FCC TEST REPORT

FCC ID : XU31006

Applicant : Orliv
Address : 44 Engleberg Terrace Lakewood NJ

Equipment Under Test (EUT) :

Product description : Orliv Smart Finder

Model No. : 1006

Standards : 47 CFR FCC15.231:2009

Date of Test : Oct. 30, 2009

Test Engineer : Mike Chen

Reviewed By : Tom. yao

PERPARED BY:

Shenzhen CCE Test Electronic Co., Ltd.

Test Result :	**PASS ***

2 Contents

Page

1 COVER PAGE 1

2 CONTENTS 2

3 TEST SUMMARY 4

4 GENERAL INFORMATION 5

4.1 CLIENT INFORMATION 5
4.2 GENERAL DESCRIPTION OF E.U.T. 5
4.3 DETAILS OF E.U.T. 5
4.4 DESCRIPTION OF SUPPORT UNITS 5
4.5 STANDARDS APPLICABLE FOR TESTING 5

5 TEST LABORATORY AND FACILITY INFROMATION 6

5.1 TEST LOCATION 6

6 TEST EQUIPMENT USED 7

7 CONDUCTED EMISSION TEST 8

7.1 TEST EQUIPMENT 8
7.2 TEST PROCEDURE 8
7.3 CONDUCTED TEST SETUP 9
7.4 EUT OPERATING CONDITION 9
7.5 CONDUCTED EMISSION LIMITS 10
7.6 CONDUCTED EMISSION TEST DATA 10

8 RADIATION EMISSION TEST 11

8.1 TEST EQUIPMENT 11
8.2 MEASUREMENT UNCERTAINTY 11
8.3 TEST PROCEDURE 11
8.4 RADIATED TEST SETUP 12
8.5 SPECTRUM ANALYZER SETUP 12
8.6 CORRECTED AMPLITUDE & MARGIN CALCULATION 13
8.7 SUMMARY OF TEST RESULTS 13
8.8 EUT OPERATING CONDITION 14
8.9 RADIATED EMISSIONS LIMIT 14
8.10 RADIATED EMISSIONS TEST RESULT 15
8.10.1 Radiated Emission Test Data 15

9 ANTENNA REQUIREMENT 17

10 PERIODIC OPERATION 18

11 BAND EDGE 21

11.1 TEST PROCEDURE 21
11.2 BAND EDGE 21
11.3 BAND EDGE TEST RESULT 22

12 PHOTOGRAPHS OF TESTING 23

12.1 RADIATION EMISSION TEST VIEW FOR 30MHZ-1000MHZ 23
12.2 RADIATION EMISSION TEST VIEW FOR 1GHZ-5GHZ 23

13 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 24

13.1 EUT - FRONT VIEW 24
13.2 EUT - BACK VIEW 24
13.3 PCB-FRONT VIEW 25
13.4 PCB-BACK VIEW 25

14 FCC ID LABEL 26

3 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Periodic operation	FCC PART 15: 2009	ANSI C63.4: 2003	**Note**	PASS
Band Edge	FCC PART 15: 2009	ANSI C63.4: 2003	**Note**	PASS
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2009	ANSI C63.4: 2003	N/A	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2009	ANSI C63.4: 2003	N/A	N/A

Note : denote that for more details of the EUT , please refer to the relating test items as below .

Remark : the methods of measurement in all the test items were according to ANSI C63.4: 2003.

4 General Information

4.1 Client Information

Applicant:	Orliv
Address:	44 Engleberg Terrace Lakewood NJ
Manufacturer:	Orliv
Address:	44 Engleberg Terrace Lakewood NJ

4.2 General Description of E.U.T.

Product description:	Orliv Smart Finder
Model No.:	1006

4.3 Details of E.U.T.

Power Supply:	Battery 12.0V

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 the Orliv Smart Finder. The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

5 Test Laboratory and facility infromation

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

- **FCC – Registration No.: 759397**

  Solid Industrial (Shenzhen) 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 759397, December 28, 2006.

5.1 Test Location

All Emissions tests were performed at:-

Solid Industrial (Shenzhen) Co., Ltd. at 333 Bulong Highway Buji Longgang, Shenzhen, Guangdong, China.

6 Test Equipment USED

Equipment	Brand Name	Model	Cal. Int Months	Last Cal. Date
3m Anechoic chamber				
EMC Analyzer	Agilent E7405A	MY45114943	12	2009-08
EMI Test Receiver	R&S	ESS	12	2009-08
Pre Amplifier	Anritsu	MH648A	12	2009-08
Bilog Antenna	SCHAFFNER	CBL6111C	12	2009-08
Broad-band Horn Antenna	SCHWARZBECK MESS-ELEKTROM / VULB9163	667	12	2009-08
10m Coaxial Cable with N-male Connectors	SCHWARZBECK MESS-ELEKTROM / AK 9515 H	---	12	2009-08
10m 50 Ohm Coaxial Cable with N-plug,individual length	SCHWARZBECK MESSELEKTOM / AK 9513	---	12	2009-08
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	12	2009-08
AM/FM Stereo Signal Generator	Panasonic	VP-8122A	12	2009-08
Signal Generator	R&S	SMG	12	2009-08

