

# HCT CO., LTD.

## CERTIFICATE OF COMPLIANCE

### FCC Certification

**Applicant Name:**  
Franklin Wireless Corp

**Address:**  
6205 Lusk Blvd, San Diego CA 92121

**Date of Issue:**

October 17, 2012

**Test Site/Location:**

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,  
Icheon-si, Kyunggi-Do, Korea

**Report No.:** HCTR1210FR24

**HCT FRN:** 0005866421

**FCC ID** : RB2-R772

**APPLICANT** : Franklin Wireless Corp

**FCC Model(s):** R772

**EUT Type:** Cellular/PCS CDMA & LTE Portable Router with WLAN

**Max. RF Output Power:** Wi-Fi 802.11b(21.48 dBm) / Wi-Fi 802.11g (20.35 dBm)  
/ Wi-Fi 802.11n (19.22 dBm)

**Frequency Range:** 2412 MHz -2462 MHz

**Modulation type** CCK/DSSS/OFDM

**FCC Classification:** Digital Transmission System(DTS)

**FCC Rule Part(s):** Part 15.247

**Engineering Statement:**

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



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**Test engineer of RF Team**



**Approved by**  
: Sang Jun Lee

**Manager of RF Team**

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|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

## Version

| TEST REPORT NO. | DATE             | DESCRIPTION             |
|-----------------|------------------|-------------------------|
| HCTR1210FR24    | October 17, 2012 | - First Approval Report |
|                 |                  |                         |
|                 |                  |                         |

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## 1. GENERAL INFORMATION

**Applicant:** Franklin Wireless Corp  
**Address:** 6205 Lusk Blvd, San Diego CA 92121  
**FCC ID:** RB2-R772  
**EUT Type:** Cellular/PCS CDMA & LTE Portable Router with WLAN  
**Model name(s):** R772  
**Date(s) of Tests:** October 09, 2012 ~ October 16, 2012  
**Place of Tests:** HCT Co., Ltd.  
 105-1, Jangam-ri , Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.  
 (IC Recognition No. : 5944A-3)

## 2. EUT DESCRIPTION

|                              |                                                                                                    |                                                                                     |
|------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>EUT Type</b>              | Cellular/PCS CDMA & LTE Portable Router with WLAN                                                  |                                                                                     |
| <b>FCC Model Name</b>        | R772                                                                                               |                                                                                     |
| <b>Power Supply</b>          | DC 5.0 V                                                                                           |                                                                                     |
| <b>Frequency Range</b>       | TX: 2412 MHz ~ 2462 MHz<br>RX: 2412 MHz ~ 2462 MHz                                                 |                                                                                     |
| <b>Max. RF Output Power</b>  | Peak                                                                                               | Wi-Fi 802.11b(21.48 dBm) / Wi-Fi 802.11g (20.35 dBm)<br>/ Wi-Fi 802.11n (19.22 dBm) |
|                              | Average                                                                                            | Wi-Fi 802.11b(15.17 dBm) / Wi-Fi 802.11g (12.37 dBm)<br>/ Wi-Fi 802.11n (11.10 dBm) |
| <b>Modulation Type</b>       | DSSS/CCK(802.11b), OFDM(802.11g, 802.11n)                                                          |                                                                                     |
| <b>Antenna Specification</b> | Manufacturer: KWANG HYUN AIRTECH CO.,LTD<br>Antenna type: Monopole Antenna<br>Peak Gain : 1.62 dBi |                                                                                     |

### 3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.10-2009) and FCC KDB 558074 D01 DTS Meas Guidance V01 dated January 18, 2012 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) Operating Under §15.247" were used in the measurement.

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2009) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2009).

#### 3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

The actual operation of WiFi must use AC adaptor. But we used computer for using special software so the channels/power could be changed, and that in normal operation the WiFi do not operate when connected to a computer's USB port.

|                                        |                                           |                                                                       |                                                  |
|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
| <b>FCC PT.15.247<br/>TEST REPORT</b>   | <b>FCC CERTIFICATION REPORT</b>           |                                                                       | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| <b>Test Report No.</b><br>HCTR1210FR24 | <b>Date of Issue:</b><br>October 17, 2012 | <b>EUT Type:</b><br>Cellular/PCS CDMA & LTE Portable Router with WLAN | <b>FCC ID:</b><br>RB2-R772                       |

## 4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

|                                        |                                           |                                                                       |                                                  |
|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
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## 6. ANTENNA REQUIREMENTS

### According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section.”

\* The antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203

|                                        |                                           |                                                                       |                                                  |
|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
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## 7. SUMMARY TEST OF RESULTS

| Test Description                    | FCC Part Section(s)        | Test Limit           | Test Condition | Test Result |
|-------------------------------------|----------------------------|----------------------|----------------|-------------|
| 6 dB Bandwidth                      | §15.247(a)(2)              | > 500 kHz            | CONDUCTED      | PASS        |
| Conducted Maximum Peak Output Power | §15.247(b)(3)              | < 1 Watt             |                | PASS        |
| Power Spectral Density              | §15.247(e)                 | < 8 dBm / 3 kHz Band |                | PASS        |
| Band Edge(Out of Band Emissions)    | §15.247(d)                 | Conducted < 20 dBc   |                | PASS        |
| AC Power line Conducted Emissions   | §15.207                    | cf. Section 8.6      |                | PASS        |
| Radiated Spurious Emissions         | §15.205, 15.209            | cf. Section 8.5.1    | RADIATED       | PASS        |
| Radiated Restricted Band Edge       | §15.247(d), 15.205, 15.209 | cf. Section 8.5.2    |                | PASS        |

## 8. TEST RESULT

### 8.1 6dB BANDWIDTH (802.11b/g/n)

#### Test Requirements and limit, §15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

**The minimum permissible 6dB bandwidth is 500 kHz.**

#### ■ TEST CONFIGURATION

#### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

RBW = 1 – 5 % of the EBW

VBW = 3 \* RBW

SPAN = 40 MHz

Detector = Peak

Trace mode = max hold

Sweep = auto couple

## ■ TEST RESULTS

### Conducted 6dB Bandwidth Measurements for 802.11b

| 802.11b Mode    |             | Measured Bandwidth<br>[MHz] | Minimum Bandwidth<br>[MHz] | Pass / Fail |
|-----------------|-------------|-----------------------------|----------------------------|-------------|
| Frequency [MHz] | Channel No. |                             |                            |             |
| 2412            | 1           | 10.51                       | 0.500                      | Pass        |
| 2437            | 6           | 10.52                       | 0.500                      | Pass        |
| 2462            | 11          | 10.53                       | 0.500                      | Pass        |

