# *FCC TEST REPORT*

| | | |
|---|---|---|
| **FCC ID** | : | XFWCND1002-TX |
| **Reference No.** | : | TK10082165-S-F |
| **Applicant** | : | 2Go Products, LLC. |
| **Address** | : | 7770 Regents Rd #113-632 San Diego California 92122 United States |
| **Product Name** | : | Remote Key Finder |
| **Model No.** | : | CND1002 |
| **Date of Test** | : | Aug.20, 2010 to Aug.25, 2010 |
| **Date of Issue** | : | Aug.25, 2010 |
| **Standard** | : | 47 CFR FCC15.231:2008 |
| **Tested By** | : | Jack.Lin |
| **Reviewed By** | : | Richard chen |

PERPARED BY:

**Shenzhen Toke Test Technology Co., Ltd.**

| | |
|---|---|
| **Test Result :** | **PASS *** |

# 2 Contents

# 3 Test Summary

| Test Items | Test Requirement | Test Method | Class / Severity | Result |
|---|---|---|---|---|
| Periodic operation | FCC PART 15: 2008 | ANSI C63.4: 2003 | **Note** | PASS |
| Band Edge | FCC PART 15: 2008 | ANSI C63.4: 2003 | **Note** | PASS |
| Radiated Emission (30MHz to 5GHz) | FCC PART 15: 2008 | ANSI C63.4: 2003 | N/A | PASS |
| Conducted Emission (150KHz to 30MHz) | FCC PART 15: 2008 | 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: | 2Go Products, LLC. |
| Address: | 7770 Regents Rd #113-632 San Diego California 92122 United States |
| Manufacturer: | Shenzhen C&D Electronic Co.,Ltd. |
| Address: | Bldg2, Xiayousong Mountaintop Industrial Dist, Long Hua Town, Bao'An District,ShenZhen City,China |

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

| | |
|---|---|
| Product description: | Remote Key Finder |
| Model No.: | CND1002 |

## 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 Remote Key Finder. The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

## 4.6 Test Location

All Emissions tests were performed at:-

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

| Equipment | Brand Name | Model | Cal. Int Months | Last Cal. Date |
|---|---|---|---|---|
| 3m Anechoic chamber | | | | |
| EMC Analyzer | Agilent E7405A | MY45114943 | 12 | 2010-08 |
| EMI Test Receiver | R&S | ESS | 12 | 2010-08 |
| Pre Amplifier | Anritsu | MH648A | 12 | 2010-08 |
| Bilog Antenna | SCHAFFNER | CBL6111C | 12 | 2010-08 |
| Broad-band Horn Antenna | SCHWARZBECK MESS-ELEKTROM / VULB9163 | 667 | 12 | 2010-08 |
| 10m Coaxial Cable with N-male Connectors | SCHWARZBECK MESS-ELEKTROM / AK 9515 H | --- | 12 | 2010-08 |
| 10m 50 Ohm Coaxial Cable with N-plug,individual length | SCHWARZBECK MESSELEKTOM / AK 9513 | --- | 12 | 2010-08 |
| Test Receiver | ROHDE&SCHWARZ/ ESPI | 101155 | 12 | 2010-08 |
| AM/FM Stereo Signal Generator | Panasonic | VP-8122A | 12 | 2010-08 |
| Signal Generator | R&S | SMG | 12 | 2010-08 |
| | | | | |

# 6 Conducted Emission Test

| | |
|---|---|
| Test Requirement: | 47 CFR FCC15.207:2008 |
| 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)<br>Quasi-Peak & Average if maximised peak within 6dB of Average Limit |

