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## FCC TEST REPORT

### 47 CFR FCC Part 15 Subpart C 15.231

Report Reference No.....: TRE1403011301 R/C:24350

FCC ID .....: N9STY-R-433-1

Compiled by

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Wenliang

Date of issue.....: Apr 09, 2014

Testing Laboratory Name .....: Shenzhen Huatongwei International Inspection Co., Ltd

Address .....: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

Applicant's name.....: TOYO ELECTRIC MFG. Co., LTD

Address .....: 9TH,FL 30 SEC 3 RENAI RD DAAN DISTRICT, TAIPEI 106  
TAIWAN

Manufacturer's name .....: T&Y ELECTRIC(SHENZHEN)Co., LTD

Address .....: ANLIANG INDUSTRIAL ZONE, HENGGANG, LONGGANG  
DISTRICT, GD, CHINA

#### Test specification:

Standard .....: 47 CFR FCC Part 15 Subpart C & 15.231

ANSI C63.10: 2009

TRF Originator .....: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF .....: Dated 2006-06

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Test item description .....: REMOTE TRANSMITTER

Trade Mark .....: TOYO

Model/Type reference.....: TY-R-433-1

Modulation .....: ASK

Listed Models .....: /

Operating Frequency.....: 433.90MHz

Result.....: PASS

## TEST REPORT

Test Report No. :	TRE1403011301	Apr 09, 2014 Date of issue
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Equipment under Test : REMOTE TRANSMITTER

Model /Type : TY-R-433-1

Listed Models : /

Applicant : TOYO ELECTRIC MFG. Co., LTD

Address : 9TH,FL 30 SEC 3 RENAI RD DAAN DISTRICT, TAIPEI  
106 TAIWAN

Manufacturer : T&Y ELECTRIC(SHENZHEN)Co., LTD

Address : ANLIANG INDUSTRIAL ZONE, HENGGANG,  
LONGGANG DISTRICT, GD, CHINA

Test Result	PASS
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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.

## Contents

<u>1.</u>	<u>TEST STANDARDS .....</u>	<u>4</u>
<u>2.</u>	<u>SUMMARY .....</u>	<u>5</u>
2.1.	General Remarks	5
2.2.	Equipment Under Test	5
2.3.	Short description of the Equipment under Test (EUT)	5
2.4.	EUT operation mode	5
2.5.	Configuration of Test System	5
2.6.	Related Submittal(s) / Grant (s)	6
2.7.	Modifications	6
<u>3.</u>	<u>TEST ENVIRONMENT .....</u>	<u>7</u>
3.1.	Address of the test laboratory	7
3.2.	Test Facility	7
3.3.	Environmental conditions	8
3.4.	Test Description	8
3.5.	Statement of the measurement uncertainty	8
3.6.	Equipments Used during the Test	9
<u>4.</u>	<u>TEST CONDITIONS AND RESULTS .....</u>	<u>10</u>
4.1.	AC Power Conducted Emission(Not Applicable)	10
4.2.	Radiated Emission	11
4.3.	Occupied Bandwidth	16
4.4.	Deactivation Time	18
4.5.	Antenna Requirement	20

## 1. TEST STANDARDS

The tests were performed according to following standards:

[\*\*FCC Rules Part 15.231\*\*](#): Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

[\*\*ANSI C63.10-2009\*\*](#): American National Standard for Testing Unlicensed Wireless Devices.

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	Mar 18, 2014
Testing commenced on	:	Mar 20, 2014
Testing concluded on	:	Apr 09, 2014

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz	
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC	
		<input checked="" type="radio"/> Other (specified in blank below)		

DC 12V from battery

### 2.3. Short description of the Equipment under Test (EUT)

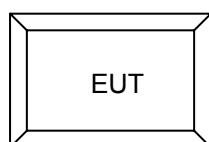
Operation Frequency:	433.9MHz
Model number:	TY-R-433-1
Channel number:	1 channel
Modulation type:	ASK

