

FCC Radio Test Report

FCC ID: YAV11HH06L

Report No. : MTI150803001RF
Applicant : USA Shutter Company dba Maestrosshield
Equipment Under Test (EUT)
EUT Name : Forest Diamond RF remote
Model No. : EL03-11HH06L
Brand Name : Maestrosshield
Receipt Date : Aug. 03, 2015
Test Date : Aug. 03, 2015 ~ Aug. 07, 2015
Issue Date : Aug. 12, 2015
Standards : FCC Part 15, Subpart C (15.231:2014)
Test Method : ANSI C63.10:2009
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above,
The EUT technically complies with the FCC requirements

Test/Witness Engineer : 

Approved& Authorized : 

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

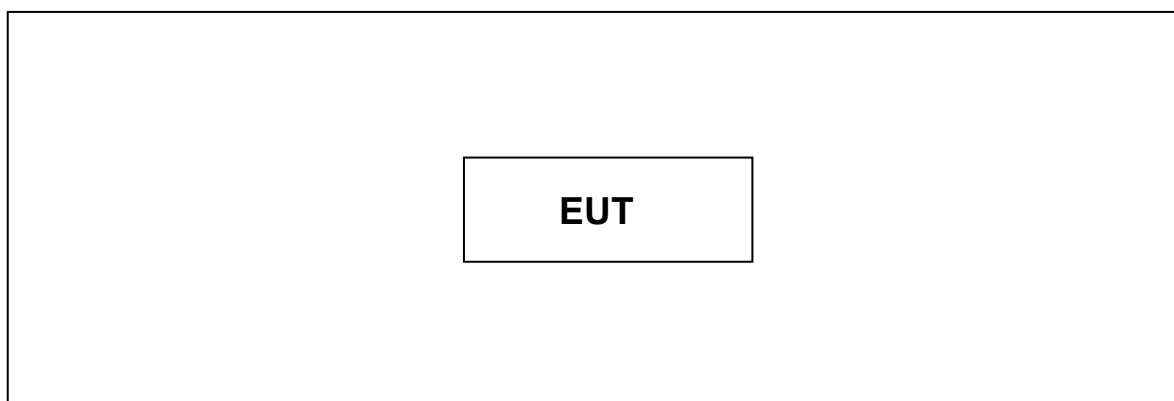
1.1 Client Information

Applicant : USA Shutter Company dba Maestrosshield
Address : 4540 Domestic Ave. Naples, Florida 34104, USA
Manufacturer : Shenzhen A-OK Technology Grand Development Co., Ltd
Address : 34 Bldg, Chentian Industry Zone, Xixiang St., Bao'an, Shenzhen

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Forest Diamond RF remote	
Models No.	:	EL03-11HH06L	
Brand Name	:	Maestrosshield	
Product Description	:	Operation Frequency:	433.92 MHz
		Out Power:	64.61dB μ V/m(AV)
		Antenna Gain:	0dBi
		Modulation Type:	OOK
Power Supply	:	Battery: 3V _{dc} (CR2032)	

1.3 Block Diagram Showing the Configuration of System Tested



1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follows was evaluated respectively.

Test Items	Note
Radiated Emission	Continuously transmitting
Bandwidth	Continuously transmitting
Release Time	Normal Mode

Note:

- (1) During the testing procedure, the continuously transmitting mode was programmed by the customer.
- (2) The EUT is considered a portable unit, and it was pre-tested on the position of each 3 axis: X axis, Y axis and Z axis. The worst case was found positioned on Z-plane. Therefore only the test data of this Z-plane were used for radiated emission measurement test.

1.6 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

FCC Part 15 Subpart (15.231)			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	PASS	
15.231	Conducted Emission	N/A	
	Release Time	PASS	
	Radiation Emission	PASS	
	20 dB Bandwidth	PASS	
Note: N/A is an abbreviation for Not Applicable.			

