# FCC REPORT

| | |
|---|---|
| **Applicant:** | GUANGDONG ROULE ELECTRONICS CO., LTD |
| **Address of Applicant:** | No. 12, Pingdong 3rd Road, Nanping Industry Community, Zhuhai Guangdong, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Car Warning Indicator |
| Model No.: | RL-9816A |
| FCC ID: | YI6RL-9816A |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.231:2013 |
| **Date of sample receipt:** | March 17, 2014 |
| **Date of Test:** | March 30-May 08, 2014 |
| **Date of report issued:** | May 08, 2014 |
| **Test Result :** | PASS * |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:


**Robinson Lo**
**Laboratory Manager**

## 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *May 08, 2014* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:***  ***Date:*** *May 08, 2014*

***Project Engineer***

***Check By:***  ***Date:*** *May 08, 2014*

***Reviewer***

# 3 Contents

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# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203 | Pass |
| Field strength of the fundamental signal | 15.231 (b) | Pass |
| Spurious emissions | 15.231 (b)/15.209 | Pass |
| 20dB Bandwidth | 15.231 (c) | Pass |
| Release time | 15.231 (a) | Pass |

*Pass: The EUT complies with the essential requirements in the standard.*

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | GUANGDONG ROULE ELECTRONICS CO., LTD |
| Address of Applicant: | No. 12, Pingdong 3rd Road, Nanping Industry Community, Zhuhai Guangdong, China |
| Manufacturer/Factory: | GUANGDONG ROULE ELECTRONICS CO., LTD |
| Address of Manufacturer/ Factory: | No. 12, Pingdong 3rd Road, Nanping Industry Community, Zhuhai Guangdong, China |

## 5.2 General Description of EUT

| | |
|---|---|
| Product Name: | Car Warning Indicator |
| Model No.: | RL-9816A |
| Operation Frequency: | 433.92MHz |
| Modulation technology: | FM |
| Antenna Type: | Integral Antenna |
| Antenna gain: | 0dBi |
| Power supply: | DC 9V |

## 5.3 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in transmitting mode. |
| *Remark: During the test, the New Battery was used.* | |

**Per-test mode.**

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis | X | Y | Z |
|---|---|---|---|
| Field Strength(dBuV/m) | 73.88 | 76.84 | 75.01 |

**Final Test Mode:**

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”:

Y axis (see the test setup photo)

## 5.4 Test Facility

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

● **CNAS —Registration No.: CNAS L5775**

CNAS has accredited Global United Technology Services Co., Ltd. to ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

## 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China
Tel: 0755-27798480
Fax: 0755-27798960

## 5.6 Other Information Requested by the Customer

None.

# 6 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | Mar. 28 2014 | Mar. 27 2015 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | Spectrum Analyzer | Agilent | E4440A | GTS533 | Dec. 05 2013 | Dec. 04 2014 |
| 4 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | Jul. 02 2013 | Jul. 01 2014 |
| 5 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | Feb. 23 2014 | Feb. 22 2015 |
| 6 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | 9120D-829 | GTS208 | June 28 2013 | June 27 2014 |
| 7 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | Mar. 28 2014 | Mar. 27 2015 |
| 8 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 9 | Coaxial Cable | GTS | N/A | GTS213 | Mar. 29 2014 | Mar. 28 2015 |
| 10 | Coaxial Cable | GTS | N/A | GTS211 | Mar. 29 2014 | Mar. 28 2015 |
| 11 | Coaxial cable | GTS | N/A | GTS210 | Mar. 29 2014 | Mar. 28 2015 |
| 12 | Coaxial Cable | GTS | N/A | GTS212 | Mar. 29 2014 | Mar. 28 2015 |
| 13 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | Jul. 02 2013 | Jul. 01 2014 |
| 14 | Amplifier(2GHz-20GHz) | HP | 8349B | GTS206 | Jul. 02 2013 | Jul. 01 2014 |
| 15 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June 28 2013 | June 27 2014 |
| 16 | Band filter | Amindeon | 82346 | GTS219 | Mar. 29 2014 | Mar. 28 2015 |
| 17 | D.C. Power Supply | Instek | PS-3030 | GTS232 | Mar. 29 2014 | Mar. 28 2015 |
| 18 | Thermo meter | KTJ | TA328 | GTS256 | Dec. 05 2013 | Dec. 04 2014 |

| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (dd-mm-yy)** | **Cal.Due date (dd-mm-yy)** |
| 1 | Barometer | ChangChun | DYM3 | GTS257 | July 09 2013 | July 08 2014 |

