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-9816B
FCC ID:	YI6RL-9816B
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231:2013
Date of sample receipt:	April 17, 2014
Date of Test:	April 17-21, 2014
Date of report issued:	April 22, 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	*April 22, 2014*	*Original*

Prepared By: Sam.Gao ***Date:*** *April 22, 2014*

Project Engineer

Check By: Hans.Hu ***Date:*** *April 22, 2014*

Reviewer

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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-9816B
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)	73.38	76.49	74.72

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

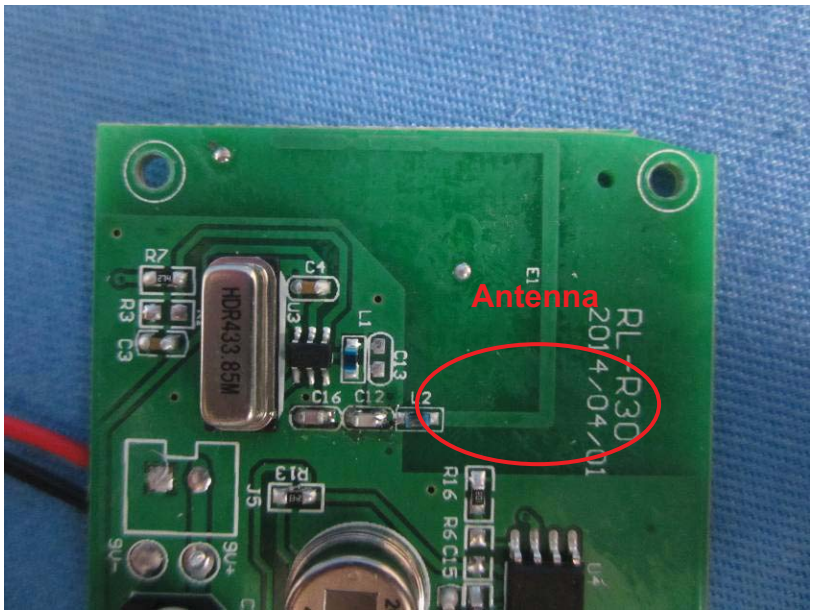
Standard requirement:	FCC Part15 C Section 15.203

15.203 requirement:

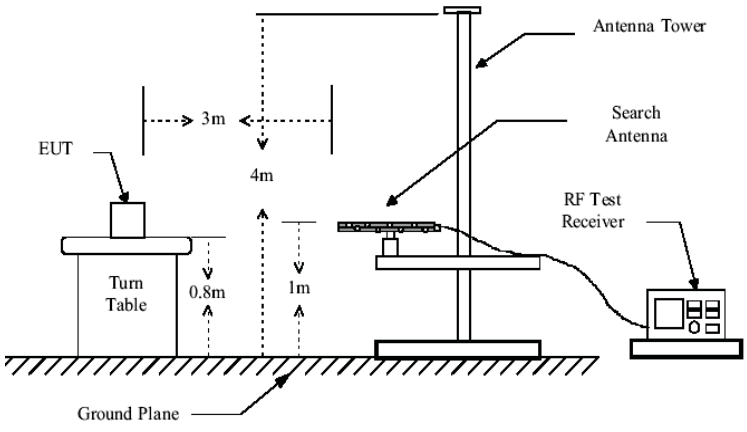
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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:

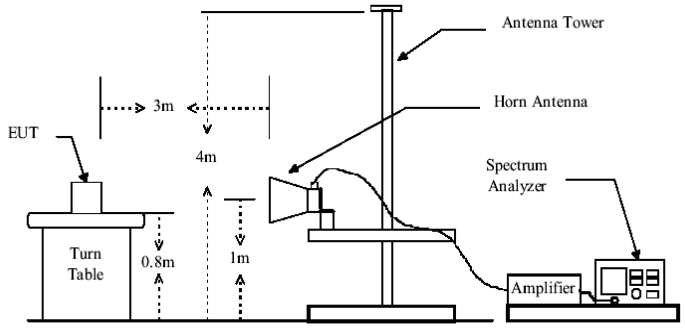
The EUT make use of a Integral Antenna, the typical gain of the antenna is 0dBi.