3. Radiated Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard

FCC Part 15.231(a)

4.1.2 Test Limit

According to FCC 15.231(a) requirement:

In addition to the provisions of Section 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 (microvolt/meter) at 3m	Field Strength of Spurious Emissions (microvolt/meter) at 3m
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 1250(**)
Above 470	12500	1250

** Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

- (1) The maximum permitted unwanted emissions level is 20 dB below the maximum permitted fundamental level. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

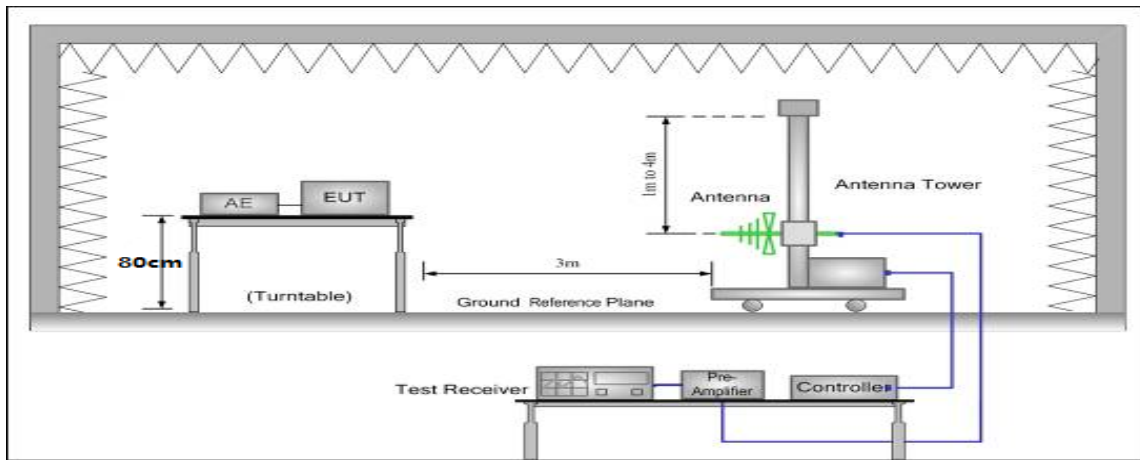
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	2400/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

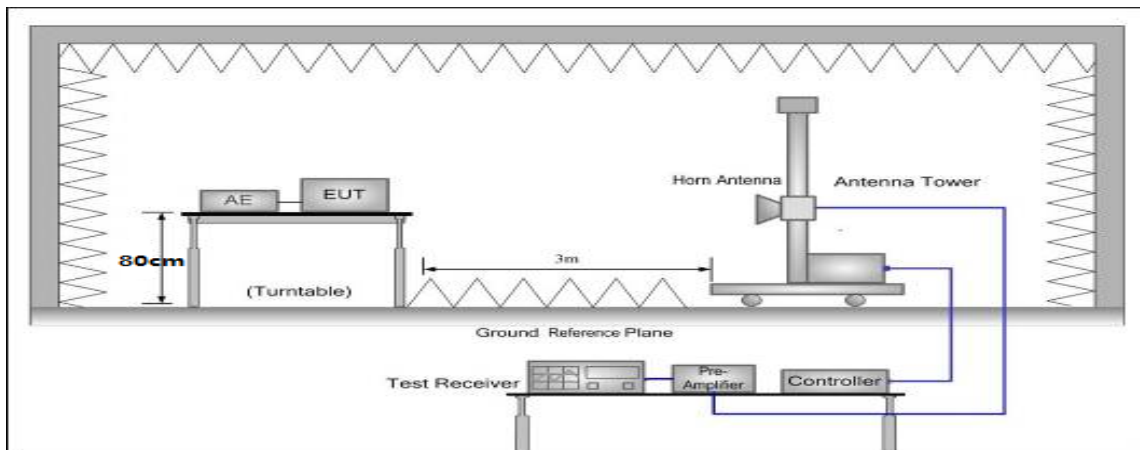
- (1) The tighter limit applies at the band edges.

4.2 Test Setup

Blew 1GHz



Above 1GHz



4.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground; the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) For the actual test configuration, please see the test setup photo.

4.4 EUT Operating Condition

The EUT was set to continuous transmission mode.

4.5 Test Equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Due
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2015.12.11
2	Horn Antenna	Schwarzbeck	BBHA 9170	9170-181	2015.12.11
3	Test Cable	United Microwave	57793	1m	2015.12.05
4	Test Cable	United Microwave	A30A30-500 6	10M	2015.12.05
5	Microwave Pre_amplifier	Agilent	8449B	3008A01714	2015.12.05
6	Pre-Amplifier	Anritsu	MH648A	M09961	2015.12.05
7	Spectrum Analyzer	R&S	FSP_40	100129	2015.12.05

4.6 Test Data

Please refer to the following pages.