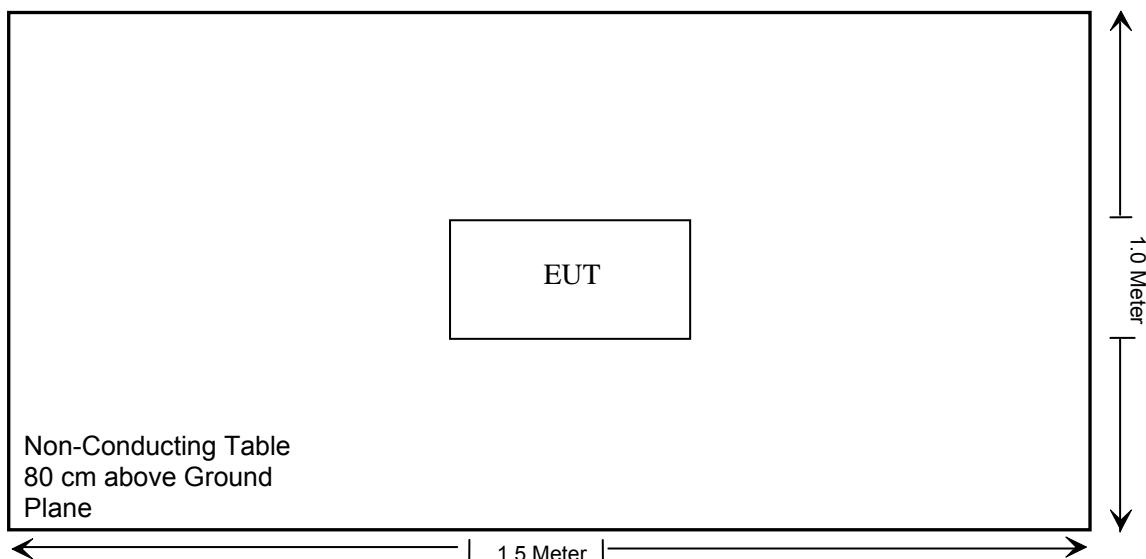
For more details, refer to the user's manual of the EUT.

### 2.4. EUT operation mode

The EUT has been tested under typical operating condition.

### 2.5. Configuration of Test System



**Block Diagram of Test Setup****2.6. Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for **FCC ID: N9STY-R-433-1** filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

**2.7. Modifications**

No modifications were implemented to meet testing criteria.

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Shenzhen Huatongwei International Inspection Co., Ltd  
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China  
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

#### **3.2. Test Facility**

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

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar. 01, 2012. Valid time is until Feb 28, 2015.

##### **A2LA-Lab Cert. No. 2243.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept. 30, 2013.

##### **FCC-Registration No.: 662850**

Shenzhen Huatongwei International Inspection 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 662850, Renewal date Jun. 01, 2012, valid time is until Jun. 01, 2015.

##### **IC-Registration No.: 5377A**

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Jan. 25, 2011, valid time is until Jan. 24, 2014.

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

##### **NEMKO-Aut. No.: ELA125**

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10, the authorization is valid through July 07, 2013

##### **VCCI**

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2010. Valid time is until Dec. 23, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2010. Valid time is until May 06, 2013.

## DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2013.

### 3.3. Environmental conditions

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

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

### 3.4. Test Description

§ 15.207 (a)	Conducted Emissions	N/A
§ 15.109	Unintentional Radiated Emissions	PASS
§ 15.205, § 15.209(a), § 15.231(b) § 15.35(c)	Radiated & Spurious Emissions	PASS
§ 15.231(a)(1)	Deactivation Time	PASS
§ 15.231	Duty Cycle	PASS
§ 15.231(c)	Occupied Bandwidth	PASS

Remark: The measurement uncertainty is not included in the test result.

### 3.5. 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 according to ETSI TR 100 028-1 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and methods according to ETSI TR 100 028-2 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd 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.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	0.09~30MHz	3.85dB	(1)
Radiated Emission	30~1000MHz	4.65dB	(1)
Radiated Emission	1~18GHz	5.16dB	(1)
99% Bandwidth	/	0.25dB	(1)
Deactivation Time	/	0.5ms	(1)

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

### 3.6. Equipments Used during the Test

Occupied Bandwidth & Deactivation Time & Duty Cycle					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2013/10/26

