

FCC Class II Permissive Change Test Report

FCC ID : HS9-RCHW3610WF01
Equipment : Lyric Water Leak and Freeze Detector
Model No. : RCHW3610WF
Brand Name : Honeywell
Applicant : Honeywell International Inc.
Address : 1985 Douglas Drive, Golden Valley, Minnesota,
United States, 55422-3922
Standard : 47 CFR FCC Part 15.247
Received Date : Dec. 01, 2015
Tested Date : Dec. 01, 2015

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:



Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FR580501-01AE	Rev. 01	Initial issue	Dec. 09, 2015

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 184.23MHz 31.03 (Margin -12.47dB) - PK	Pass

1 General Description

1.1 Information

- ✧ This report is prepared for FCC Class II Permissive change.

This report is issued as a supplementary report to original ICC report no. FR580501AE. The modification was two additional PCB designs: V04 & V05. The difference compared with original design is adding components into power portion of Non-RF part. In this report, only radiated emission below 1GHz tests had been re-tested and only its data was presented in the following sections.

V04: with jumper wire

V05: w/o jumper wire

- ✧ The EUT is a Lyric Water and Freeze Detector with 1.25m extended sensor cable.

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Freq. (MHz)	Channel Number	Data Rate
2400-2483.5	V4.1 LE	2402-2480	0-39 [40]	1 Mbps
Note 1: Bluetooth LE (Low energy) uses GFSK modulation.				

1.1.2 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	PIFA	3	N/A	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	4.5Vdc from batteries (1.5Vdc x3 AA batteries)
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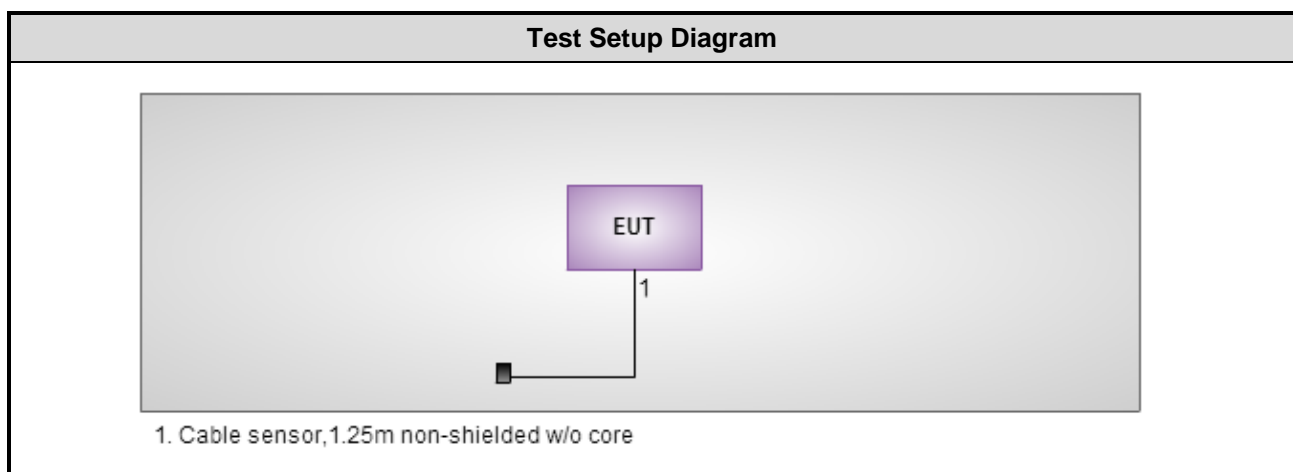
1.1.4 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	---	---	---	---	---

1.3 Test Setup Chart



1.4 Test Equipment List and Calibration Data

Test Item	Radiated Emission				
Test Site	966 chamber 3 / (03CH03-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016
Receiver	Agilent	N9038A	MY53290044	Oct. 14, 2015	Oct. 13, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-563	Dec. 30, 2014	Dec. 29, 2015
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 16, 2015	Nov. 15, 2016
Preamplifier	EMC	EMC02325	980187	Sep. 21, 2015	Sep. 20, 2016
Preamplifier	Agilent	83017A	MY53270014	Sep. 07, 2015	Sep. 06, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 09, 2015	Feb. 08, 2016
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 09, 2015	Feb. 08, 2016
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 09, 2015	Feb. 08, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 DTS Meas Guidance v03r03