## 6.1 Test Equipment

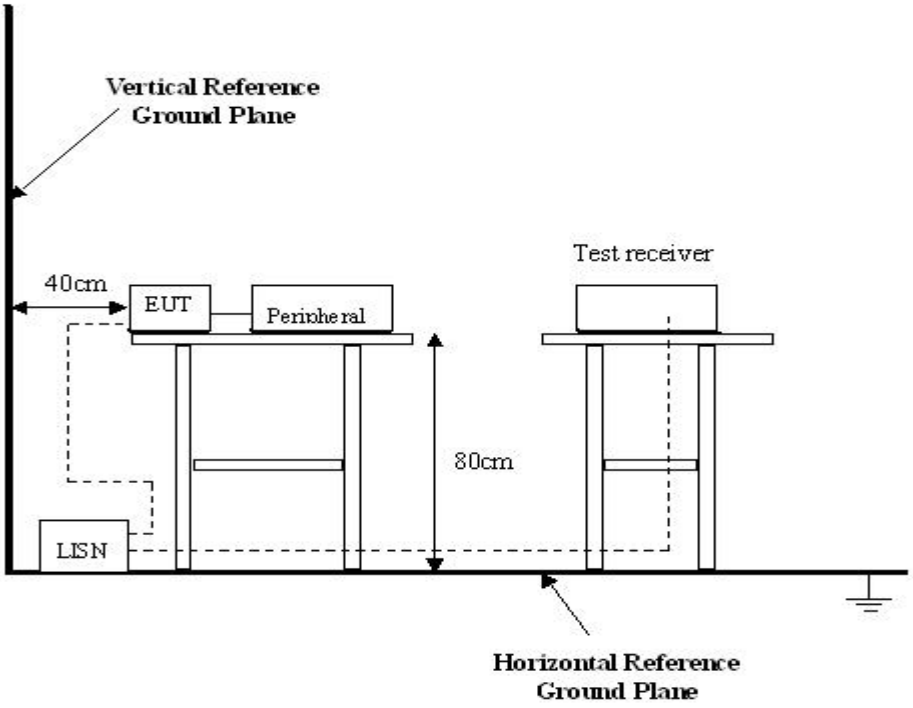
Please refer to Section 5 this report.

## 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

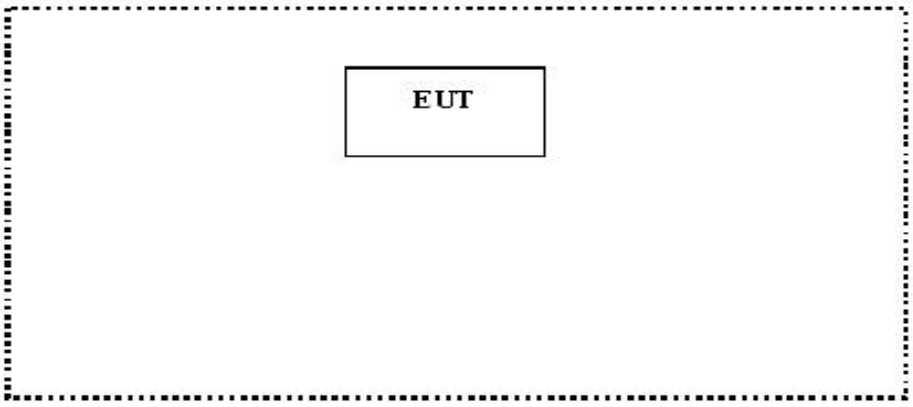
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.




## 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

| 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

## 6.6 Conducted Emission Test Data

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

# 7 Radiation Emission Test

| | |
|---|---|
| Test Requirement: | 47 CFR FCC15.231:2008 |
| Test Method: | Based on FCC Part15 Paragraph 15.33 |
| Test Date: | Aug.23,2010 |
| 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 Solid Industrial (Shenzhen) Co., Ltd. EMC Lab is +/-4.98 dB.

## 7.3 Test Procedure

1. New battery was talled 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.

## 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.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.

## 7.5 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

## 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:

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

## 7.7 Summary of Test Results

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

## 7.8 EUT Operating Condition

The EUT was working in the continuously transmit mode.