### Conducted 6dB Bandwidth Measurements for 802.11g

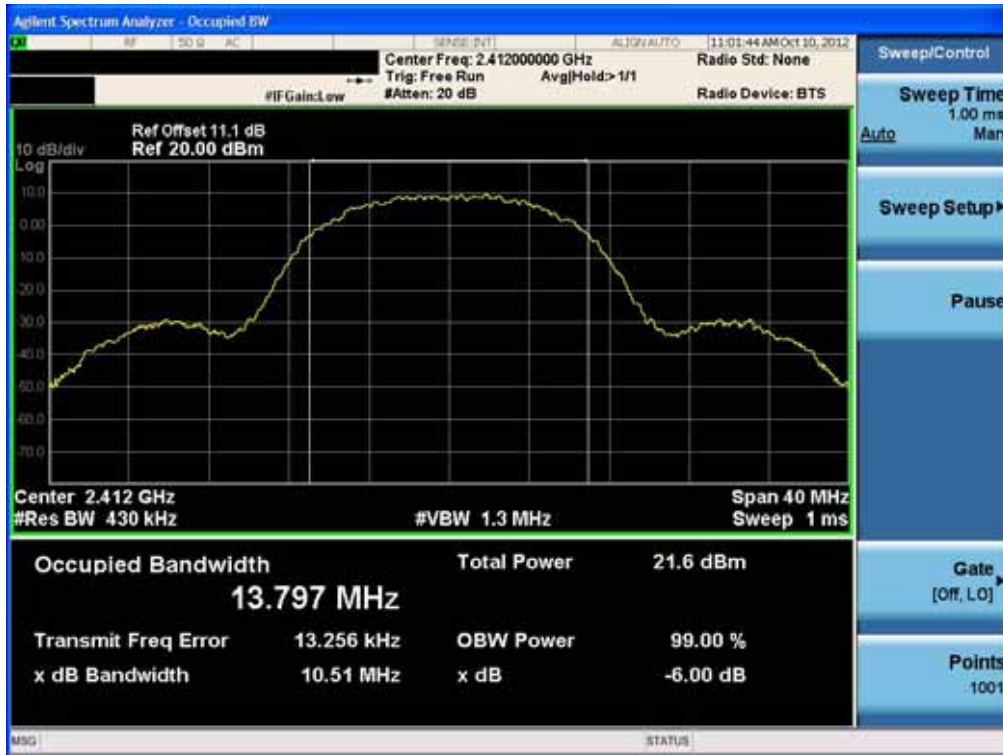
| 802.11g Mode    |             | Measured Bandwidth<br>[MHz] | Minimum Bandwidth<br>[MHz] | Pass / Fail |
|-----------------|-------------|-----------------------------|----------------------------|-------------|
| Frequency [MHz] | Channel No. |                             |                            |             |
| 2412            | 1           | 16.47                       | 0.500                      | Pass        |
| 2437            | 6           | 16.45                       | 0.500                      | Pass        |
| 2462            | 11          | 16.46                       | 0.500                      | Pass        |

### Conducted 6dB Bandwidth Measurements for 802.11n

| 802.11n Mode    |             | Measured Bandwidth<br>[MHz] | Minimum Bandwidth<br>[MHz] | Pass / Fail |
|-----------------|-------------|-----------------------------|----------------------------|-------------|
| Frequency [MHz] | Channel No. |                             |                            |             |
| 2412            | 1           | 17.68                       | 0.500                      | Pass        |
| 2437            | 6           | 17.64                       | 0.500                      | Pass        |
| 2462            | 11          | 17.65                       | 0.500                      | Pass        |

## RESULT PLOTS

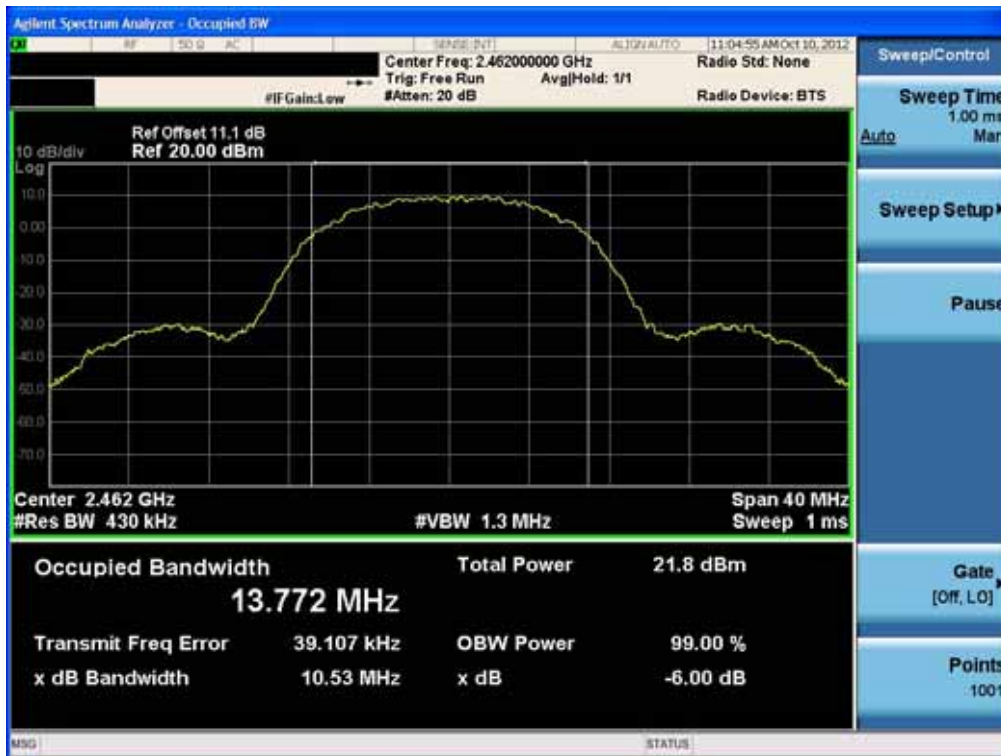
6dB Bandwidth plot (802.11b-CH 1)



6dB Bandwidth plot (802.11b-CH 6)



### 6dB Bandwidth plot (802.11b-CH 11)



### 6dB Bandwidth plot (802.11g-CH 1)



### 6dB Bandwidth plot (802.11g-CH 6)



### 6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n-CH 1)



6dB Bandwidth plot (802.11n-CH 6)



### 6dB Bandwidth plot (802.11n-CH 11)



|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
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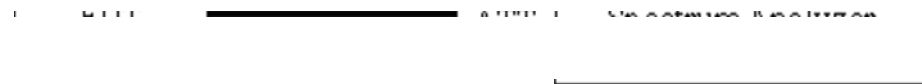
## 8.2 OUTPUT POWER (802.11b/g/n)

### Test Requirements and limit, §15.247(b)(3)

A transmitter antenna terminal of EUT is connected to the input of a Spectrum Analyzer. Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

**The maximum permissible conducted output power is 1 Watt.**

### ■ TEST CONFIGURATION



### ■ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to KDB 558074(issued 1/18/2012).

This EUT TX condition is actual operating mode(not near 100 % duty cycle) by WLAN test program.

The Spectrum Analyzer is set to

- Peak Power( Measurement Procedure PK2 in KDB 558074)

RBW = 1 MHz

VBW = 3 MHz

SPAN = 5 – 30 % greater than the EBW

Detector Mode = Peak

Integrated bandwidth = EBW

Sweep = auto couple

Trace Mode = max hold

- Average Power(Measurement Procedure AVG2 in KDB 558074)

RBW = 1 MHz

VBW = 3 MHz

SPAN = 5 – 30 % greater than the EBW

Detector Mode = power averaging(RMS) or sample

Integrated bandwidth = EBW

Sweep = auto couple

Sweep Point = 1001

Trace average at least 100 traces in power averaging(RMS) mode

|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
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# ■ **Sample Calculation**

$$\begin{aligned}\text{Output Power} &= \text{Reading Value} + \text{ATT loss} + \text{Cable loss(1 ea)} \\ &= 10 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} = 20.8 \text{ dBm}\end{aligned}$$

Note :

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is 11.11 dB at 2412 MHz , 11.10 dB at 2437 MHz and is 11.12 dB at 2462 MHz. So, the offset is 11.1 dB. And the offset gap in the 2.4 GHz range do not affect the output power final result.

|                                        |                                           |                                                                       |                                                  |
|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
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■ TEST RESULTS-Peak

Conducted Output Power Measurements (802.11b Mode)

| 802.11b Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 1 Mbps         | 17.79                  | 30             |
|                |             | 2 Mbps         | 18.08                  | 30             |
|                |             | 5.5 Mbps       | 19.57                  | 30             |
|                |             | 11 Mbps        | 21.04                  | 30             |
| 2437           | 6           | 1 Mbps         | 18.00                  | 30             |
|                |             | 2 Mbps         | 18.27                  | 30             |
|                |             | 5.5 Mbps       | 19.81                  | 30             |
|                |             | 11 Mbps        | 21.31                  | 30             |
| 2462           | 11          | 1 Mbps         | 17.80                  | 30             |
|                |             | 2 Mbps         | 18.53                  | 30             |
|                |             | 5.5 Mbps       | 19.55                  | 30             |
|                |             | 11 Mbps        | 21.48                  | 30             |

