Report No.: GTSE12120149601

FCC REPORT

Applicant:	CARRIN ELECTRONICS COMPANY LIMITED
Address of Applicant:	UNIT 2105-2106, TOWER A, REGENT CENTRE, 63 WO YI HOP RD, KWAI CHUNG, HONGKONG

Equipment Under Test (EUT)

Product Name:	THERMO SENSOR
Model No.:	KW5012FSK
FCC ID:	X6I-KW5012FSK
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231:2011
Date of sample receipt:	December 21, 2012
Date of Test:	December 21-27, 2012
Date of report issue:	December 28, 2012
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	*December 28, 2012*	*Original*

Prepared by: Sam. Gao ***Date:*** *December 28, 2012*

Project Engineer

Reviewed by: Hans. Hu ***Date:*** *December 28, 2012*

Reviewer

3 Contents

Page

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.231 (e)	Pass
Spurious emissions	15.231 (e)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell time	15.231 (e)	Pass
Silent Period	15.231 (e)	Pass

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

5 General Information

5.1 Client Information

Applicant:	CARRIN ELECTRONICS COMPANY LIMITED
Address of Applicant:	UNIT 2105-2106, TOWER A, REGENT CENTRE, 63 WO YI HOP RD, KWAI CHUNG, HONGKONG
Manufacturer:	CARRIN ELECTRONICS COMPANY LIMITED
Address of Manufacturer:	UNIT 2105-2106, TOWER A, REGENT CENTRE, 63 WO YI HOP RD, KWAI CHUNG, HONGKONG

5.2 General Description of EUT

Product Name:	THERMO SENSOR
Model No.:	KW5012FSK
Operation Frequency:	915MHz
Modulation type:	ASK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	DC 3V(2*1.5 AA Size Batteries)

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

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)	71.28	74.12	72.53

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 Description of Support Units

None.

5.5 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, July 20, 2010.

- **Industry Canada (IC)**

  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-1.

5.6 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

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. 30 2011	Mar. 29 2013
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. 6, 2012	Dec. 5， 2013
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 03 2012	Jul. 02 2013
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Mar. 10 2012	Mar. 09 2013
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	Mar. 10 2012	Mar. 09 2013
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 10 2012	Mar. 09 2013
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Jul. 03 2012	Jul. 02 2013
10	Coaxial Cable	GTS	N/A	GTS211	Jul. 03 2012	Jul. 02 2013
11	Coaxial cable	GTS	N/A	GTS210	Jul. 03 2012	Jul. 02 2013
12	Coaxial Cable	GTS	N/A	GTS212	Jul. 03 2012	Jul. 02 2013
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 03 2012	Jul. 02 2013
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 03 2012	Jul. 02 2013
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2012	June 28 2013
16	Band filter	Amindeon	82346	GTS219	Mar. 31 2012	Mar. 30 2013
17	D.C. Power Supply	Instek	PS-3030	GTS232	Mar. 31 2012	Mar. 30 2013
18	Thermo meter	KTJ	TA328	GTS256	Jul. 06 2012	Jul. 05 2013

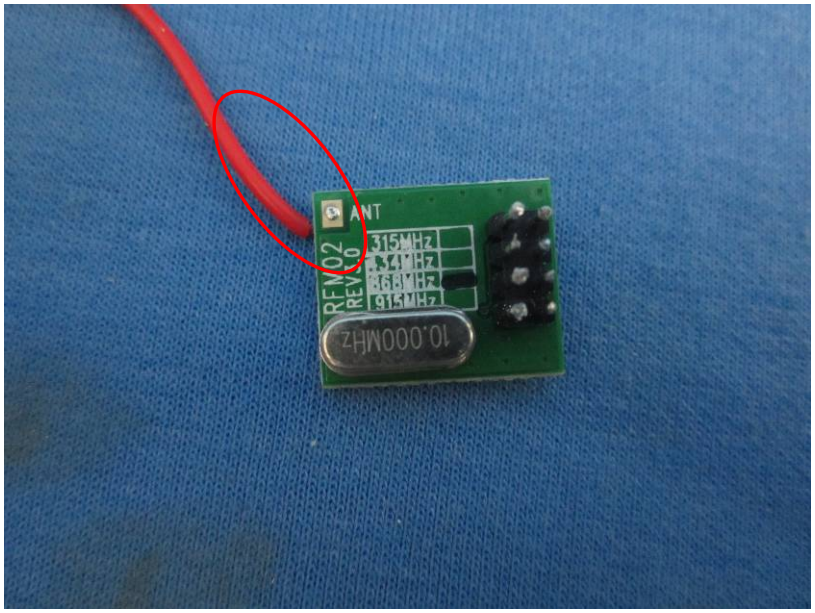
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (dd-mm-yy)**	**Cal.Due date (dd-mm-yy)**
1	Barometer	ChangChun	DYM3	GTS257	July 10 2012	July 09 2013