# 7 Test results and Measurement Data

## 7.1 Antenna requirement

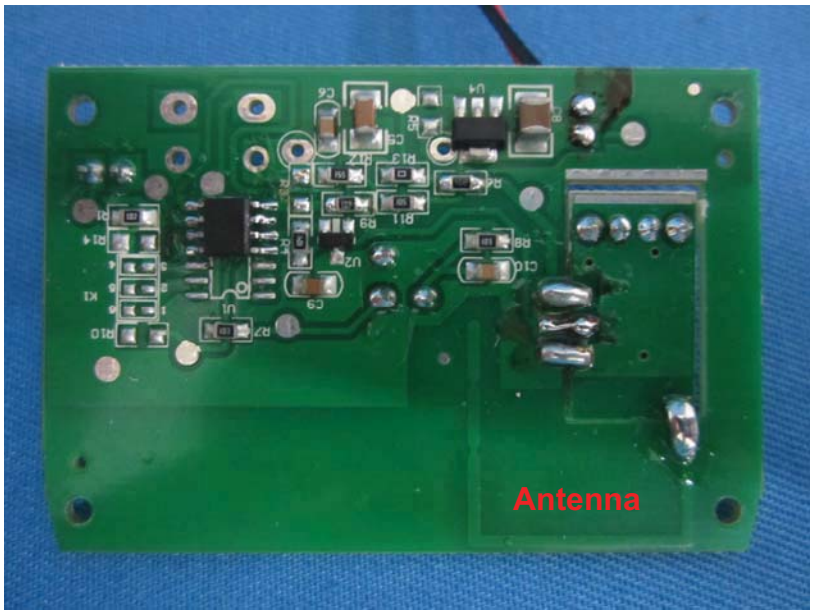
| | |
|---|---|
| **Standard requirement:** | FCC Part15 C Section 15.203 |

**15.203 requirement:**

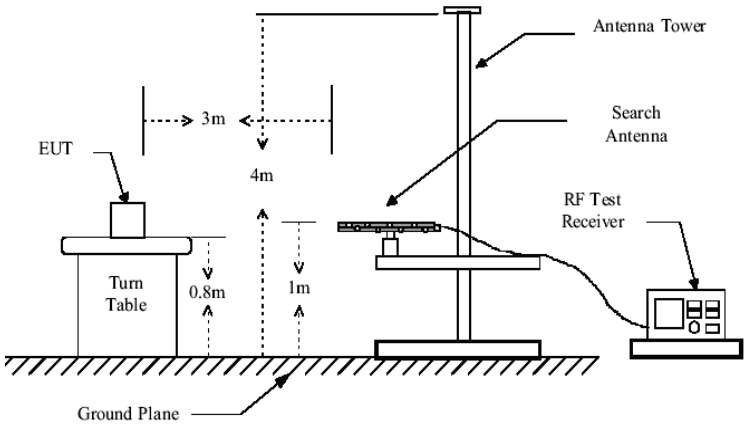
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**E.U.T Antenna:**

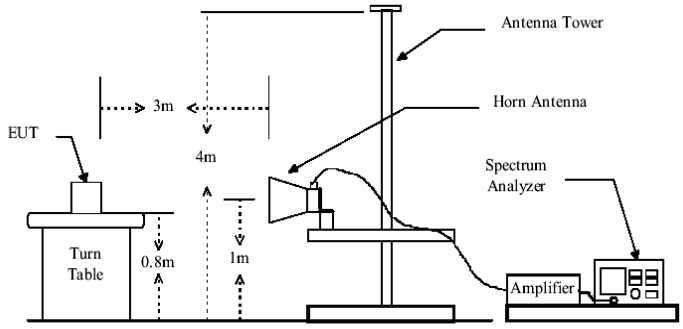
The EUT make use of a Integral Antenna, the typical gain of the antenna is 0dBi.



## 7.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 5000MHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td>Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:<br>(Field strength of the fundamental signal)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">433.92MHz</td><td>80.80</td><td>Average Value</td></tr>
<tr><td>100.80</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:<br>(Spurious Emissions)</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.00</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.50</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.00</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.00</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average Value</td></tr>
<tr><td>74.00</td><td>Peak Value</td></tr>
</table>
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.
</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz<br> 

<br>Above 1GHz</td></tr>
</table>

| | |
|---|---|
| |  |
| Test Procedure: | 1. During the test, the New Battery was used.<br>2. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>3. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>4. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>7. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

Measurement data:

### 7.2.1 Field Strength of The Fundamental Signal

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 88.06 | 17.53 | 3.02 | 31.77 | 76.84 | 100.8 | -23.96 | Horizontal |
| 433.92 | 82.93 | 17.53 | 3.02 | 31.77 | 71.71 | 100.8 | -29.09 | Vertical |

