

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
FR580501-01AD	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]: 182.29MHz 30.25 (Margin -13.25dB) – 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. FR580501AD. 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. Frequency (MHz)	Channel Number	Data Rate
2400-2483.5	BR	2402-2480	0-78 [79]	1 Mbps
2400-2483.5	EDR	2402-2480	0-78 [79]	2 Mbps
2400-2483.5	EDR	2402-2480	0-78 [79]	3 Mbps
Note 1: RF output power specifies that Maximum Peak Conducted Output Power.				
Note 2: Bluetooth BR uses a GFSK.				
Note 3: Bluetooth EDR uses a combination of $\pi/4$ -DQPSK and 8DPSK.				

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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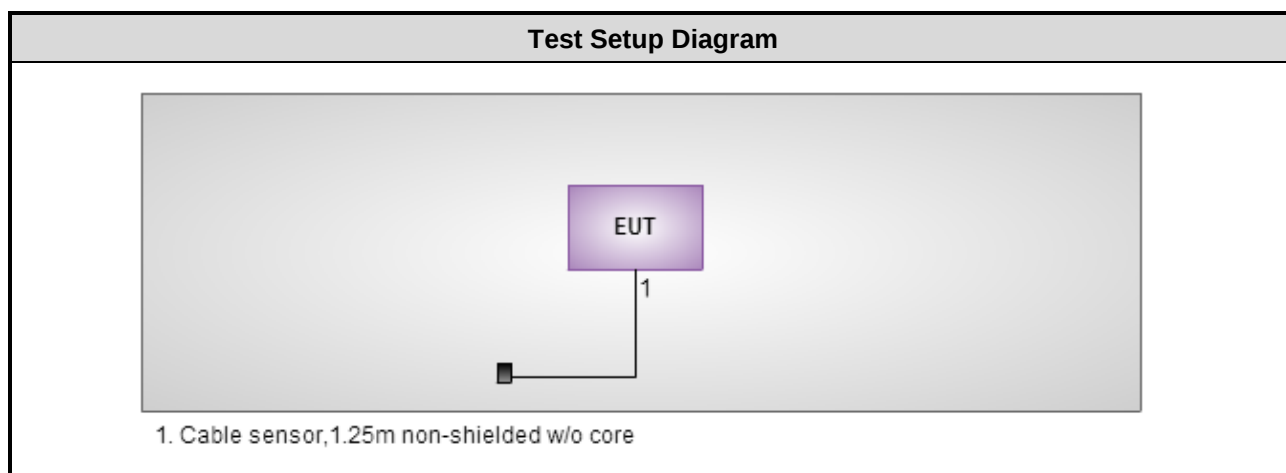
1.1.4 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	---	---

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 The Equipment List

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

FCC Public notice DA 00-705

ANSI C63.10-2013

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 ≤ 1GHz	GFSK	2441	1Mbps	1, 2

NOTE:

1. The tests reported herein were performed according to the original worst case conditions in original report no. FR580501AD.
2. 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.
3. Both versions of PCB design were selected for final testing as below test configurations.
4. Test Configurations are listed as below:
 - 1) Configuration 1: V04, Z-plane.
 - 2) Configuration 2: V05, Z-plane

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into 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.

