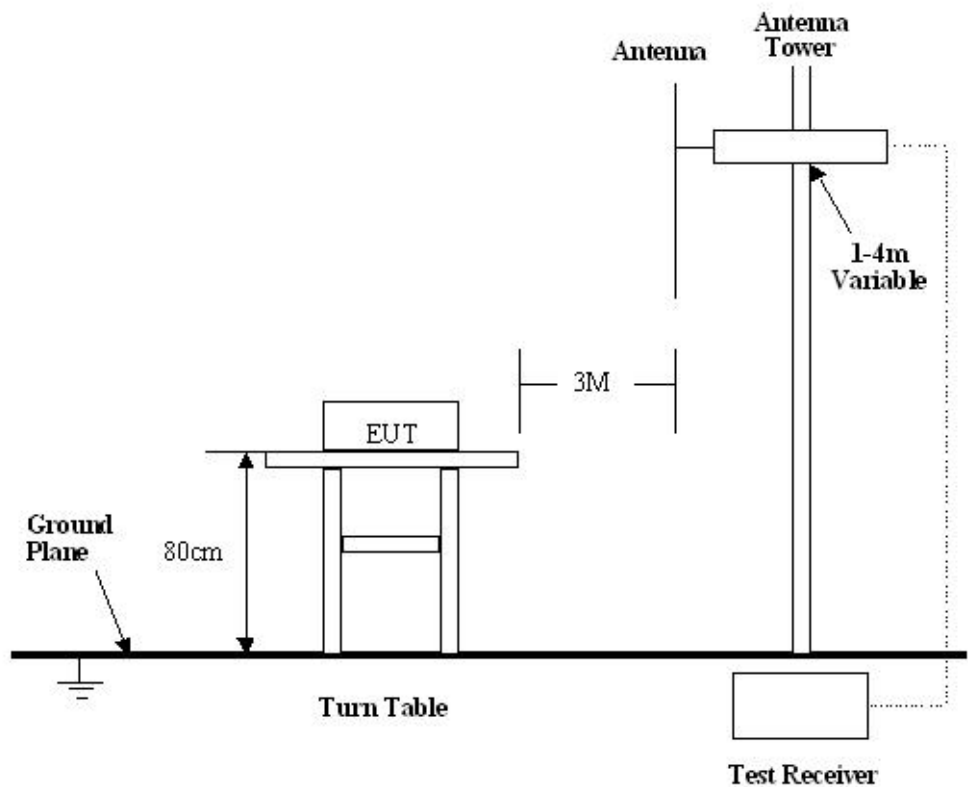
Based on ANSI C63.4: 2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is +2.9 dB.

### 7.3 Test Procedure

1. New battery was installed in the equipment under test for radiated emissions test.
2. This is a handheld device, The radiation emission should be tested under 3-axes position (lying, side and stand). After pre-test, It was found that the worse radiation emission was get at the lying position. so the data show was the lying position only.
3. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
4. All data was recorded in the peak and average detection mode.
5. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.231, Paragraph 15.209 limits.



7.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.231 Rules, the system was tested to 4000 MHz.

Below 1GHz

Start Frequency .....30 MHz  
Stop Frequency .....1000 MHz  
Sweep Speed Auto  
IF Bandwidth .....120 kHz  
Video Bandwidth .....100 kHz  
Quasi-Peak Adapter Bandwidth .....120 kHz  
Quasi-Peak Adapter Mode.....Normal  
Resolution Bandwidth .....100 kHz

Above 1GHz

Start Frequency .....	1GHz
Stop Frequency .....	4GHz
Sweep Speed	Auto
IF Bandwidth .....	120 kHz
Video Bandwidth .....	1 MHz
Quasi-Peak Adapter Bandwidth .....	120 kHz
Quasi-Peak Adapter Mode.....	Normal
Resolution Bandwidth .....	1MHz

7.6 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

7.7 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.231 standards.

7.8 EUT Operating Condition

Same as section 6.4 of this report.