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
Radiated emission \leq 1GHz	± 3.99 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	20°C / 61%	Warren Lee

- FCC site registration No.: 390588
- IC site registration No.: 10807C -1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Radiated Emissions \leq 1GHz	BT LE	2440	1Mbps	1, 2
NOTE: <ol style="list-style-type: none">The tests reported herein were performed according to the original worst case conditions in original report no. FR580501AE.The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Z-plane results were found as the worst case and were shown in this report.Both versions of PCB design were selected for final testing as below test configurations.Test Configurations are listed as below:<ol style="list-style-type: none">Configuration 1: V04, Z-plane.Configuration 2: V05, Z-plane				

3 Transmitter Test Results

3.1 Emissions in Restricted Frequency Bands

3.1.1 Limit of Emissions in Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.2 Test Procedures

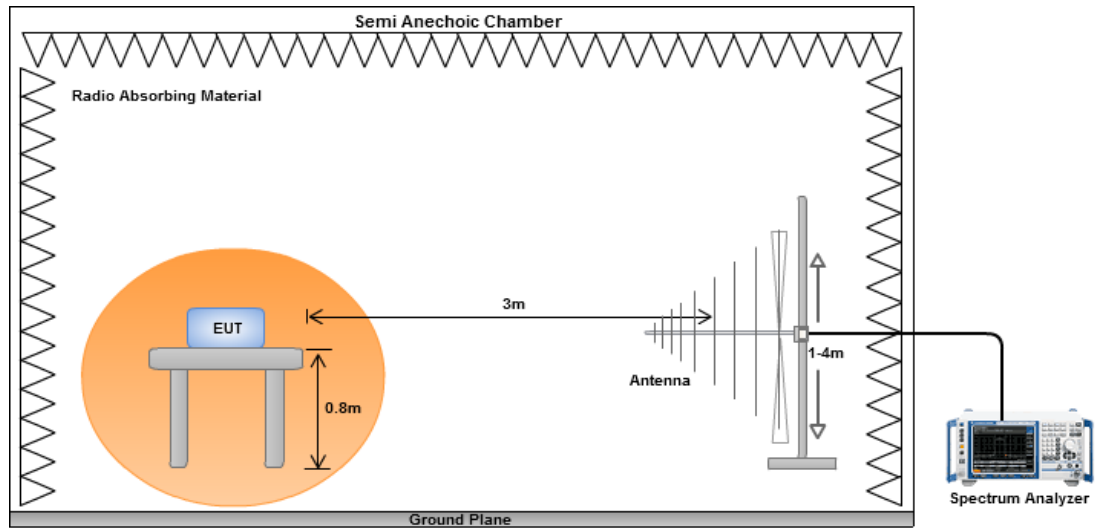
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

