

4322065.50

## **FCC Test report for Pulse II DUO**

### **Model Guybrator**

Guangzhou, date of issue: 2015-05-11

Author Daniel He

By order of JM Sunflower Ltd. at Kwai Chung, Hong Kong

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## 1 **CONCLUSION**

The device under test (DUT) as mentioned in this report complies with the stated requirements of the FCC Part 15, Subpart C.

FCC ID: 2AEYM1013.

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

The tests described in this report do not result in the right to use any approval mark as conferred by DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch As far as the tests were based on certain specifications; these are mentioned in the report.

## 2 SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

### 2.1 Applied standards

Standard	Title
FCC part 15, Subpart C	Federal Communications Commission (FCC) – Radio Frequency Devices

### 2.2 Reference standards

Standard	Year	Title
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices

### 2.3 Overview of results

Test Item	Standard	Result
Antenna requirement	FCC PART 15 C Section 15.203	PASS
Radiated Emission	FCC PART 15 section 15.231(b)	PASS
Occupied Bandwidth	FCC PART 15 section 15.231(c)	PASS
Deactivate Time	FCC PART 15 section 15.231(a)(1)	PASS

Remark:

- 1) EUT: In this whole report EUT means Equipment Under Test.
- 2) Tx: In this whole report Tx (or tx) means Transmitter.
- 3) Rx: In this whole report Rx (or rx) means Receiver.
- 4) RF: In this whole report RF means Radio Frequency.
- 5) The EUT is a manually operated remote control transmitter, Section 15.231(a) (2), (3) and (5) are not applicable.

### 3 GENERAL INFORMATION

#### 3.1 Model description

The apparatus as supplied for the test is Pulse II DUO, model Guybrator (contains transmit and receiver) intended for residential use, the product contains electronic control circuitry and powered by 3Vdc (CR2032 Button cell Battery) for transmit, 3.7Vdc by rechargeable Lithium-ion for receiver.

For the receiver, report 4322065.51(FCC Part 15, subpart B) can be referred  
The characteristics of the device are:

Operating Frequency	433.92MHz $\pm$ 500 kHz	
Operating Temperature Range	-40 – 55 °C	
Antenna Assembly	Type	Internal, PCB antenna
	Gain	Maximum 2 dBi
Modulation Type	ASK	



Figure 1 the transmitter

The operating modes as stated in the user manual are On (transmitting) and OFF mode.

### 3.2 Product Information

Equipment under test	Pulse II DUO
Trade mark	Hot Octopuss
Tested Type	Guybrator (the transmitter part)
Rating	3Vdc (CR2032 Button cell Battery)

### 3.3 Customer Information

Applicant/Manufacturer	JM Sunflower Ltd.
Contact person	Jiri Holoubek
Telephone	+852 2428 8338
Telefax	/
Address	Rm01, 3/F, Fabrico factory Building, 78-84 Kwai Cheong Road, Kwai Chung Hong Kong

Factory	JM Sunflower Ltd.
Contact person	Jiri Holoubek
Telephone	+852 2428 8338
Telefax	/
Address	Rm01, 3/F, Fabrico factory Building, 78-84 Kwai Cheong Road, Kwai Chung Hong Kong



### 3.4 **Product labeling**

According to section 15.19, the DUT shall have the following statement labeled to its housing on a conspicuous location:

“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”.

### 3.5 **User information**

The user- or instruction manual shall:

Caution the user that changes or modifications not expressly approved by the responsible party for compliance could void the user’s authority to operate the equipment.

## 4 TEST INFORMATION

### 4.1 Test configuration

<p>Requirements:</p>	<p>15.31(e): For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.</p> <p>15.32: Power supplies and CPU boards used with personal computers and for which separate authorizations are required to be obtained shall be tested as follows: Testing shall be in accordance with the procedures specified in Section 15.31 of this part.</p>
<p>Test frequencies and frequency range:</p>	<p>According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:</p> <p>According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:</p>

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

## Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

Remark: Test frequency is 434.17MHz

**4.2 Special accessories of the EUT**

None.

**4.3 Assistant equipment used on the test**

None.