7.9 Radiated Emissions Limit

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40. 66-40. 70. ....	2, 250. ....	225
70-130. ....	1, 250. ....	125
130-174. ....	\1\ 1, 250 to 3, 750	\1\ 125 to 375
174-260. ....	3, 750. ....	375
260-470. ....	\1\ 3, 750 to 12, 500.	\1\ 375 to 1, 250
Above 470. ....	12, 500. ....	1, 250



7.10 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was established by adding  
The meter reading of the spectrum analyer (which is set to read in units of dBuV)  
To the antenna correction factor supplied by the antenna manufacturer. The antenna  
Correction factors are stared in terms of dB.The gain of the pressletor was accounted  
For in the spectrum analyser meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS  
33            20dBuV+10.36dB=30.36dBuV/m @3m

7.10.1 Radiated Emission Test Data

Test Item:	Radiated Emission Test Data
Test Voltage:	DC 12V
Test Mode:	TX On
Temperature:	24 °C
Humidity:	52%RH
Test Result:	PASS
Receiver spurious:	N/A (this product is transmitter only.)

Remark:

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 dettectot with  
1MHz RBW above 1GHz.

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
315	AV	Vertical	64.21	75.62	10.41	1.1	45
315	AV	Horizontal	62.74	75.62	12.88	1.1	90
630	QP	Vertical	39.66	46.00	6.34	1.0	110
945	QP	Vertical	35.88	46.00	10.12	1.1	60
1260	PK	Vertical	36.05	74.00	31.27	1.0	45
1575	PK	Vertical	37.34	74.00	29.98	1.2	90
1890	PK	Vertical	34.28	74.00	33.04	1.1	90
2205	PK	Vertical	36.01	74.00	31.31	1.0	110
2520	PK	Vertical	35.09	74.00	32.23	1.0	110
2835	PK	Vertical	35.87	74.00	31.45	1.0	60
3150	PK	Vertical	36.17	74.00	31.15	1.2	45
630	QP	Horizontal	37.13	46.00	5.74	1.0	10
945	QP	Horizontal	35.54	46.00	16.46	1.1	90
1260	PK	Horizontal	36.89	74.00	37.11	1.2	110
1575	PK	Horizontal	36.78	74.00	37.22	1.1	10
1890	PK	Horizontal	36.01	74.00	37.99	1.2	60
2205	PK	Horizontal	37.90	74.00	36.10	1.1	45
2520	PK	Horizontal	35.66	74.00	38.34	1.2	90
2835	PK	Horizontal	37.90	74.00	36.10	1.1	90
3150	PK	Horizontal	46.36	74.00	27.64	1.2	110
630	QP	Vertical	36.31	46.00	9.69	1.1	120
945	QP	Vertical	34.61	46.00	11.39	1.2	45
1260	AV	Vertical	29.37	54.00	24.63	1.1	100
1575	AV	Vertical	30.66	54.00	23.34	1.2	60
1890	AV	Vertical	27.6	54.00	26.4	1.0	90
2205	AV	Vertical	29.33	54.00	24.67	1.1	120
2520	AV	Vertical	28.41	54.00	25.59	1.1	110
2835	AV	Vertical	29.19	54.00	24.81	1.1	60
3150	AV	Vertical	29.49	54.00	24.51	1.2	45
630	QP	Horizontal	37.13	46.00	5.74	1.2	90
945	QP	Horizontal	35.54	46.00	16.46	1.1	90
1260	AV	Horizontal	30.21	54.00	23.79	1.1	110
1575	AV	Horizontal	30.10	54.00	23.90	1.0	120

1890	AV	Horizontal	29.33	54.00	24.67	1.2	110
2205	AV	Horizontal	31.22	54.00	22.78	1.1	60
2520	AV	Horizontal	28.98	54.00	25.02	1.0	45
2835	AV	Horizontal	31.22	54.00	22.78	1.1	90
3150	AV	Horizontal	39.68	54.00	14.32	1.2	90

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1). For the band 130-174MHz, uV/m at 3 meters =  $56.81818(F) - 6136.3636$ ;

(2). For the band 260-470MHz, uV/m at 3 meters =  $41.6667(F) - 7083.3333$ .

Sample calculation of limit @ 315MHz

$41.6667(315) - 7083.3333 = 6041.677 \text{ uV/m}$

$20\log(6041.677) = 75.62 \text{ dBuV/m limit @ 315MHz}$

## 8 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, 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 to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product has a permanent antenna, fulfill the requirement of this section