7 Test results and Measurement Data

7.1 Antenna requirement:

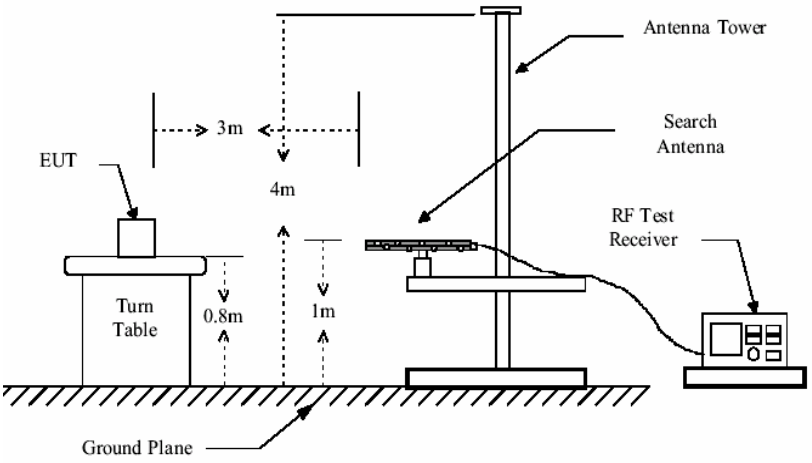
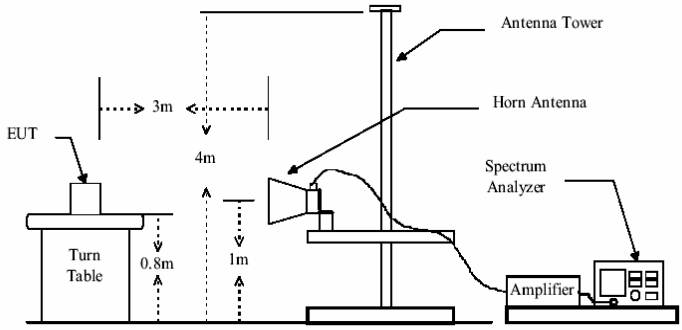
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling 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 antenna is Integral antenna, the best case gain of the antenna is 2dBi



7.2 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.231(e) and 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 (Semi-Anechoic Chamber)</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">915.00MHz</td><td>94.00</td><td>Average Value</td></tr>
<tr><td>74.00</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>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</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 Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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.
</td></tr>
</table>

Test setup:	Below 1GHz  Above 1GHz 
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
915.00	74.23	24.03	4.91	31.19	71.98	94.00	-22.02	Horizontal
915.00	76.37	24.03	4.91	31.19	74.12	94.00	-19.88	Vertical

Average value:

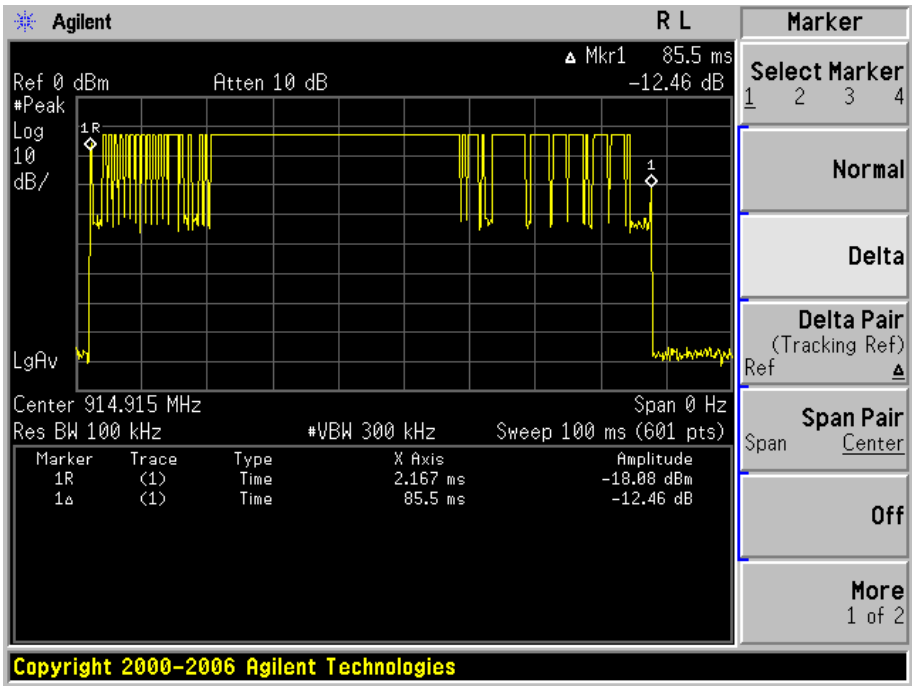
Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
915.00	71.98	-1.36	70.62	74.00	-3.38	Horizontal
915.00	74.12	-1.36	72.76	74.00	-1.24	Vertical