**Conducted Output Power Measurements (802.11g Mode)**

| 802.11g Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 6 Mbps         | 19.89                  | 30             |
|                |             | 9 Mbps         | 20.03                  | 30             |
|                |             | 12 Mbps        | 20.16                  | 30             |
|                |             | 18 Mbps        | 19.71                  | 30             |
|                |             | 24 Mbps        | 18.78                  | 30             |
|                |             | 36 Mbps        | 18.82                  | 30             |
|                |             | 48 Mbps        | 16.53                  | 30             |
|                |             | 54 Mbps        | 16.73                  | 30             |
| 2437           | 6           | 6 Mbps         | 19.65                  | 30             |
|                |             | 9 Mbps         | 20.24                  | 30             |
|                |             | 12 Mbps        | 20.22                  | 30             |
|                |             | 18 Mbps        | 20.11                  | 30             |
|                |             | 24 Mbps        | 19.06                  | 30             |
|                |             | 36 Mbps        | 18.67                  | 30             |
|                |             | 48 Mbps        | 17.05                  | 30             |
|                |             | 54 Mbps        | 17.31                  | 30             |
| 2462           | 11          | 6 Mbps         | 19.82                  | 30             |
|                |             | 9 Mbps         | 20.35                  | 30             |
|                |             | 12 Mbps        | 20.06                  | 30             |
|                |             | 18 Mbps        | 19.81                  | 30             |
|                |             | 24 Mbps        | 18.48                  | 30             |
|                |             | 36 Mbps        | 18.52                  | 30             |
|                |             | 48 Mbps        | 16.79                  | 30             |
|                |             | 54 Mbps        | 17.03                  | 30             |

**Conducted Output Power Measurements (802.11n Mode)**

| 802.11n Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 6.5 Mbps       | 18.83                  | 30             |
|                |             | 13 Mbps        | 18.68                  | 30             |
|                |             | 19.5 Mbps      | 18.82                  | 30             |
|                |             | 26 Mbps        | 17.40                  | 30             |
|                |             | 39 Mbps        | 17.48                  | 30             |
|                |             | 52 Mbps        | 17.64                  | 30             |
|                |             | 58.5 Mbps      | 17.79                  | 30             |
|                |             | 65 Mbps        | 17.59                  | 30             |
| 2437           | 6           | 6.5 Mbps       | 18.93                  | 30             |
|                |             | 13 Mbps        | 19.22                  | 30             |
|                |             | 19.5 Mbps      | 18.70                  | 30             |
|                |             | 26 Mbps        | 17.45                  | 30             |
|                |             | 39 Mbps        | 17.08                  | 30             |
|                |             | 52 Mbps        | 17.19                  | 30             |
|                |             | 58.5 Mbps      | 17.36                  | 30             |
|                |             | 65 Mbps        | 17.26                  | 30             |
| 2462           | 11          | 6.5 Mbps       | 18.65                  | 30             |
|                |             | 13 Mbps        | 18.51                  | 30             |
|                |             | 19.5 Mbps      | 18.55                  | 30             |
|                |             | 26 Mbps        | 17.37                  | 30             |
|                |             | 39 Mbps        | 17.44                  | 30             |
|                |             | 52 Mbps        | 17.47                  | 30             |
|                |             | 58.5 Mbps      | 17.62                  | 30             |
|                |             | 65 Mbps        | 17.53                  | 30             |

■ TEST RESULTS-Average

Conducted Output Power Measurements (802.11b Mode)

| 802.11b Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 1 Mbps         | 14.92                  | 30             |
|                |             | 2 Mbps         | 14.85                  | 30             |
|                |             | 5.5 Mbps       | 14.95                  | 30             |
|                |             | 11 Mbps        | 14.87                  | 30             |
| 2437           | 6           | 1 Mbps         | 15.07                  | 30             |
|                |             | 2 Mbps         | 15.09                  | 30             |
|                |             | 5.5 Mbps       | 15.17                  | 30             |
|                |             | 11 Mbps        | 15.05                  | 30             |
| 2462           | 11          | 1 Mbps         | 14.88                  | 30             |
|                |             | 2 Mbps         | 14.81                  | 30             |
|                |             | 5.5 Mbps       | 14.90                  | 30             |
|                |             | 11 Mbps        | 14.84                  | 30             |

**Conducted Output Power Measurements (802.11g Mode)**

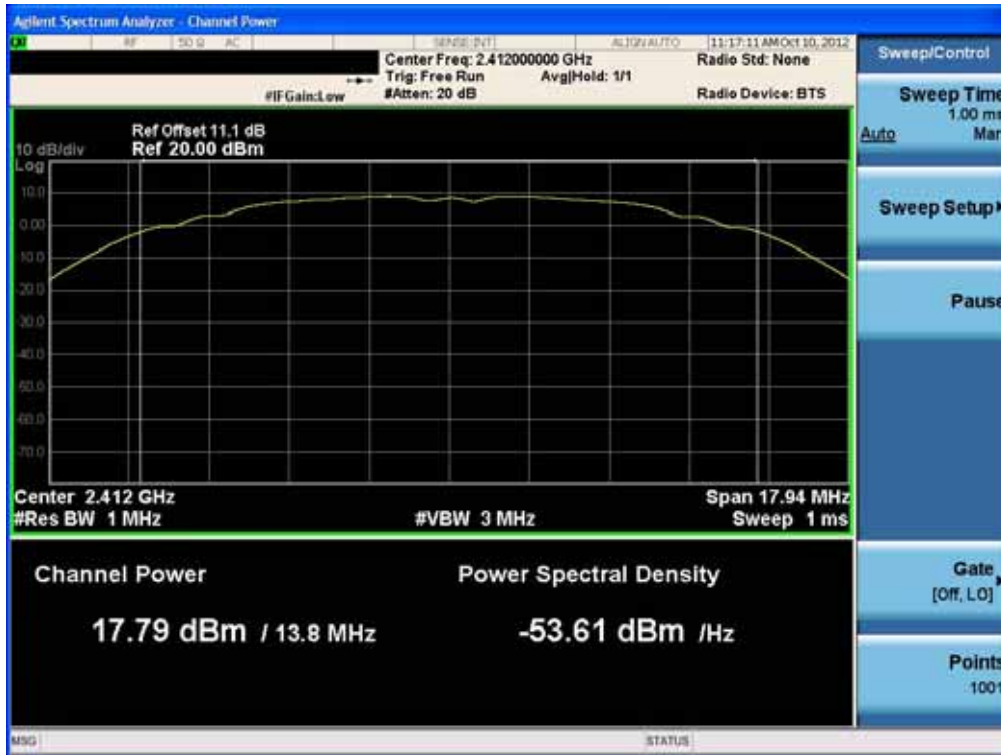
| 802.11g Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 6 Mbps         | 12.25                  | 30             |
|                |             | 9 Mbps         | 12.23                  | 30             |
|                |             | 12 Mbps        | 12.21                  | 30             |
|                |             | 18 Mbps        | 11.96                  | 30             |
|                |             | 24 Mbps        | 10.22                  | 30             |
|                |             | 36 Mbps        | 10.28                  | 30             |
|                |             | 48 Mbps        | 7.87                   | 30             |
|                |             | 54 Mbps        | 7.80                   | 30             |
| 2437           | 6           | 6 Mbps         | 12.37                  | 30             |
|                |             | 9 Mbps         | 12.34                  | 30             |
|                |             | 12 Mbps        | 12.32                  | 30             |
|                |             | 18 Mbps        | 12.30                  | 30             |
|                |             | 24 Mbps        | 10.52                  | 30             |
|                |             | 36 Mbps        | 10.21                  | 30             |
|                |             | 48 Mbps        | 8.30                   | 30             |
|                |             | 54 Mbps        | 8.30                   | 30             |
| 2462           | 11          | 6 Mbps         | 12.20                  | 30             |
|                |             | 9 Mbps         | 12.10                  | 30             |
|                |             | 12 Mbps        | 12.07                  | 30             |
|                |             | 18 Mbps        | 12.05                  | 30             |
|                |             | 24 Mbps        | 10.31                  | 30             |
|                |             | 36 Mbps        | 9.99                   | 30             |
|                |             | 48 Mbps        | 8.11                   | 30             |
|                |             | 54 Mbps        | 8.12                   | 30             |