## 9 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion, This device does meet the FCC requirement.

**Duty Cycle(%)=**

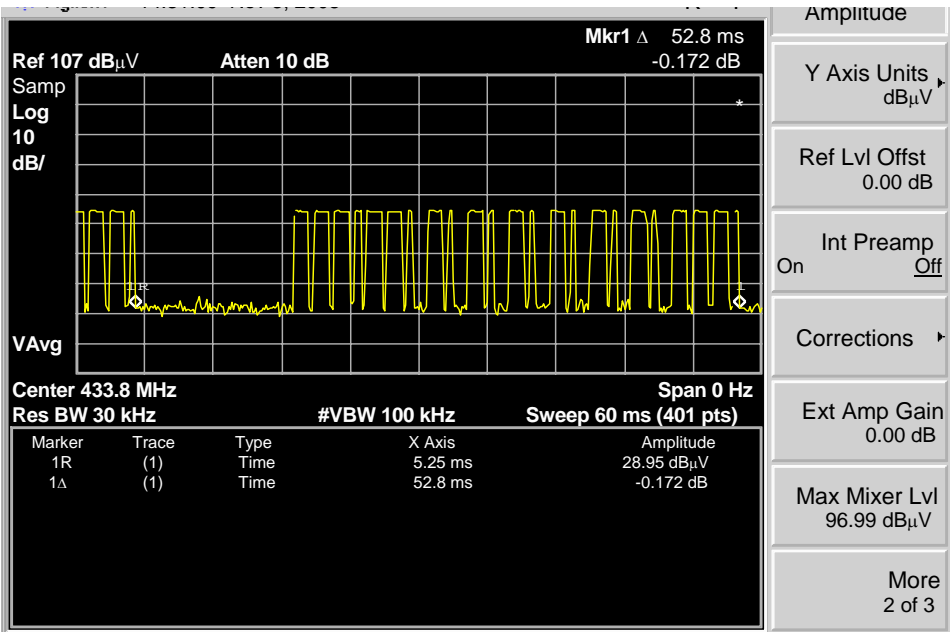
**Total On interval in a complete pulse train/ Length of a complete pulse train \* %**

**Duty Cycle Correction Factor(dB)=20 \* Log10(Duty Cycle(%))**

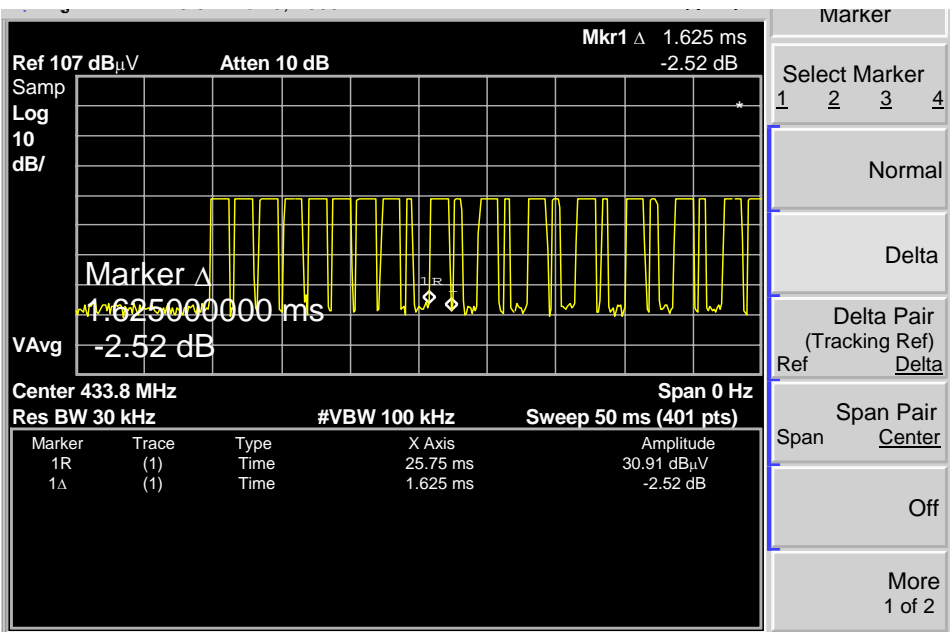
Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Long Pulse	14	1.625	22.75msec
Short Pulse	9	0.625	5.625msec

Total On interval in a complete pulse train	52.8 msec
Length of a complete pulse train	28.375msec
Duty Cycle(%)	53.74%
Duty Cycle Correction Factor(dB)	6.68