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:
(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:
(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
 

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

	
Test Procedure:	1. During the test, the New Battery was used. 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. 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. 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. 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. 6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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	87.71	17.53	3.02	31.77	76.49	100.80	-24.31	Horizontal
433.92	82.12	17.53	3.02	31.77	70.90	100.80	-29.90	Vertical

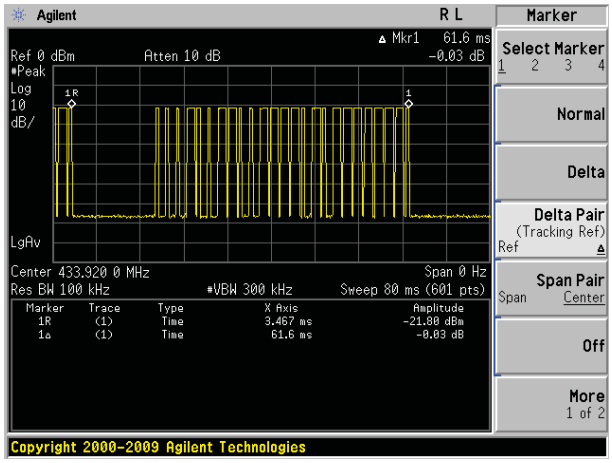
Average value:

Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	76.49	-7.24	69.25	80.80	-11.55	Horizontal
433.92	70.90	-7.24	63.66	80.80	-17.14	Vertical

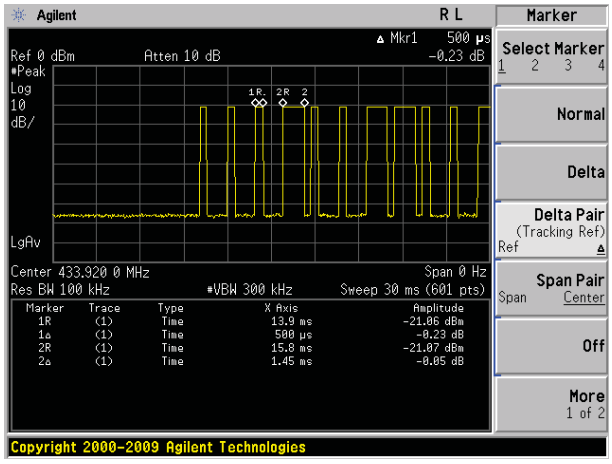
Average value:	
Calculate Formula:	Average value=Peak value + Duty Cycle Factor
	Duty cycle factor=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =10*0.5+15*1.45=26.75ms
	T period =61.6ms
	Duty cycle= 26.75/61.6=43.43%
	duty cycle factor= -7.24