Average value=Peak Value + Duty cycle factor

Duty cycle factor	
Calculate Formula:	Duty cycle factor=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =85.5ms
	T period =100ms
	Duty cycle= 85.5%
	duty cycle factor= -1.36

Test plot as follows:

T on time slot:



7.2.2 Spurious Emissions

■ Below 1GHz

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
45.22	38.78	16.56	0.72	32.00	24.06	40.00	-15.94	Vertical
59.03	37.91	15.87	0.85	31.94	22.69	40.00	-17.31	Vertical
99.53	37.86	16.13	1.19	31.76	23.42	43.50	-20.08	Vertical
282.99	38.66	15.75	2.28	32.17	24.52	46.00	-21.48	Vertical
568.61	38.86	19.93	3.59	31.20	31.18	46.00	-14.82	Vertical
744.87	38.09	22.39	4.26	31.25	33.49	46.00	-12.51	Vertical
41.28	39.38	16.58	0.68	32.04	24.60	40.00	-15.40	Horizontal
102.00	37.96	16.01	1.21	31.77	23.41	43.50	-20.09	Horizontal
239.99	40.44	15.07	2.07	32.16	25.42	46.00	-20.58	Horizontal
504.71	38.10	18.74	3.33	31.53	28.64	46.00	-17.36	Horizontal
716.68	39.57	22.00	4.15	31.21	34.51	46.00	-11.49	Horizontal
862.00	38.93	15.43	0.88	31.93	23.31	46.00	-22.69	Horizontal

■ Above 1GHz

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
1830.00	42.16	25.42	4.87	29.05	43.40	74.00	-30.60	Vertical
2745.00	31.41	28.24	5.71	30.30	35.06	74.00	-38.94	Vertical
3660.00	31.52	29.20	7.27	27.61	40.38	74.00	-33.62	Vertical
4575.00	25.92	31.47	8.40	24.48	41.31	74.00	-32.69	Vertical
5490.00	26.27	31.98	9.49	23.82	43.92	74.00	-30.08	Vertical
6405.00	22.07	33.46	10.78	24.76	41.55	74.00	-32.45	Vertical
1830.00	41.58	25.42	4.87	29.05	42.82	74.00	-31.18	Vertical
2745.00	30.46	28.24	5.71	30.30	34.11	74.00	-39.89	Vertical
3660.00	33.48	29.20	7.27	27.61	42.34	74.00	-31.66	Horizontal
4575.00	27.34	31.47	8.40	24.48	42.73	74.00	-31.27	Horizontal
5490.00	27.15	31.98	9.49	23.82	44.80	74.00	-29.20	Horizontal
6405.00	25.73	33.46	10.78	24.76	45.21	74.00	-28.79	Horizontal
1830.00	42.16	25.42	4.87	29.05	43.40	74.00	-30.60	Horizontal
2745.00	31.41	28.24	5.71	30.30	35.06	74.00	-38.94	Horizontal
3660.00	31.52	29.20	7.27	27.61	40.38	74.00	-33.62	Horizontal
4575.00	25.92	31.47	8.40	24.48	41.31	74.00	-32.69	Horizontal

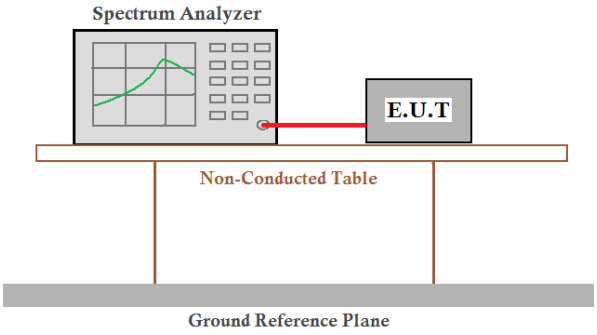
Average value:

Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1830.00	43.40	-1.36	42.04	54.00	-11.96	Vertical
2745.00	35.06	-1.36	33.70	54.00	-20.30	Vertical
3660.00	40.38	-1.36	39.02	54.00	-14.98	Vertical
4575.00	41.31	-1.36	39.95	54.00	-14.05	Vertical
5490.00	43.92	-1.36	42.56	54.00	-11.44	Vertical
6405.00	41.55	-1.36	40.19	54.00	-13.81	Vertical
1830.00	42.82	-1.36	41.46	54.00	-12.54	Vertical
2745.00	34.11	-1.36	32.75	54.00	-21.25	Vertical
3660.00	42.34	-1.36	40.98	54.00	-13.02	Horizontal
4575.00	42.73	-1.36	41.37	54.00	-12.63	Horizontal
5490.00	44.80	-1.36	43.44	54.00	-10.56	Horizontal
6405.00	45.21	-1.36	43.85	54.00	-10.15	Horizontal
1830.00	43.40	-1.36	42.04	54.00	-11.96	Horizontal
2745.00	35.06	-1.36	33.70	54.00	-20.30	Horizontal
3660.00	40.38	-1.36	39.02	54.00	-14.98	Horizontal
4575.00	41.31	-1.36	39.95	54.00	-14.05	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 Bandwidth

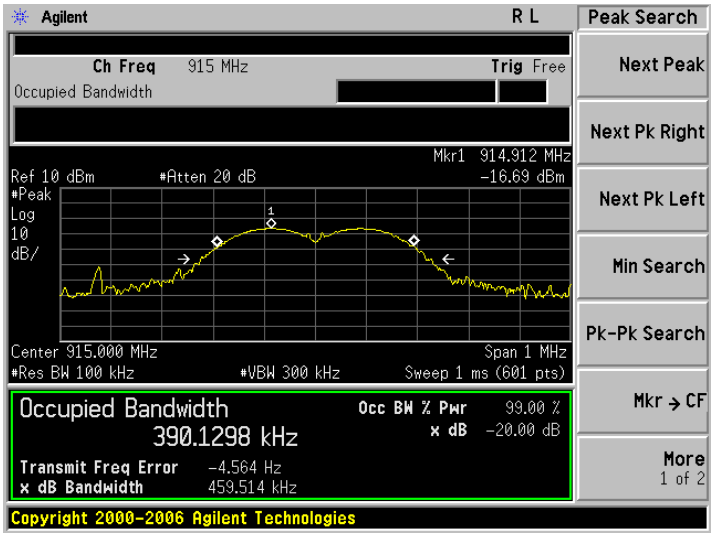
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.4:2003
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz For devices operating above 900 MHz, the emission shall be no wider than 0.5% of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

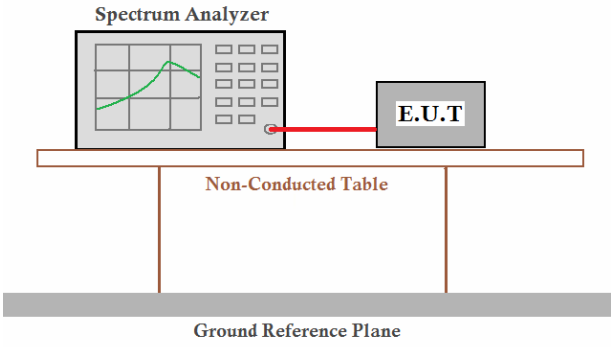
Test Frequency (MHz)	20dB bandwidth (MHz)	Limit (MHz)	Result
915MHz	0.4595	2.288MHz	Pass

Note: Limit= Fundamental frequency×0.25%=915×0.25%=2.288MHz

Test plot as follows:



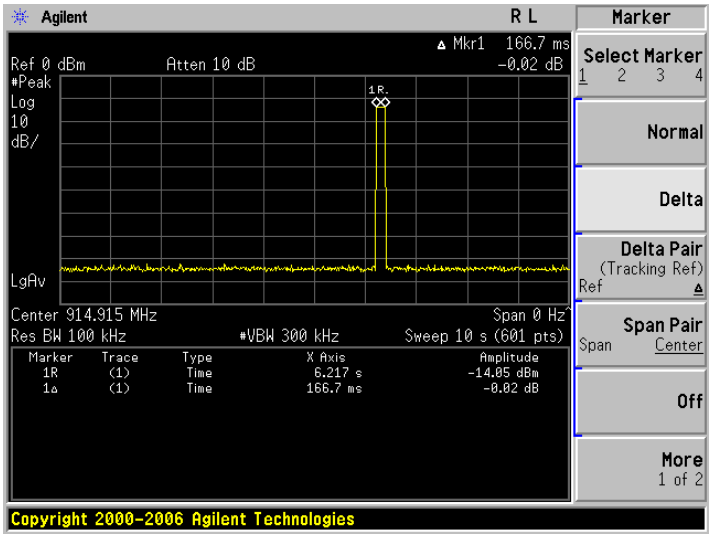
7.4 Dwell time

Test Requirement:	FCC Part15 C Section 15.231 (e)
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