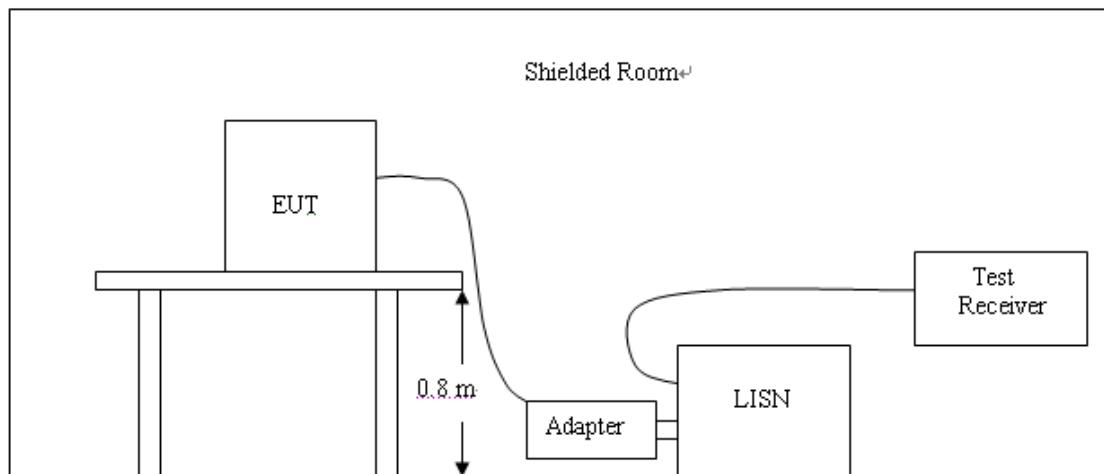
Radiated Emission & Spurious Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2013/10/26
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2013/10/26
3	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	2013/10/26
4	TURNTABLE	ETS	2088	2149	2013/10/26
5	ANTENNA MAST	ETS	2075	2346	2013/10/26
6	EMI TEST SOFTWARE	Rohde&Schwarz	ESK1	N/A	2013/10/26
7	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2013/10/26
8	Amplifier	Sonoma	310N	E009-13	2013/10/26
9	JS amplifier	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2013/10/26
10	High pass filter	Compliance Direction systems	BSU-6	34202	2013/10/26
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	470	2013/10/26
12	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2013/10/26
13	HORN ANTENNA	ShwarzBeck	9120D	1011	2013/10/26
14	TURNTABLE	MATURO	TT2.0	----	2013/10/26
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	2013/10/26
16	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2013/10/25

The Calibration Interval was one year.

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission(Not Applicable)

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2009
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
- 4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dB <sub>P</sub> V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

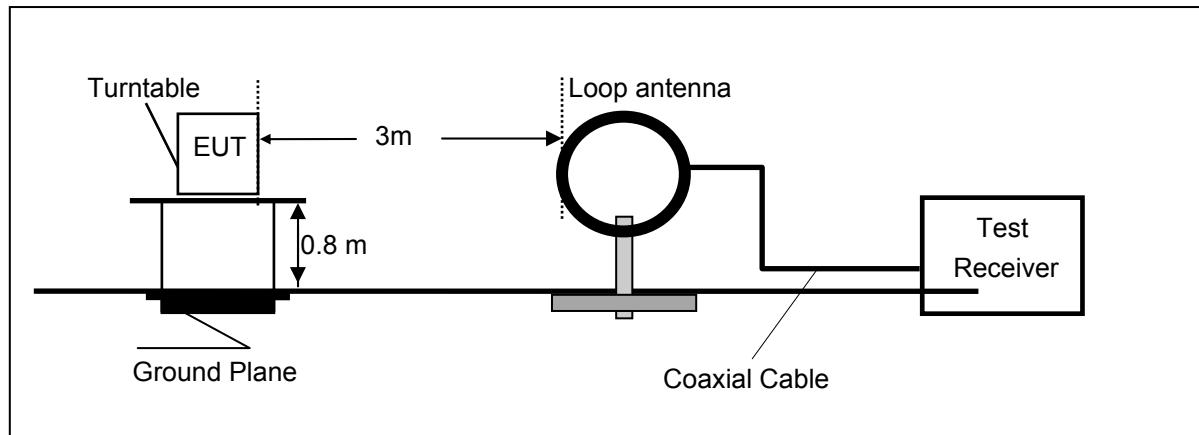
Due to this EUT is powered by battery only, this test item is not applicable.