7 Conducted Emission Test

Test Requirement:	47 CFR FCC15.207:2009
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

7.1 Test Equipment

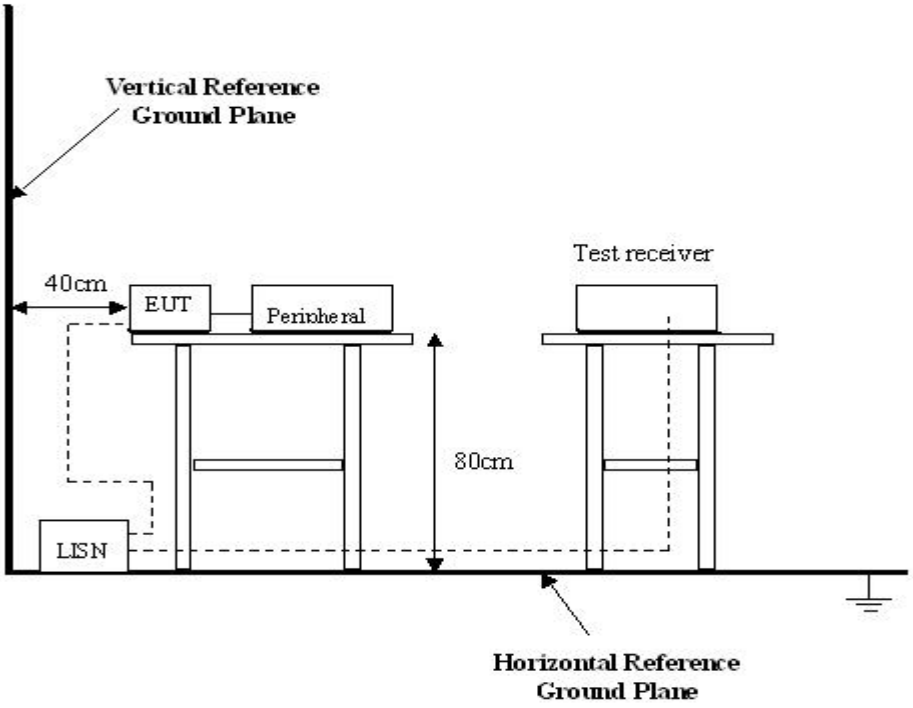
Please refer to Section 5 this report.

7.2 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.

7.3 Conducted Test Setup

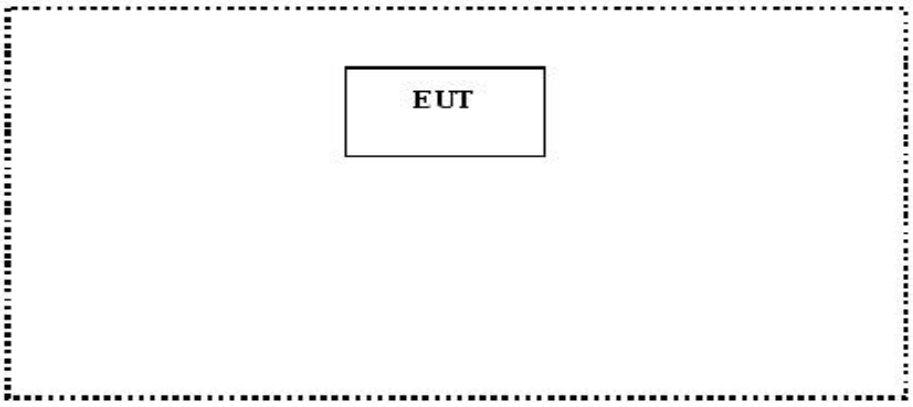
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



7.4 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.



7.5 Conducted Emission Limits

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

7.6 Conducted Emission Test Data

Owing to the EUT operated with battery, this test is not performed.

8 Radiation Emission Test

Test Requirement:	47 CFR FCC15.231:2009	
Test Method:	Based on FCC Part15 Paragraph 15.33	
Test Date:	Oct. 30, 2009	
Operating Environment:		
Frequency Range:	30MHz to 5GHz	Measurement Distance:3m
Temperature:	25.5 °C	
Humidity:	51 % RH	
Barometric Pressure:	1012 mbar	

EUT Operation Condition: The EUT was programmed to be in continuously transmitting mode.

8.1 Test Equipment

Please refer to Section 5 this report.

8.2 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 Solid Industrial (Shenzhen) Co., Ltd. EMC Lab is +/-4.98 dB.

8.3 Test Procedure

1. New battery were installed in the equipment under test for radiated emissions test.
2. This is a handhold 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.
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.

