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Ke Mei Ou Lab Corp.
FEDERAL COMMUNICATIONS COMMISSION
Registration Number: 125782

FCC TEST REPORT

Under
FCC 15 Subpart C, Paragraph 15.231

Prepared For :

FOB INSTRUMENTS LTD.

Smartime, 21DONG, CHANGZHEN VILLAGE, GONGMENG TOWN,
SHENZHEN CITY OF CHINA

FCC ID: RYI901
EUT: Wireless Thermometer and Hygrometer
Model: 90.1

March 18, 2004

Report Type: Original Report
Test Engineer: Peter Lin
Test Date: February 29, 2004
Review By: _____ Apollo Liu / Manager

The test report consists 24 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of Ke Mei Ou Laboratory Corporation. The test result in the report only applied to the tested sample.

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1. General Information

1. 1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1. 2 Testing Laboratory

Ke Mei Ou Laboratory Co., Ltd.

7A, Jiaxiangge, Jiahuixincheng, No.3027, Shennan Rd., Futian, Shenzhen, Guangdong, P.R.China.

Tel: +86 755 83642690 Fax: +86 755 83297077

Email: kmo@kmolab.com

Internet: www.kmolab.com

1. 3 Details of Applicant

Name	**: FOB Instruments Ltd.**
Address	**: Smartime, 21 Dong, Changzhen Village, Gongming Town, Shenzhen City of China.**
Contact	**: Steven Wang / Engineer**
Tel	**: + 86 755 27559626**
Fax	**: + 86 755 27559696**

1. 4 Application Details

Date of Receipt of Application	: February 26, 2004
Date of Receipt of Test Item	: February 26, 2004
Date of Test	: February 29, 2004

1. 5 Test Item

Manufacturer	: See Applicant
Model No.	: 90.1
Description	: Wireless Thermometer and Hygrometer

Additional Information

Frequency	: 433.896MHz
Transmission Range	: N/A
Number of Channels	: 1
Power Supply	: DC 1.5V AA size x 2.
Extreme Temp. Tolerance	: N/A

1. 6 Test Standards

FCC 15 Subpart C, Paragraph 15.231

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2. Technical Test

2. 1 Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Test	N/A	Owing to the DC operation of EUT, this test item is not performed.
FCC Part 15 Subpart C Paragraph 15.231(e) Limit	Field Strength of Fundamental	PASS	Minimum passing margin is -2.0 dB at 433.896 MHz Horizontal
FCC Part 15, Subpart C Paragraph 15.231(e) Limit & Paragraph 15.209	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is -7.2dB at 867.801 MHz Horizontal
FCC Part 15 Subpart C Paragraph 15.231Limit	Measured Bandwidth	PASS	Complies.

3. EUT Modifications

No modification by Ke Mei Ou Laboratory Co., Ltd.

4. Conducted Power Line Test

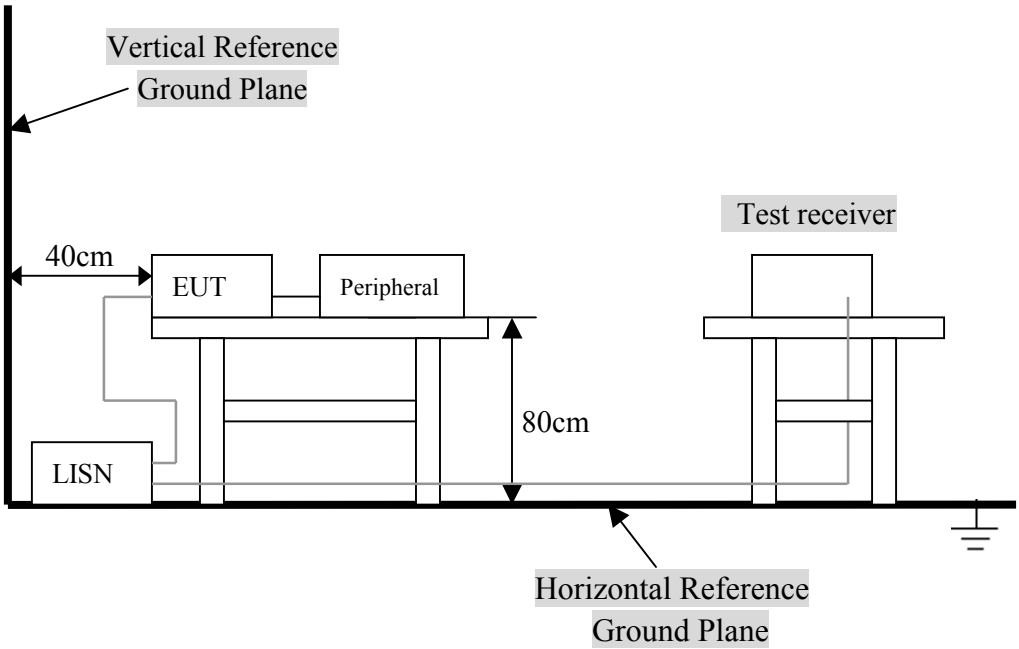
4. 1 Test Equipment

Please refer to Section 9 this report.

4. 2 Test Procedure

The EUT was tested according to ANSI C63.4 - 2001. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 uHenry as specified by section 5.1 of ANSI C63.4 - 2001. cables and peripherals were moved to find the maximum emission levels for each frequency.

4. 3 Test Setup



For the actual test configuration, Please refer to the related items– Photos of Testing.