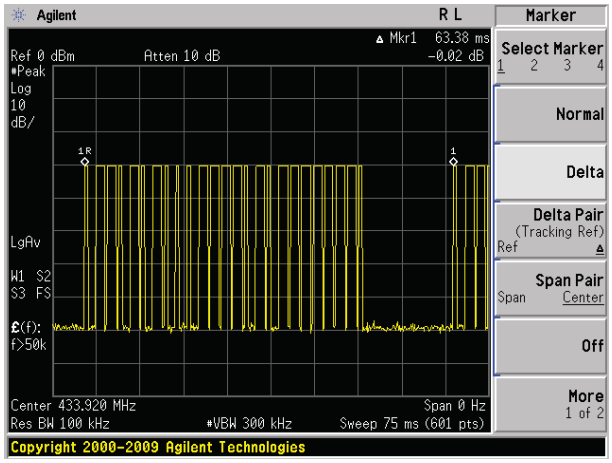
**Average value:**

| Frequency (MHz) | Peak Value (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 433.92 | 76.84 | -7.19 | 69.65 | 80.8 | -11.20 | Horizontal |
| 433.92 | 71.71 | -7.19 | 64.52 | 80.8 | -16.33 | Vertical |

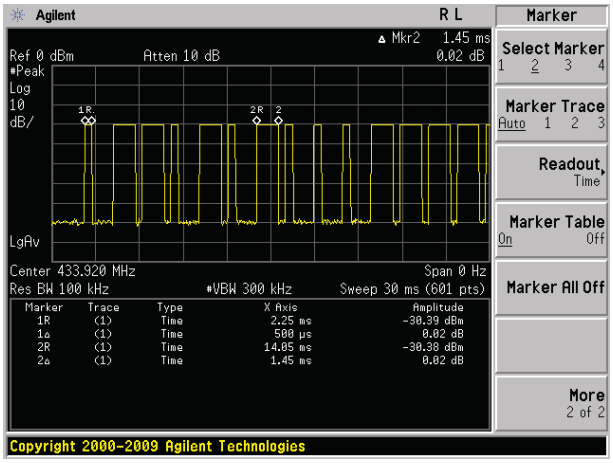
| **Average value:** | |
|---|---|
| Calculate Formula: | Average value=Peak value + Duty Cycle Factor |
| | Duty cycle factor=20 log(Duty cycle) |
| | Duty cycle= T on time / T period |
| Test data: | Ton time = 9*0.5+16*1.45= 27.7ms |
| | T period =63.38ms |
| | Duty cycle= 27.7/63.38=43.7% |
| | duty cycle factor= -7.19 |

Test plot as follows:

T Period:




Ton time:



### 7.2.2 Spurious emissions

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 46.83 | 40.18 | 15.44 | 0.74 | 31.99 | 24.37 | 40.00 | -15.63 | Vertical |
| 95.76 | 40.15 | 14.90 | 1.16 | 31.74 | 24.47 | 43.50 | -19.03 | Vertical |
| 155.91 | 43.96 | 10.51 | 1.60 | 32.00 | 24.07 | 43.50 | -19.43 | Vertical |
| 385.28 | 53.50 | 16.73 | 2.79 | 31.93 | 41.09 | 46.00 | -4.91 | Vertical |
| 52.95 | 43.41 | 15.11 | 0.80 | 31.95 | 27.37 | 40.00 | -12.63 | Horizontal |
| 106.76 | 39.74 | 14.54 | 1.25 | 31.79 | 23.74 | 43.50 | -19.76 | Horizontal |
| 408.95 | 40.35 | 17.26 | 2.90 | 31.86 | 28.65 | 46.00 | -17.35 | Horizontal |
| 824.60 | 40.53 | 22.33 | 4.55 | 31.28 | 36.13 | 46.00 | -9.87 | Horizontal |