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
48.50	37.84	15.34	0.76	31.97	21.97	40.00	-18.03	Vertical
92.14	35.76	14.33	1.13	31.73	19.49	43.50	-24.01	Vertical
155.91	44.76	10.51	1.60	32.00	24.87	43.50	-18.63	Vertical
266.61	37.54	14.26	2.21	32.17	21.84	46.00	-24.16	Vertical
618.54	36.95	20.52	3.80	31.07	30.20	46.00	-15.80	Vertical
42.30	37.13	15.57	0.69	32.03	21.36	40.00	-18.64	Horizontal
75.45	37.47	9.91	0.99	31.82	16.55	40.00	-23.45	Horizontal
115.32	37.59	13.31	1.32	31.84	20.38	43.50	-23.12	Horizontal
228.49	36.78	13.57	2.01	32.15	20.21	46.00	-25.79	Horizontal
286.98	37.79	14.81	2.30	32.18	22.72	46.00	-23.28	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	60.99	22.78	4.73	31.22	57.28	80.80	-23.52	Vertical
1301.76	45.54	25.63	4.54	33.27	42.44	74.00	-31.56	Vertical
1735.68	51.28	25.05	4.82	34.00	47.15	80.80	-33.65	Vertical
2169.60	48.32	27.67	5.15	34.27	46.87	80.80	-33.93	Vertical
2603.52	45.27	27.82	5.58	33.78	44.89	80.80	-35.91	Vertical
3037.44	50.03	28.61	6.02	33.28	51.38	80.80	-29.42	Vertical
3471.36	45.34	29.52	7.71	32.29	50.28	80.80	-30.52	Vertical
3905.28	37.71	30.88	8.19	31.86	44.92	74.00	-29.08	Vertical
4339.20	39.74	31.75	8.58	32.07	48.00	74.00	-26.00	Vertical
867.84	57.11	22.78	4.73	31.22	53.40	80.80	-27.40	Horizontal
1301.76	37.47	25.63	4.54	33.27	34.37	74.00	-39.63	Horizontal
1735.68	56.23	25.05	4.82	34.00	52.10	80.80	-28.70	Horizontal
2169.60	51.56	27.67	5.15	34.27	50.11	80.80	-30.69	Horizontal
2603.52	52.00	27.82	5.58	33.78	51.62	80.80	-29.18	Horizontal
3037.44	50.34	28.61	6.02	33.28	51.69	80.80	-29.11	Horizontal
3471.36	44.33	29.52	7.71	32.29	49.27	80.80	-31.53	Horizontal
3905.28	36.13	31.05	8.24	31.89	43.53	74.00	-30.47	Horizontal
4339.20	43.70	31.75	8.58	32.07	51.96	74.00	-22.04	Horizontal

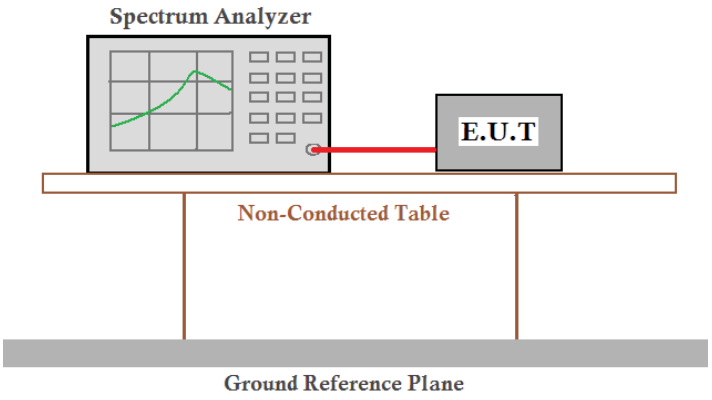
Average value:

Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
867.84	57.28	-7.24	50.04	60.80	-10.76	Vertical
1301.76	42.44	-7.24	35.20	54.00	-18.80	Vertical
1735.68	47.15	-7.24	39.91	60.80	-20.89	Vertical
2169.60	46.87	-7.24	39.63	60.80	-21.17	Vertical
2603.52	44.89	-7.24	37.65	60.80	-23.15	Vertical
3037.44	51.38	-7.24	44.14	60.80	-16.66	Vertical
3471.36	50.28	-7.24	43.04	60.80	-17.76	Vertical
3905.28	44.92	-7.24	37.68	54.00	-16.32	Vertical
4339.20	48.00	-7.24	40.76	54.00	-13.24	Vertical
867.84	53.40	-7.24	46.16	60.80	-14.64	Horizontal
1301.76	34.37	-7.24	27.13	54.00	-26.87	Horizontal
1735.68	52.10	-7.24	44.86	60.80	-15.94	Horizontal
2169.60	50.11	-7.24	42.87	60.80	-17.93	Horizontal
2603.52	51.62	-7.24	44.38	60.80	-16.42	Horizontal
3037.44	51.69	-7.24	44.45	60.80	-16.35	Horizontal
3471.36	49.27	-7.24	42.03	60.80	-18.77	Horizontal
3905.28	43.53	-7.24	36.29	54.00	-17.71	Horizontal
4339.20	51.96	-7.24	44.72	54.00	-9.28	Horizontal

Remark:

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

7.3 20dB Occupy Bandwidth

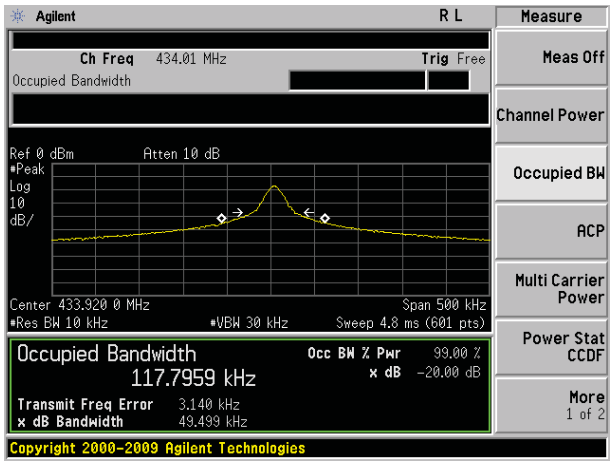
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.4:2003
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of 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

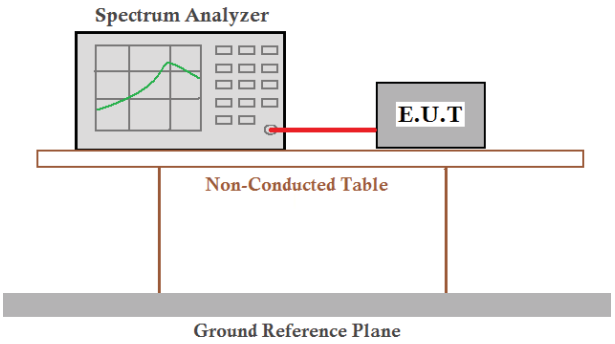
Test Frequency (MHz)	20dB bandwidth (MHz)	Limit (MHz)	Result
433.92	0.049	1.085 MHz	Pass

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

Test plot as follows:



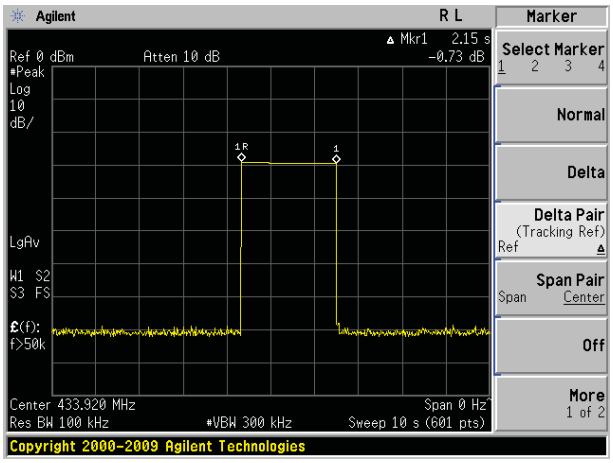
7.4 Release time

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:

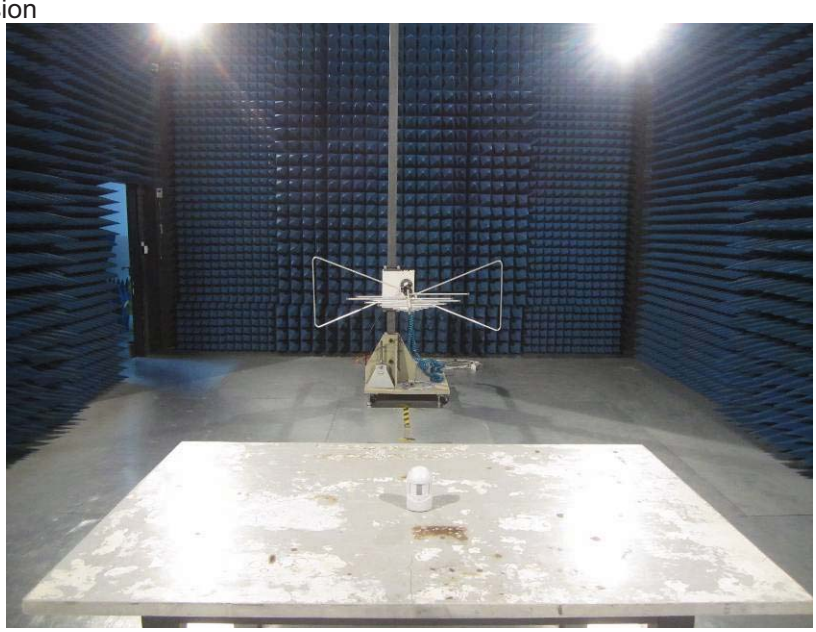
Release time (second)	Limit (second)	Result
2.15	<5.0	Pass