## 4.2. Radiated Emission

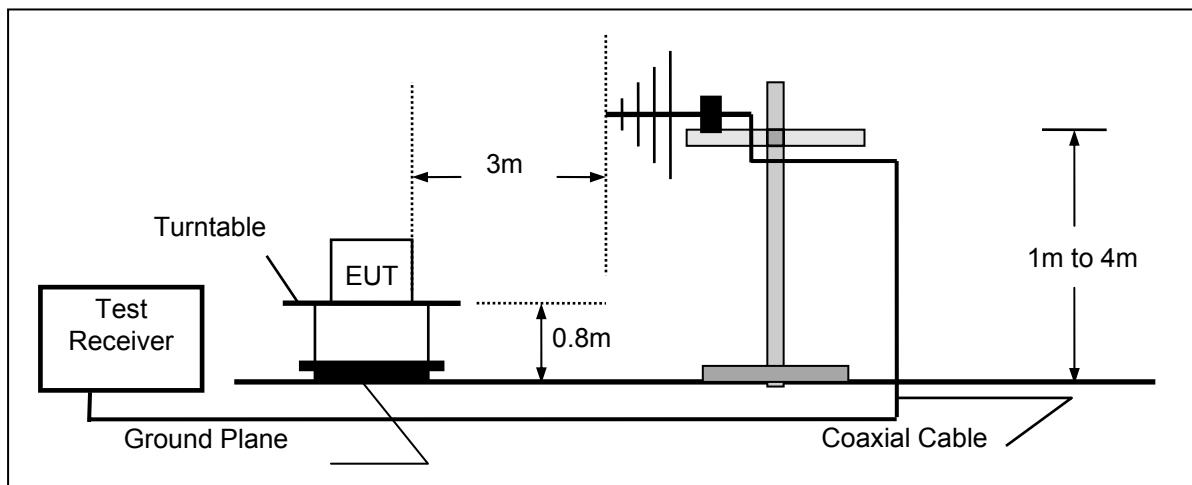
### TEST CONFIGURATION

Radiated Emission Test Set-Up

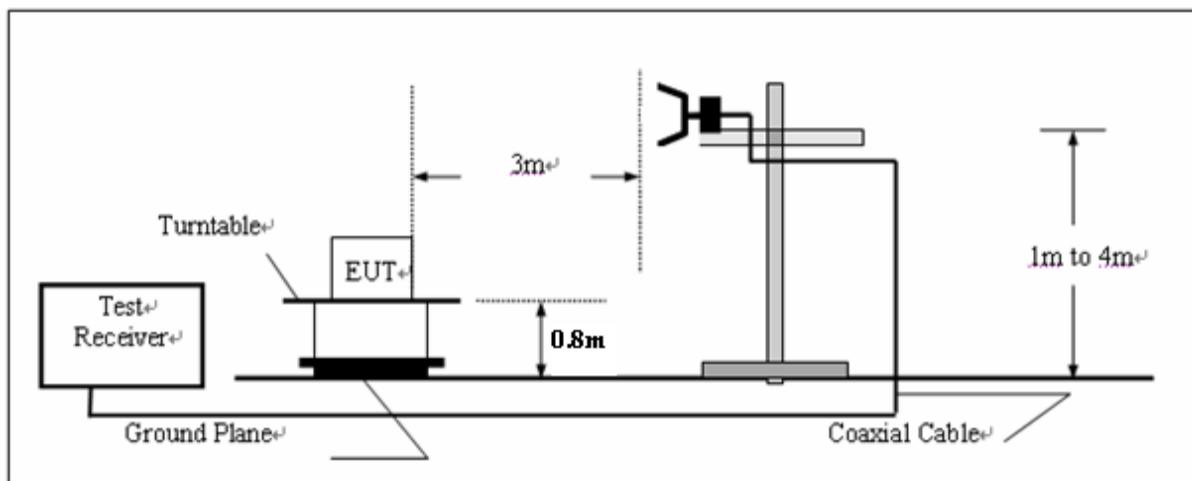
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



**TEST PROCEDURE**

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. the fundamental frequency is 433.90MHz, So the radiation emissions frequency range were tested from 30MHz to 4.339GHz.

**RADIATION LIMIT**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table:

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
0.009 - 0.490	300	20*log(2400/F(kHz))	2400/F(kHz)
0.490 - 1.705	30	20*log(24000/F(kHz))	24000/F(kHz)
1.705 - 30.0	30	29.54	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

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	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

\*\* linear interpolations

**TEST RESULTS**

The emissions from 30MHz to 5GHz are measured peak and average level, below 1Ghz measured QP level,detailed test data please see below.Besides,we tested 3 direction and recorded the worst data.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

***Radiated emission of fundamental emission***

Frequency (MHz)	Corrected Reading (dB $\mu$ V/m)@3m	FCC Limit (dB $\mu$ V/m) @3m	Margin (dB)	Detector	Polarization
433.90	75.79	100.82	25.03	PK	Horizontal
433.90	67.23	80.82	13.59	AV	Horizontal
433.90	80.69	100.82	20.13	PK	Vertical
433.90	72.13	80.82	8.69	AV	Vertical

***Spurious radiated emission***

Frequency (MHz)	Corrected Reading (dB $\mu$ V/m)@3m	FCC Limit (dB $\mu$ V/m) @3m	Margin (dB)	Detector	Polarization
30.00	35.86	40.00	4.14	PK	Horizontal
867.82	57.71	80.82	23.11	PK	Horizontal
867.84	49.15	60.82	11.67	AV	Horizontal
1301.76	46.21	80.82	34.61	PK	Horizontal
1301.76	37.65	60.82	23.17	AV	Horizontal
3568.68	43.12	74.00	30.88	PK	Horizontal
3569.68	34.56	54.00	19.44	AV	Horizontal
30.00	25.48	40.00	14.52	PK	Vertical
867.82	57.73	80.82	23.09	PK	Vertical
867.84	49.17	60.82	11.65	AV	Vertical
1301.76	53.05	80.82	27.77	PK	Vertical
1301.76	44.49	60.82	16.33	AV	Vertical
3568.68	42.05	74.00	31.95	PK	Vertical
3569.68	33.49	54.00	20.51	AV	Vertical