## 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 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 |

### 7.10.1 Radiated Emission Test Data

| | |
|---|---|
| Test Item: | Radiated Emission Test Data |
| Test Voltage: | DC 12V |
| Test Mode: | TX On |
| Temperature: | 25.5 °C |
| Humidity: | 51%RH |
| Test Result: | PASS |

**Note:**

AV = Peak+20Log$_{10}$(duty cycle) = Peak – 8.44

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 .

| 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 | 84.80 | 100.82 | -16.02 | 1.0 | 10 |
| 433.92 | Peak | Horizontal | 79.46 | 100.82 | -21.36 | 1.1 | 60 |
| 867.831 | Peak | Vertical | 53.61 | 80.82 | -27.21 | 1.0 | 10 |
| 1301.76 | Peak | Vertical | 42.75 | 74.00 | -31.25 | 1.1 | 120 |
| 1735.58 | Peak | Vertical | 38.70 | 74.00 | -35.30 | 1.1 | 20 |
| 2169.6 | Peak | Vertical | 34.86 | 74.00 | -39.14 | 1.1 | 140 |
| 2603.52 | Peak | Vertical | 35.79 | 74.00 | -38.21 | 1.0 | 60 |
| 3037.44 | Peak | Vertical | 36.34 | 74.00 | -37.66 | 1.1 | 45 |
| 3471.36 | Peak | Vertical | 37.5 | 74.00 | -36.5 | 1.0 | 60 |
| 3905.28 | Peak | Vertical | 37.07 | 74.00 | -36.93 | 1.1 | 50 |
| 4339.2 | Peak | Vertical | 35.87 | 74.00 | -38.13 | 1.1 | 110 |
| 867.831 | Peak | Horizontal | 53.61 | 74.00 | -20.39 | 1.2 | 100 |
| 1301.76 | Peak | Horizontal | 44.01 | 80.82 | -36.81 | 1.1 | 120 |
| 1735.58 | Peak | Horizontal | 39.59 | 74.00 | -34.41 | 1.1 | 90 |
| 2169.6 | Peak | Horizontal | 38.45 | 74.00 | -35.55 | 1.0 | 120 |
| 2603.52 | Peak | Horizontal | 38.61 | 74.00 | -35.39 | 1.1 | 40 |
| 3037.44 | Peak | Horizontal | 36.80 | 74.00 | -37.20 | 1.0 | 60 |
| 3471.36 | Peak | Horizontal | 38.51 | 74.00 | -35.49 | 1.1 | 10 |
| 3905.28 | Peak | Horizontal | 33.24 | 74.00 | -40.76 | 1.1 | 10 |
| 4339.2 | Peak | Horizontal | 35.14 | 74.00 | -38.86 | 1.0 | 90 |
| 433.92 | AV | Vertical | 76.36 | 80.82 | -4.46 | 1.1 | 20 |
| 433.92 | AV | Horizontal | 71.02 | 80.82 | -9.8 | 1.1 | 0 |
| 867.831 | AV | Vertical | 45.17 | 60.82 | -15.65 | 1.0 | 60 |
| 1301.76 | AV | Vertical | 34.31 | 54.00 | -19.69 | 1.2 | 120 |
| 1735.58 | AV | Vertical | 30.26 | 54.00 | -23.74 | 1.0 | 60 |
| 2169.6 | AV | Vertical | 26.42 | 54.00 | -27.58 | 1.1 | 140 |
| 2603.52 | AV | Vertical | 27.35 | 54.00 | -26.65 | 1.1 | 10 |
| 3037.44 | AV | Vertical | 27.90 | 54.00 | -26.10 | 1.0 | 40 |
| 3471.36 | AV | Vertical | 29.06 | 54.00 | -24.94 | 1.0 | 60 |
| 3905.28 | AV | Vertical | 28.63 | 54.00 | -25.37 | 1.1 | 40 |
| 4339.2 | AV | Vertical | 27.43 | 54.00 | -26.57 | 1.0 | 110 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 867.831 | AV | Horizontal | 45.17 | 80.82 | -35.65 | 1.1 | 110 |
| 1301.76 | AV | Horizontal | 35.57 | 54.00 | -18.43 | 1.0 | 45 |
| 1735.58 | AV | Horizontal | 31.15 | 54.00 | -22.85 | 1.1 | 90 |
| 2169.6 | AV | Horizontal | 30.01 | 54.00 | -23.99 | 1.1 | 130 |
| 2603.52 | AV | Horizontal | 30.17 | 54.00 | -23.83 | 1.2 | 45 |
| 3037.44 | AV | Horizontal | 28.36 | 54.00 | -25.64 | 1.1 | 160 |
| 3471.36 | AV | Horizontal | 30.07 | 54.00 | -23.93 | 1.0 | 140 |
| 3905.28 | AV | Horizontal | 24.80 | 54.00 | -29.20 | 1.1 | 10 |
| 4339.2 | AV | Horizontal | 26.70 | 54.00 | -27.30 | 1.0 | 50 |