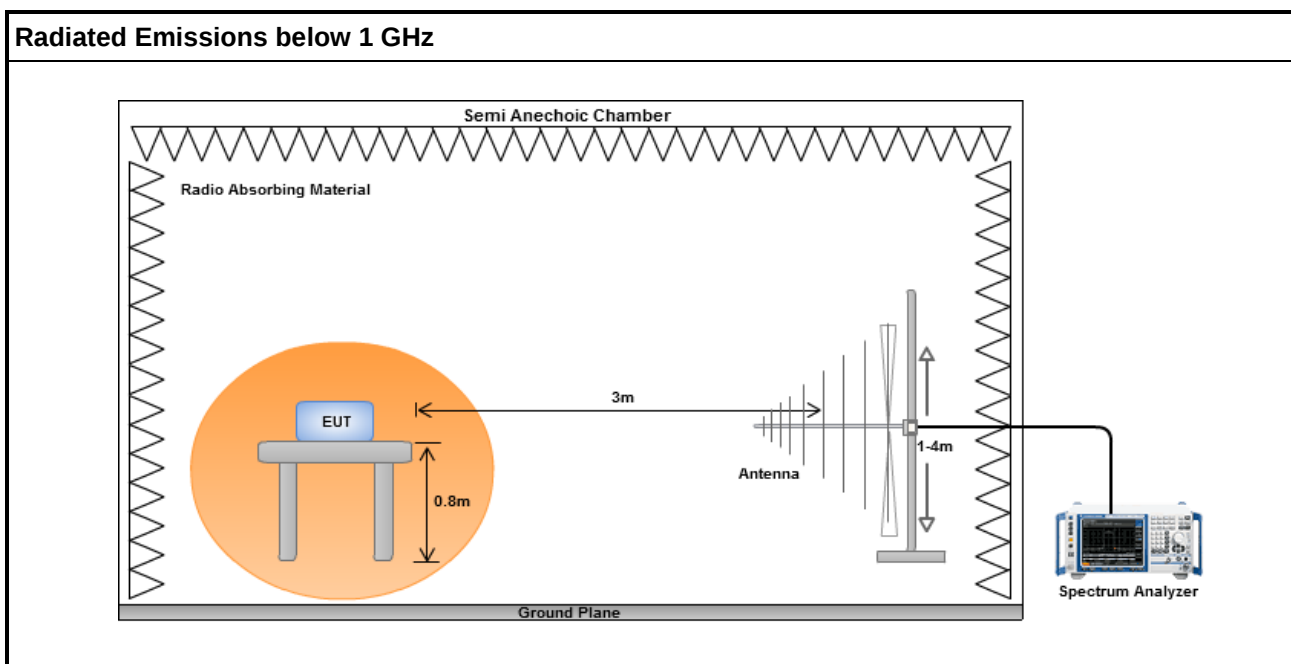
3.1.2 Test Procedures

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:

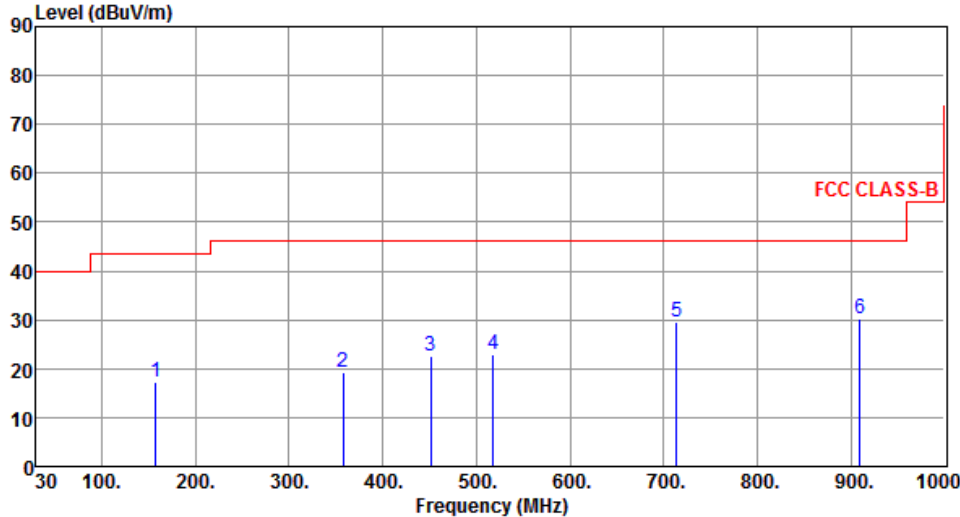
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