8.4 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.The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

8.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.231Rules, the system was tested to 5000 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 5GHz
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

8.6 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.7 Summary of Test Results

According to the data in section 8.10.1, the EUT complied with the FCC Part15 Paragraph 15.231 standards.

8.8 EUT Operating Condition

The EUT was working in the continuously transmit mode.

8.9 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

8.10 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was egtablished 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

8.10.1 Radiated Emission Test Data

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
433.92	Peak	Vertical	78.88	100.82	-21.94	1.1	0
433.92	Peak	Horizontal	73.65	100.82	-27.17	1.4	60
867.831	Peak	Vertical	48.82	80.82	-32.00	1.5	0
1301.76	Peak	Vertical	37.96	74.00	-36.04	2	120
1735.58	Peak	Vertical	32.75	74.00	-41.25	1.6	0
2169.6	Peak	Vertical	30.07	74.00	-43.93	1.5	140
2603.52	Peak	Vertical	31.00	74.00	-43.00	1.3	60
3037.44	Peak	Vertical	31.55	74.00	-42.45	1.4	45
3471.36	Peak	Vertical	32.71	74.00	-41.29	1.5	60
3905.28	Peak	Vertical	32.65	74.00	-41.35	1.5	50
4339.2	Peak	Vertical	31.08	74.00	-42.92	1.6	110
867.831	Peak	Horizontal	48.82	74.00	-25.18	1.3	120
1301.76	Peak	Horizontal	39.22	80.82	-41.60	1.4	45
1735.58	Peak	Horizontal	34.80	74.00	-39.20	1.5	90
2169.6	Peak	Horizontal	33.66	74.00	-40.34	1	130
2603.52	Peak	Horizontal	33.82	74.00	-40.18	2	40
3037.44	Peak	Horizontal	32.01	74.00	-41.99	1.3	60

3471.36	Peak	Horizontal	33.72	74.00	-40.28	1.5	110
3905.28	Peak	Horizontal	28.45	74.00	-45.55	1.3	10
4339.2	Peak	Horizontal	30.35	74.00	-43.65	2	90
433.92	AV	Vertical	75.23	80.82	-5.59	1.1	0
433.92	AV	Horizontal	70.00	80.82	-10.82	1.1	0
867.831	AV	Vertical	45.17	60.82	-15.65	1.5	60
1301.76	AV	Vertical	34.31	54.00	-19.69	2	120
1735.58	AV	Vertical	29.10	54.00	-24.90	1.6	60
2169.6	AV	Vertical	26.42	54.00	-27.58	1.5	140
2603.52	AV	Vertical	27.35	54.00	-26.65	1.3	60
3037.44	AV	Vertical	27.90	54.00	-26.10	1.4	45
3471.36	AV	Vertical	29.06	54.00	-24.94	1.5	60
3905.28	AV	Vertical	29.00	54.00	-25.00	1.5	45
4339.2	AV	Vertical	27.43	54.00	-26.57	1.6	110
867.831	AV	Horizontal	45.17	80.82	-35.65	1.3	10
1301.76	AV	Horizontal	35.57	54.00	-18.43	1	135
1735.58	AV	Horizontal	31.15	54.00	-22.85	1.5	90
2169.6	AV	Horizontal	30.01	54.00	-23.99	1	130
2603.52	AV	Horizontal	30.17	54.00	-23.83	2	40
3037.44	AV	Horizontal	28.36	54.00	-25.64	1.3	60
3471.36	AV	Horizontal	30.07	54.00	-23.93	1.5	110
3905.28	AV	Horizontal	24.80	54.00	-29.20	1.3	140
4339.2	AV	Horizontal	26.70	54.00	-27.30	1	0

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 @ 433.92MHz

41.6667 (433.92)- 7083.3333=10996.681uV/m

20log(10996.681)=80.82 dBuV/m(AV) limit @ 433.92MHz

And :
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

AV = Peak +20Log$_{10}$(duty cycle)

Note:

AV = Peak+20Log$_{10}$(duty cycle) = Peak - 3.65

So the Radiated Emission test data as the table follow.For more details of the calculation , please refer to the section 9 of the Periodic operation .

9 Antenna Requirement.

According to the 47 CFR FCC15.203:2009, 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

10 Periodic Operation

Test Requirement: 47 CFR FCC15.231:2009
Test Date: Oct. 30, 2009
Operating Environment:
Temperature: 25.5 °C
Humidity: 51 % RH
Barometric Pressure: 1012 mbar

EUT Operation Condition: The EUT was programmed to be in continuously transmitting mode.