**Note 1:**

1. Below 30MHz, found the radiated emission level is very low, so don't show on the report.
2. According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

**Note 2:** Average Result =Peak Field Strength+Duty Cycle Correction Factor.

**Note 3:** Duty Cycle Correction Factor value refers to below.

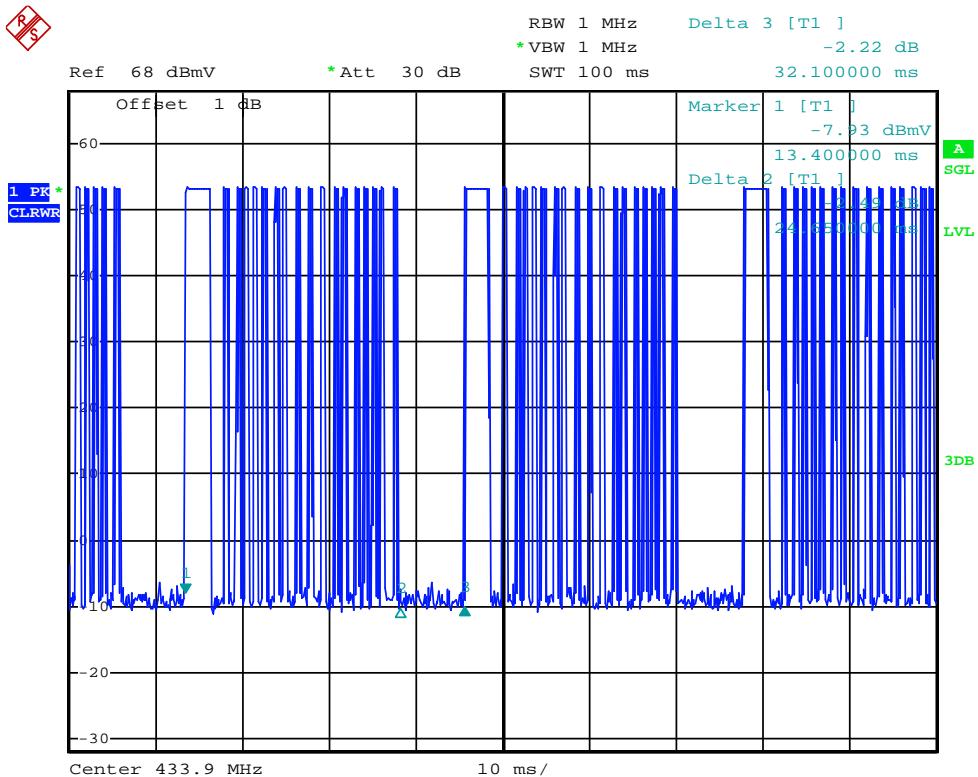
## Duty Cycle Correction Factor

$$\text{Duty Cycle} = \text{TX on}/(\text{TX on} + \text{TX off}) \times 100\% = 11.98/32.1 = 37.32\%$$

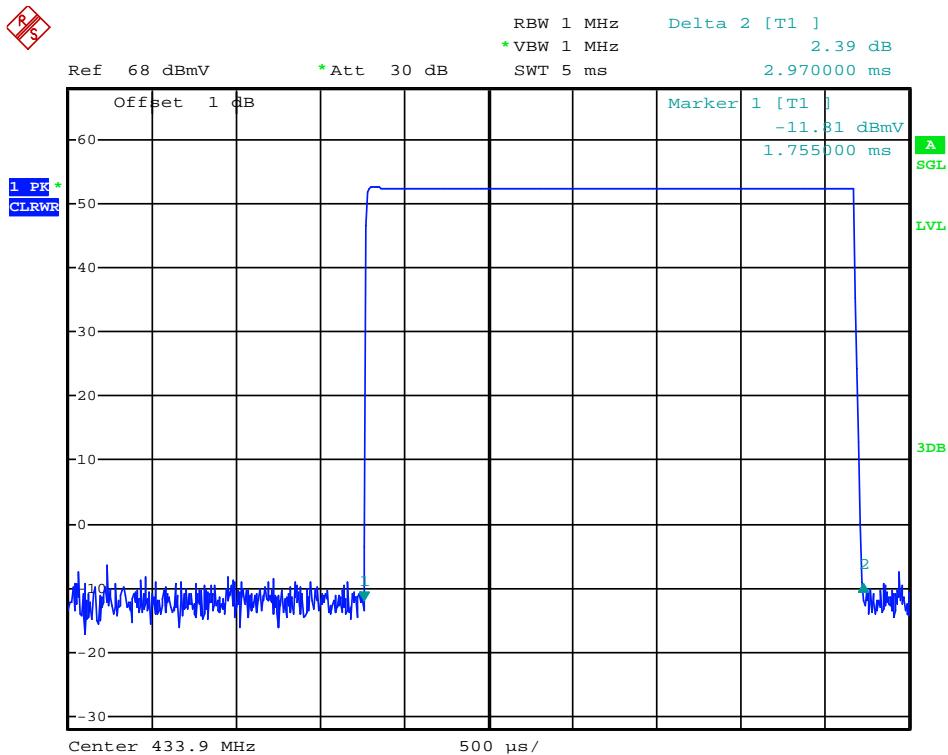
$$\text{Time (Tx on)} = 2.97\text{ms} + 0.53\text{ms} \times 17 = 11.98\text{ms}$$