4. 4 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2001. EUT was used 2 x AAA 1.5V batteries. Press any key of the EUT. Once the button releasing, the transmission will be stopped within 1 second. The EUT transmitted continuously and the duty cycle of transmitting was set to worst case condition (100% duty cycle), which provided by manufacturer during all the tests. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model #	FCC ID
Wireless Thermometer and Hygrometer	FOB Instruments Ltd.	90.1	RYI901

B. Internal Devices

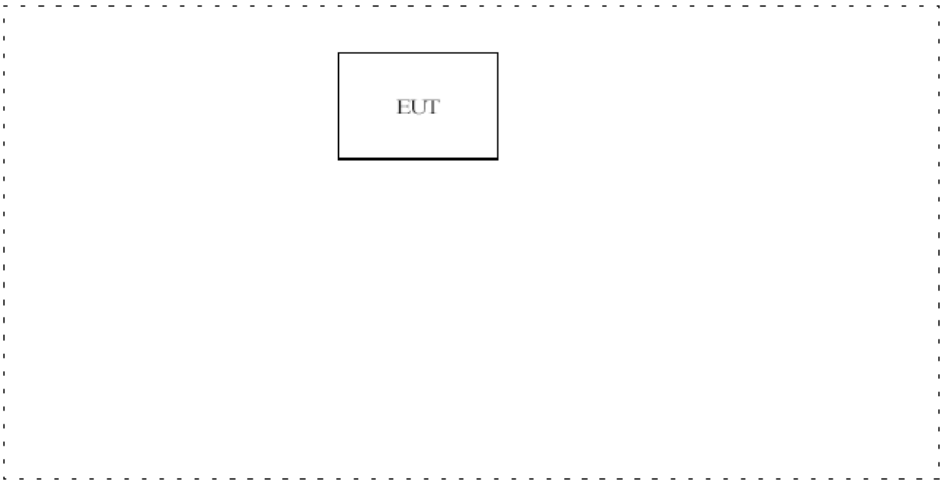
Device	Manufacturer	Model #	FCCID / DoC
N/A			

C. Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
N/A				

4. 5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 2001.
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.



4. 6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency Range (MHz)	**Class A QP/AV**	**Class B QP/AV**
0.15 – 0.5	79/66	66-56/56-46
0.5 – 5.0	73/60	56/46
5.0 - 30	73/60	60/50

NOTE ：In the above table, the tighter limit applies at the band edges.

4. 7 Conducted Power Line Test Result

Owing to the DC operation of EUT, this test item is not performed.

5. Radiated Emission Test

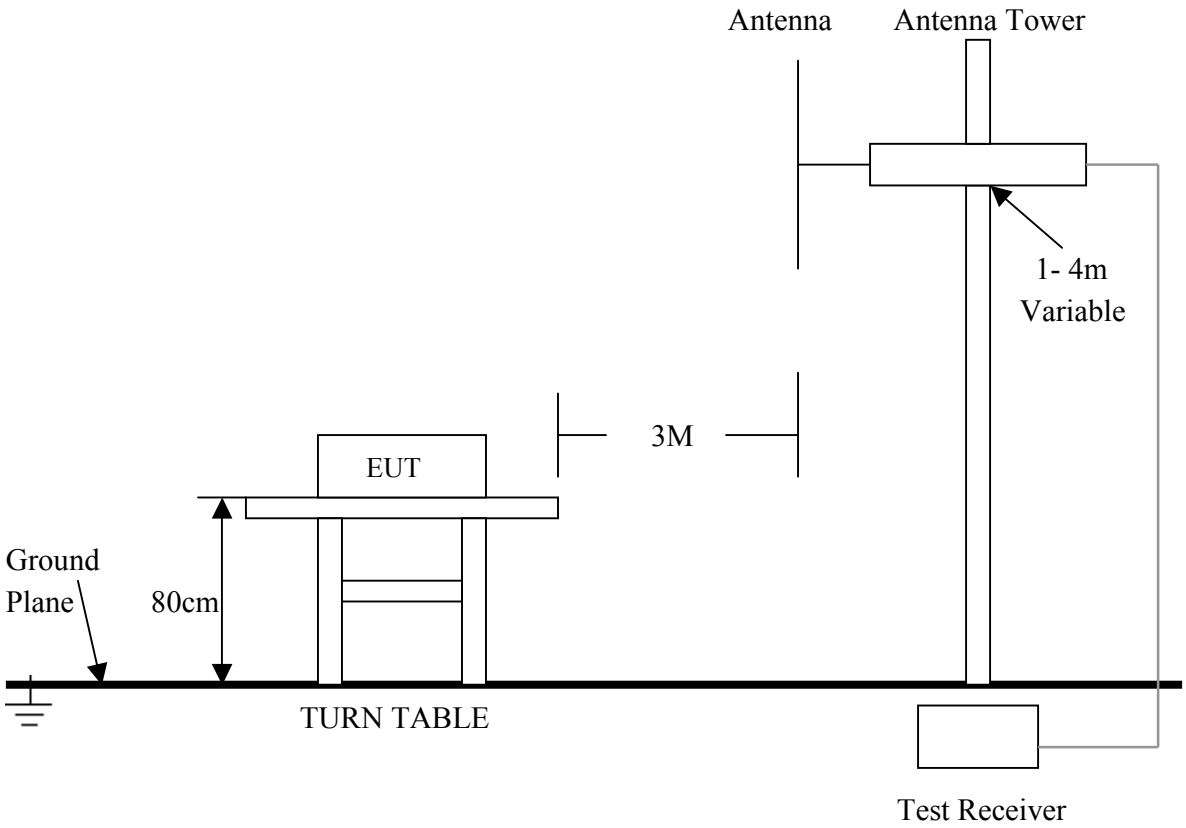
5. 1 Test Equipment

Please refer to Section 9 this report.