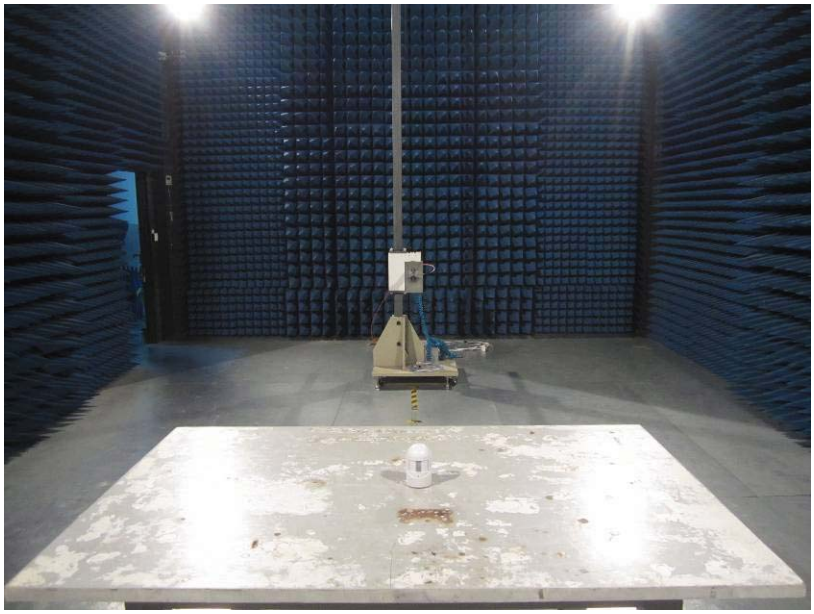
Test plot as follows:



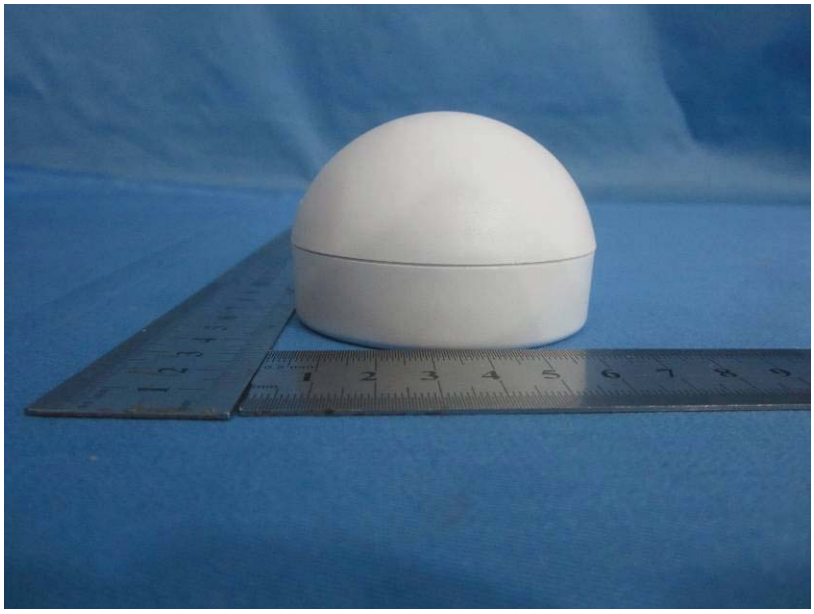
8 Test Setup Photo

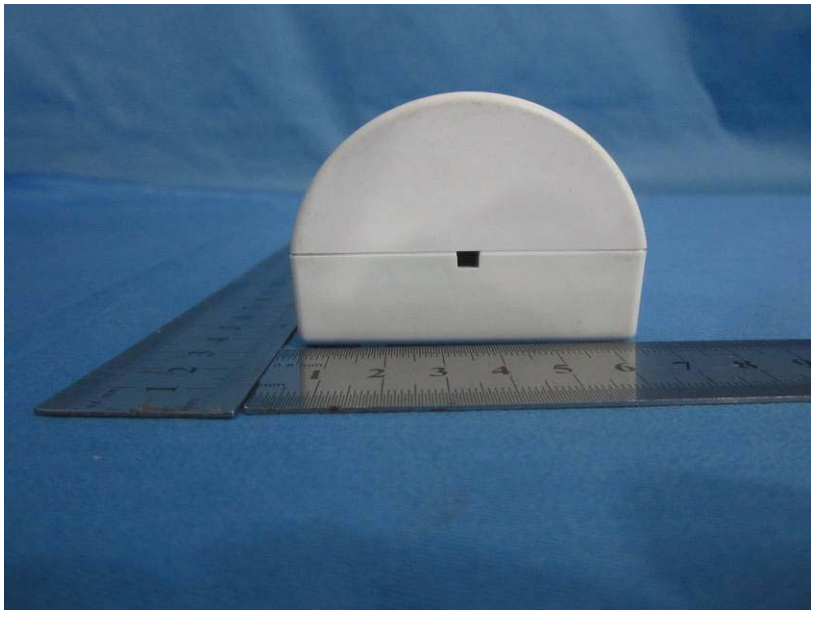
Radiated Emission

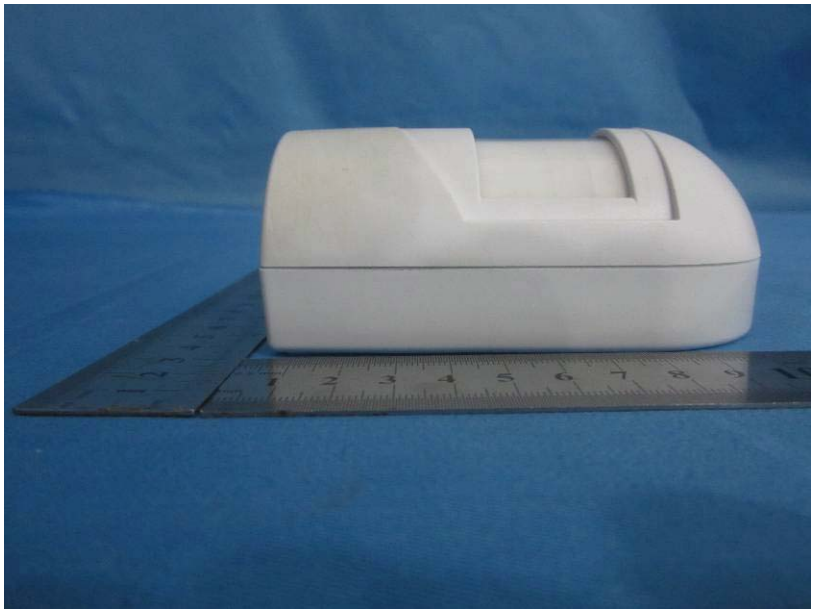