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

Duty Cycle(%)=
Total On interval in a complete pulse train/ Length of a complete pulse train * %

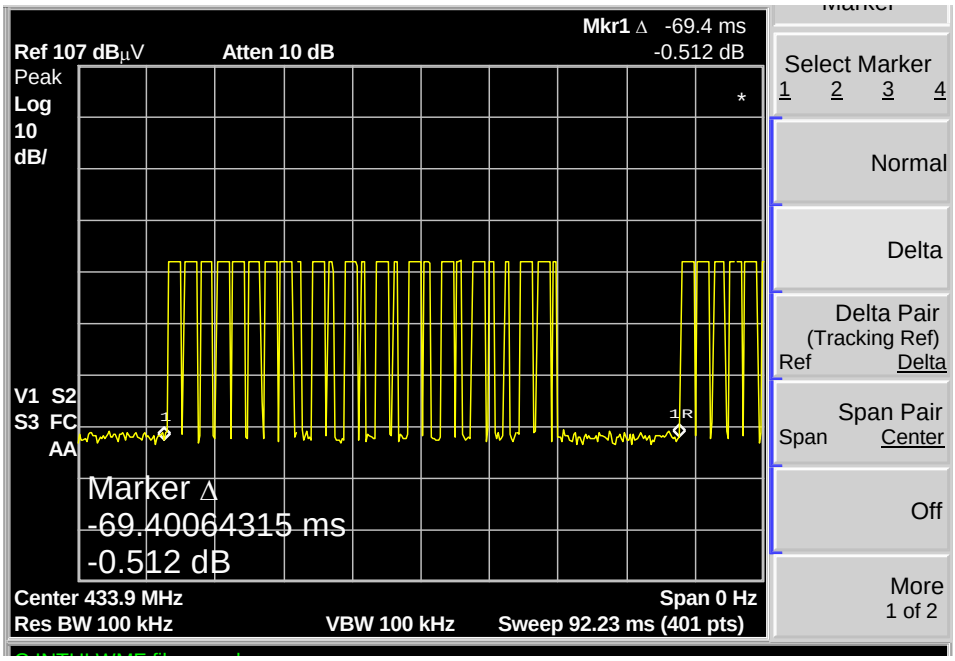
Duty Cycle Correction Factor(dB)=20 * Log_{10}(Duty Cycle(%))

Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Long Pulse	16	2.075	33.2msec
Short Pulse	9	1.383	12.447msec

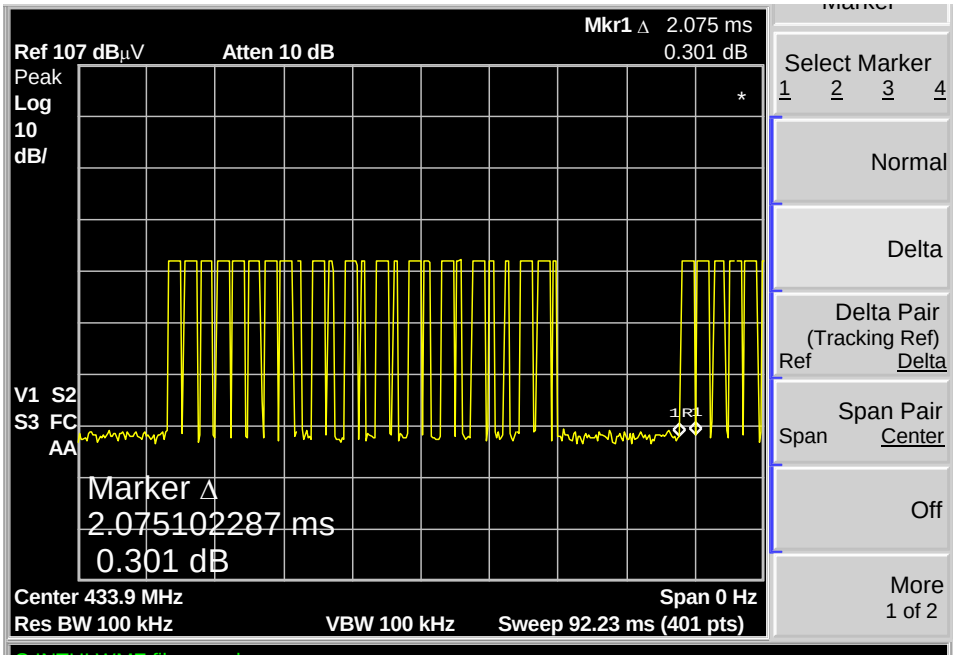
Total On interval in a complete pulse train	69.4msec
Length of a complete pulse train	45.647msec
Duty Cycle(%)	65.78%
Duty Cycle Correction Factor(dB)	-3.65

Refer to the duty cycle plot (as below),This device does meet the FCC requirement.