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 +20$Log_{10}$(duty cycle)

# 8 Antenna Requirement.

According to the 47 CFR FCC15.203:2008 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

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

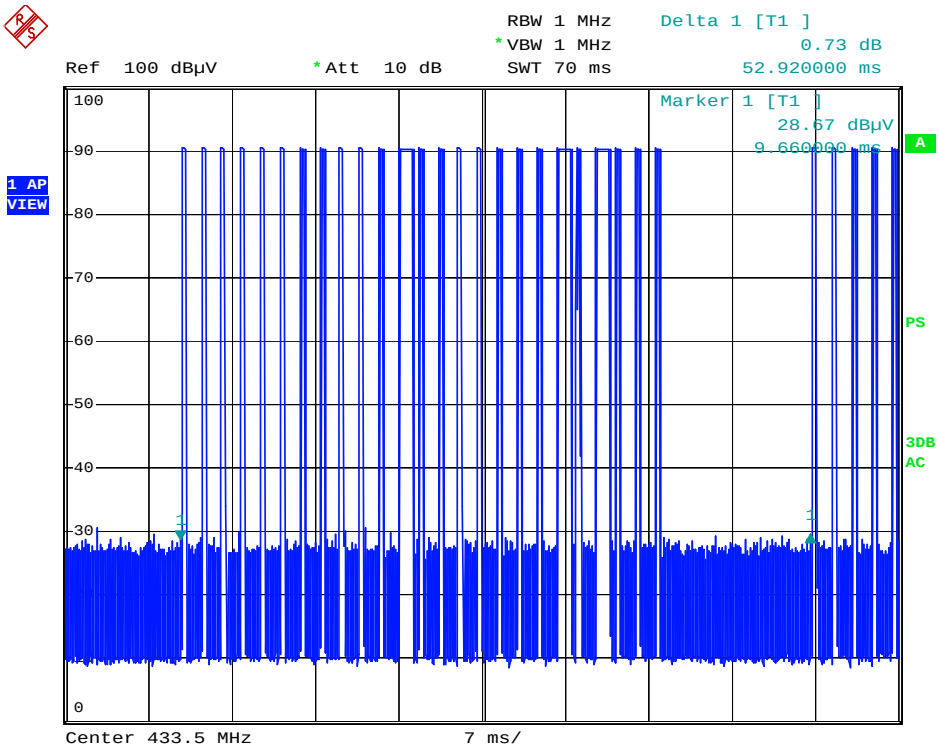
**Duty Cycle Correction Factor(dB)=20 * $Log_{10}$(Duty Cycle(%))**

| Pulse Train | Number of Pulse | T(ms) | Total Time(ms) |
|---|---|---|---|
| Long Pulse | 3 | 1.54 | 4.62 msec |
| Short Pulse | 22 | 0.7 | 15.4msec |