5. 2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2001. The radiated test was performed at Ke Mei Ou Laboratory. This site is on file with the FCC laboratory division, Registration No. 125782.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2001.
3. The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a " **QP**" in the data table.
6. The antenna polarization : Vertical polarization and Horizontal polarization.

5. 3 Radiated Test Setup



For the actual test configuration , please refer to the related items– Photos of Testing.

5. 4 Configuration of The EUT

Same as section 4 . 4 of this report

5. 5 EUT Operating Condition

Same as section 4 . 5 of this report.

5. 6 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below ：

A. FCC Part 15 Subpart C Paragraph 15.231(e) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
433.896	4398.28	72.9	439.8	52.9

Note:
(1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(3) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency (MHz)	Distance (m)	Field Strength (dBuV/m)
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
ABOVE 960	3	54.0

Note:
(1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
(2) In the Above Table, the tighter limit applies at the band edges.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the

5. 7 Radiated Emission Test Result

A. Fundamental Radiated Emission Data

Product	: Wireless Thermometer and Hygrometer	Test Mode	: Normal
Test Item	: Fundamental Radiated Emission Data	Temperature	: 25 ℃
Test Voltage	: DC 3V (Power by Battery)	Humidity	: 56%RH
Test Result	: PASS		

Freq. (MHz)	Emission (dBuV/m)	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
433.896	70.9	HORIZ	72.9	-2.0
433.896	64.1	VERT	72.9	-8.8

Note: (1) All Readings are Peak value.
(2) Emission Level = Reading Level + Probe Factor + Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.

C. General Radiated Emission Data & Harmonics Radiated Emission Data

Product	: Wireless Thermometer and Hygrometer	Test Mode	: Normal
Test Item	: General Radiated Emission Data & Harmonics Radiated Emission Data	Temperature	: 25 ℃
Test Voltage	: DC 3V (Power by Battery)	Humidity	: 56%RH
Test Result	: PASS		

Freq. (MHz)	Emission (dBuV/m)	HORIZ / VERT	Limits (dBuV/m)	Margin (dB)
42.360	24.1	HORIZ	40.0	-15.9
42.621	22.6	VERT	40.0	-17.4
867.801	45.7	HORIZ	52.9	-7.2
867.801	44.2	VERT	52.9	-8.7
1301.690	33.6	HORIZ	52.9	-19.3
1301.690	32.0	VERT	52.9	-20.9
1735.600	23.3	HORZ	52.9	-29.6
1735.600	25.8	VERT	52.9	-27.1
2169.480	20.1	HORIZ	52.9	-32.8
2169.480	19.6	VERT	52.9	-33.3

Note: (1) All Reading Levels below 1GHz are Quasi-Peak, above are peak and average value.
(2) Emission Level = Reading Level + Probe Factor + Cable Loss.