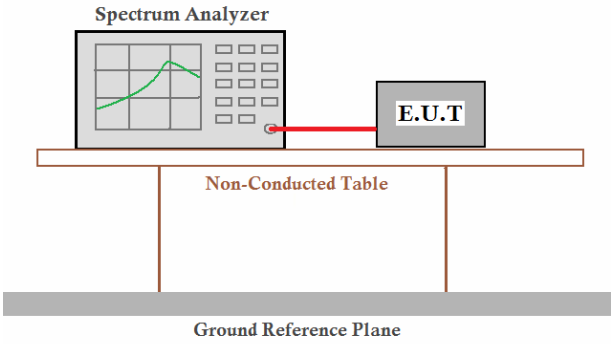
Measurement data:

Dwell time (second)	Limit (second)	Result
0.1667	<1.0	Pass

Test plot as follows:



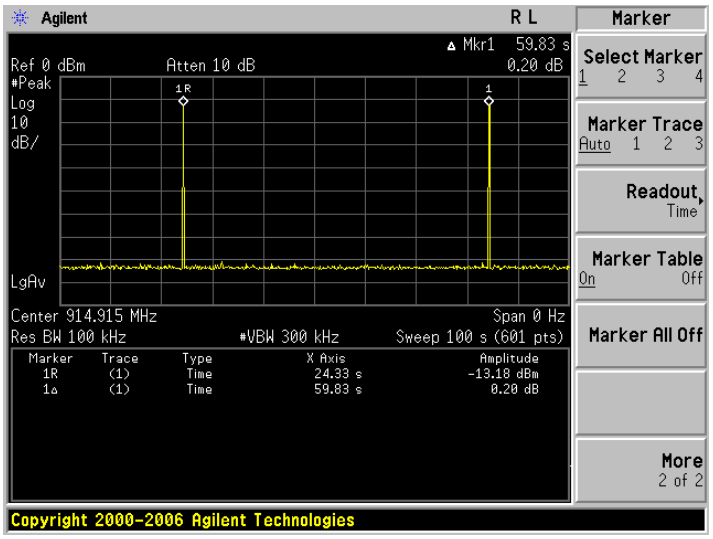
7.5 Silent period

Test Requirement:	FCC Part15 C Section 15.231 (e)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	at least 30 times the duration of the transmission and more than 10 seconds
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmit, and read the transmission time.
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:

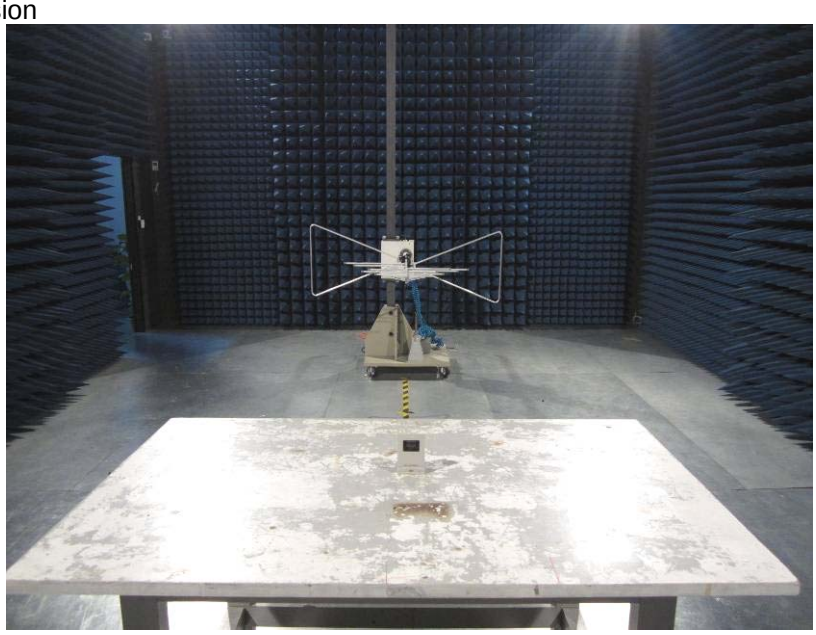
Silent period (second)	Limit (second)	Result
59.83	>10 and 30*0.1667	Pass