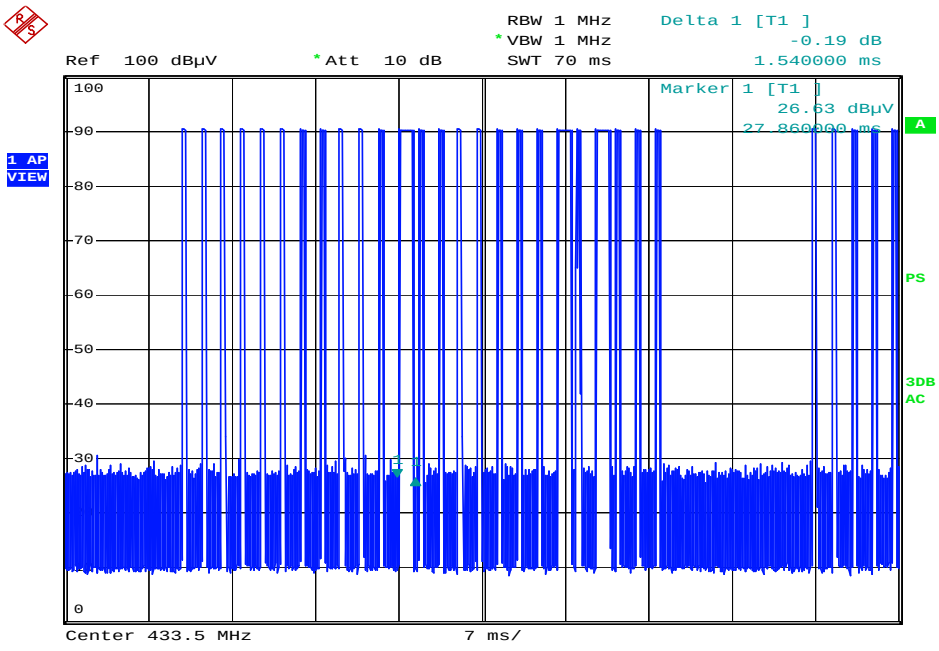
| | |
|---|---|
| Total On interval in a complete pulse train | 52.92msec |
| Length of a complete pulse train | 20.02msec |
| Duty Cycle(%) | 37.83% |
| Duty Cycle Correction Factor(dB) | -8.44 |

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

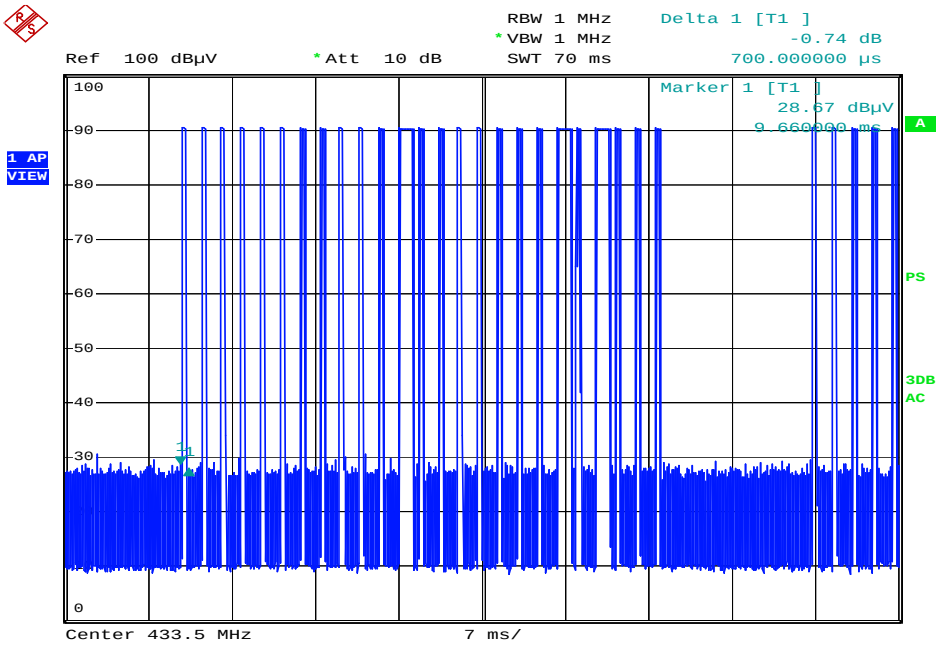
Length of a complete pulse train:



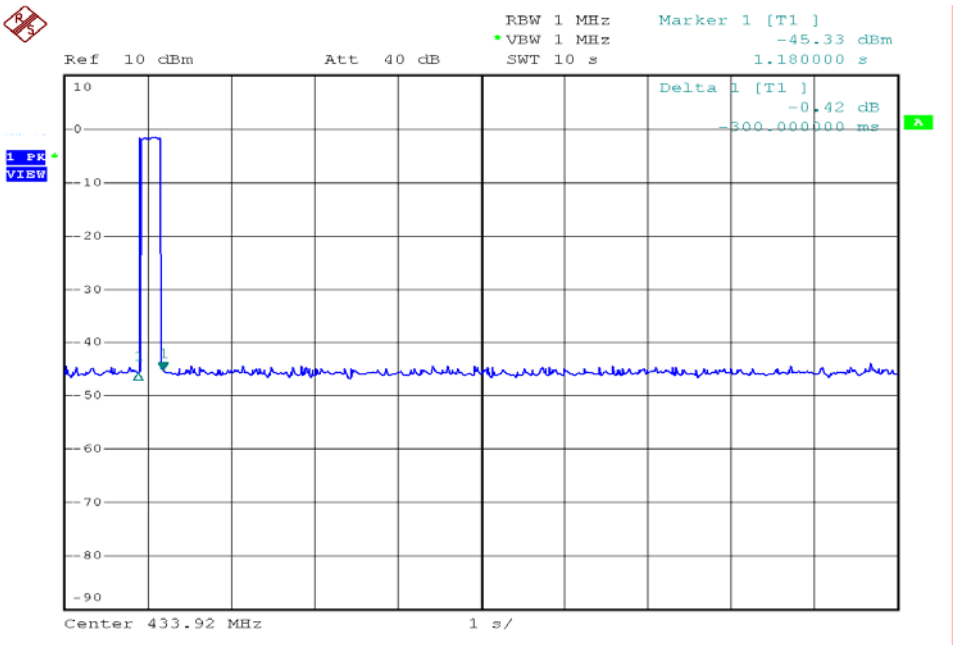

Long Pulse




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 0.30s, within not more than 5 seconds of being released.



# 10 Band Edge

| | |
|---|---|
| Test Requirement: | 47 CFR FCC15 Subpart C:2003 |
| Test Method: | Based on FCC Part15 Paragraph 15.231 |
| Test Date: | Aug.24,2010 |
| Test mode: | Continuously transmit |
| Temperature: | 25.5 °C |
| Humidity: | 51%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 Continuously transmit mode.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.