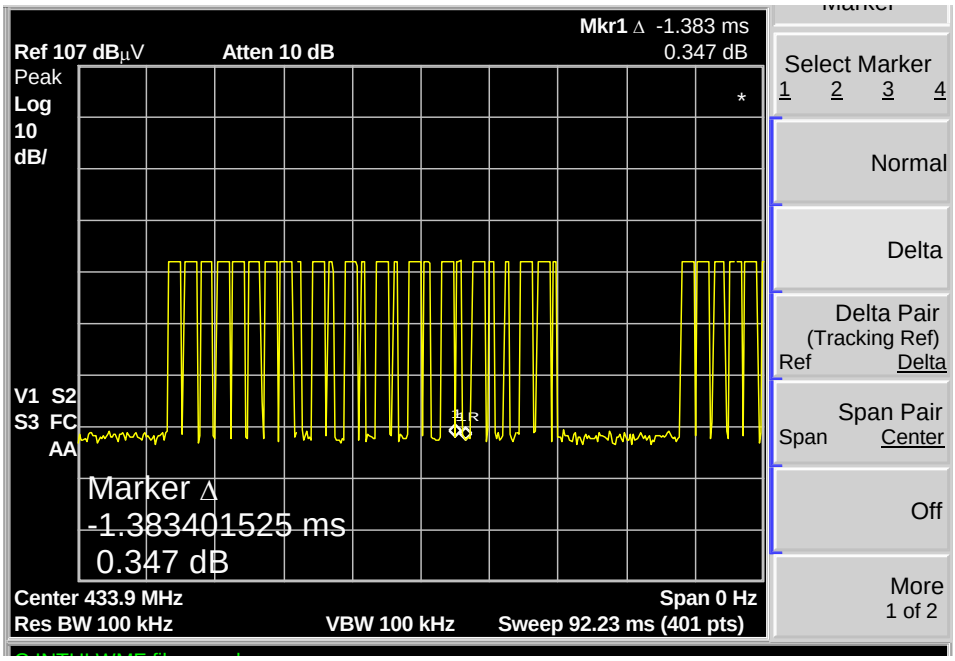
Length of a complete pulse train:



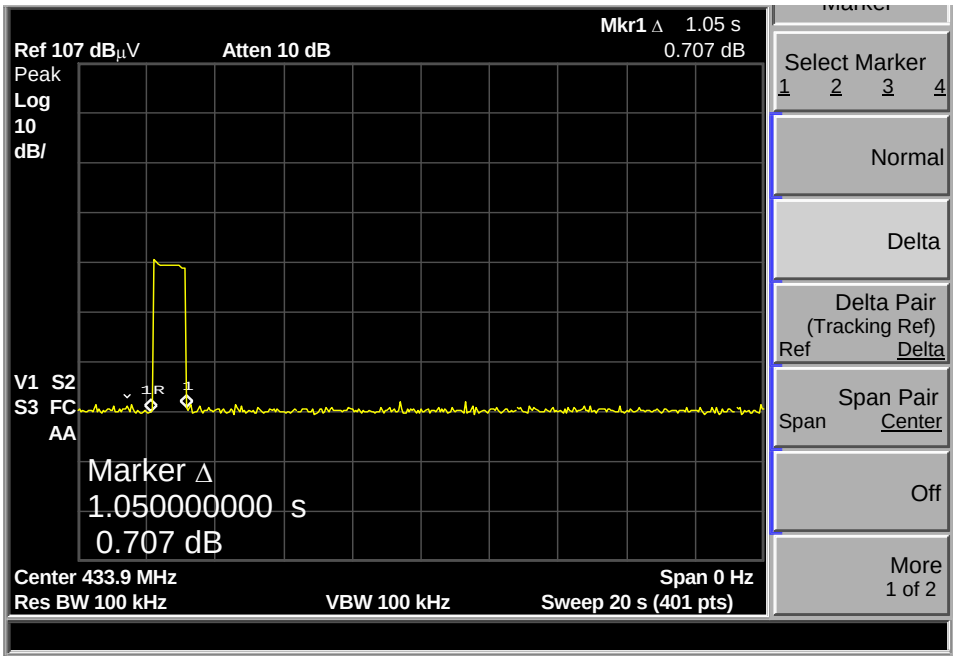
Long Pulse



Short Pulse:



Refer to the plot (as below),We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitteri is 1.05seconds, within not more than 5 seconds of being released.



11 Band Edge

Test Requirement:	47 CFR FCC15 Subpart C:2009
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	Oct. 30, 2009
Operating Environment:	
Test mode:	Continuously transmit
Temperature:	25.5 °C
Humidity:	51%RH

11.1 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 Continuously transmit mode.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.