**Harmonic emissions**

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 867.84 | 52.07 | 22.78 | 4.74 | 31.22 | 49.72 | 80.80 | -31.08 | Vertical |
| 1301.76 | 60.24 | 25.63 | 4.54 | 33.27 | 57.14 | 74.00 | -16.86 | Vertical |
| 1735.68 | 46.06 | 25.05 | 4.82 | 34.00 | 41.93 | 80.80 | -38.87 | Vertical |
| 2169.60 | 53.47 | 27.74 | 5.15 | 34.27 | 52.09 | 80.80 | -28.71 | Vertical |
| 2603.52 | 51.31 | 27.82 | 5.58 | 33.78 | 50.93 | 80.80 | -29.87 | Vertical |
| 3037.44 | 54.82 | 28.61 | 6.02 | 33.28 | 56.17 | 80.80 | -24.63 | Vertical |
| 3471.36 | 46.11 | 28.90 | 6.91 | 32.79 | 49.13 | 80.80 | -31.67 | Vertical |
| 3905.28 | 42.64 | 29.52 | 7.71 | 32.29 | 47.58 | 74.00 | -26.42 | Vertical |
| 4339.20 | 44.68 | 30.88 | 8.19 | 31.86 | 51.89 | 74.00 | -22.11 | Vertical |
| 867.84 | 45.70 | 22.78 | 4.74 | 31.22 | 42.00 | 80.80 | -38.80 | Horizontal |
| 1301.76 | 54.52 | 25.63 | 4.54 | 33.27 | 51.42 | 74.00 | -22.58 | Horizontal |
| 1735.68 | 42.07 | 25.05 | 4.82 | 34.00 | 37.94 | 80.80 | -42.86 | Horizontal |
| 2169.60 | 49.07 | 27.67 | 5.15 | 34.27 | 47.62 | 80.80 | -33.18 | Horizontal |
| 2603.52 | 50.76 | 27.82 | 5.58 | 33.78 | 50.38 | 80.80 | -30.42 | Horizontal |
| 3037.44 | 50.16 | 28.61 | 6.02 | 33.28 | 51.51 | 80.80 | -29.29 | Horizontal |
| 3471.36 | 44.99 | 28.90 | 6.91 | 32.79 | 48.01 | 80.80 | -32.79 | Horizontal |
| 3905.28 | 49.64 | 29.52 | 7.71 | 32.29 | 54.58 | 74.00 | -19.42 | Horizontal |
| 4339.20 | 36.08 | 30.88 | 8.19 | 31.86 | 43.29 | 74.00 | -30.71 | Horizontal |

**Average value:**

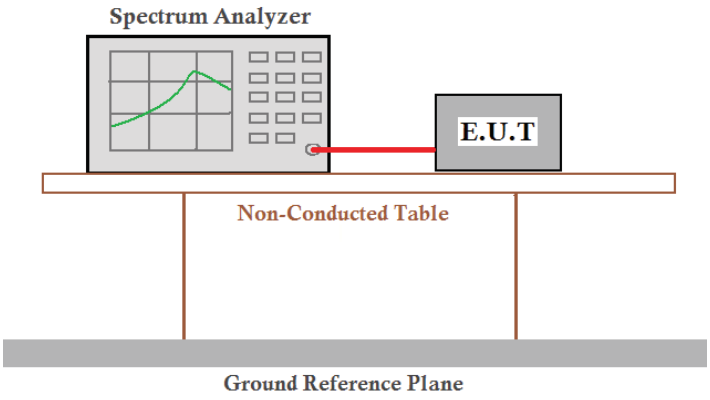
| Frequency (MHz) | PK Level (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 867.84 | 49.72 | / | / | 60.80 | -19.64 | Vertical |
| 1301.76 | 57.14 | -7.19 | 49.95 | 54.00 | -5.42 | Vertical |
| 1735.68 | 41.93 | / | / | 60.80 | -27.43 | Vertical |
| 2169.60 | 52.09 | / | / | 60.80 | -17.27 | Vertical |
| 2603.52 | 50.93 | / | / | 60.80 | -18.43 | Vertical |
| 3037.44 | 56.17 | -7.19 | 48.98 | 60.80 | -13.19 | Vertical |
| 3471.36 | 49.13 | / | / | 60.80 | -20.23 | Vertical |
| 3905.28 | 47.58 | / | / | 54.00 | -14.98 | Vertical |
| 4339.20 | 51.89 | / | / | 54.00 | -10.67 | Vertical |
| 867.84 | 42.00 | / | / | 60.80 | -27.36 | Horizontal |
| 1301.76 | 51.42 | / | / | 54.00 | -11.14 | Horizontal |
| 1735.68 | 37.94 | / | / | 60.80 | -31.42 | Horizontal |
| 2169.60 | 47.62 | / | / | 60.80 | -21.74 | Horizontal |
| 2603.52 | 50.38 | / | / | 60.80 | -18.98 | Horizontal |
| 3037.44 | 51.51 | / | / | 60.80 | -17.85 | Horizontal |
| 3471.36 | 48.01 | / | / | 60.80 | -21.35 | Horizontal |
| 3905.28 | 54.58 | -7.19 | 47.39 | 54.00 | -7.98 | Horizontal |
| 4339.20 | 43.29 | / | / | 54.00 | -19.27 | Horizontal |

*Remark:*

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *Average value=Peak value + Duty cycle factor*

*3. When Pk Value is lower than AV limit ,then AV value deem to comply with AV limit without further test or calculate.*