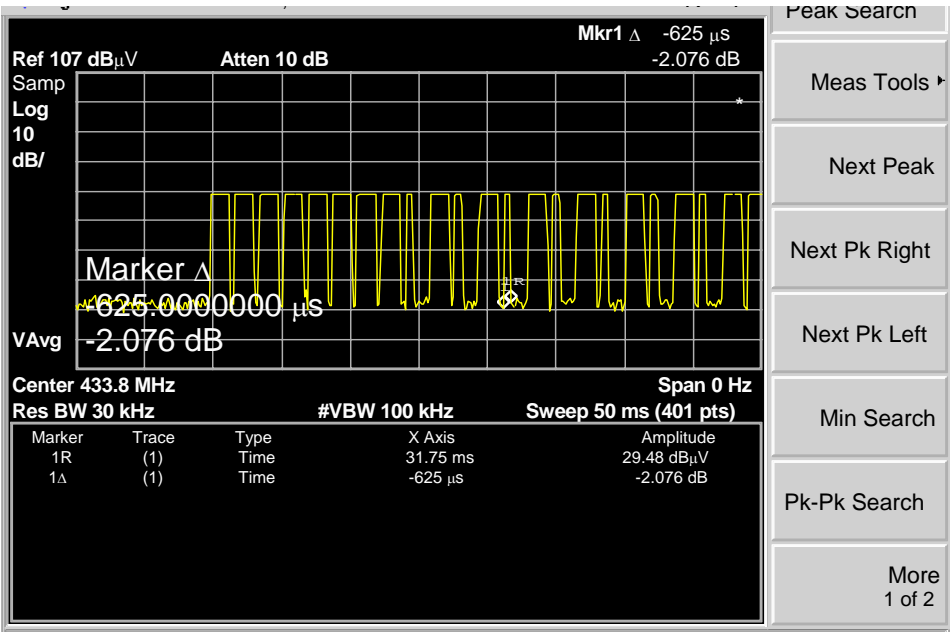
Refer to the duty cycle plot (as below),This device does meet the FCC requirement.  
Length of a complete pulse train:



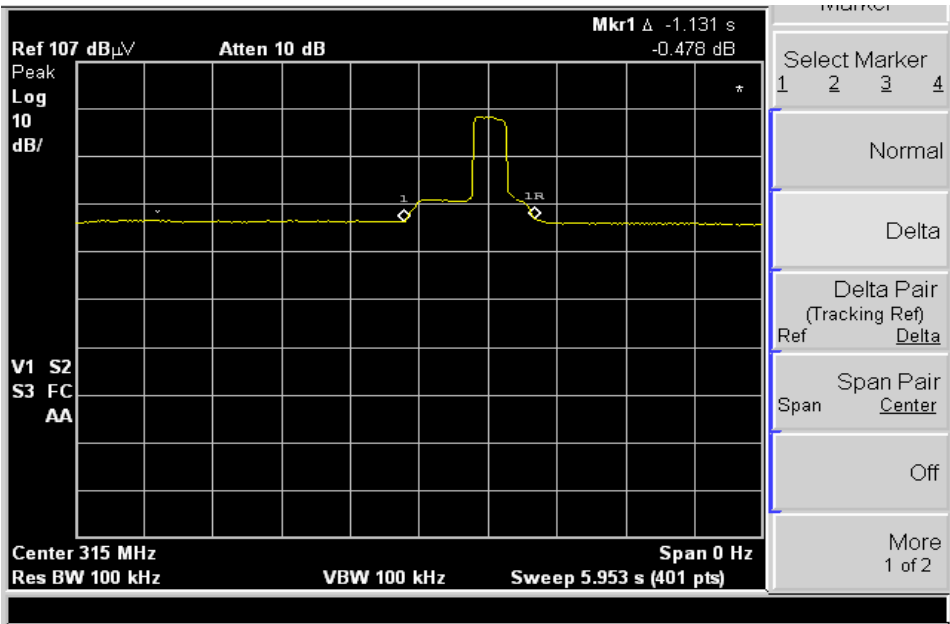
Long Pulse



Short Pulse:



Refer to the plot (as below), We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter is 1.131 seconds, within not more than 5 seconds of being released.