**4.4 Test laboratory**

Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch
Registration Number	245651
Address	Building A3, No.3 Qiyun Road, Science City, Guangzhou Hi-Tech Industrial Development Zone, Guangzhou, P.R. China
Date	2015-04-15 to 2015-05-08
Supervised by	Daniel He

**4.5 Test facility**

The semi-anechoic chamber test site and corresponding measurement facility are located at the premises of DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch.

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum analyzer	R&S	FSV40	SN101012	2014/09/11	1 Year
2	RF Cable	/	/	/	2014/09/11	1 Year
3	EMI receiver	R&S	ESCI	101205	2014-12-27	1 Year
4	Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	2015-01-06	1 Year
5	Horn antenna	R&S	HF907	102306	2014-07-17	1 Year

#### 4.6 Environmental conditions

Tests have been performed in a controlled laboratory environment, where the environmental conditions are maintained within the applicable ranges.

Ambient temperature	15 °C – 25 °C
Relative Humidity air	30% - 60%

#### 4.7 Measurement Uncertainty

Test Item	Uncertainty
Occupied Channel Bandwidth	±0.7%
Radiated disturbance (30MHz– 1000MHz)	± 3.32 dB
Radiated disturbance (1GHz– 3GHz)	± 2.73 dB

**Remark:**

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

## 5 ANTENNA REQUIREMENTS

### 5.1 Standard equipment

15.203 requirement:

For intentional device. According to 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.

#### EUT Antenna

The antenna is circular polarization antenna and no consideration of replacement. The best case gain of the antenna is 2dBi



Test result: The unit does meet the FCC requirements.

## 6 RADIATED SPURIOUS EMISSIONS

Test Requirement:	FCC Part 15 C section 15.231 (b)
Test Method:	ANSI C63.10: Clause 6.4, 6.5 and 6.6
Test Status:	Test the EUT in transmitting mode.
Test 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	1,250 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

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 434.17 MHz

For the band 260-470MHz, the limit for average or QP field strength dBuV/m for the fundamental emission can calculate from below formula:

$\mu\text{V/m}$  at 3 meters=  $41.6667 (F)-7083.3333$ ,

so the limit is 80.83dB $\mu\text{V/m}$

No fundamental is allowed in the restricted bands.

The limit for average or QP field strength dBuV/m for the unwanted emission is 20dB below the maximum permitted fundamental level, and spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, **whichever limit permits a higher field strength.**

And according 15.35(a)

15.35(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.

Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

According to 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz, When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§ 15.250, 15.252, 15.255, and 15.509-15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: **Average = Peak value + 20log (Duty cycle)**, where the duty factor is calculated from following formula:

One cycle (T): 64.87289 ms

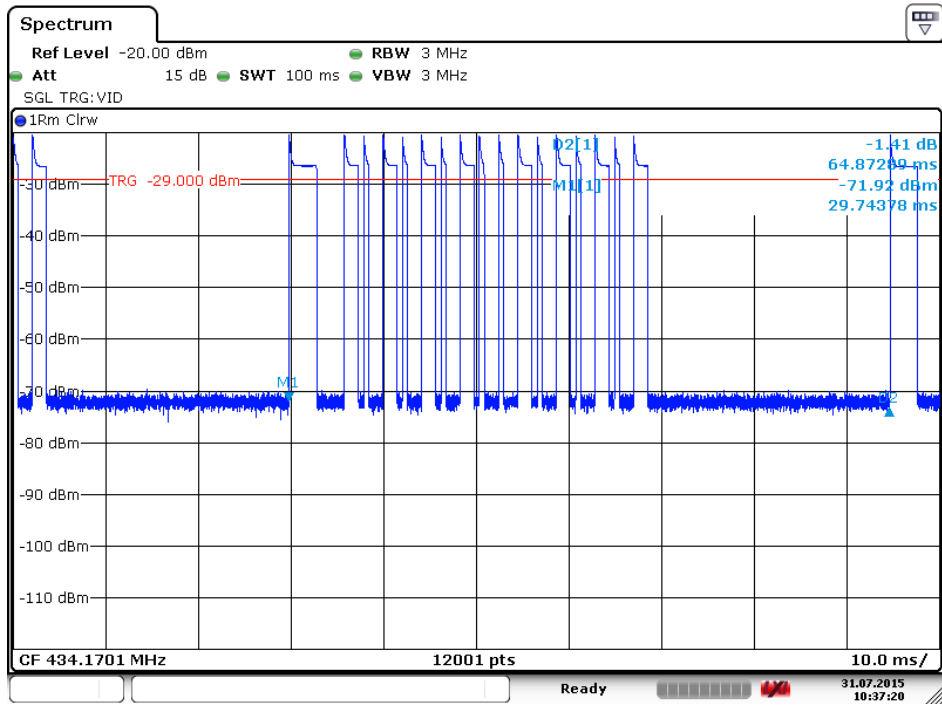
Ton: 2.98956 ms + 8x1.52289 ms + 8x0.53956 ms =19.48916 ms