PK

Frequency	Reading (dBμV)		Correct Factor	Duty Factor	Result dBμV/m		Limit	Margin (dB)		Remark
MHz	Hor.	Ver.	dB/m	dB	Hor.	Ver.	dBμV/m	Hor.	Ver.	
433.92	84.87	84.79	-12.76	-	72.11	72.03	100.8	28.69	28.77	Fundamental
867.84	61.12	57.17	-6.18	-	54.94	50.99	80.8	25.86	29.81	Noise
1301.76	50.02	44.78	-5.39	-	44.63	39.39	80.8	36.17	41.41	Noise
1735.68	53.75	48.05	-3.12	-	50.63	44.93	80.8	30.17	35.87	Noise
2169.6	57.8	59.06	-0.16	-	57.64	58.9	80.8	23.16	21.9	Noise
2603.52	60.1	52.67	1.85	-	61.95	54.52	80.8	18.85	26.28	Noise
3037.44	58.03	56.67	4.35	-	62.38	61.02	80.8	18.42	19.78	Noise
3471.36	53.21	46.72	6.63	-	59.84	53.35	80.8	20.96	27.45	Noise
3905.28	46.39	37.37	8.77	-	55.16	46.14	80.8	25.64	34.66	Noise
4339.2	42.67	35.35	10.87	-	53.54	46.22	80.8	27.26	34.58	Noise

Result = Reading +Correct Factor

AV (PK with Duty factor)

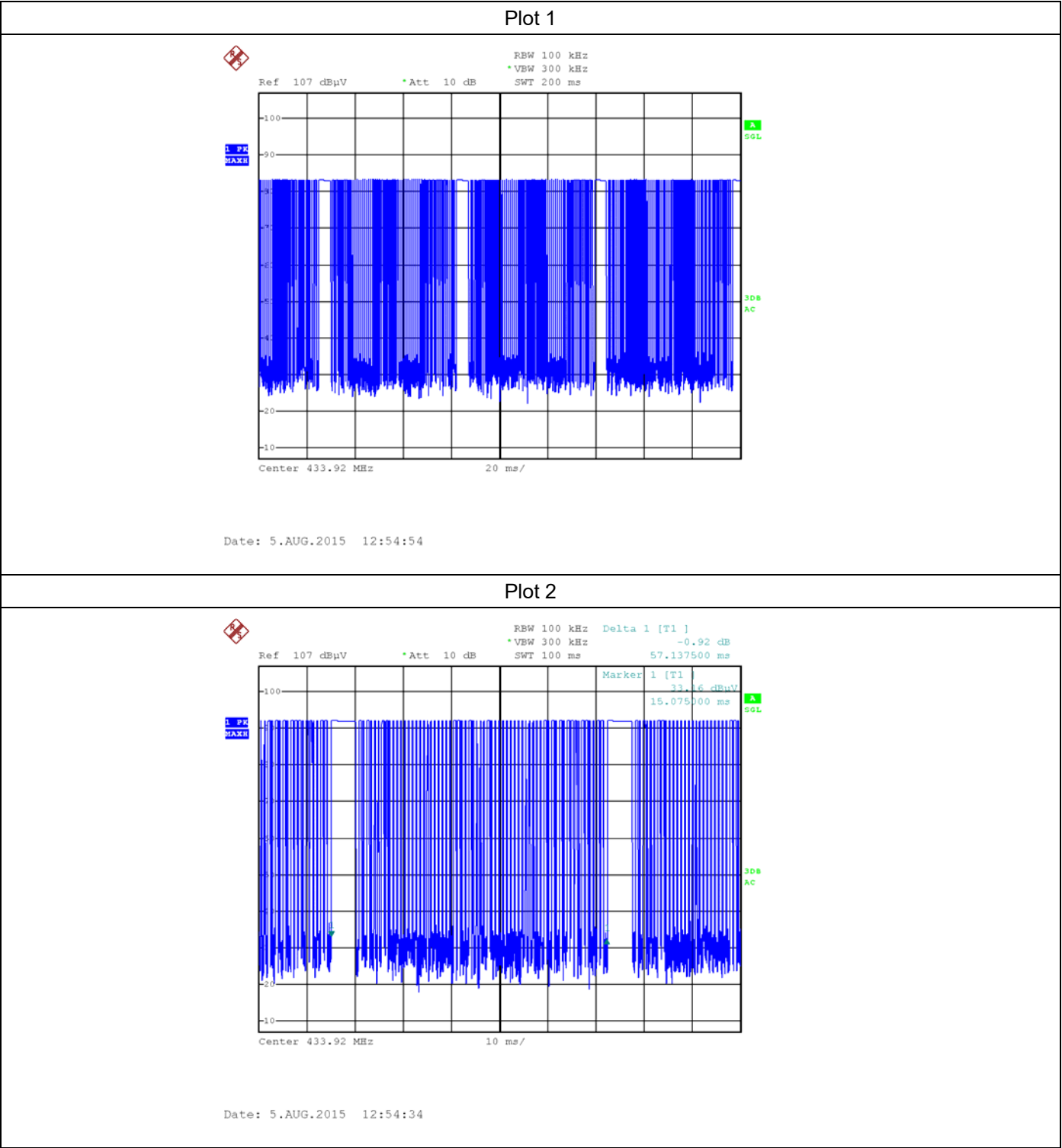
Frequency	Reading (dBμV)		Correct Factor	Duty Factor	Result dBμV/m		Limit	Margin (dB)		Remark
MHz	Hor.	Ver.	dB/m	dB	Hor.	Ver.	dBμV/m	Hor.	Ver.	
433.92	84.87	84.79	-12.76	-7.50	64.61	64.53	80.8	16.19	16.27	Fundamental
867.84	61.12	57.17	-6.18	-7.50	47.44	43.49	60.8	13.36	17.31	Noise
1301.76	50.02	44.78	-5.39	-7.50	37.13	31.89	60.8	23.67	28.91	Noise
1735.68	53.75	48.05	-3.12	-7.50	43.13	37.43	60.8	17.67	23.37	Noise
2169.6	57.8	59.06	-0.16	-7.50	50.14	51.4	60.8	10.66	9.4	Noise
2603.52	60.1	52.67	1.85	-7.50	54.45	47.02	60.8	6.35	13.78	Noise
3037.44	58.03	56.67	4.35	-7.50	54.88	53.52	60.8	5.92	7.28	Noise
3471.36	53.21	46.72	6.63	-7.50	52.34	45.85	60.8	8.46	14.95	Noise
3905.28	46.39	37.37	8.77	-7.50	47.66	38.64	60.8	13.14	22.16	Noise
4339.2	42.67	35.35	10.87	-7.50	46.04	38.72	60.8	14.76	22.08	Noise