6. Band Edge

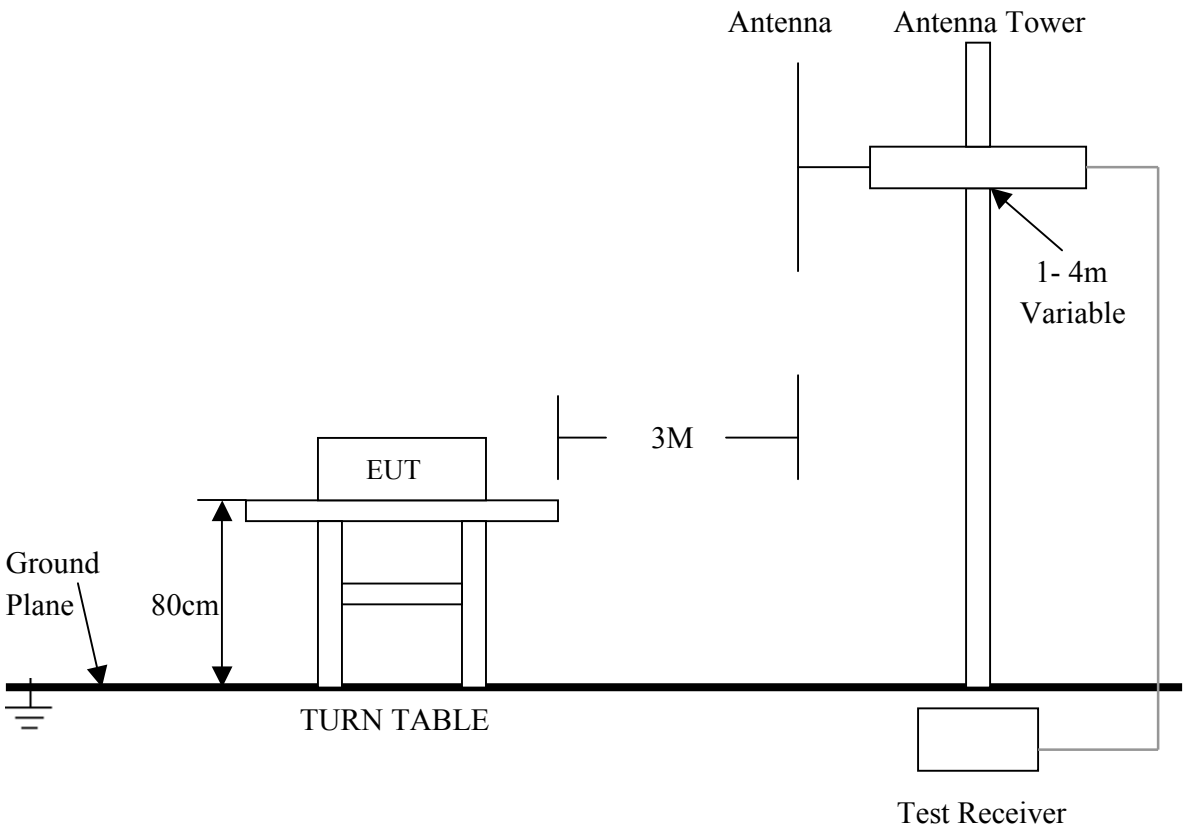
6. 1 Test Equipment

Please refer to Section 9 this report.

6. 2 Test Procedure

1. The EUT was tested according to ANSI C63.4 - 2001. The radiated test was performed at Ke Mei Ou Laboratory. This site is on file with the FCC laboratory division, Registration No. 125782.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2001.
3. The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz , peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
4. The antenna high were varied from 1 m to 4 m high to find the maximum emission for each frequency.
5. The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement. The bandwidth below 30MHz setting on the field strength meter is 10 kHz, above 1GHz are 1 MHz.
6. Maximizing procedure was performed on the highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.
7. The antenna polarization ： Vertical polarization and horizontal polarization.

6. 3 Radiated Test Setup



For the actual test configuration , please refer to the related items– Photos of Testing

6. 4 Configuration of The EUT

Same as section 4 . 4 of this report

6. 5 EUT Operating Condition

Same as section 4 . 5 of this report.

6. 6 Band Edge FCC 15.231 Limit

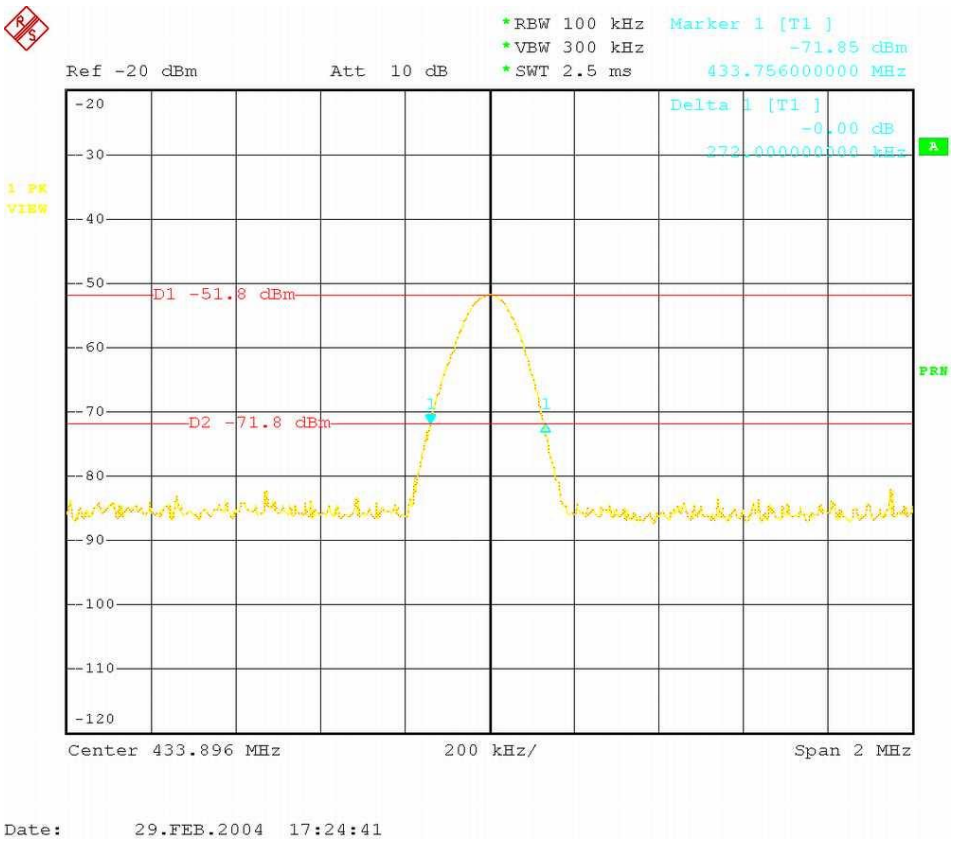
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

B.W(20dBc) Limit = 0.25% x f (MHz) = 0.25% x 433.896MHz = 1.0847MHz

From the plot, the bandwidth is observed to be 0.272 MHz, at 20dBc where the bandwidth limit is 1.0847MHz.

6. 7 Band Edge Test Result

Product	: Wireless Thermometer an Hygrometer	Test Mode	: Normal
Test Item	: Band Edge Data	Temperature	: 25 ℃
Test Voltage	: DC 3V (Power by Battery)	Humidity	: 56%RH
Test Result	: **PASS**		



Note: (1) The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209.

(2) The average measurement was not performed when the peak measured data under the limit of average detection.