$20\log (\text{Duty cycle}) = 20\log(19.48916/64.87289) = 20\log (0.3004) = -10.445\text{dB}$

Please refer to below plots for more details.

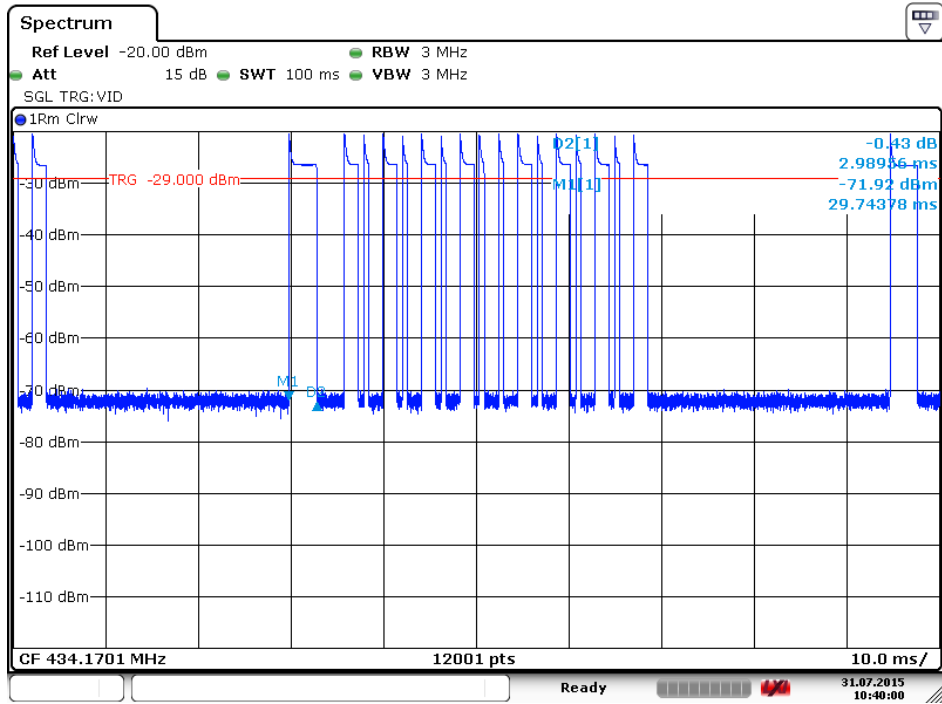


One period:

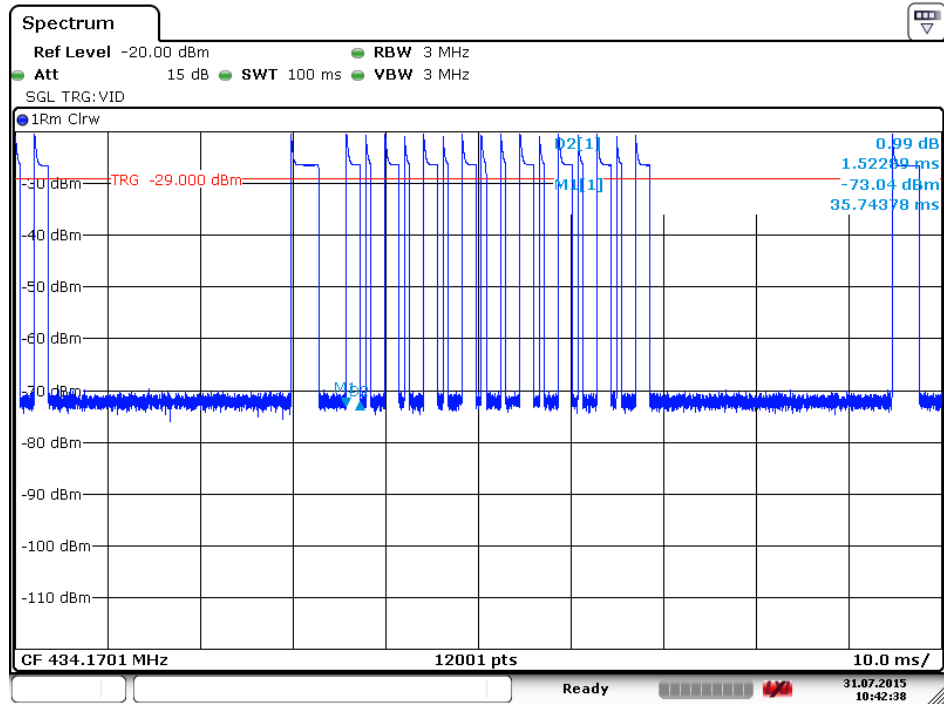


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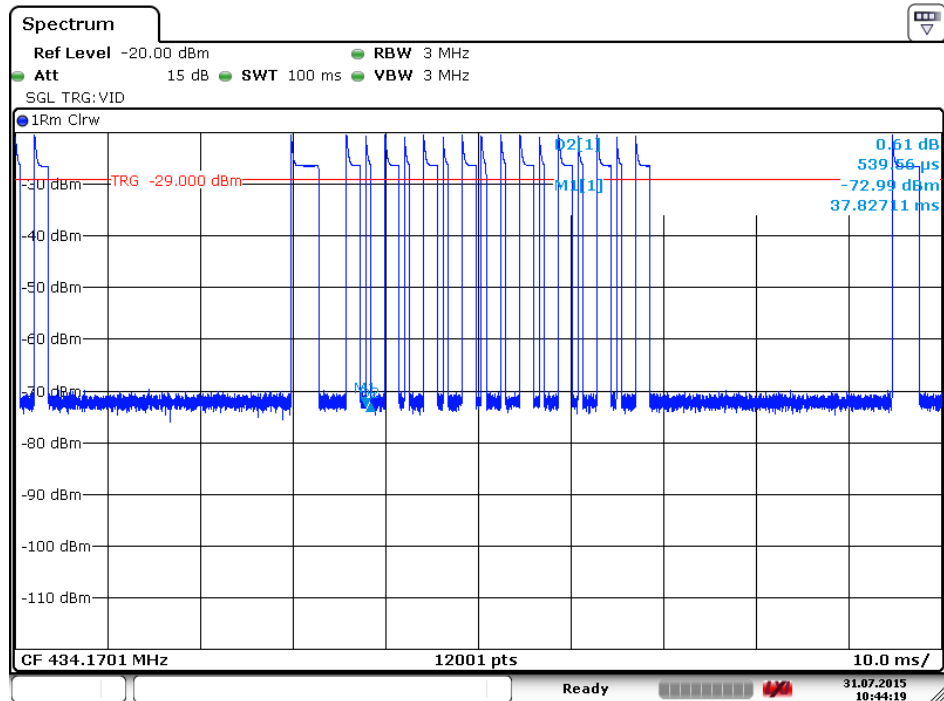
On time:



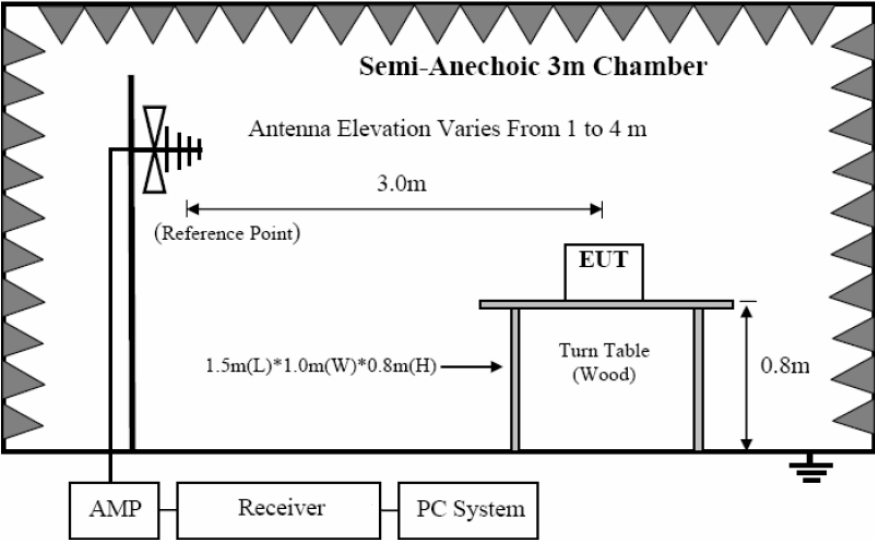
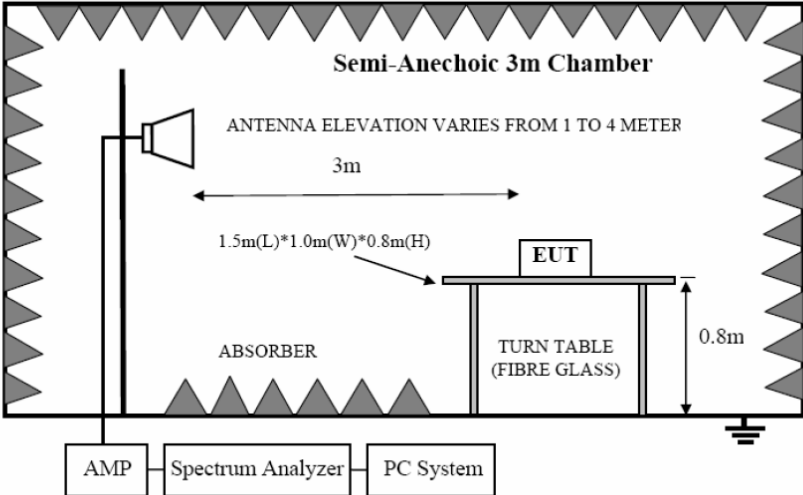
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<b>Test Configuration:</b>	
<p>In 3m Anechoic Chamber Test Setup Diagram for below 1GHz</p>  <p>In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz</p>  <p>Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.</p>	
<b>Test Procedure:</b>	
<ol style="list-style-type: none"> <li>1) 30 MHz to 1 GHz emissions: For testing performed with the bi-log type antenna. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.</li> <li>2) 1 GHz to 40 GHz emissions: Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to</li> </ol>	

perform radiated emission test above 1 GHz.

For testing performed with the horn antenna. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

For hand-held or body-worn devices rotated through three orthogonal axes(X,Y,Z) to determine which attitude (orientation) and equipment arrangement produces the highest emission relative to the limit; the attitude and equipment arrangement that produces the highest emission relative to the limit was used in making final radiated emission measurements.

Y: rotate EUT by 90° vertically.

X: rotate EUT by 90° clockwise.

Z: EUT as Radiated Emission test setup photograph in section 9 of this report.

<p>Detector:</p>	<p>For PK value:            RBW = 1 MHz for <math>f \geq 1</math> GHz, 100 kHz for <math>f &lt; 1</math> GHz            VBW <math>\geq</math> RBW            Sweep = auto            Detector function = peak            Trace = max hold            For AV value:            For harmonic emissions:            Average = Peak value + 20log (Duty cycle),            For other unwanted emissions:            RBW = 1 MHz for <math>f \geq 1</math> GHz, 100 kHz for <math>f &lt; 1</math> GHz            VBW =10Hz            Sweep = auto            Detector function = peak            Trace = max hold</p>
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1) For Fundamental emission:

antenna polarization	Test frequency	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Detector
		AV	PK	AV	PK	AV	PK	
Horizontal	434.17	64.10	74.55	80.83	100.83	-16.73	-26.28	Peak
Vertical		59.34	69.78			-21.50	-31.05	Peak

Remark: Average = Peak value + 20log (Duty cycle)

2) For other emissions:

The evaluated frequency range from 30MHz to 5 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak and average detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. The worst case emissions were reported.