## 7.3 20dB Occupy Bandwidth

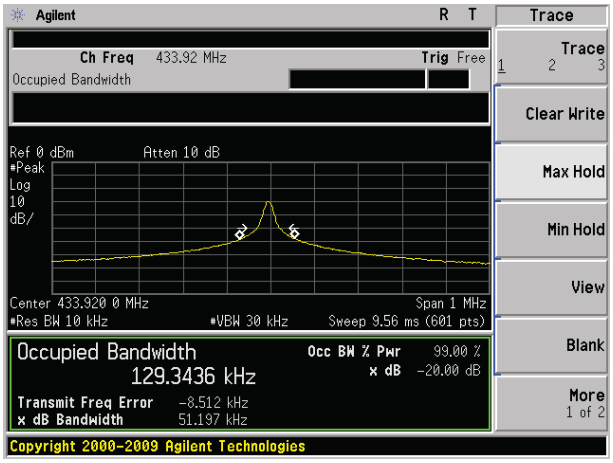
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (c) |
| Test Method: | ANSI C63.4:2003 |
| Limit: | The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

**Measurement Data**

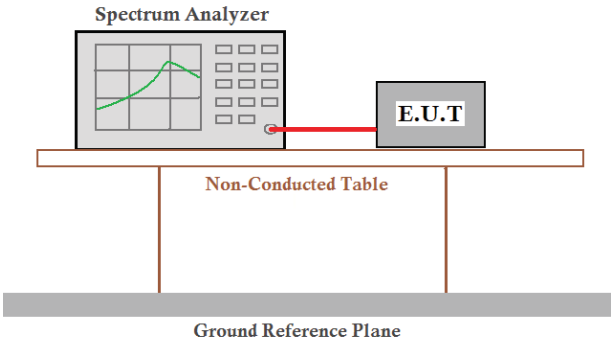
| Test Frequency (MHz) | 20dB bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|
| 433.92 | 0.051 | 1.085 MHz | Pass |

Note: Limit= Fundamental frequency×0.25%=433.92×0.25%=1.085MHz

Test plot as follows:



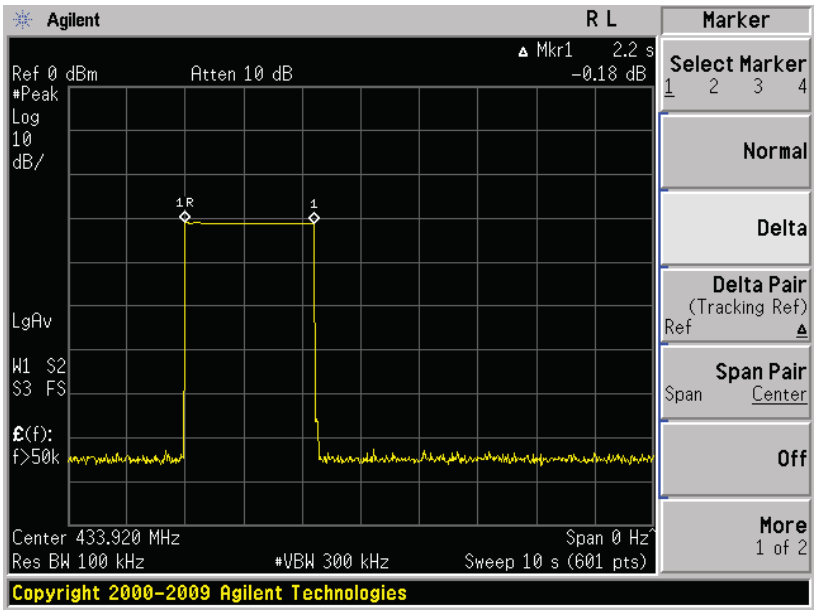
## 7.4 Release time

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (a)(2) |
| Test Method: | ANSI C63.4:2003 |
| Receiver setup: | RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak |
| Limit: | Not more than 5 seconds |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |
| Product Description: | A transmitter activated automatically |

Measurement data:

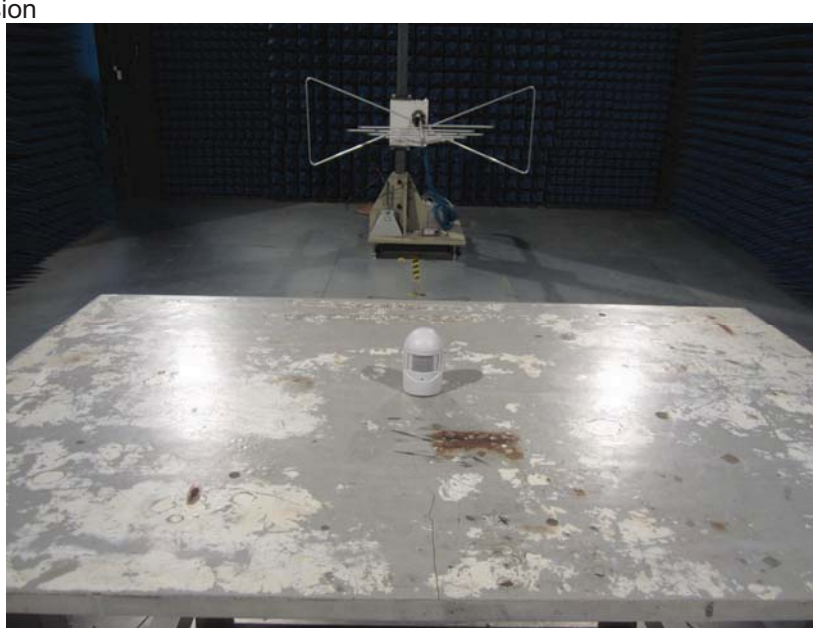
| Release time (second) | Limit (second) | Result |
|---|---|---|
| 2.2 | <5.0 | Pass |