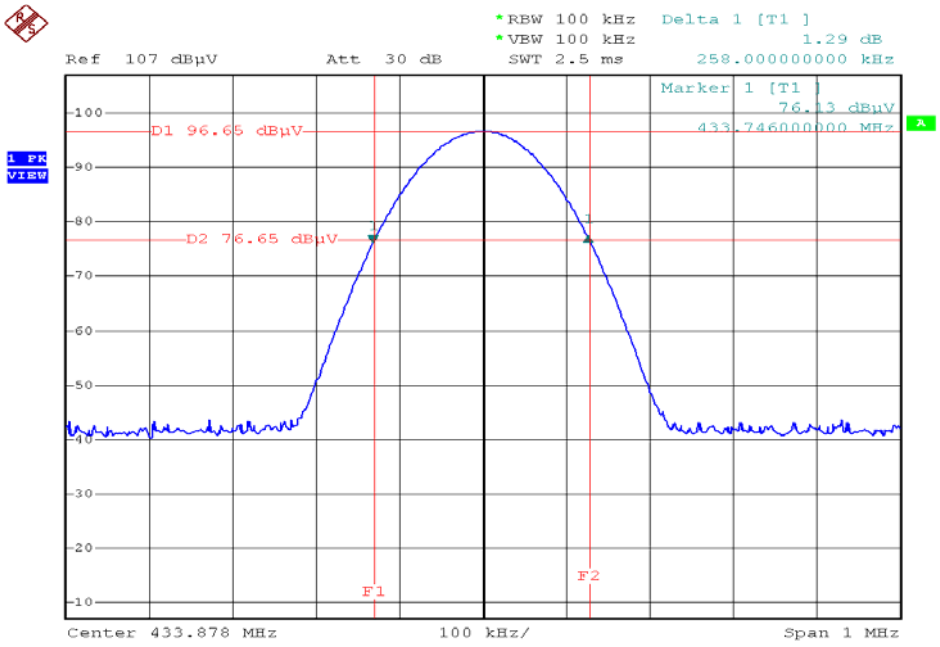
11.2 Band Edge

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)	Bandwidth Emission (KHz)	Limit (KHz)	Result
433.92	258.00	1084.8	Pass