**Result:**

antenna polarization	Test frequency	Measured field strength (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Detector
Horizontal	40.68	25.63	60.83	-35.20	PK
	73.25*	28.74	54.00	-25.26	PK
	293.52	29.13	60.83	-31.70	PK
	356.89	30.12	60.83	-30.71	PK
	654.78	31.03	60.83	-29.80	PK
	868.34	55.53	60.83	-5.30	PK
	1302.51*	32.65	54.00	-21.35	PK
	1736.68	29.74	60.83	-31.09	PK
	2170.85	32.97	60.83	-27.86	PK
	2605.02	32.86	60.83	-27.97	PK
	3039.19	34.98	60.83	-25.85	PK
3473.36	35.71	60.83	-25.12	PK	

antenna polarization	Test frequency	Measured field strength (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Detector
Vertical	40.35	25.41	60.83	-35.42	PK
	71.74	27.39	60.83	-33.44	PK
	294.28	27.63	60.83	-33.20	PK
	368.63	29.41	60.83	-31.42	PK
	671.84	30.11	60.83	-30.72	PK
	868.34	48.14	60.83	-12.69	PK
	1302.51*	29.57	54.00	-24.43	PK
	1736.68	29.42	60.83	-31.41	PK
	2170.85	31.84	60.83	-28.99	PK
	2605.02	31.76	60.83	-29.07	PK
	3039.19	33.82	60.83	-27.01	PK
	3473.36	34.99	60.83	-25.84	PK

Remark:

\*: Denotes restricted band of operation

Any emission falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with emission limit of FCC Part 15 Section 15.209

**Conclusion:**

**PASS**

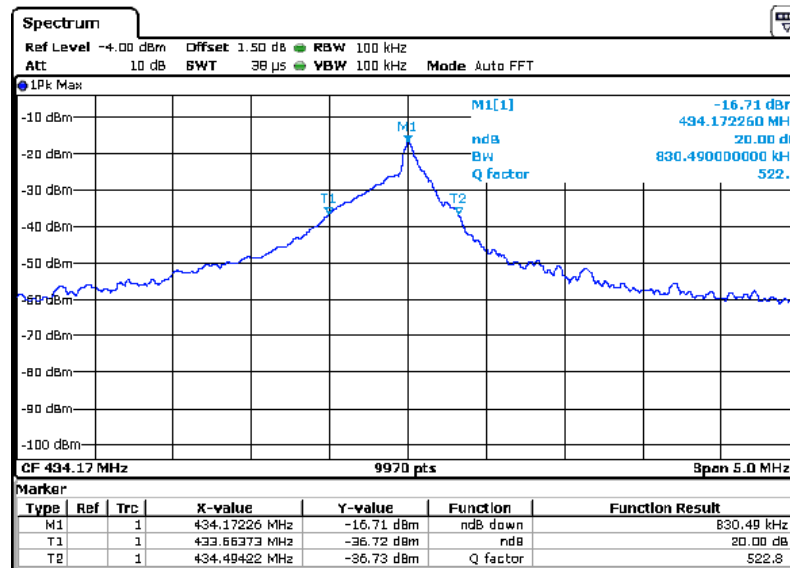
## 7 20DB DOWN BANDWIDTH

Test Requirement:	FCC Part 15 C section 15.231 (c)
Test Method:	ANSI C63.10: Clause 6.9
Test Status:	Test the EUT in transmitting mode.
Test Limit:	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. 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.
Method of measurement:	The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector. Record the 20 dB bandwidth of the carrier.

### Result:

Test Channel	bandwidth	Limit
434.17	830.49kHz	1.085MHz

Test result: The unit does meet the FCC requirements.



Conclusion:

# PASS



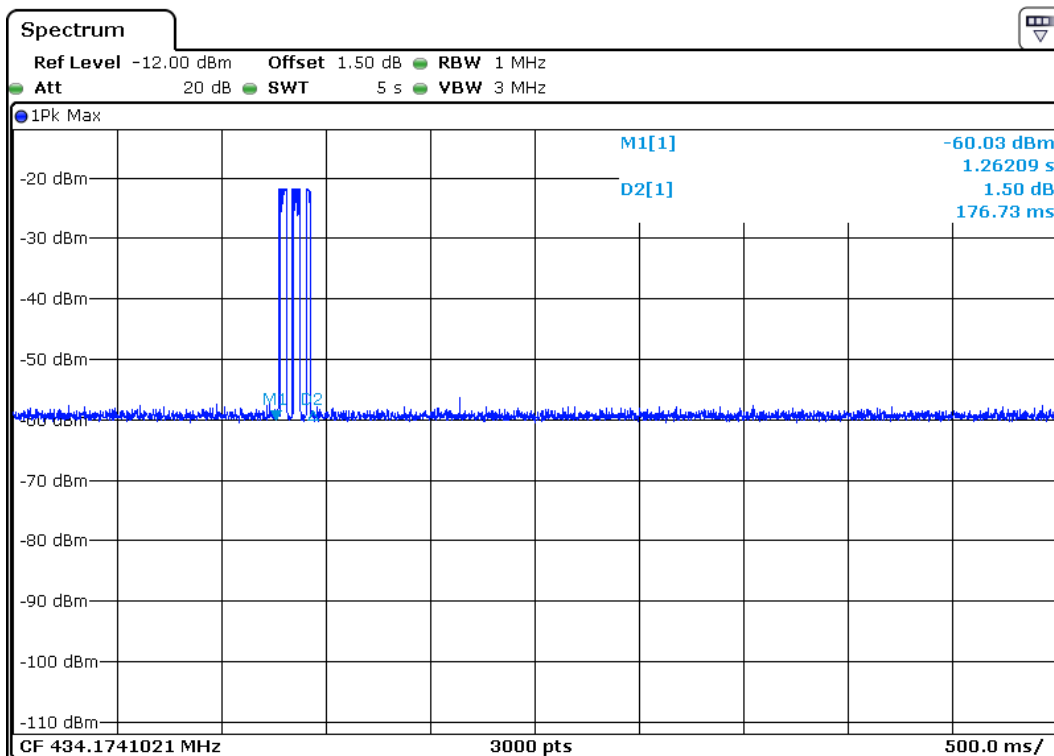
## 8 DEACTIVATE TIME

Test Requirement:	FCC Part 15 C section 15.231(a)
Test Method:	FCC Part 15 C section 15.231(a)
Test Status:	Test the EUT in transmitting mode.
Requirements	
<p><b>1. Regulation 15.231 (a)</b> The provisions of this Section are restricted to periodic operation within the band 40.66 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys is not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.</p> <p><b>Result:</b></p> <p>The EUT is a remote switch without audio or video transmitted.</p> <p>The EUT meets the requirements of this section.</p>	
<p><b>2. Regulation 15.231 (a1)</b> A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.</p>	

### Results

Carrier Frequency	Shutdown Time	Limit
434.17	176.73ms	≤5s

The unit does meet the FCC requirements.



**3. Regulation 15.231 (a2)** A transmitter activated automatically shall cease transmission within 5 seconds after activation.

**Result:**

The EUT does not have automatic transmission.

**4. Regulation 15.231 (a3)** Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

**Result:**

The EUT is a manually operated remote control transmitter, so it does not employ periodic transmission.

**5. Regulation 15.231 (a4)** Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

**Result:**

This section is not applicable to the EUT.

**Conclusion:**

**PASS**

## 9 TEST SETUP AND ARRANGEMENT

The photograph shows the tested device.