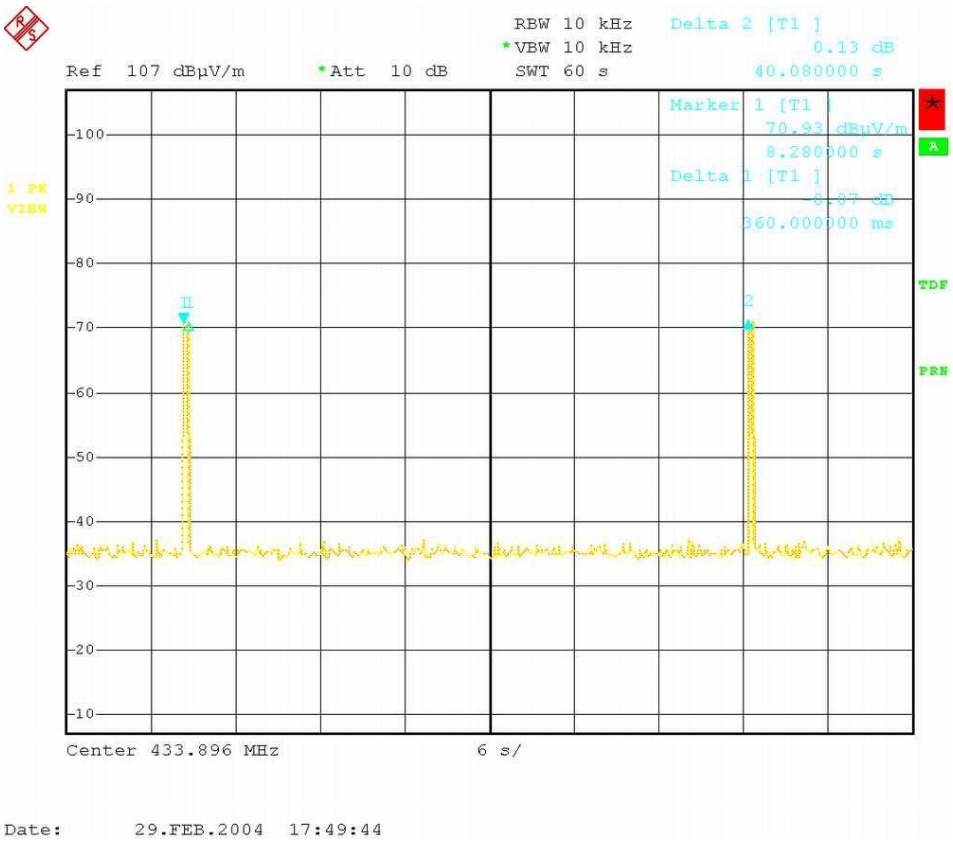
6. 8 Periodic Operation [FCC 47CFR 15.231e]

According to FCC 47CFR15.231e. The EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmission shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Results:

Since the EUT of each transmission is 360msec, so the silent period must not less than 10.8 seconds (360msec x 30).

The following figures showed the duration of each transmission and silent period.