**Conducted Output Power Measurements (802.11n Mode)**

| 802.11n Mode   |             | Rate<br>(Mbps) | Measured<br>Power(dBm) | Limit<br>(dBm) |
|----------------|-------------|----------------|------------------------|----------------|
| Frequency[MHz] | Channel No. |                |                        |                |
| 2412           | 1           | 6.5 Mbps       | 11.03                  | 30             |
|                |             | 13 Mbps        | 10.89                  | 30             |
|                |             | 19.5 Mbps      | 10.95                  | 30             |
|                |             | 26 Mbps        | 9.23                   | 30             |
|                |             | 39 Mbps        | 9.14                   | 30             |
|                |             | 52 Mbps        | 9.17                   | 30             |
|                |             | 58.5 Mbps      | 9.19                   | 30             |
|                |             | 65 Mbps        | 9.03                   | 30             |
| 2437           | 6           | 6.5 Mbps       | 11.10                  | 30             |
|                |             | 13 Mbps        | 10.94                  | 30             |
|                |             | 19.5 Mbps      | 10.98                  | 30             |
|                |             | 26 Mbps        | 8.85                   | 30             |
|                |             | 39 Mbps        | 8.78                   | 30             |
|                |             | 52 Mbps        | 8.79                   | 30             |
|                |             | 58.5 Mbps      | 8.78                   | 30             |
|                |             | 65 Mbps        | 8.73                   | 30             |
| 2462           | 11          | 6.5 Mbps       | 10.88                  | 30             |
|                |             | 13 Mbps        | 10.75                  | 30             |
|                |             | 19.5 Mbps      | 10.80                  | 30             |
|                |             | 26 Mbps        | 9.17                   | 30             |
|                |             | 39 Mbps        | 9.13                   | 30             |
|                |             | 52 Mbps        | 9.05                   | 30             |
|                |             | 58.5 Mbps      | 9.06                   | 30             |
|                |             | 65 Mbps        | 9.02                   | 30             |

## RESULT PLOTS-Peak

### Conducted Output Power (802.11b-CH 1) 1Mbps



### Conducted Output Power (802.11b-CH 1) 2Mbps



## Conducted Output Power (802.11b-CH 1) 5.5Mbps



## Conducted Output Power (802.11b-CH 1) 11Mbps



## Conducted Output Power (802.11b-CH 6) 1Mbps



## Conducted Output Power (802.11b-CH 6) 2Mbps



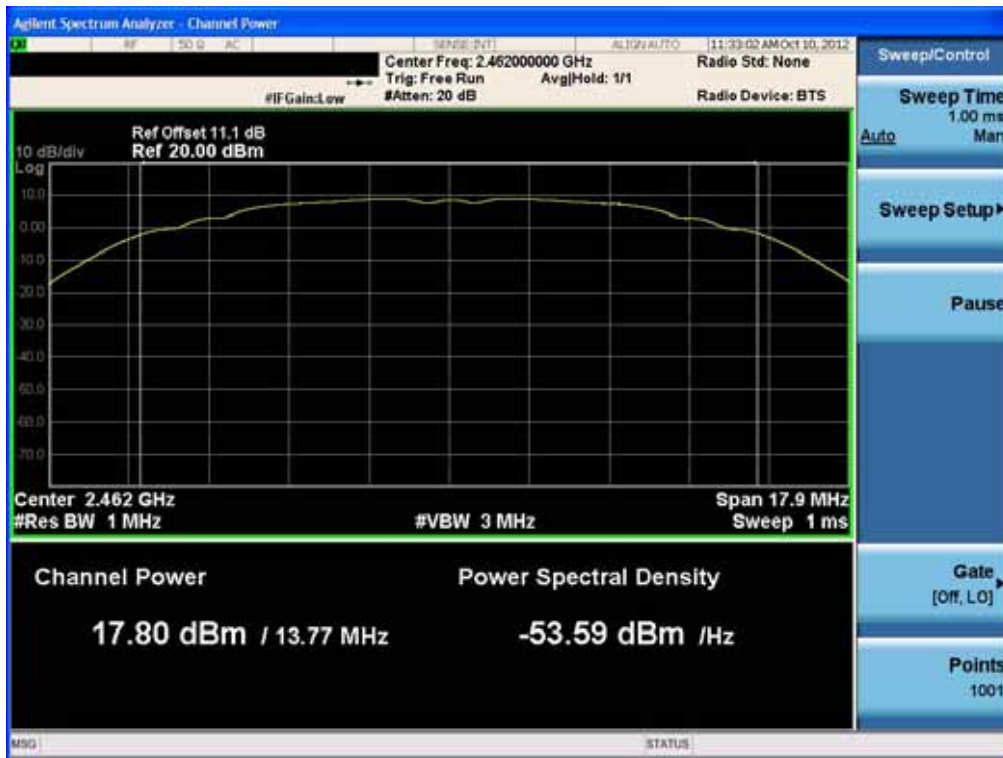
## Conducted Output Power (802.11b-CH 6) 5.5Mbps