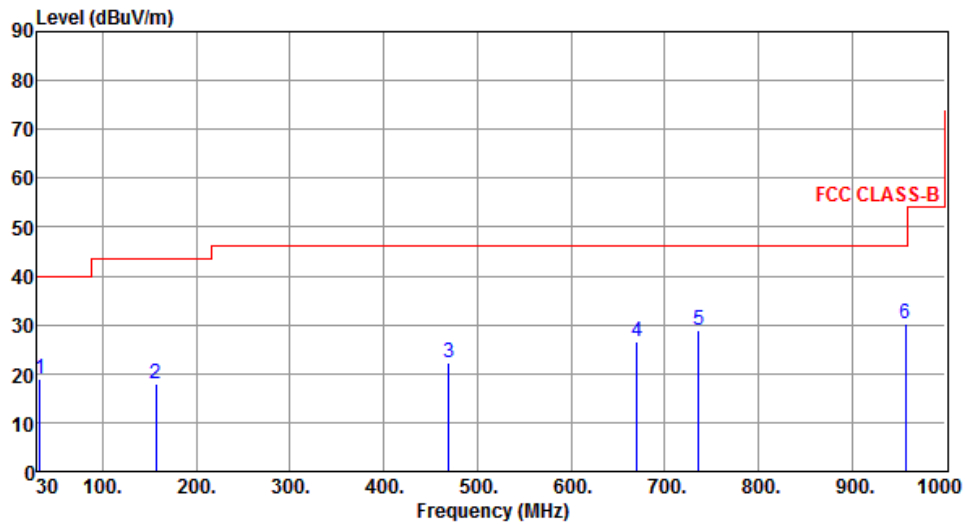
3.1.3 Test Setup

Radiated Emissions below 1 GHz



3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Horizontal	Test Configuration	1



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	32.91	18.89	40.00	-21.11	32.76	-13.87	Peak	---	---
2	157.07	17.96	43.50	-25.54	31.46	-13.50	Peak	---	---
3	469.41	22.34	46.00	-23.66	30.84	-8.50	Peak	---	---
4	670.20	26.54	46.00	-19.46	31.48	-4.94	Peak	---	---
5	736.16	28.89	46.00	-17.11	32.53	-3.64	Peak	---	---
6	957.32	30.25	46.00	-15.75	30.08	0.17	Peak	---	---

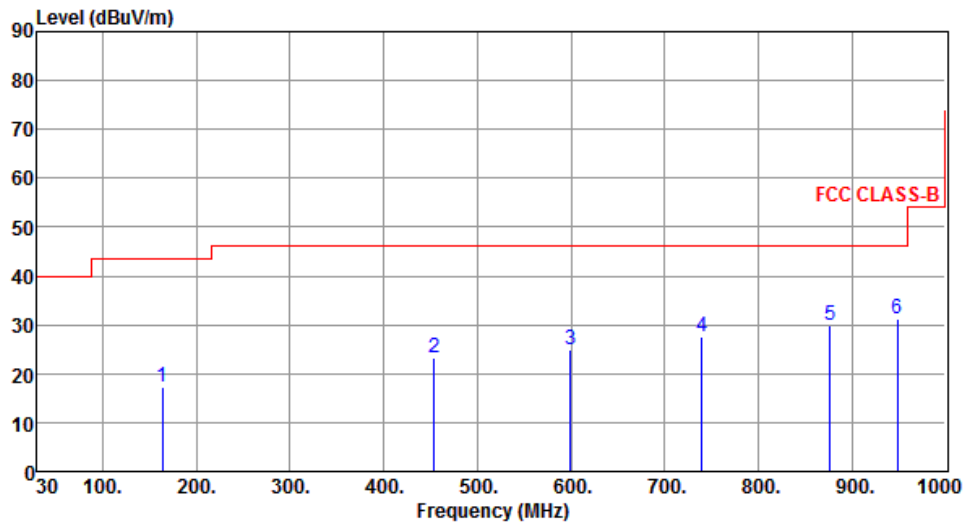
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical	Test Configuration	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	163.86	17.42	43.50	-26.08	31.12	-13.70	Peak	---	---
2	453.89	23.32	46.00	-22.68	32.05	-8.73	Peak	---	---
3	599.39	25.03	46.00	-20.97	30.84	-5.81	Peak	---	---
4	740.04	27.57	46.00	-18.43	31.15	-3.58	Peak	---	---
5	876.81	29.91	46.00	-16.09	31.13	-1.22	Peak	---	---
6	948.59	31.19	46.00	-14.81	31.14	0.05	Peak	---	---