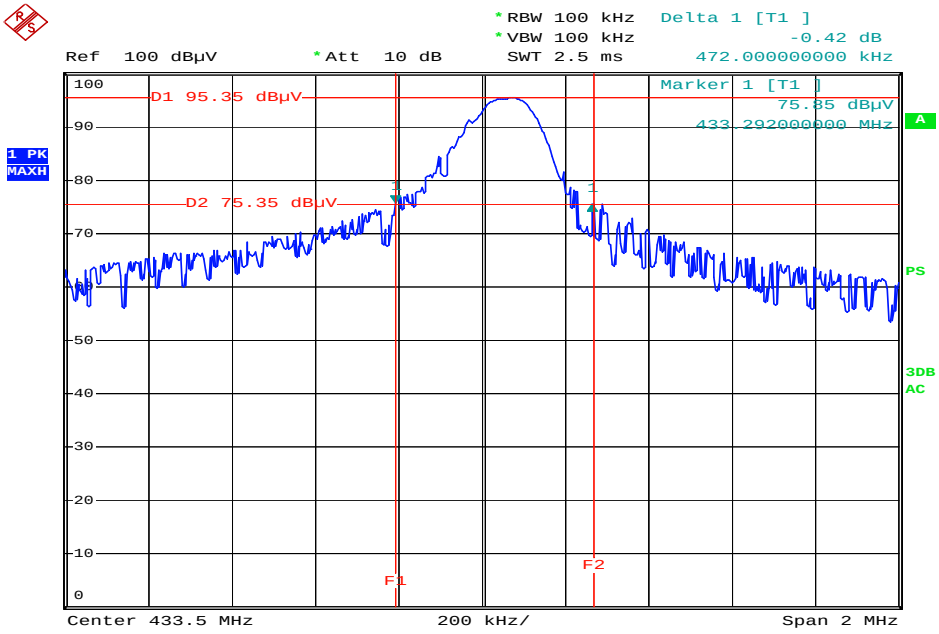
## 10.2 Band Edge

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 | 472.00 | 1084.8 | Pass |

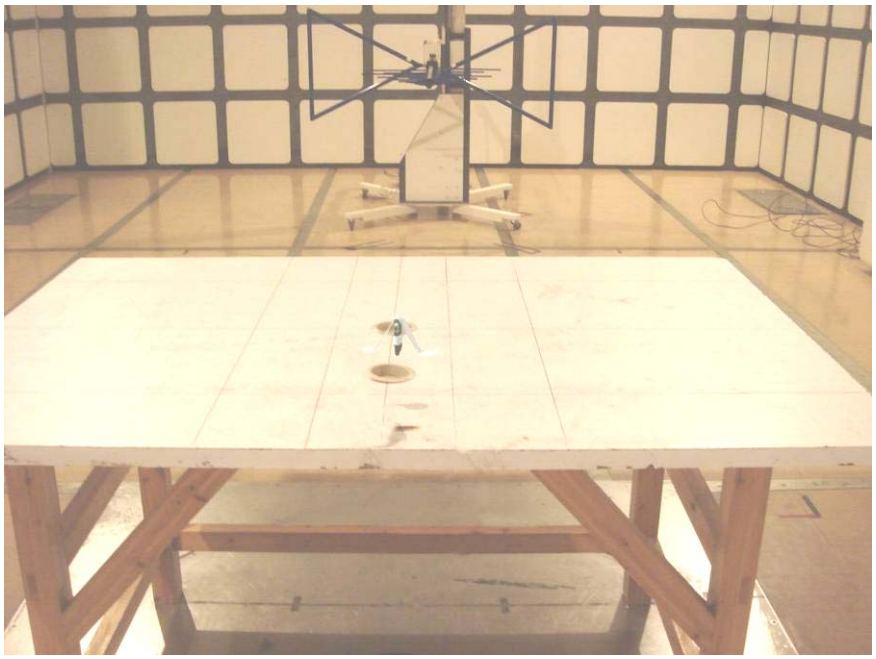
## 10.3 Band Edge Test Result

### 433.92MHz TX

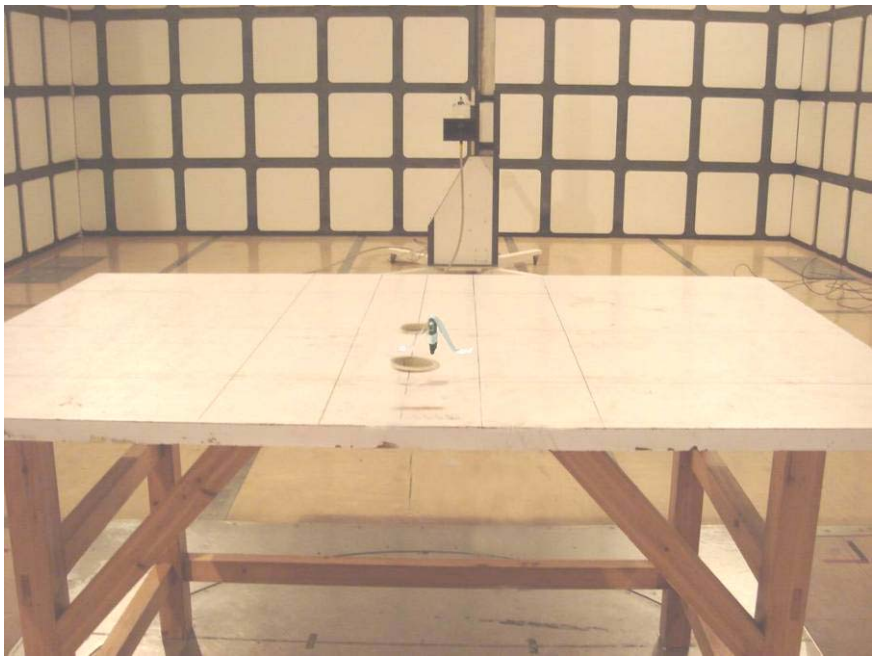


# 11 Photographs of Testing

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