Result = Reading + Correct Factor + Duty Factor

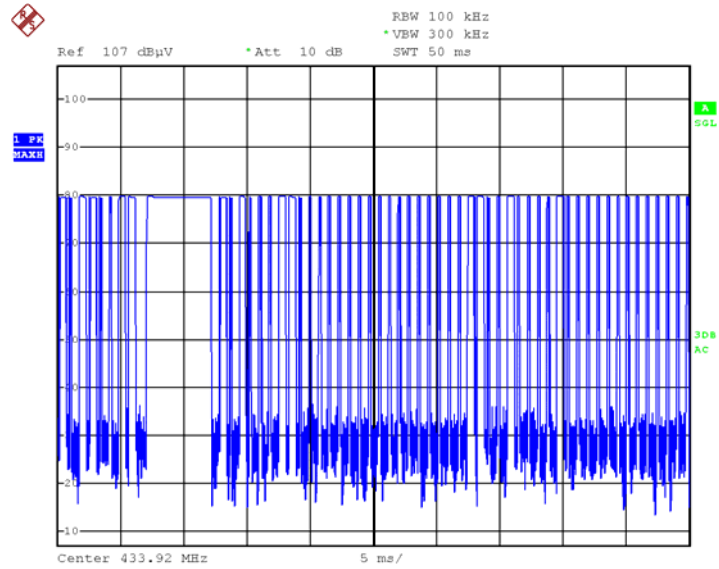
*other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*Duty Factor = $20 \cdot \log_{10} (\text{Duty cycle}) = 20 \cdot \log_{10} ((5.14+0.99 \cdot 17+0.219 \cdot 40)/57.138) = -7.50$ (Please see the following plots for the detail of duty cycle).