## 10 20 dB Bandwidth Test Results

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	May.16,2011
Test mode:	TX On
Temperature:	24 °C
Humidity:	52%RH

### 10.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

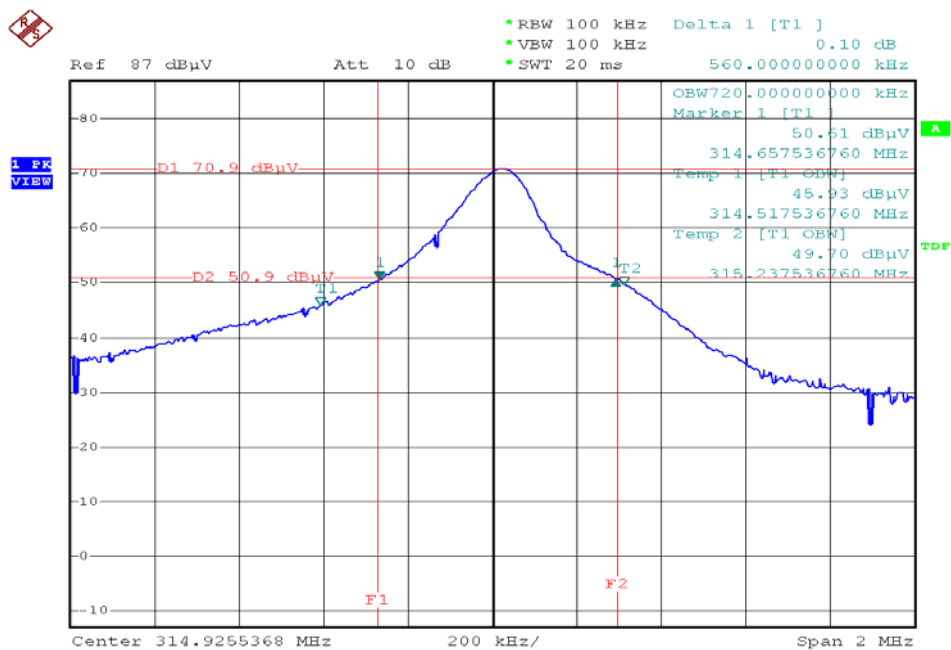
### 10.2 20 dB Bandwidth Limit

Requirements: 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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Frequency(MHz)	20 Bandwidth(kHz)	Limit(kHz):No wider than 0.25% of the center frequency	Results
315.00	720	$315 \times 0.25\% = 787\text{KHz}$	PASSED