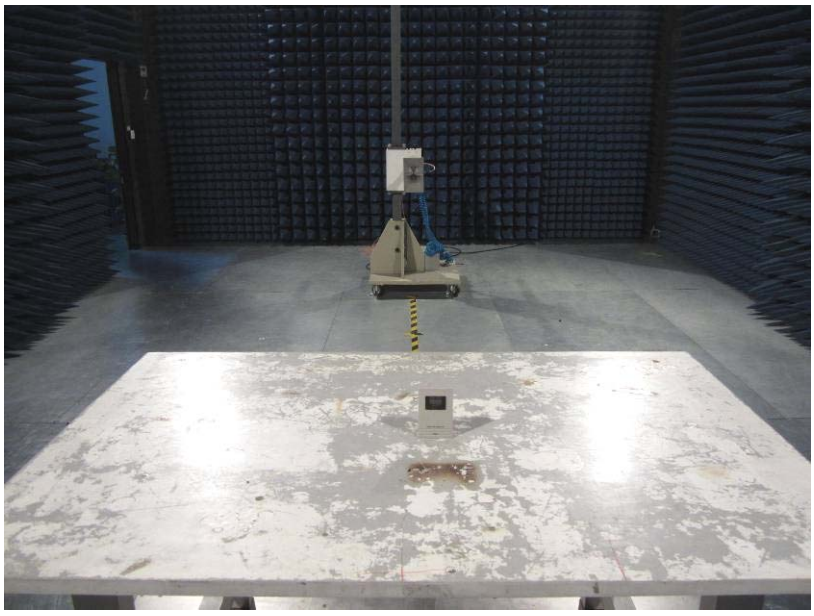
Test plot as follows:



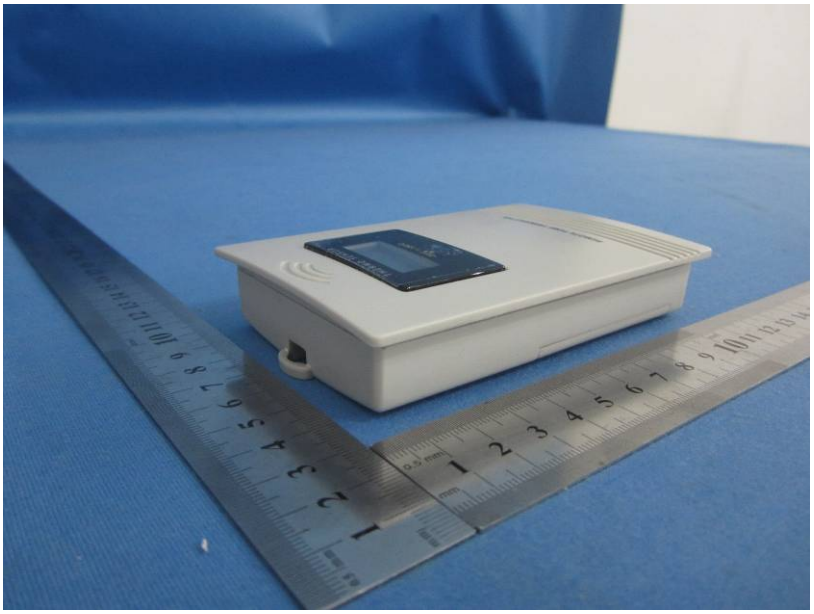
8 Test Setup Photo

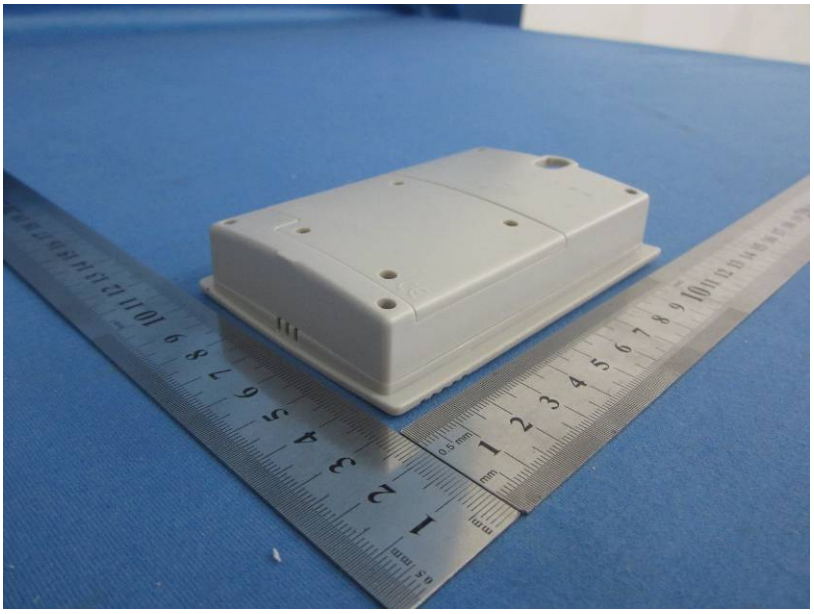
Radiated Emission



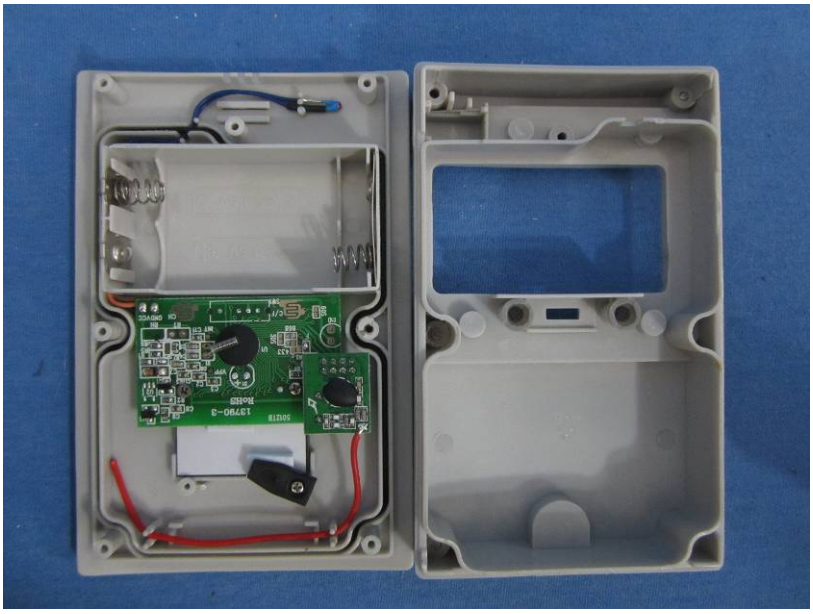


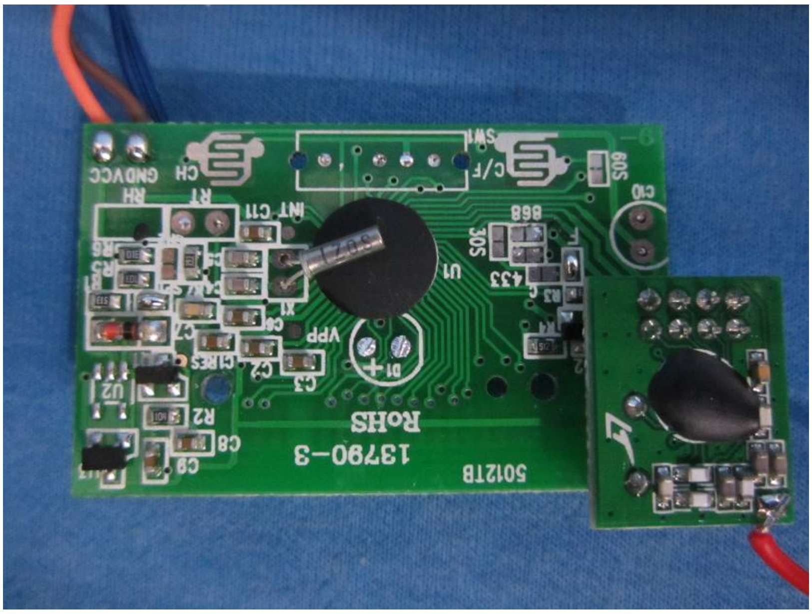
9 EUT Constructional Details

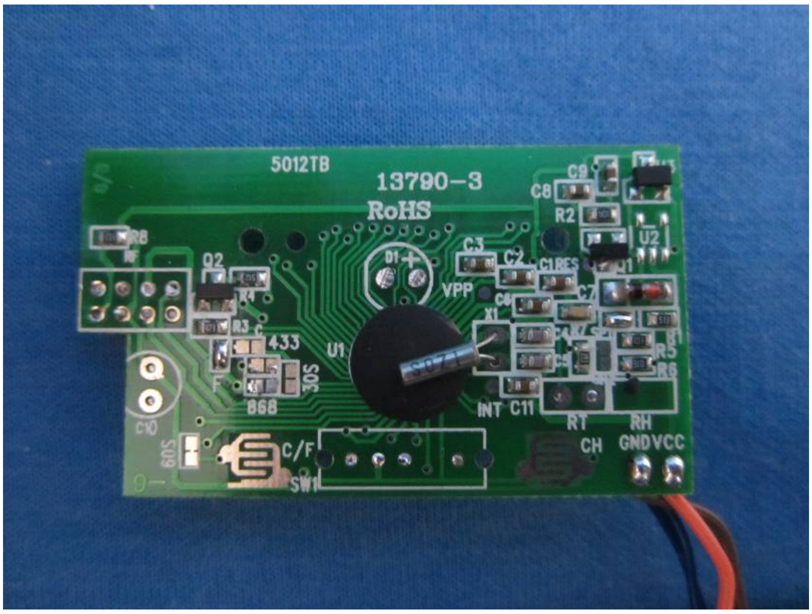





REMOTE TEMP TRANSMITTER