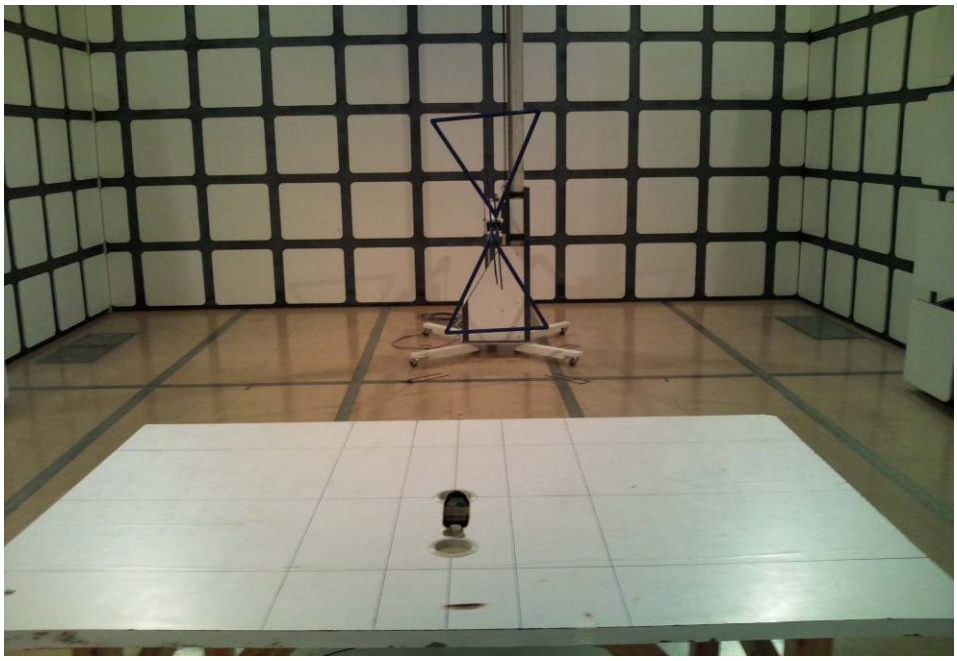
11.3 Band Edge Test Result

433.92MHz TX

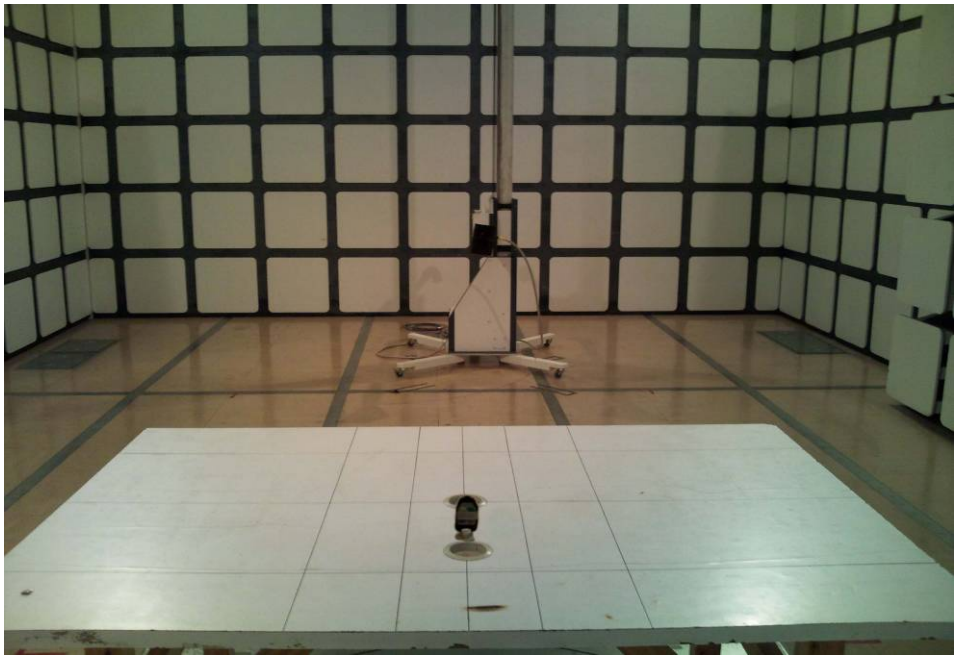


12 Photographs of Testing

12.1 Radiation Emission Test View For 30MHz-1000MHz

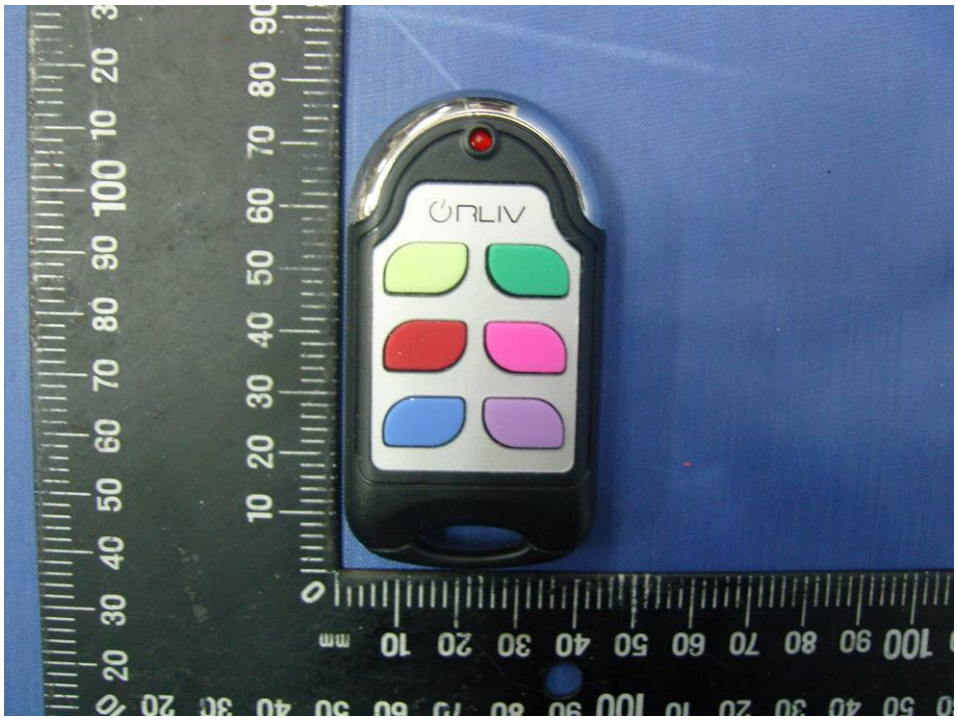


12.2 Radiation Emission Test View For 1GHz-5GHz

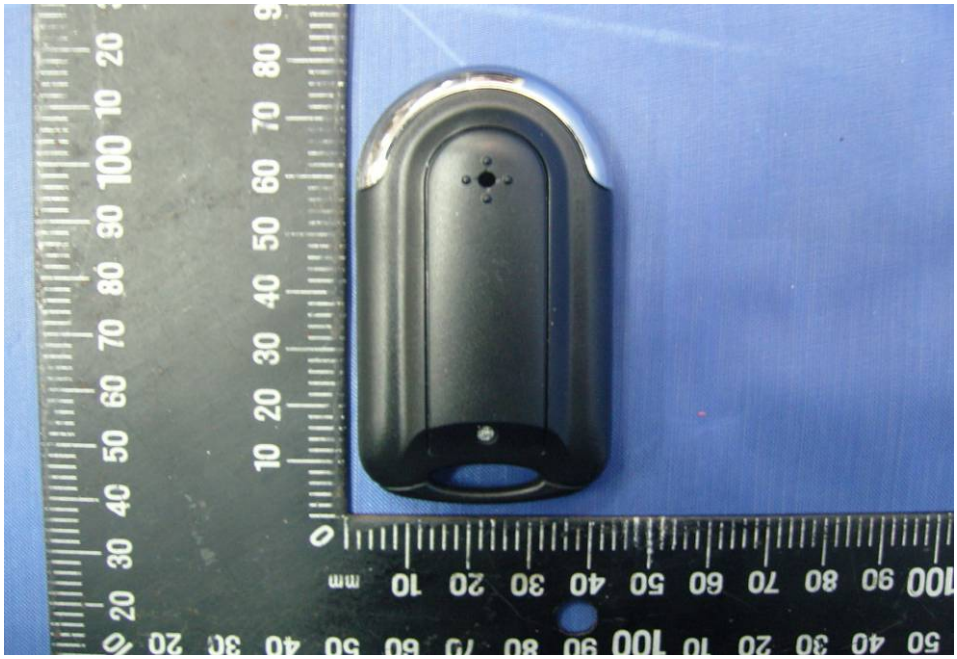