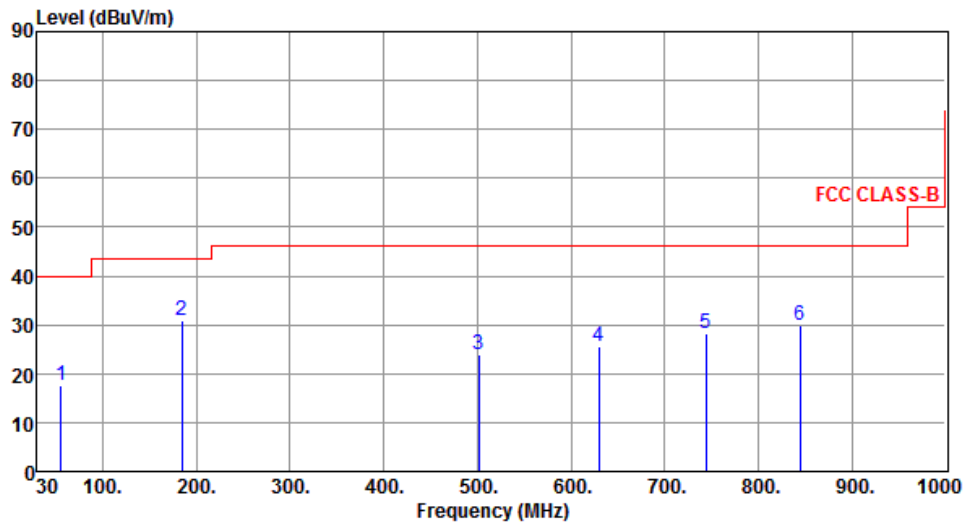
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Horizontal	Test Configuration	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	55.22	17.71	40.00	-22.29	31.37	-13.66	Peak	---	---
2	184.23	31.03	43.50	-12.47	46.79	-15.76	Peak	---	---
3	501.42	23.77	46.00	-22.23	31.79	-8.02	Peak	---	---
4	629.46	25.67	46.00	-20.33	31.21	-5.54	Peak	---	---
5	743.92	28.24	46.00	-17.76	31.74	-3.50	Peak	---	---
6	844.80	29.82	46.00	-16.18	31.71	-1.89	Peak	---	---

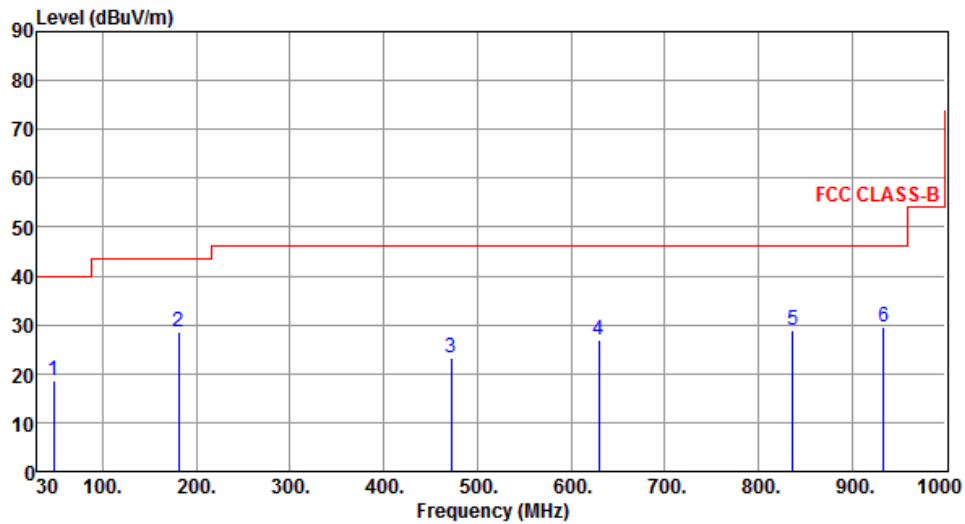
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2440
Polarization	Vertical	Test Configuration	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	47.46	18.53	40.00	-21.47	31.61	-13.08	Peak	---	---
2	181.32	28.72	43.50	-14.78	44.14	-15.42	Peak	---	---
3	472.32	23.23	46.00	-22.77	31.69	-8.46	Peak	---	---
4	629.46	26.89	46.00	-19.11	32.43	-5.54	Peak	---	---
5	837.04	28.93	46.00	-17.07	30.97	-2.04	Peak	---	---
6	934.04	29.47	46.00	-16.53	29.65	-0.18	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website <http://www.icertifi.com.tw>.

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If you have any suggestion, please feel free to contact us as below information

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