$$\text{Time (TX on + TX off)} = 32.1\text{ms}$$

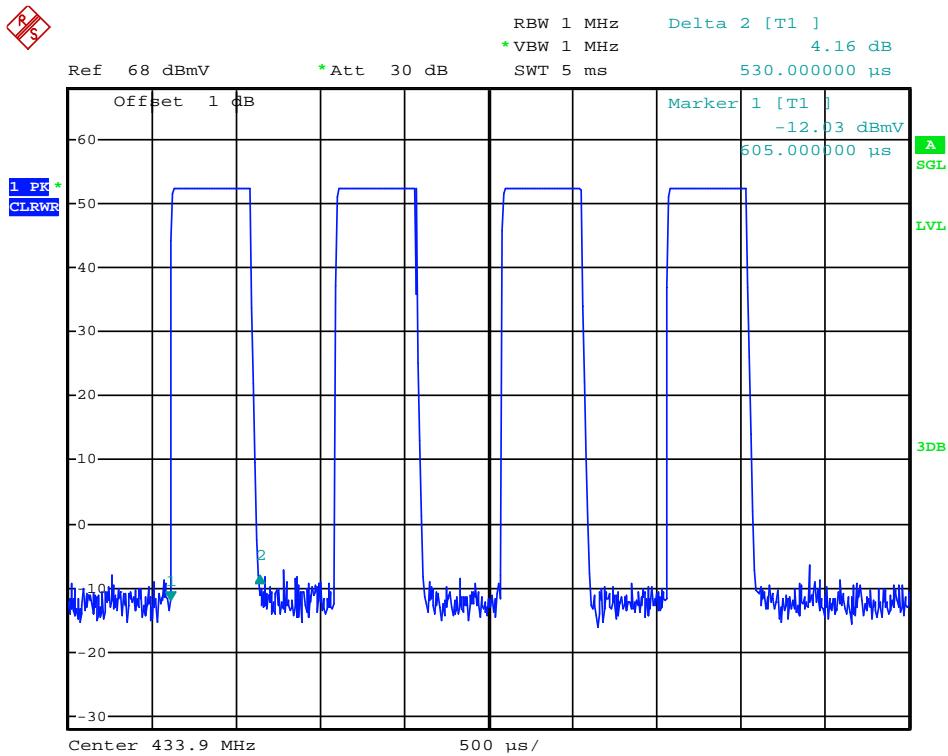
$$\text{Duty Cycle Correction Factor} = 20\log(1/\text{Duty Cycle}) = 8.56$$