7. Photos of Testing

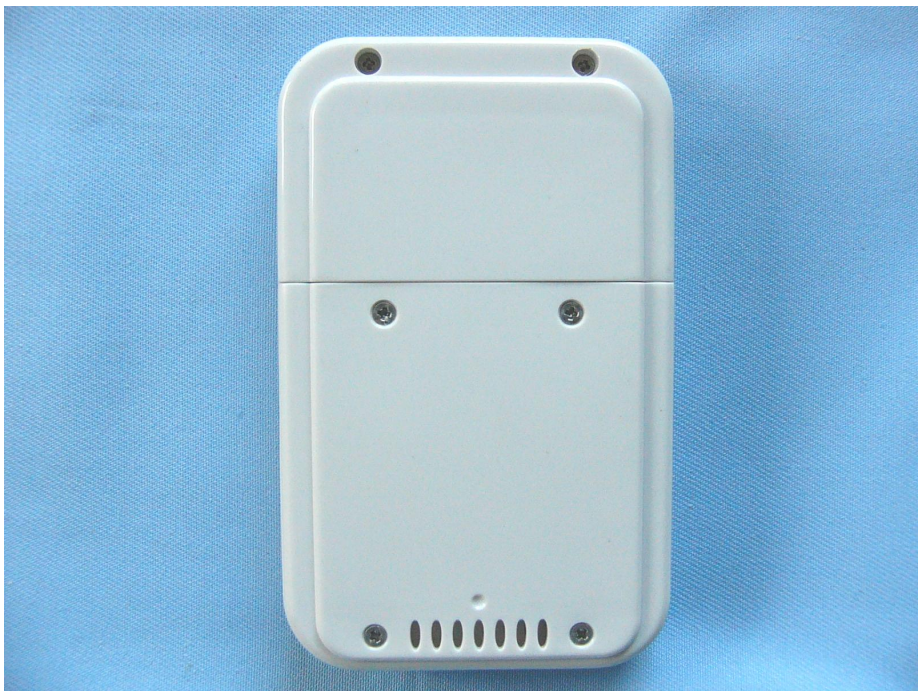
7. 1 EUT Test Photographs

Radiated emission test view

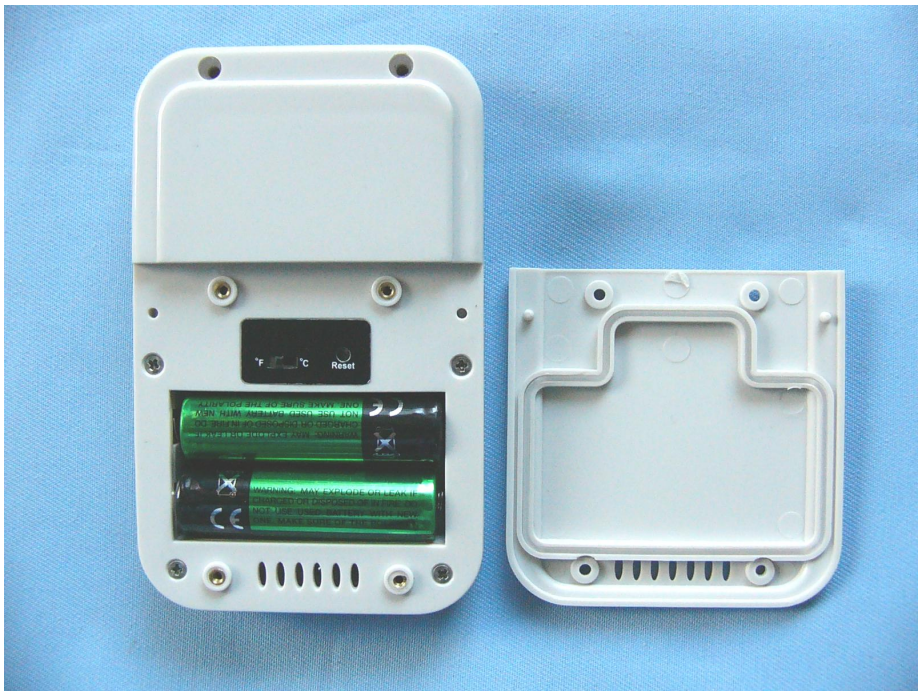
7. 2 EUT Detailed Photographs

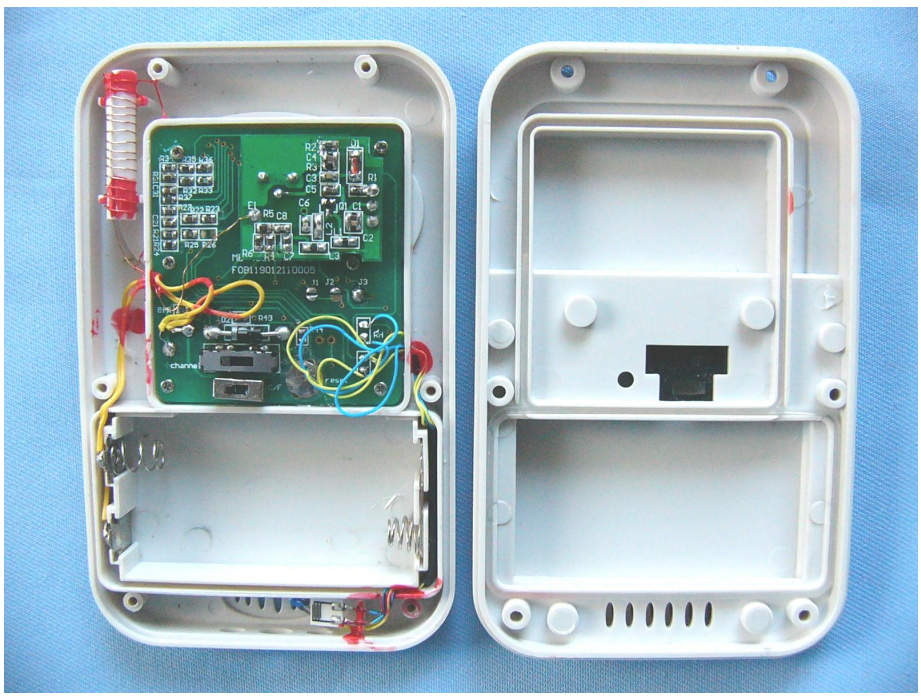
EUT top view

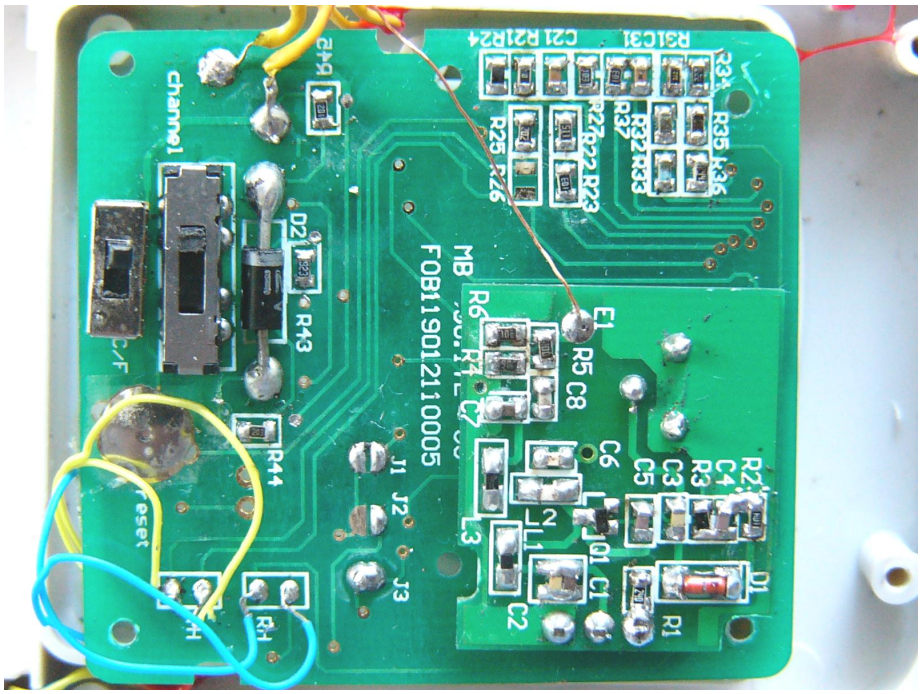
EUT bottom view



EUT inside whole view



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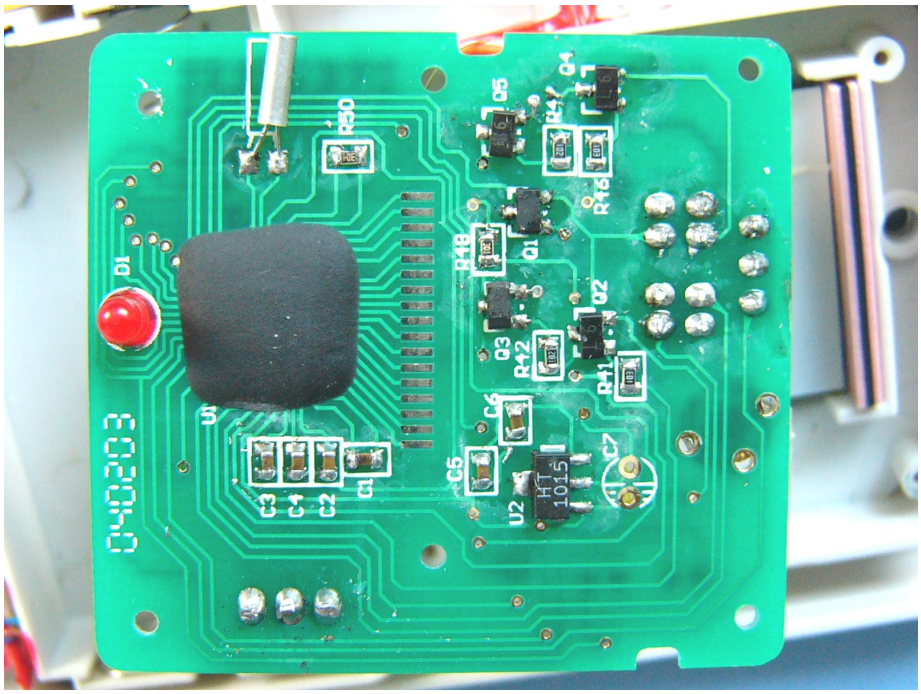