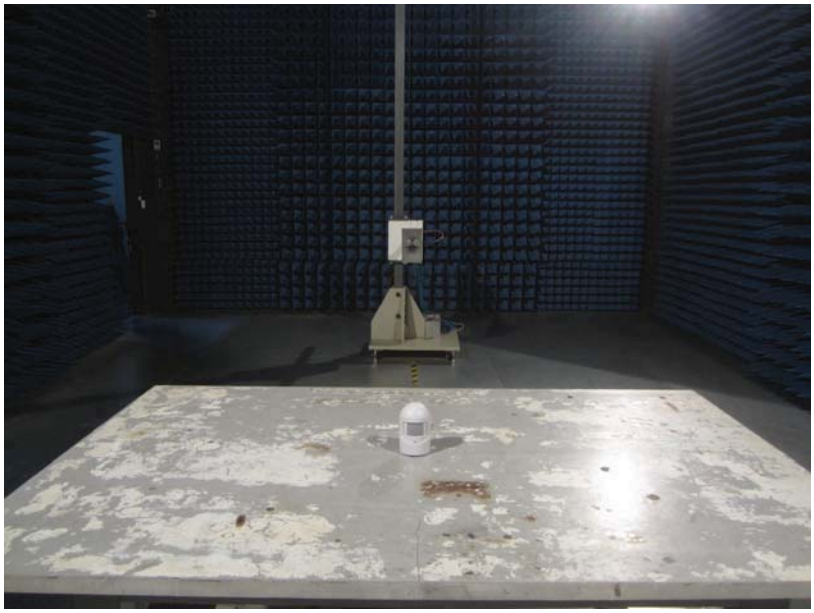
Test plot as follows:



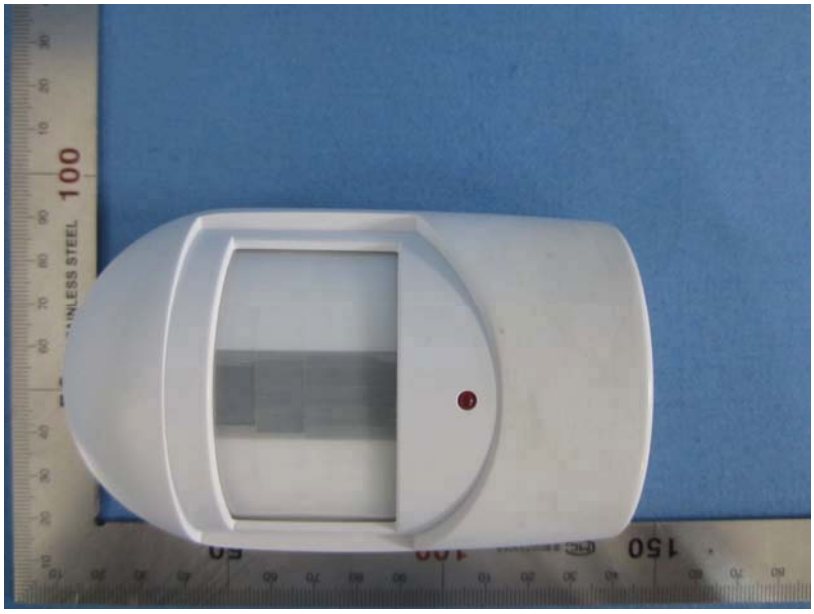
# 8 Test Setup Photo

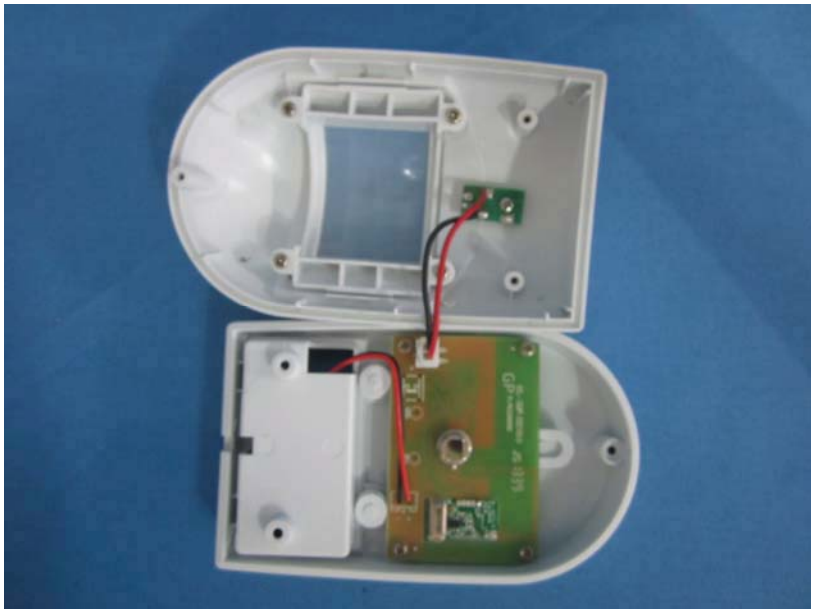
Radiated Emission

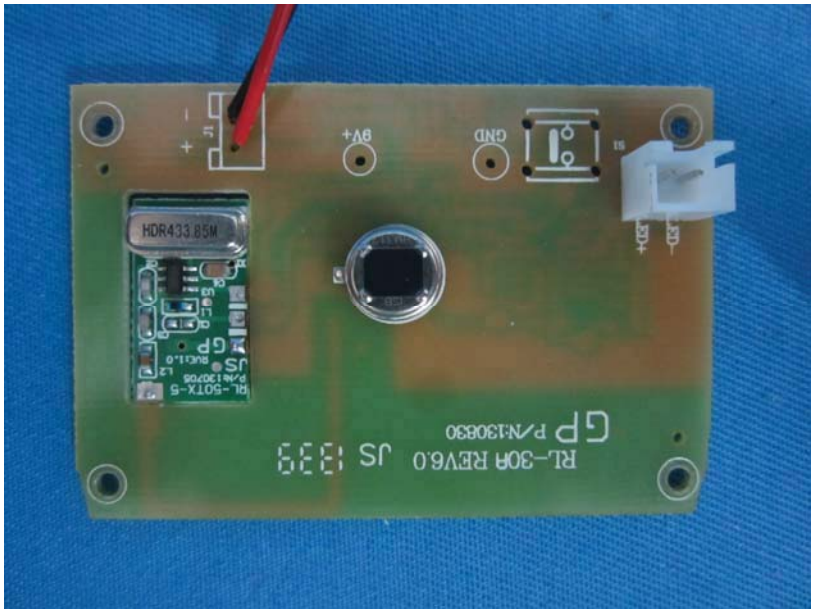


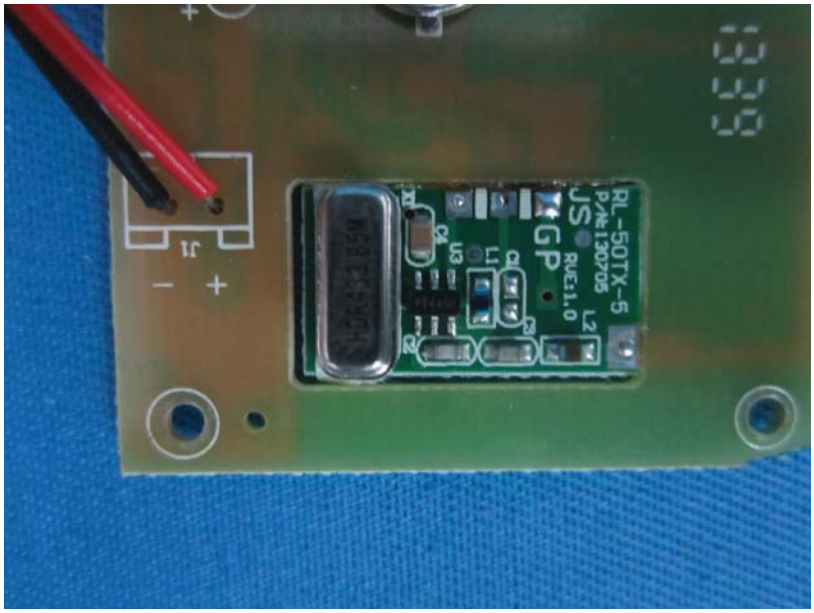


# 9 EUT Constructional Details






HDR433.85M
9V+