Duty Cycle:

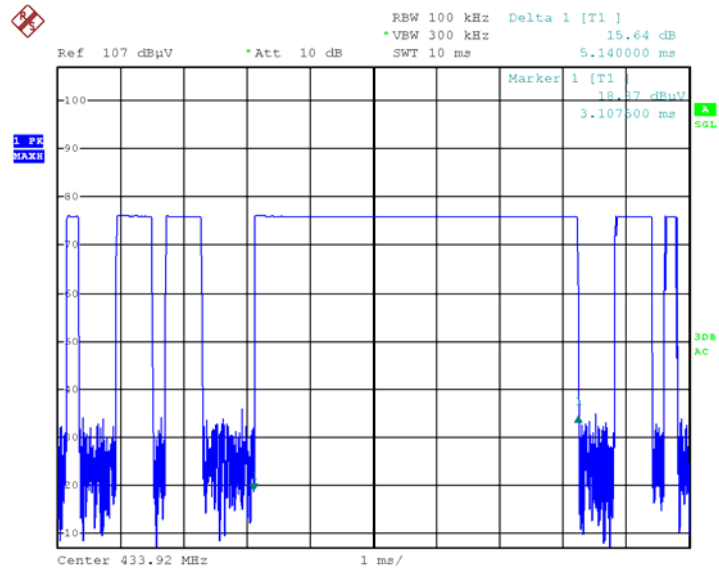


Plot 3



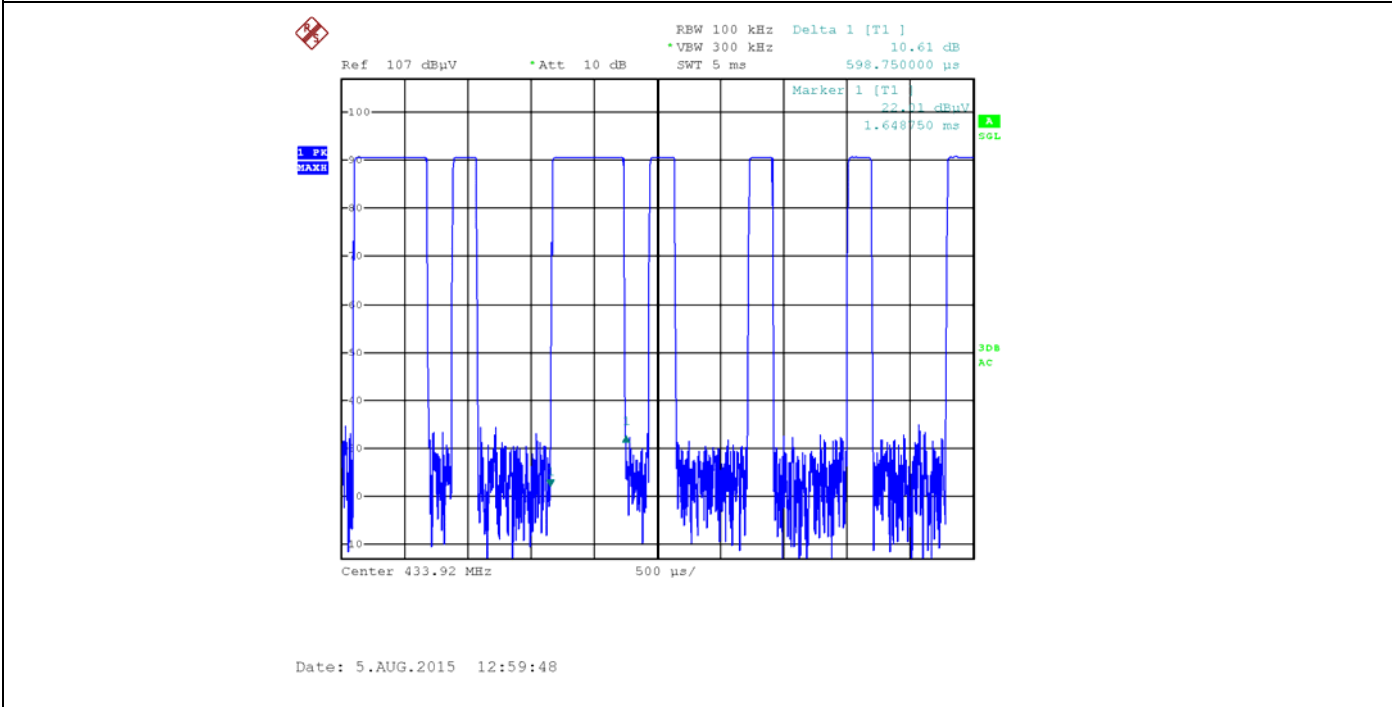
Date: 5.AUG.2015 12:55:25

Plot 4

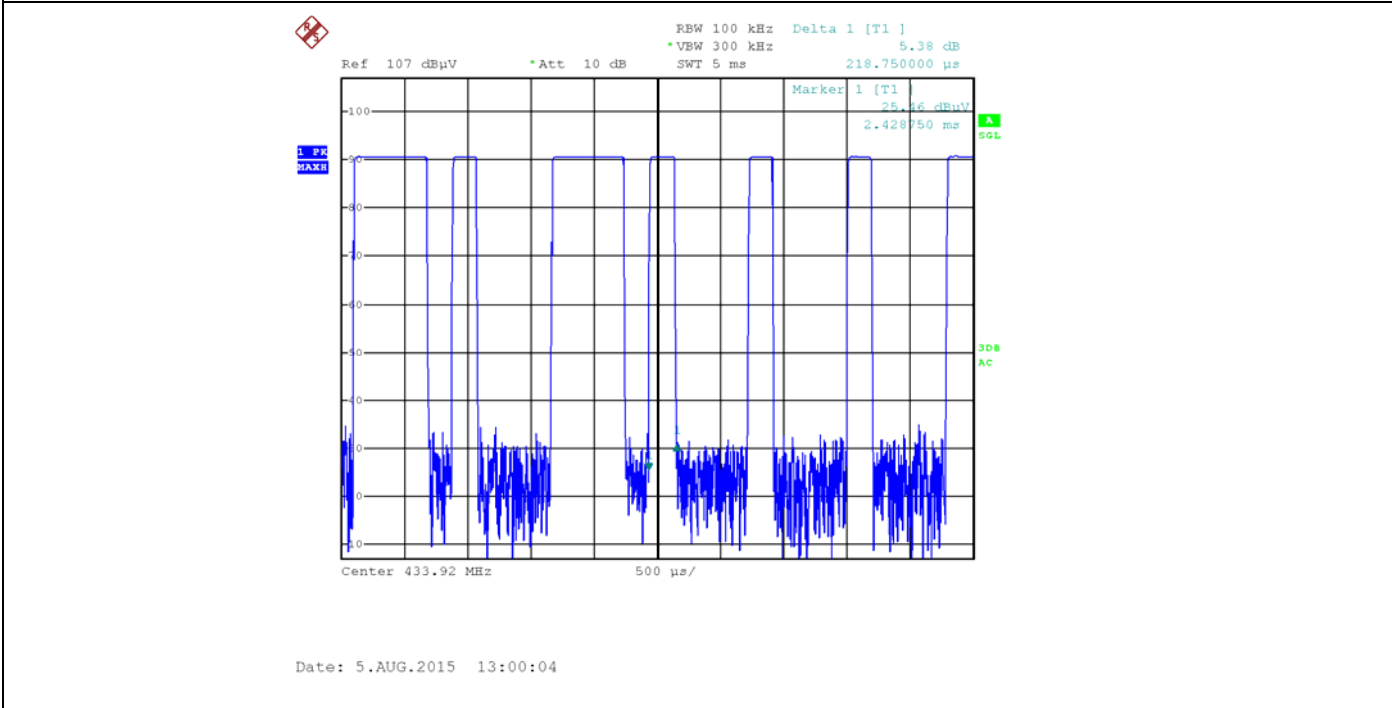


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Plot 5



Plot 6



4. Bandwidth

5.1 Test Standard and Limit

5.1.1 Test Standard

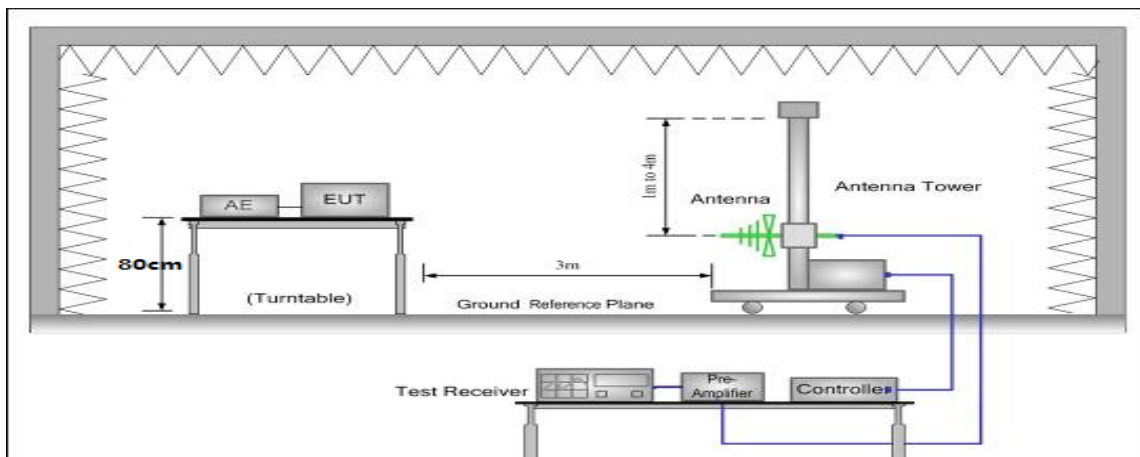
FCC Part 15.231

5.1.2 Test Limit

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. So the emission bandwidth limits have been calculated in below table.