13 Photographs - Constructional Details

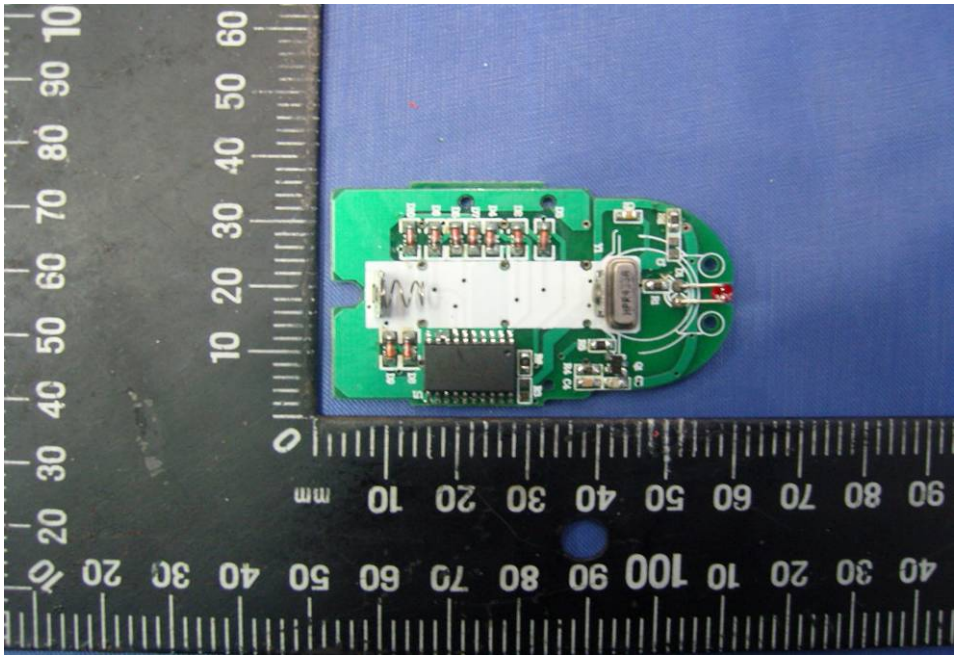
13.1 EUT - Front View



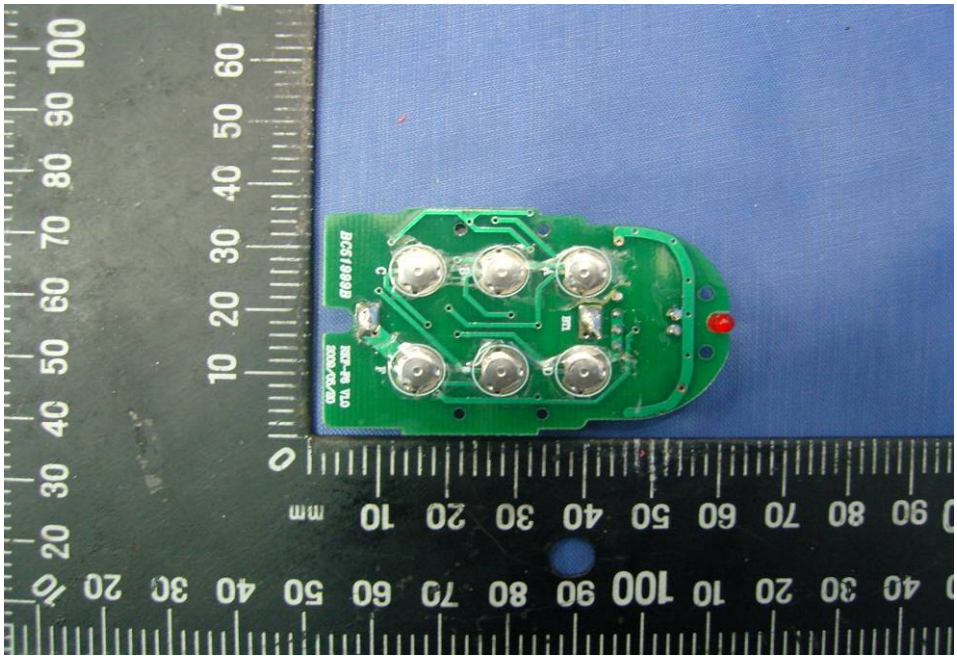
13.2 EUT - Back View



13.3 PCB-Front View



13.4 PCB-Back View



14 FCC ID Label

Proposed Label Location on EUT

EUT Bottom View/proposed FCC Label Location