3.1.3 Test Setup



3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal	Test Configuration	1

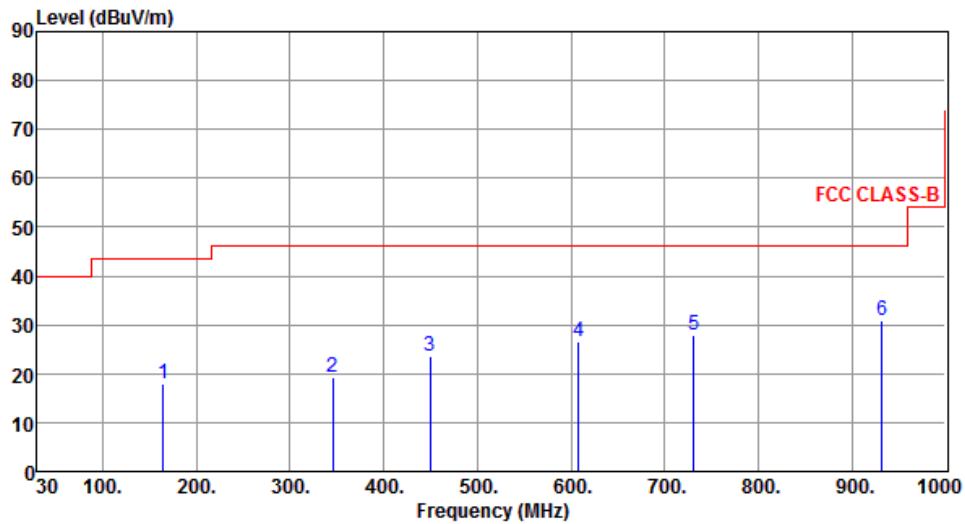


The graph displays the radiated unwanted emissions for a transmitter. The y-axis represents the Level in dBUV/m, ranging from 0 to 90. The x-axis represents the Frequency in MHz, ranging from 30 to 1000. A red line indicates the FCC CLASS-B limit, which is 40 dBUV/m from 30 to 100 MHz, 45 dBUV/m from 100 to 1000 MHz, and 55 dBUV/m above 1000 MHz. Six measured peaks are labeled with numbers 1 through 6, corresponding to the data in the table below.

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	158.04	17.26	43.50	-26.24	30.76	-13.50	Peak	---	---
2	357.86	19.35	46.00	-26.65	30.62	-11.27	Peak	---	---
3	450.98	22.65	46.00	-23.35	31.42	-8.77	Peak	---	---
4	517.91	23.06	46.00	-22.94	30.73	-7.67	Peak	---	---
5	713.85	29.60	46.00	-16.40	33.67	-4.07	Peak	---	---
6	909.79	30.14	46.00	-15.86	30.70	-0.56	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)	2441
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	164.83	17.81	43.50	-25.69	31.56	-13.75	Peak	---	---
2	345.25	19.34	46.00	-26.66	30.95	-11.61	Peak	---	---
3	450.01	23.68	46.00	-22.32	32.46	-8.78	Peak	---	---
4	608.12	26.48	46.00	-19.52	32.21	-5.73	Peak	---	---
5	731.31	27.94	46.00	-18.06	31.67	-3.73	Peak	---	---
6	932.10	31.01	46.00	-14.99	31.22	-0.21	Peak	---	---