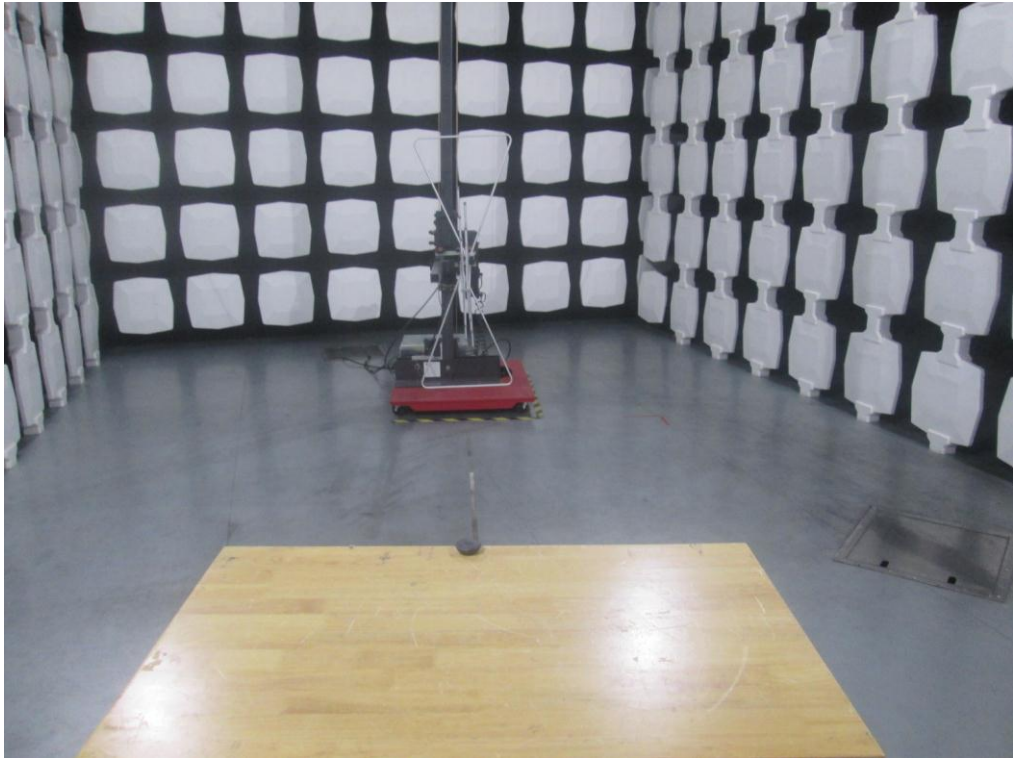


Figure 2 Radiated emission test setup (below 1 GHz)

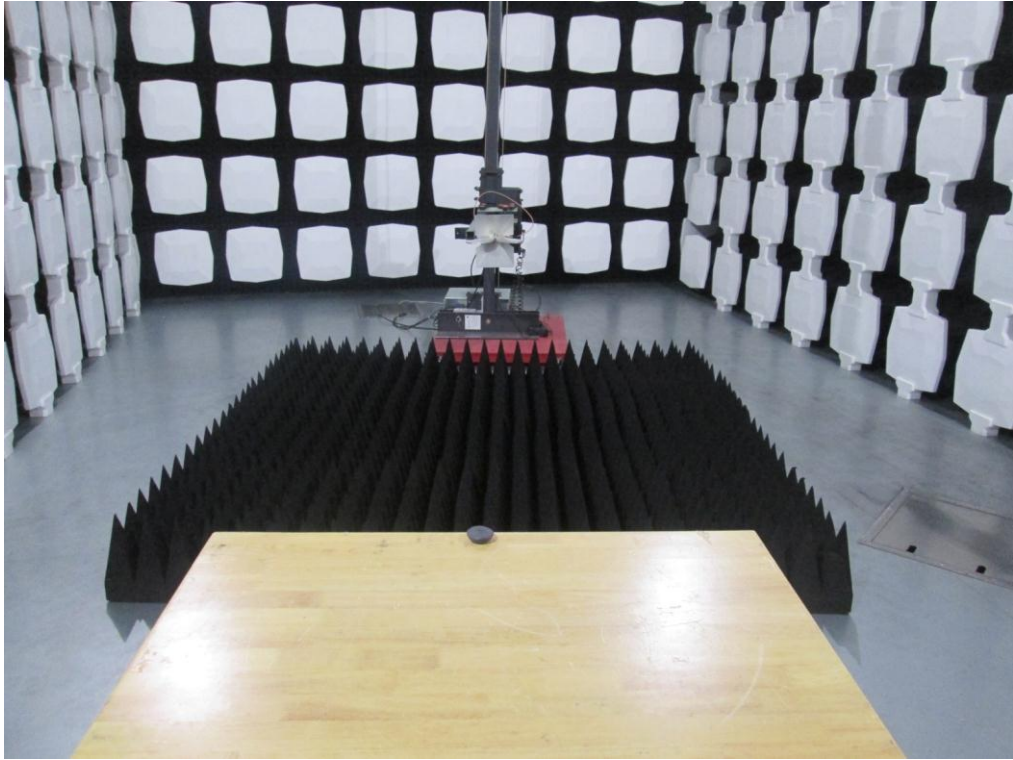


Figure 3 Radiated emission test setup (above 1 GHz)

10 **PHOTOS OF EUT**