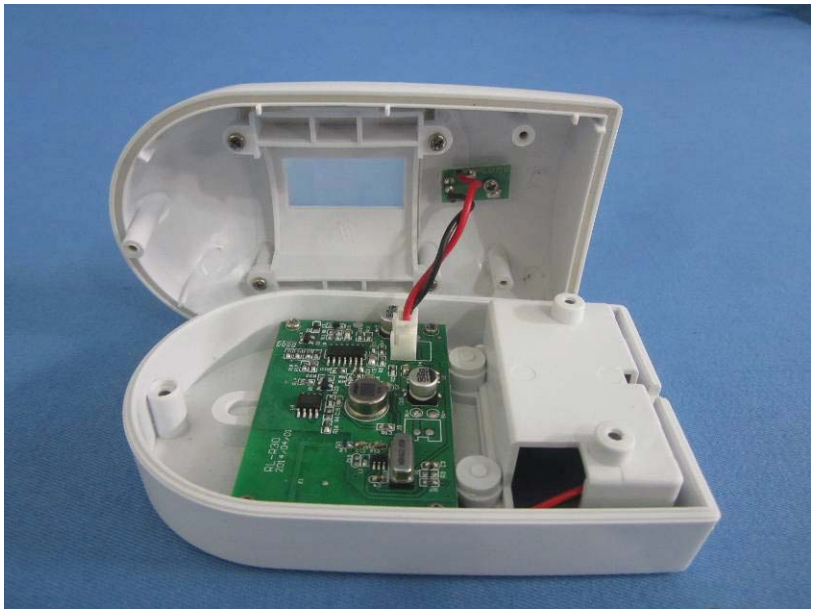


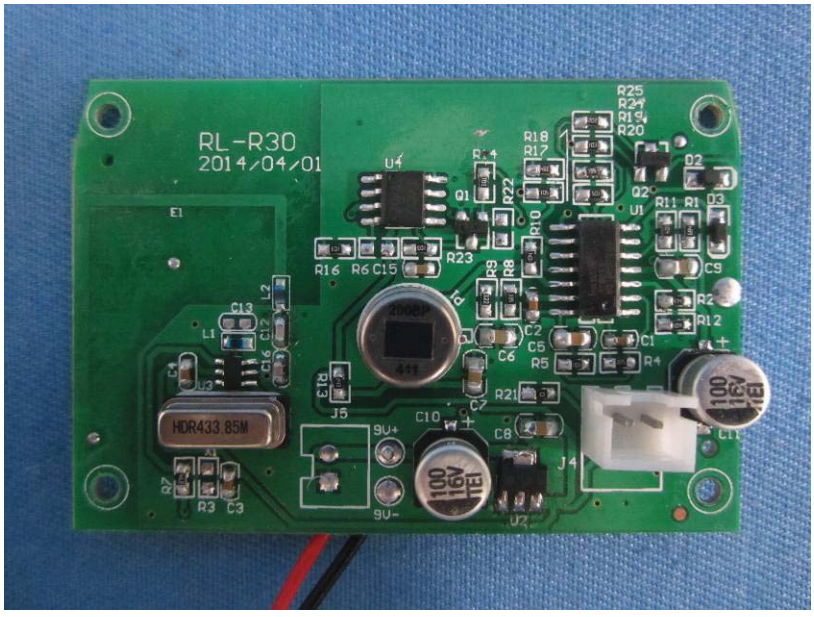
9 EUT Constructional Details

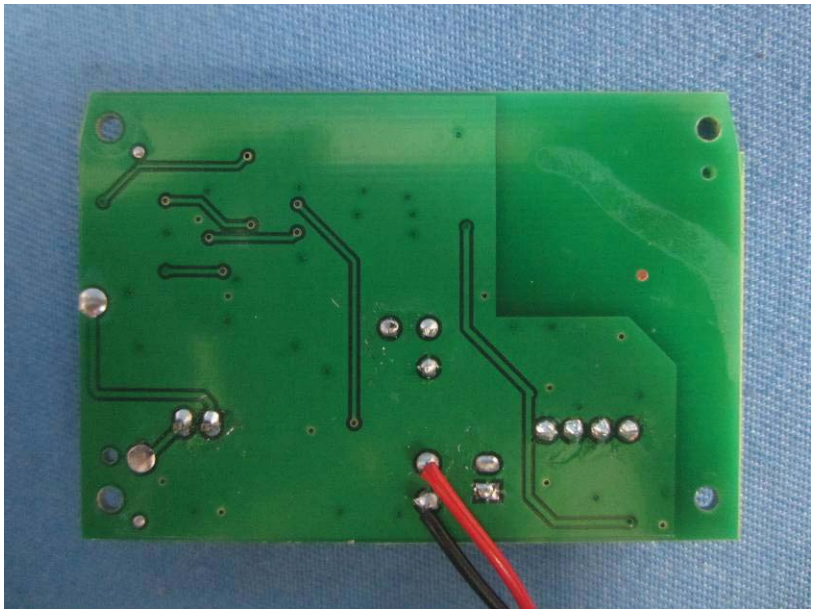