Date: 25.MAR.2014 10:26:49



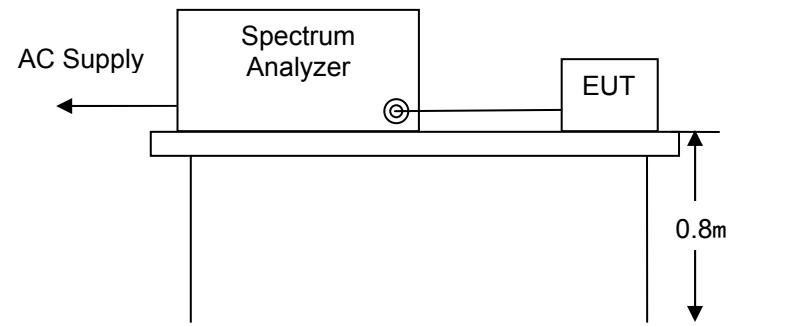
Date: 25.MAR.2014 10:27:51



Date: 25.MAR.2014 10:28:34

### 4.3. Occupied Bandwidth

#### TEST CONFIGURATION



#### TEST PROCEDURE

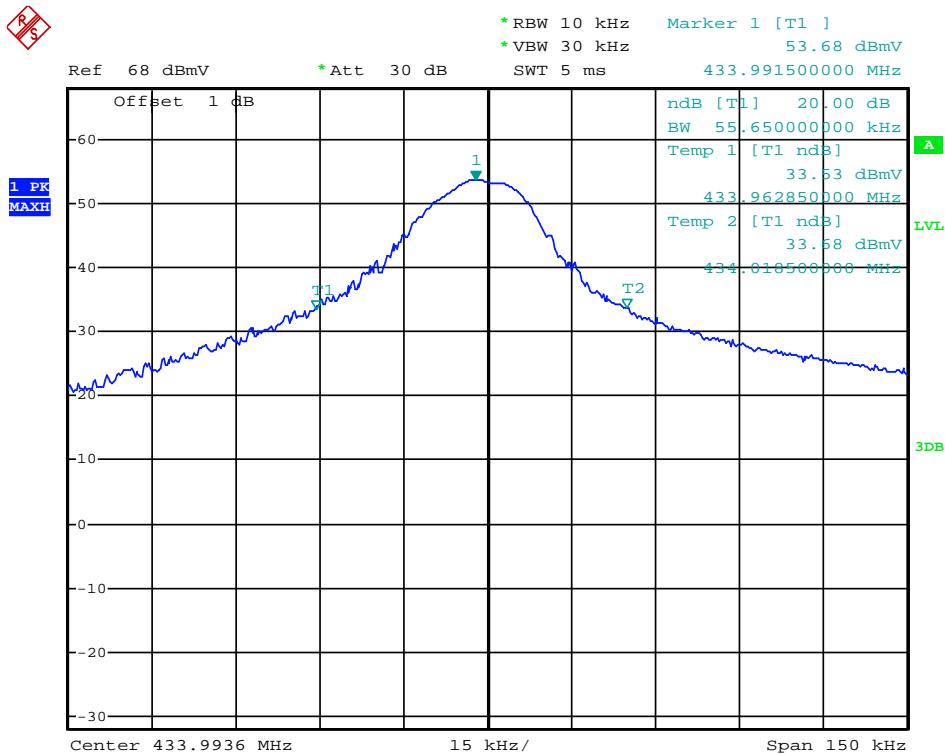
1. As required by 47 CFR 15.231(c): The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.
2. Customer provided a test mode internal to the EUT to control the RF modulation. The EUT antenna was attached and the waveform was received by the test antenna which was connected to the spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

#### Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz

#### TEST RESULTS

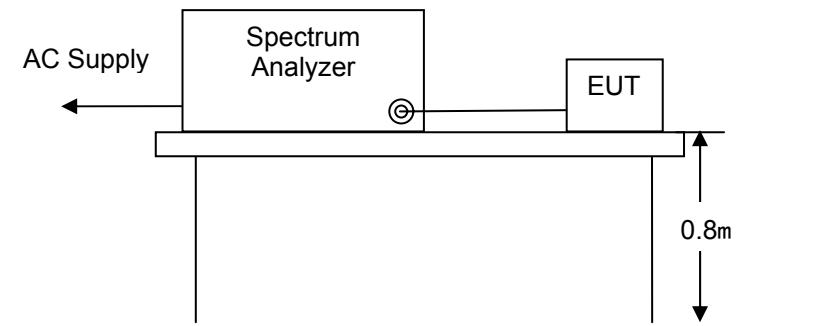
Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Result
433.90	0.0557	0.25%*433.90=1.08	PASS



Date: 25.MAR.2014 10:30:10

#### 4.4. Deactivation Time

##### TEST CONFIGURATION



##### TEST PROCEDURE

- 1 The EUT was placed on a wooden table which is 0.8m height and close to receiver antenna of spectrum analyzer.
- 2 The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was set to 1 MHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