10.3 20 dB Bandwidth Test Result Record

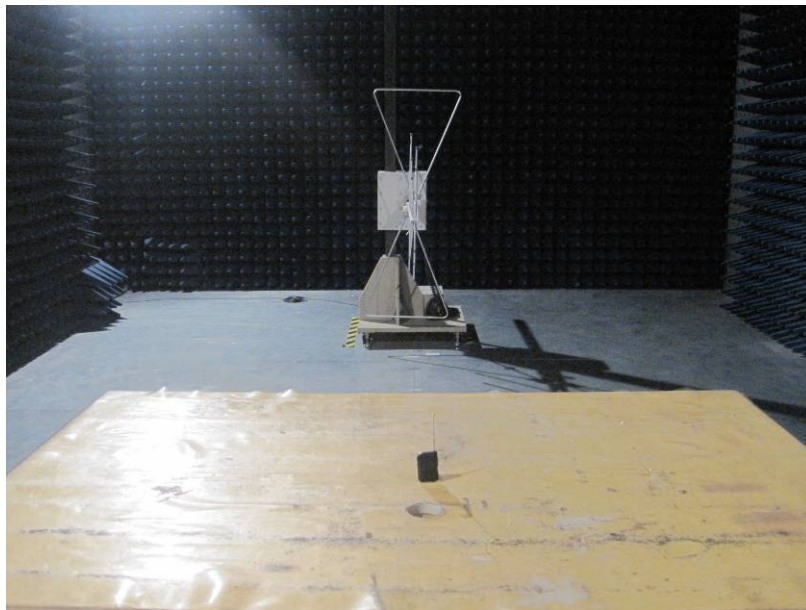
315.00MHz TX



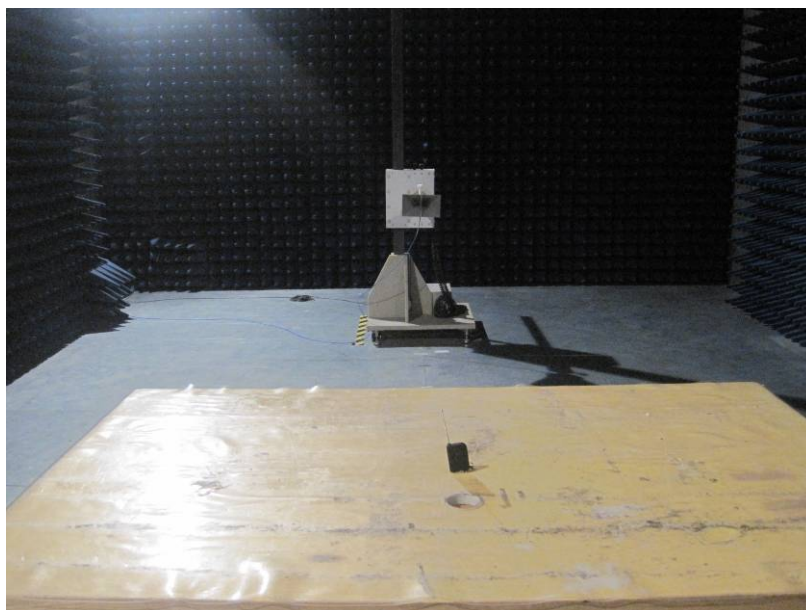


## 11 Photographs of Testing

### 11.1 Radiation Emission Test View For 30MHz-1000MHz



### 11.2 Radiation Emission Test View For 1GHz-4GHz



## 12 Photographs - Constructional Details

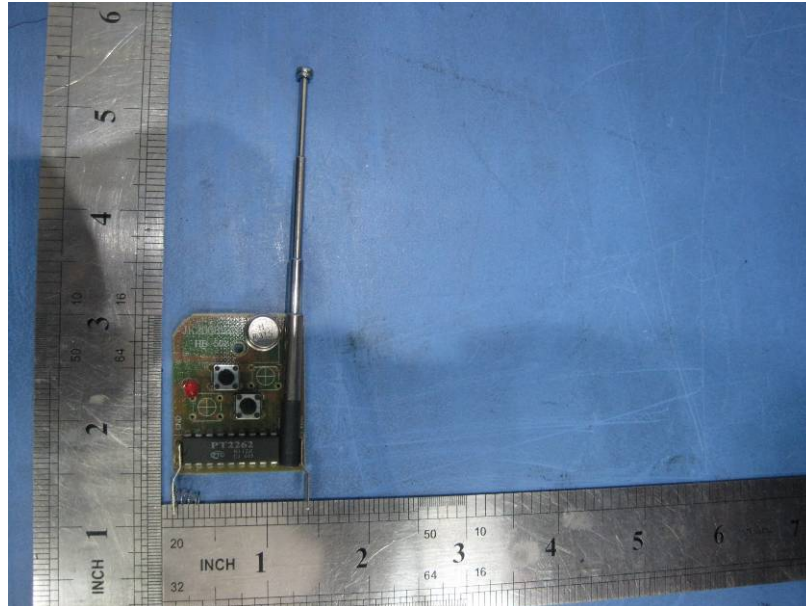
### 12.1 EUT - Front View



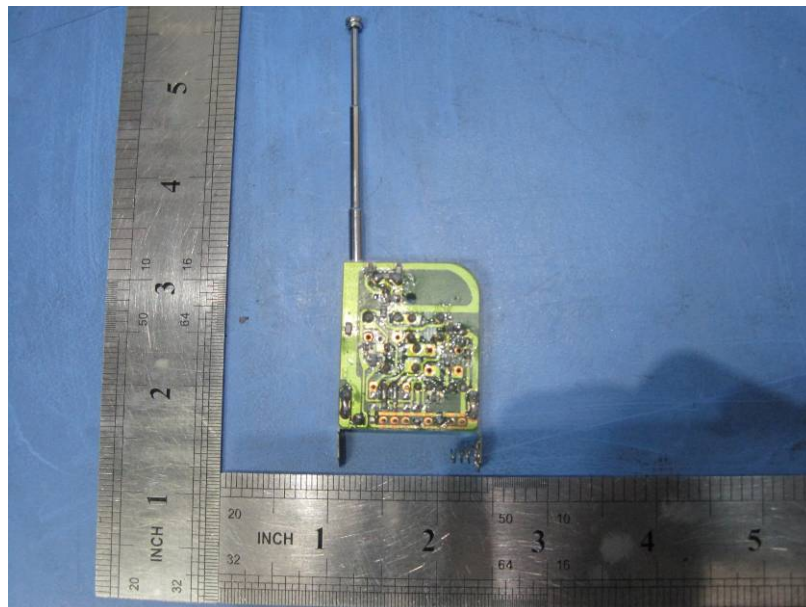
### 12.2 EUT - Back View



### 12.3 PCB-Front View



### 12.4 PCB-Back View



### 13 FCC ID Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT  
EUT Bottom View/proposed FCC Label Location