## Conducted Output Power (802.11b-CH 6) 11Mbps



## Conducted Output Power (802.11b-CH 11) 1Mbps



## Conducted Output Power (802.11b-CH 11) 2Mbps



## Conducted Output Power (802.11b-CH 11) 5.5Mbps



## Conducted Output Power (802.11b-CH 11) 11Mbps



## Conducted Output Power (802.11g-CH 1) 6Mbps



## Conducted Output Power (802.11g-CH 1) 9Mbps



## Conducted Output Power (802.11g-CH 1) 12Mbps



## Conducted Output Power (802.11g-CH 1) 18Mbps



## Conducted Output Power (802.11g-CH 1) 24Mbps



## Conducted Output Power (802.11g-CH 1) 36Mbps



## Conducted Output Power (802.11g-CH 1) 48Mbps



## Conducted Output Power (802.11g-CH 1) 54Mbps



## Conducted Output Power (802.11g-CH 6) 6Mbps



## Conducted Output Power (802.11g-CH 6) 9Mbps



## Conducted Output Power (802.11g-CH 6) 12Mbps



## Conducted Output Power (802.11g-CH 6) 18Mbps



## Conducted Output Power (802.11g-CH 6) 24Mbps



## Conducted Output Power (802.11g-CH 6) 36Mbps



## Conducted Output Power (802.11g-CH 6) 48Mbps



## Conducted Output Power (802.11g-CH 6) 54Mbps



### Conducted Output Power (802.11g-CH 11) 6Mbps



### Conducted Output Power (802.11g-CH 11) 9Mbps



### Conducted Output Power (802.11g-CH 11) 12Mbps



### Conducted Output Power (802.11g-CH 11) 18Mbps



## Conducted Output Power (802.11g-CH 11) 24Mbps



## Conducted Output Power (802.11g-CH 11) 36Mbps



## Conducted Output Power (802.11g-CH 11) 48Mbps



## Conducted Output Power (802.11g-CH 11) 54Mbps



## Conducted Output Power (802.11n-CH 1) 6.5Mbps



## Conducted Output Power (802.11n-CH 1) 13Mbps



## Conducted Output Power (802.11n-CH 1) 19.5Mbps



## Conducted Output Power (802.11n-CH 1) 26Mbps



## Conducted Output Power (802.11n-CH 1) 39Mbps



## Conducted Output Power (802.11n-CH 1) 52Mbps



## Conducted Output Power (802.11n-CH 1) 58.5Mbps



## Conducted Output Power (802.11n-CH 1) 65Mbps



## Conducted Output Power (802.11n-CH 6) 6.5Mbps



## Conducted Output Power (802.11n-CH 6) 13Mbps



## Conducted Output Power (802.11n-CH 6) 19.5Mbps



## Conducted Output Power (802.11n-CH 6) 26Mbps



## Conducted Output Power (802.11n-CH 6) 39Mbps



## Conducted Output Power (802.11n-CH 6) 52Mbps



## Conducted Output Power (802.11n-CH 6) 58.5Mbps



## Conducted Output Power (802.11n-CH 6) 65Mbps



## Conducted Output Power (802.11n-CH 11) 6.5Mbps



## Conducted Output Power (802.11n-CH 11) 13Mbps



## Conducted Output Power (802.11n-CH 11) 19.5Mbps



## Conducted Output Power (802.11n-CH 11) 26Mbps



## Conducted Output Power (802.11n-CH 11) 39Mbps



## Conducted Output Power (802.11n-CH 11) 52Mbps



## Conducted Output Power (802.11n-CH 11) 58.5Mbps



## Conducted Output Power (802.11n-CH 11) 65Mbps



## RESULT PLOTS-Average

### Conducted Output Power (802.11b-CH 1) 1Mbps



### Conducted Output Power (802.11b-CH 1) 2Mbps



|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

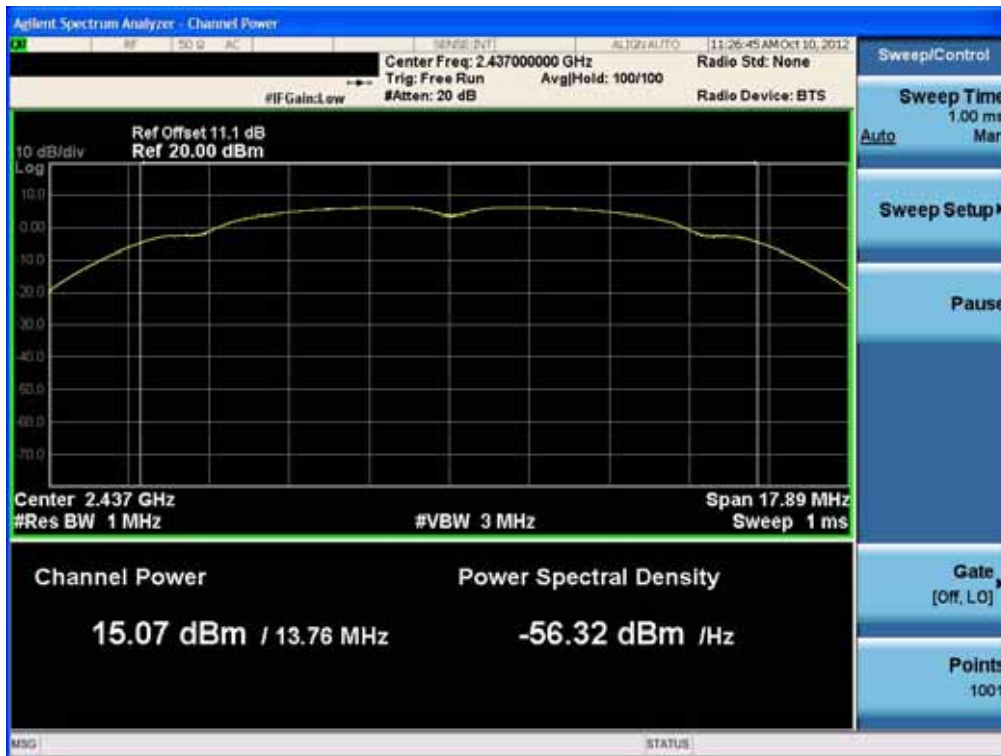
## Conducted Output Power (802.11b-CH 1) 5.5Mbps



## Conducted Output Power (802.11b-CH 1) 11Mbps



## Conducted Output Power (802.11b-CH 6) 1Mbps



## Conducted Output Power (802.11b-CH 6) 2Mbps



## Conducted Output Power (802.11b-CH 6) 5.5Mbps



## Conducted Output Power (802.11b-CH 6) 11Mbps



## Conducted Output Power (802.11b-CH 11) 1Mbps



## Conducted Output Power (802.11b-CH 11) 2Mbps



## Conducted Output Power (802.11b-CH 11) 5.5Mbps



## Conducted Output Power (802.11b-CH 11) 11Mbps



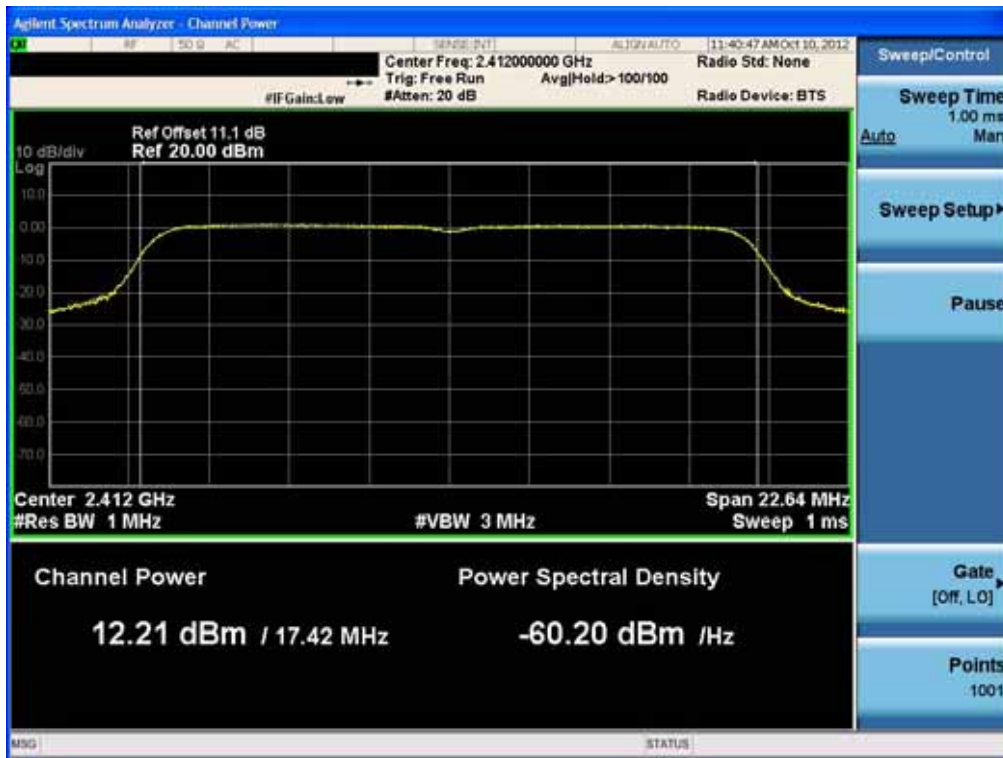
### Conducted Output Power (802.11g-CH 1) 6Mbps