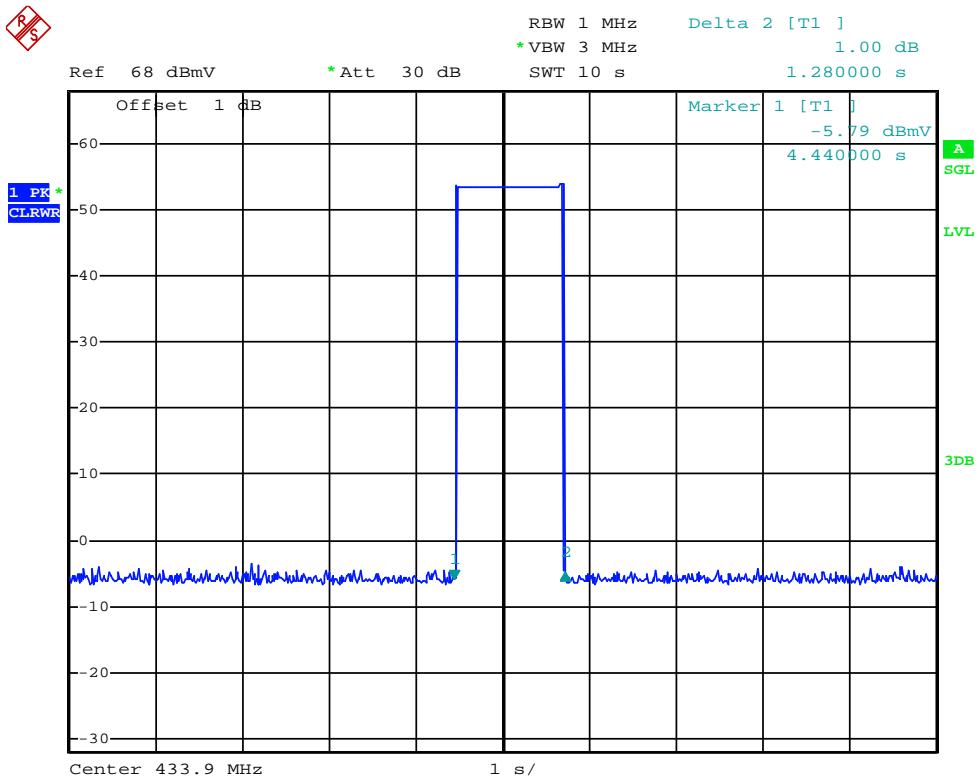
##### LIMIT

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

##### TEST RESULTS

Note: The transmitter was manually activated, and the carrier frequency 433.92MHz:

Frequency (MHz)	One transmission time (s)	Limit (s)	Result
433.90MHz	1.28	5	Pass



Date: 25.MAR.2014 10:45:31

## 4.5. Antenna Requirement

### Standard Applicable

According to FCC Part 15C § 15.203,

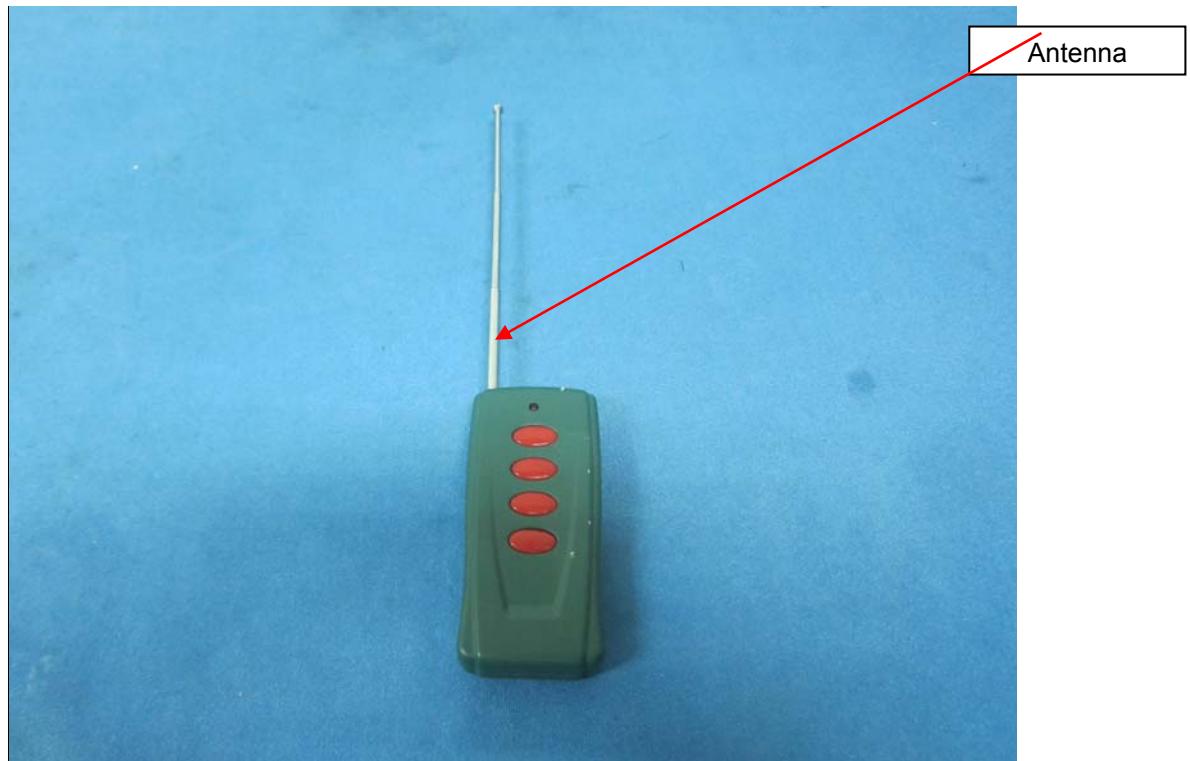
- a), An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
- b), The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**Refer to statement below for compliance.**

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### Antenna Connected Construction

The antenna used in this product is a Fixed Antenna .The maximum Gain of the antenna only 1.5dBi.please see the photo as following:



.....End of Report.....