THERMO SENSOR
-20°C ~ +50°C



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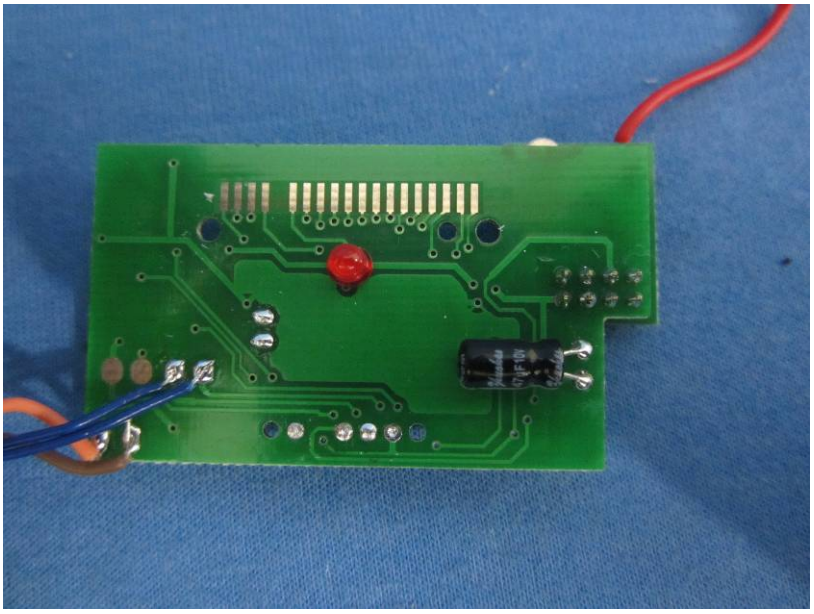

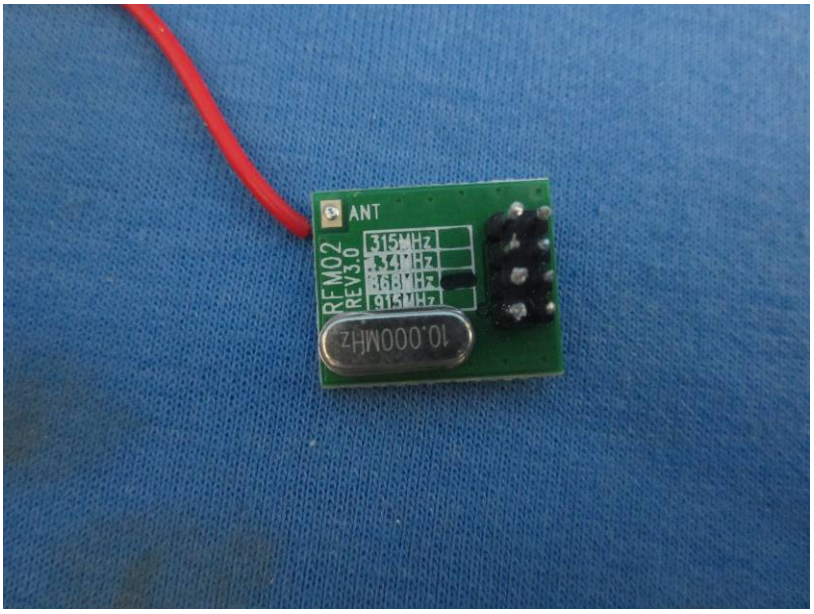
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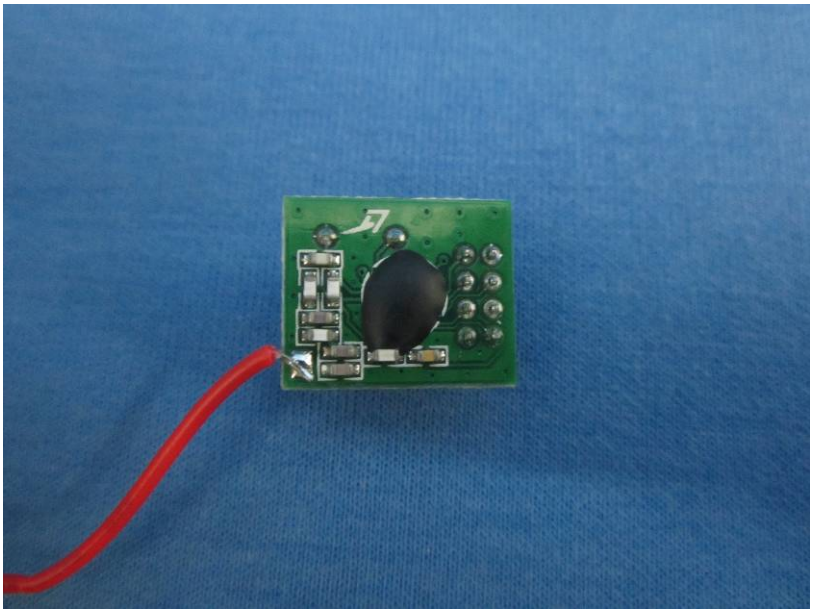

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