MB
FOB119012110005
R43
R44
R5
C8
C6
C5
C3
C4
R3
R2
L2
L3
Q1
C1
C2
R1
D1
J1
J2
J3
E1
R6
R4
C7
R25
R26
R27
R22
R23
R32
R33
R35
R36
R34
R31
C31
R21
R24
C21
D2
C/F
Reset
RH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D1
U1
C3
C4
C2
C1
R50
Q5
Q4
R47
R46
R48
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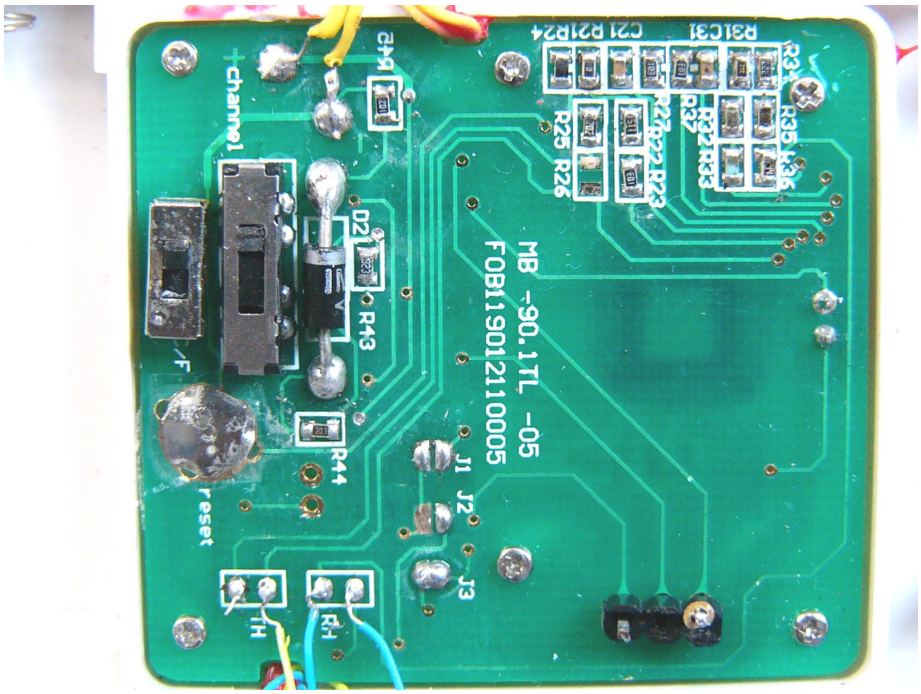
Q2
Q3
R42
R41
C6
C5
U2
HT
1015
C7