GND
RL-30R REV6.0
P/N:130830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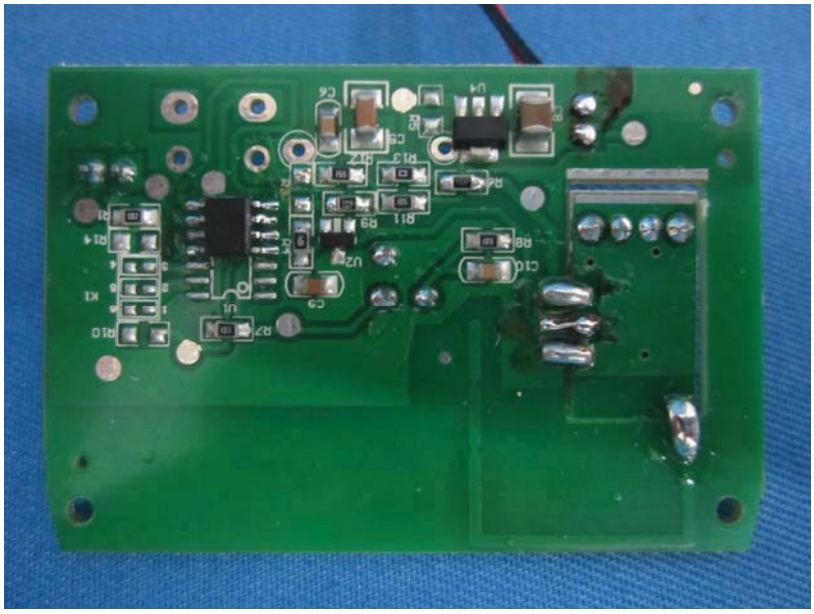

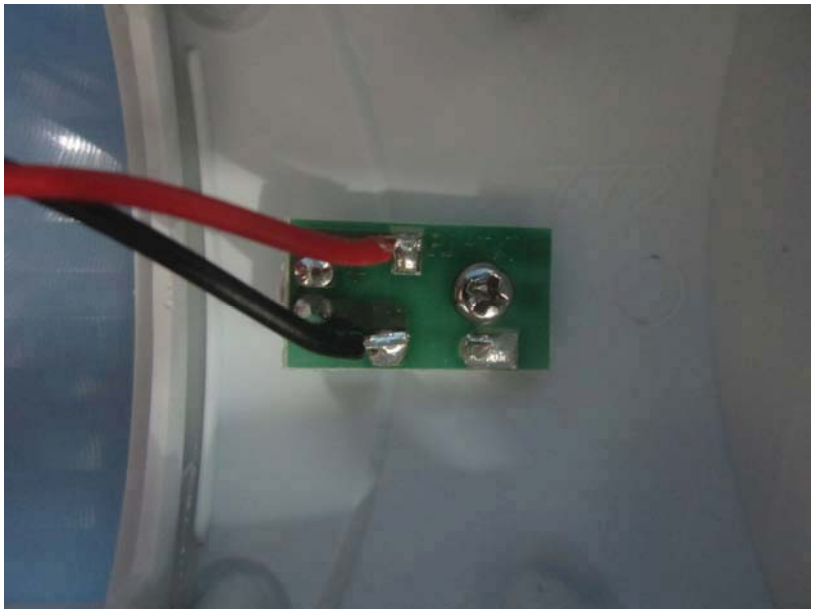

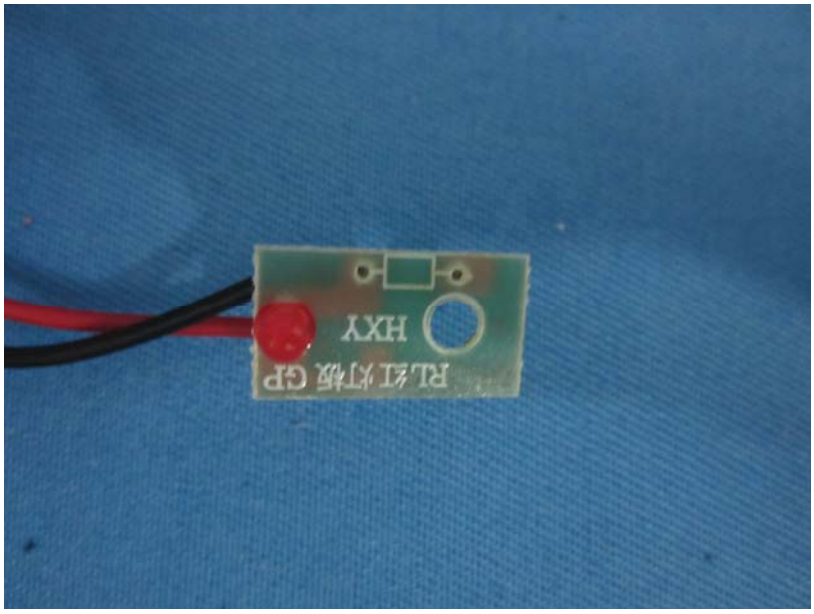


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