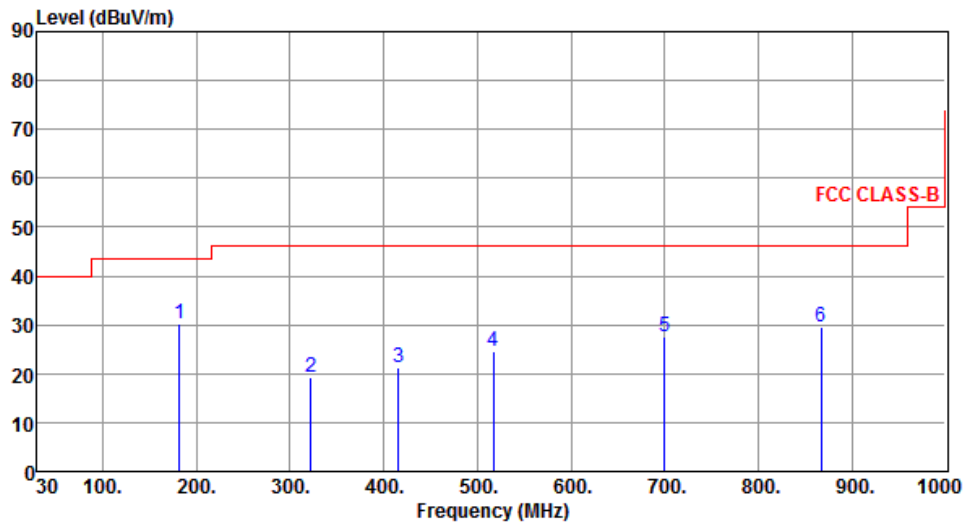
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*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)	2441
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	182.29	30.25	43.50	-13.25	45.78	-15.53	Peak	---	---
2	321.97	19.28	46.00	-26.72	31.56	-12.28	Peak	---	---
3	416.06	21.33	46.00	-24.67	31.02	-9.69	Peak	---	---
4	516.94	24.64	46.00	-21.36	32.33	-7.69	Peak	---	---
5	700.27	27.65	46.00	-18.35	31.97	-4.32	Peak	---	---
6	867.11	29.44	46.00	-16.56	30.87	-1.43	Peak	---	---

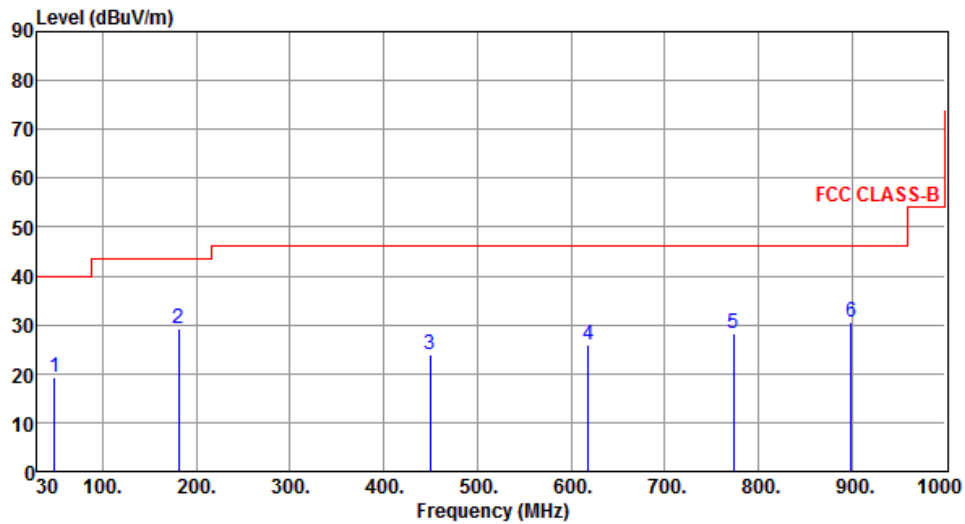
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*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)	2441
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	48.43	19.24	40.00	-20.76	32.35	-13.11	Peak	---	---
2	181.32	29.10	43.50	-14.40	44.52	-15.42	Peak	---	---
3	450.01	24.07	46.00	-21.93	32.85	-8.78	Peak	---	---
4	618.79	25.94	46.00	-20.06	31.57	-5.63	Peak	---	---
5	773.99	28.39	46.00	-17.61	31.46	-3.07	Peak	---	---
6	899.12	30.70	46.00	-15.30	31.43	-0.73	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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