## 11.2 Radiation Emission Test View For 1GHz-5GHz

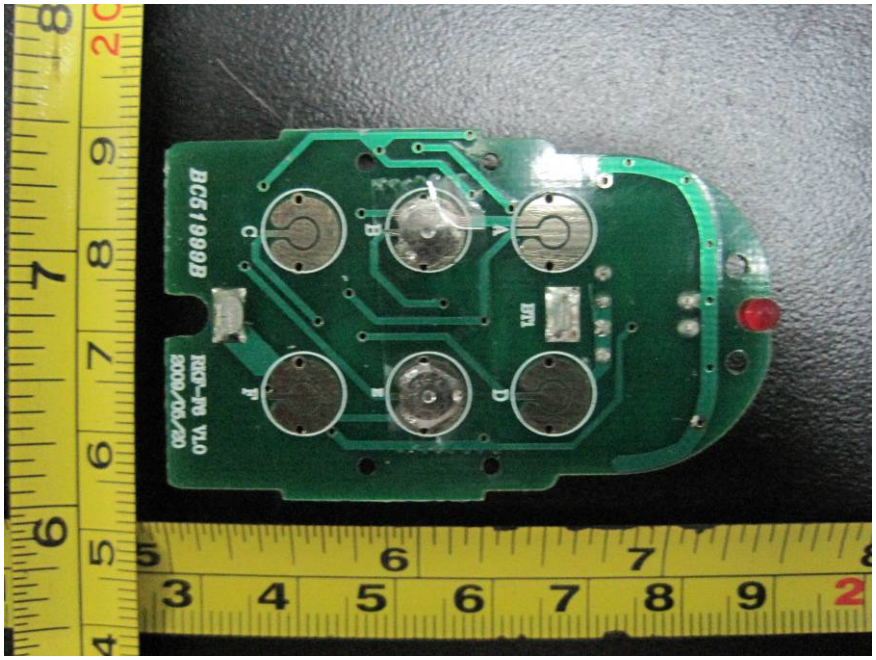


# 12 Photographs - Constructional Details

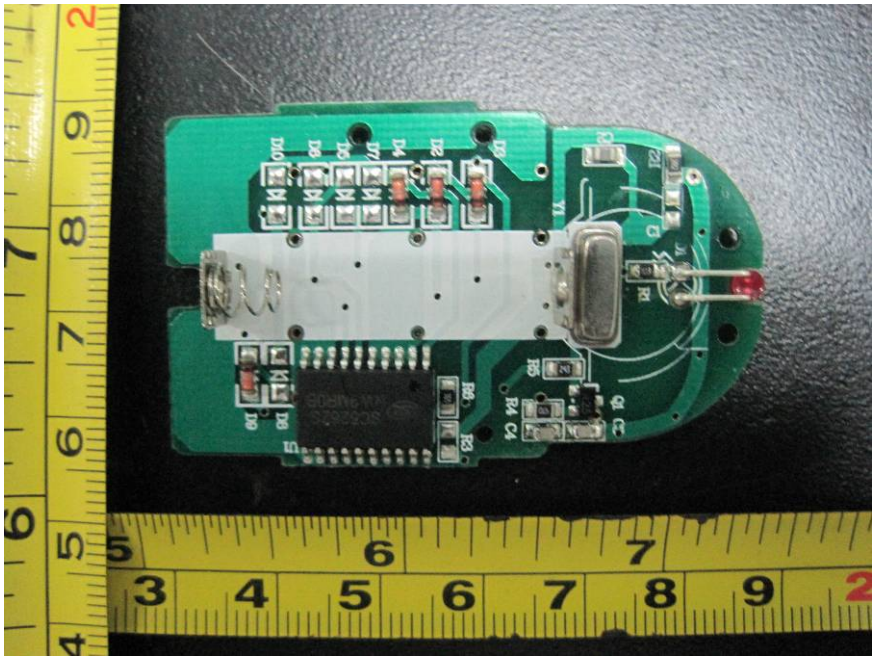
## 12.1 EUT - Front View

## 12.2 EUT - Back View

## 12.3 PCB-Front View



## 12.4 PCB-Back View



# 13 FCC ID Label

Proposed Label Location on EUT

EUT Bottom View/proposed FCC Label Location