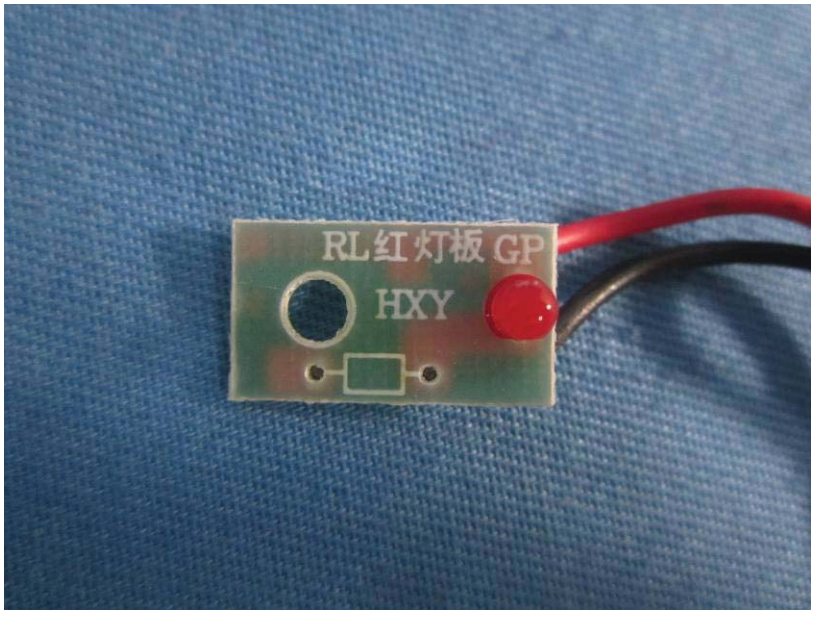


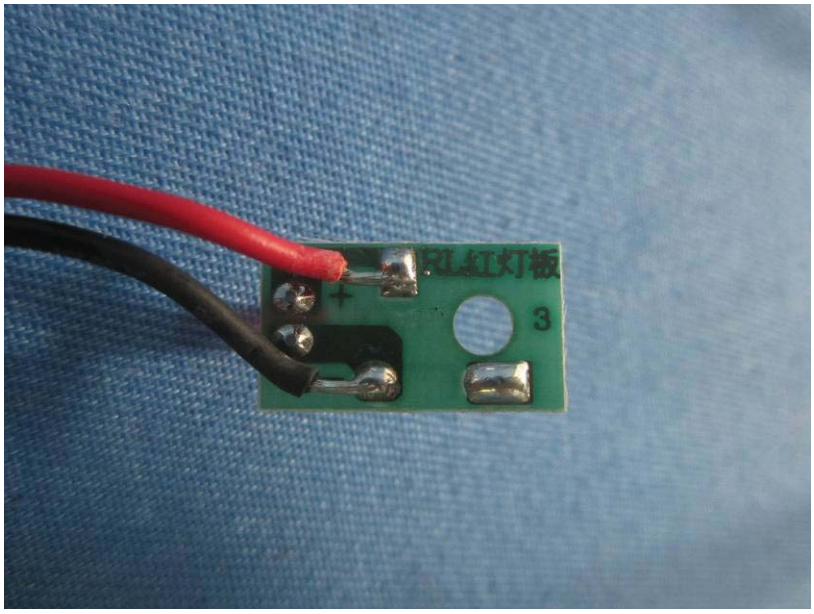





RL-R30
2014/04/01
HDR433.85M




RL红灯板 GP
HXY



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