MB -90.1TL -05
FOB119012110005
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R43
R44
J1
J2
J3
R25 R26
R27 R22 R23
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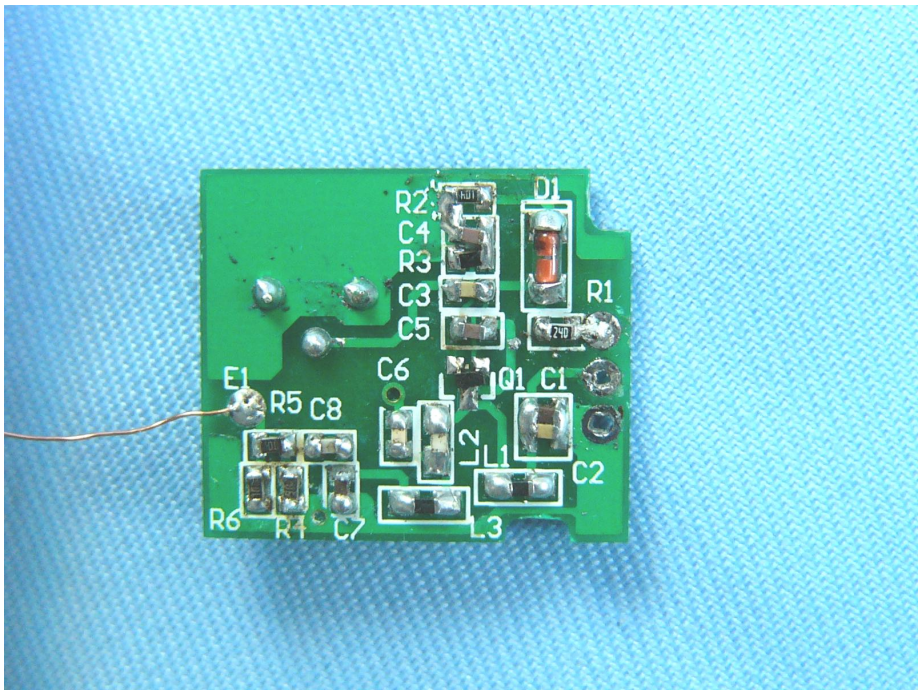
R31 C31
TH
RH


R2
C4
R3
C3
C5
D1
R1
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C1
E1
R5
C8
L2
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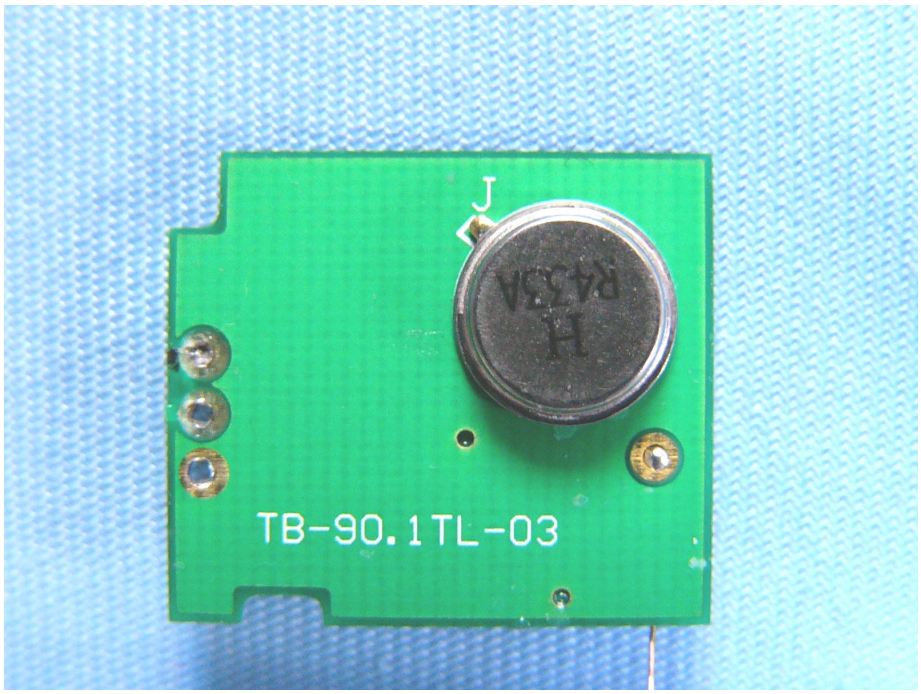
R4
C7
L3


J
H
R4.53A
TB-90.1TL-03

8. FCC ID Label

FCC ID: RYI901

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT

EUT Bottom View/Proposed FCC ID Label Location

9. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Date of Cal.	Due Date
Turntable	KMO	KSZ001T	200306	NCR	NCR
Antenna Tower	KMO	KSZ002AT	200307	NCR	NCR
OATS	KMO	KSZSITE001	N/A	July 06, 2003	July 06, 2004
EMI Test Receiver	Rohde & Schwarz	ESPI3	100180	Oct.18, 2003	Oct.18, 2004
Signal Generator	Rohde & Schwarz	SMT03	100059	Feb.01, 2004	Feb.01, 2005
Bilog Antenna	Chase	CBL6111C	2576	Feb.01, 2004	Feb.01, 2005
Ultra Broadband Antenna	Rohde & Schwarz	HL 562	100110	June.05, 2003	June.05, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct. 23,2003	Oct. 23, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct. 23,2003	Oct. 23, 2004
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
KMO Shielded Room	KMO	KMO-001	N/A	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb. 27, 2004	Feb.27, 2005
AMN	Rohde & Schwarz	ESH3-Z5	100002	Feb. 01, 2004	Feb.01, 2005
LISN	Kyoritsu	KNW-407	8-1441-8	Feb. 23, 2004	Feb.23, 2005
EMI Test Receiver	Rohde & Schwarz	ESI26	838786/013	Feb. 01, 2004	Feb.01, 2005
Bilog Antenna	Chase	CBL6112B	2591	Feb. 01, 2004	Feb.01, 2005
Horn Antenna	Rohde & Schwarz	HF906	100014	Feb. 01, 2004	Feb.01, 2005
3m Semi-Anechoic Chamber	Albatross Projects	9mX6mX6m	N/A	Feb. 01, 2004	Feb.01, 2005