### Conducted Output Power (802.11g-CH 1) 9Mbps



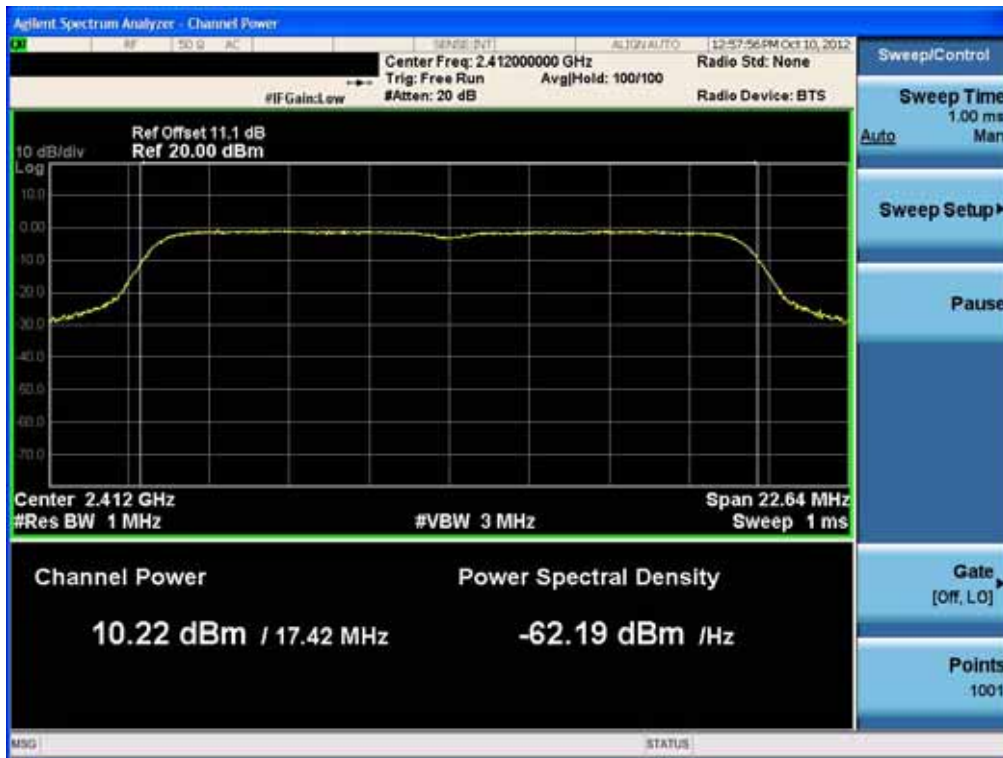
## Conducted Output Power (802.11g-CH 1) 12Mbps



## Conducted Output Power (802.11g-CH 1) 18Mbps



## Conducted Output Power (802.11g-CH 1) 24Mbps



## Conducted Output Power (802.11g-CH 1) 36Mbps



## Conducted Output Power (802.11g-CH 1) 48Mbps



## Conducted Output Power (802.11g-CH 1) 54Mbps



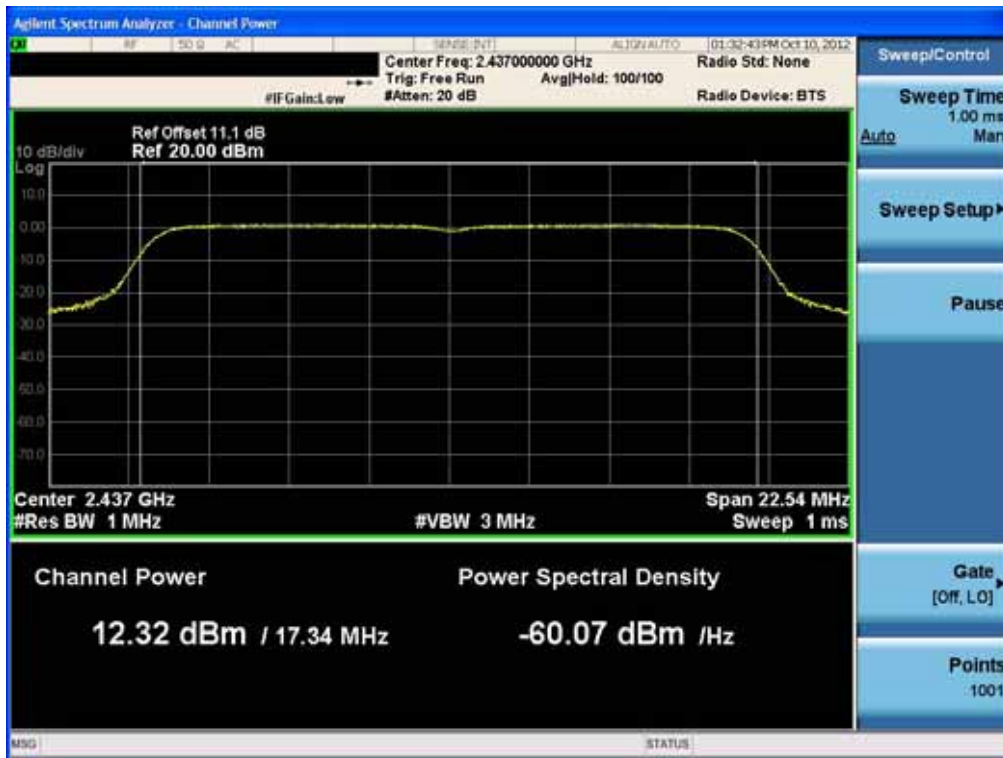
## Conducted Output Power (802.11g-CH 6) 6Mbps



## Conducted Output Power (802.11g-CH 6) 9Mbps



## Conducted Output Power (802.11g-CH 6) 12Mbps



## Conducted Output Power (802.11g-CH 6) 18Mbps



## Conducted Output Power (802.11g-CH 6) 24Mbps



## Conducted Output Power (802.11g-CH 6) 36Mbps



## Conducted Output Power (802.11g-CH 6) 48Mbps



## Conducted Output Power (802.11g-CH 6) 54Mbps



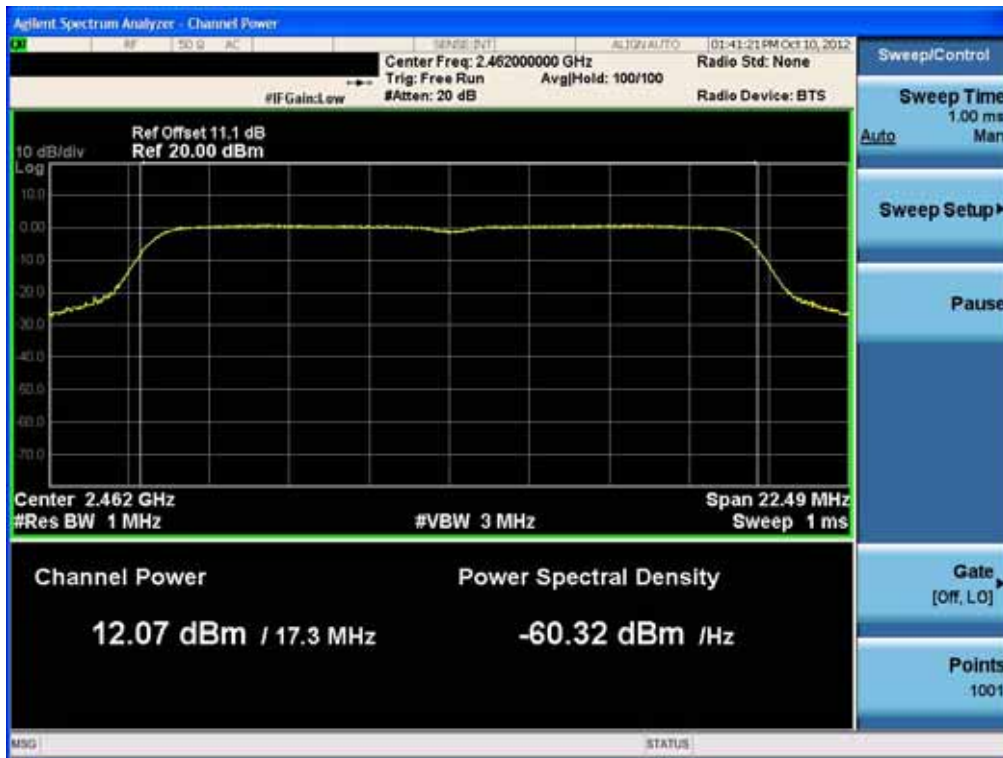
## Conducted Output Power (802.11g-CH 11) 6Mbps