Fundamental Frequency	20 dB Bandwidth Limits (MHz)
433.92 MHz	1.0848

5.2 Test Setup



5.3 Test Procedure

- (1) Set Spectrum Analyzer Center Frequency= Fundamental Frequency, RBW=10 kHz, VBW= 30 kHz, Span= 1 MHz.
- (2) Measured the spectrum width with power higher than 20 dB below carrier.

5.4 EUT Operating Condition

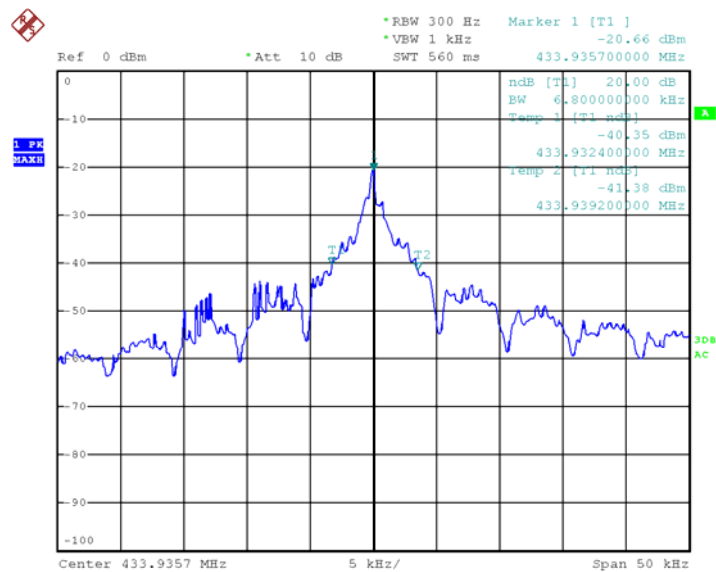
The EUT was set to continuous transmission mode.

5.5 Test Equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Due
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2015.12.11
2	Horn Antenna	Schwarzbeck	BBHA 9170	9170-181	2015.12.11
3	Test Cable	United Microwave	57793	1m	2015.12.05
4	Test Cable	United Microwave	A30A30-500 6	10M	2015.12.05
5	Microwave Pre_amplifier	Agilent	8449B	3008A01714	2015.12.05
6	Pre-Amplifier	Anritsu	MH648A	M09961	2015.12.05
7	Spectrum Analyzer	R&S	FSP_40	100129	2015.12.05