## Conducted Output Power (802.11g-CH 11) 9Mbps



### Conducted Output Power (802.11g-CH 11) 12Mbps



### Conducted Output Power (802.11g-CH 11) 18Mbps



## Conducted Output Power (802.11g-CH 11) 24Mbps



## Conducted Output Power (802.11g-CH 11) 36Mbps



## Conducted Output Power (802.11g-CH 11) 48Mbps



## Conducted Output Power (802.11g-CH 11) 54Mbps



## Conducted Output Power (802.11n-CH 1) 6.5Mbps



## Conducted Output Power (802.11n-CH 1) 13Mbps



## Conducted Output Power (802.11n-CH 1) 19.5Mbps



## Conducted Output Power (802.11n-CH 1) 26Mbps



### Conducted Output Power (802.11n-CH 1) 39Mbps



### Conducted Output Power (802.11n-CH 1) 52Mbps



## Conducted Output Power (802.11n-CH 1) 58.5Mbps



## Conducted Output Power (802.11n-CH 1) 65Mbps



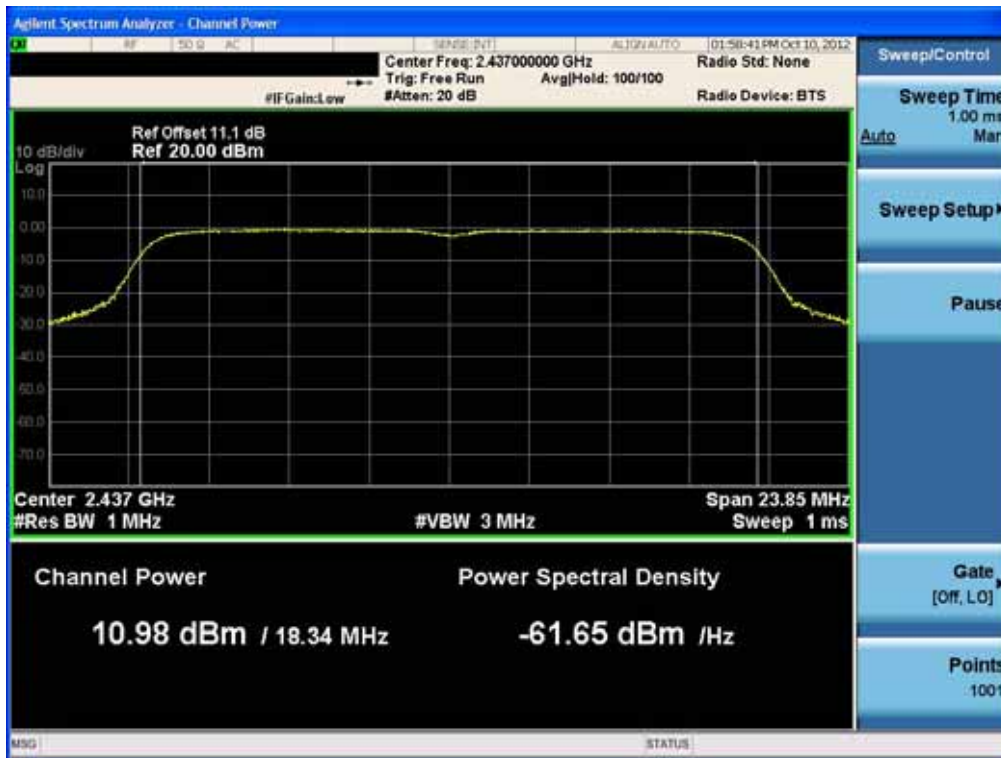
### Conducted Output Power (802.11n-CH 6) 6.5Mbps



### Conducted Output Power (802.11n-CH 6) 13Mbps



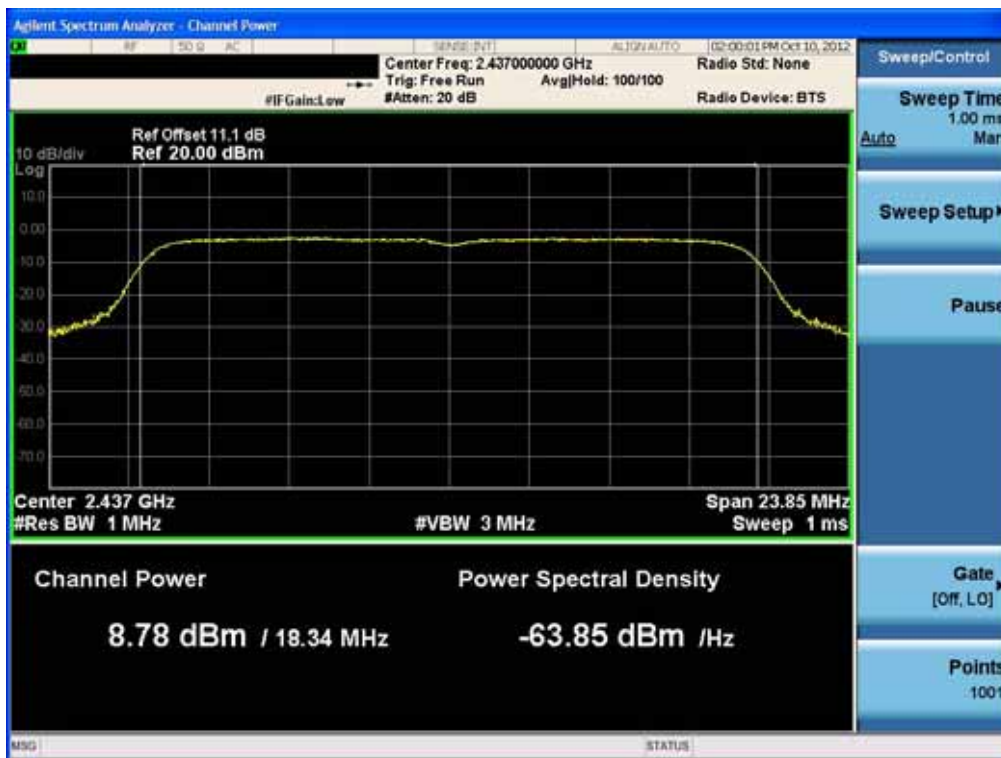
## Conducted Output Power (802.11n-CH 6) 19.5Mbps



## Conducted Output Power (802.11n-CH 6) 26Mbps



### Conducted Output Power (802.11n-CH 6) 39Mbps



### Conducted Output Power (802.11n-CH 6) 52Mbps



## Conducted Output Power (802.11n-CH 6) 58.5Mbps



## Conducted Output Power (802.11n-CH 6) 65Mbps



## Conducted Output Power (802.11n-CH 11) 6.5Mbps



## Conducted Output Power (802.11n-CH 11) 13Mbps



## Conducted Output Power (802.11n-CH 11) 19.5Mbps



## Conducted Output Power (802.11n-CH 11) 26Mbps



### Conducted Output Power (802.11n-CH 11) 39Mbps



### Conducted Output Power (802.11n-CH 11) 52Mbps



## Conducted Output Power (802.11n-CH 11) 58.5Mbps



## Conducted Output Power (802.11n-CH 11) 65Mbps



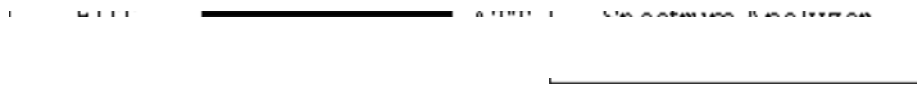
### 8.3 POWER SPECTRAL DENSITY (802.11b/g/n)

#### Test Requirements and limit, §15.247(e)

The peak power spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

**Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.**

#### ■ TEST CONFIGURATION



#### ■ TEST PROCEDURE

We tested according to KDB 558074(issued 1/18/2012).