5.6 Test Data

Frequency (MHz)	20 dBc Bandwidth (kHz)	Result
433.92	6.8	PASS



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5. Release Time Measurement

6.1 Test Standard and Limit

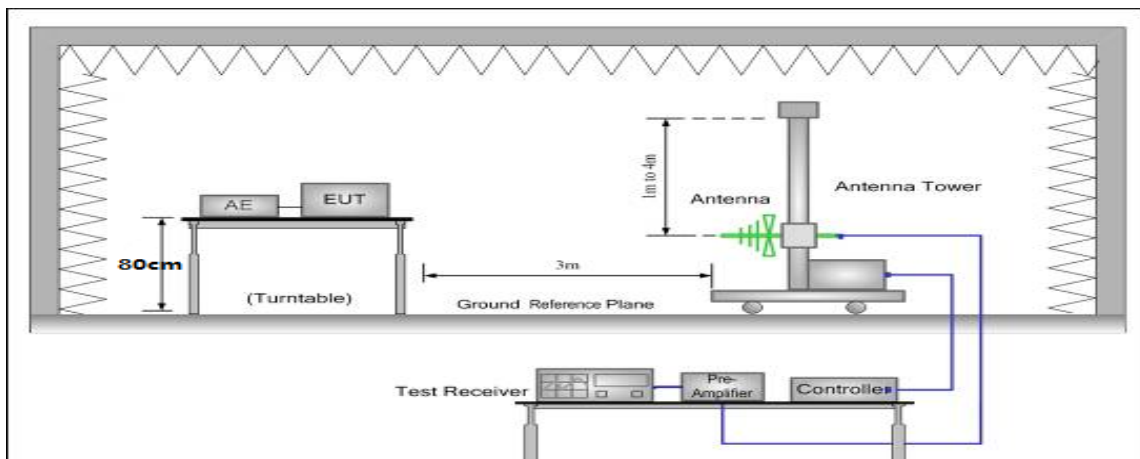
5.1.1 Test Standard

FCC Part 15.231 (a)(1)

5.1.2 Test Limit

According to FCC Part 15.231 (a)(1), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.2 Test Setup



6.3 Test Procedure

- (1) Setup the EUT as show in the block diagram above.
- (2) Set Spectrum Analyzer Centre Frequency= Fundamental Frequency, RBW=100 kHz, VBW= 100 kHz, Span= 0 Hz. Sweep Time= 5 Seconds.
- (3) Setup the EUT as normal operation and press Transmitter button.
- (4) Set Spectrum Analyzer View, Delta Mark time.

6.4 EUT Operating Condition

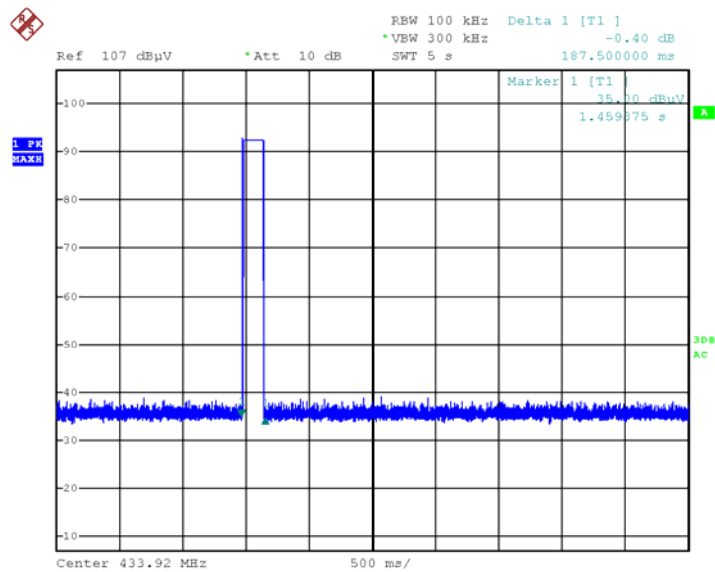
The EUT was set to work in normal mode.

6.5 Test Equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Due
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2015.12.11
2	Horn Antenna	Schwarzbeck	BBHA 9170	9170-181	2015.12.11
3	Test Cable	United Microwave	57793	1m	2015.12.05
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6	Pre-Amplifier	Anritsu	MH648A	M09961	2015.12.05
7	Spectrum Analyzer	R&S	FSP_40	100129	2015.12.05

6.7 Test Data

Release Time (s)	Limit (s)	Result
0.1875	5	PASS



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6. Antenna Requirement

8.1 Standard Requirement

11.1.1 Standard

FCC Part 15.203

11.1.2 Requirement

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. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

8.3 Result

The EUT antenna is a PCB Antenna, the antenna gain is 0dBi. It complies with the standard requirement.