The spectrum analyzer is set to :

1. Span = 5 – 30 % greater than the EBW
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Sweep = Auto couple
5. Detector Mode = Peak
6. Trace Mode = Max hold
7. Search peak

|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

## ■ Sample Calculation

$$\begin{aligned} \text{PSD} &= \text{Reading Value} + \text{ATT loss} + \text{Cable loss(1 ea)} + \text{BWCF} \\ &= -5 \text{ dBm} + 10 \text{ dB} + 0.8 \text{ dB} - 15.2 \text{ dB} = 0.6 \text{ dBm} \end{aligned}$$

Where: BWCF(Bandwidth Correction Factor) =  $10\log(3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is 11.11 dB at 2412 MHz , 11.10 dB at 2437 MHz and is 11.12 dB at 2462 MHz. So, the offset is 11.1 dB. And the offset gap in the 2.4 GHz range do not affect the output power final result.

## ■ TEST RESULTS

Conducted Power Density Measurements

| Frequency<br>(MHz) | Channel<br>No. | Mode    | Test Result            |              |              |                |               |
|--------------------|----------------|---------|------------------------|--------------|--------------|----------------|---------------|
|                    |                |         | Spectrum<br>Value(dBm) | BWCF<br>(dB) | PSD<br>(dBm) | Limit<br>(dBm) | Pass/<br>Fail |
| 2412               | 1              | 802.11b | 5.726                  | -15.2        | -9.474       | 8              | Pass          |
| 2437               | 6              |         | 6.004                  | -15.2        | -9.196       | 8              | Pass          |
| 2462               | 11             |         | 6.183                  | -15.2        | -9.016       | 8              | Pass          |
| 2412               | 1              | 802.11g | 1.283                  | -15.2        | -13.917      | 8              | Pass          |
| 2437               | 6              |         | 1.283                  | -15.2        | -13.917      | 8              | Pass          |
| 2462               | 11             |         | 0.925                  | -15.2        | -14.275      | 8              | Pass          |
| 2412               | 1              | 802.11n | -0.039                 | -15.2        | -15.239      | 8              | Pass          |
| 2437               | 6              |         | -0.038                 | -15.2        | -15.238      | 8              | Pass          |
| 2462               | 11             |         | 0.206                  | -15.2        | -14.994      | 8              | Pass          |

Note : PSD = Spectrum Value + BWCF

## RESULT PLOTS

Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11b-CH 6)



### Power Spectral Density (802.11b-CH 11)



### Power Spectral Density (802.11g-CH 1)



### Power Spectral Density (802.11g-CH 6)



### Power Spectral Density (802.11g-CH11)



### Power Spectral Density (802.11n-CH 1)



### Power Spectral Density (802.11n-CH 6)



## Power Spectral Density (802.11n-CH11)



|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

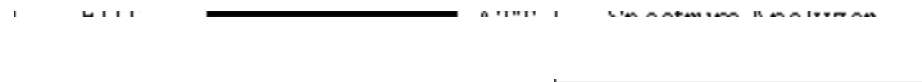
## 8.4 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

### Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

**Limit : 20 dBc**

### ■ TEST CONFIGURATION



### ■ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer.

RBW = 100 kHz(Upon 1 GHz = 1 MHz)

VBW = 300 kHz(Upon 1 GHz = 1 MHz)

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep = auto couple

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.8 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. Actual value of

|                                        |                                           |                                                                       |                                                  |
|----------------------------------------|-------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|
| <b>FCC PT.15.247<br/>TEST REPORT</b>   | <b>FCC CERTIFICATION REPORT</b>           |                                                                       | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| <b>Test Report No.</b><br>HCTR1210FR24 | <b>Date of Issue:</b><br>October 17, 2012 | <b>EUT Type:</b><br>Cellular/PCS CDMA & LTE Portable Router with WLAN | <b>FCC ID:</b><br>RB2-R772                       |

loss for the attenuator and cable combination is 11.11 dB at 2412 MHz , 11.10 dB at 2437 MHz and is 11.12 dB at 2462 MHz. So, the offset is 11.1 dB. And the offset gap in the 2.4 GHz range do not affect the output power final result.

5. In case of conducted spurious emissions test, please check factors blow table.

#### ■ FACTORS FOR FREQUENCY

| Freq(MHz) | Factor(dB) |
|-----------|------------|
| 30        | 10.37      |
| 100       | 10.16      |
| 200       | 10.15      |
| 300       | 10.14      |
| 400       | 10.18      |
| 500       | 10.19      |
| 600       | 10.20      |
| 700       | 10.30      |
| 800       | 10.25      |
| 900       | 10.28      |
| 1000      | 10.29      |
| 2000      | 10.17      |
| 2412*     | 10.11      |
| 2437*     | 10.10      |
| 2462*     | 10.12      |
| 3000      | 10.26      |
| 4000      | 10.31      |
| 5000      | 9.85       |
| 6000      | 10.20      |
| 7000      | 10.60      |
| 8000      | 10.53      |
| 9000      | 10.23      |
| 10000     | 10.41      |
| 11000     | 10.65      |
| 12000     | 11.19      |
| 13000     | 10.97      |
| 14000     | 11.42      |
| 15000     | 12.01      |
| 16000     | 11.77      |
| 17000     | 10.78      |
| 18000     | 10.76      |
| 19000     | 11.15      |
| 20000     | 10.75      |
| 21000     | 10.82      |
| 22000     | 10.82      |
| 23000     | 11.26      |
| 24000     | 11.08      |
| 25000     | 11.18      |
| 26000     | 10.90      |

Note : 1. '\*' is fundamental frequency range.

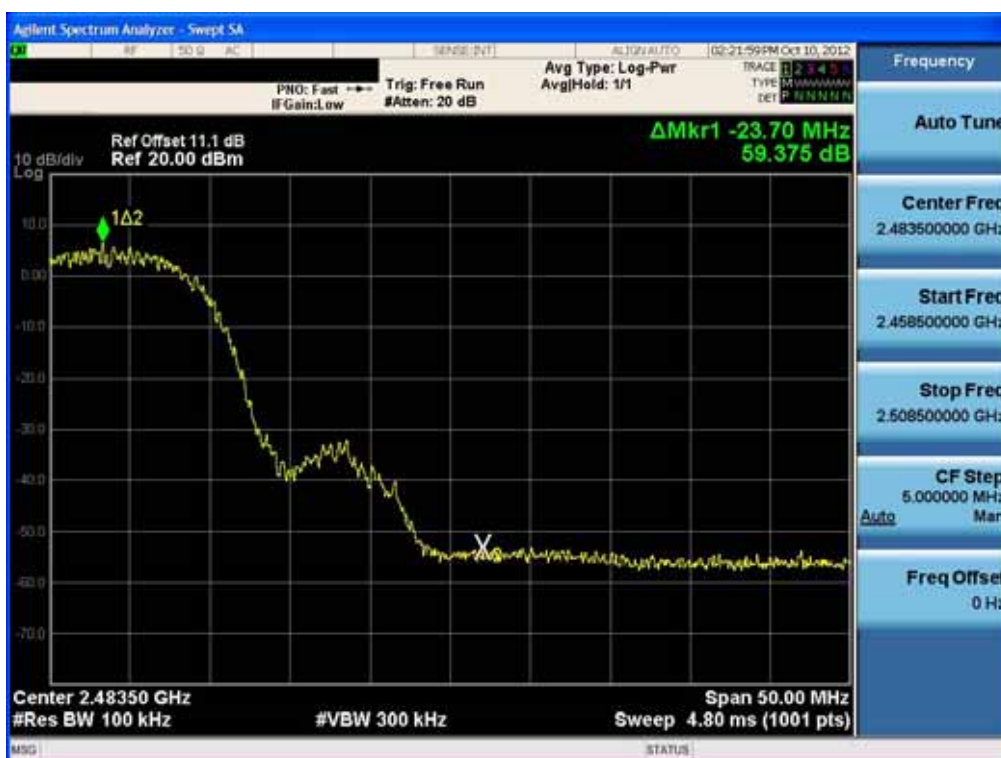
2. Factor = Cable loss + Attenuator loss

## RESULT PLOTS

BandEdge (802.11b-CH1)



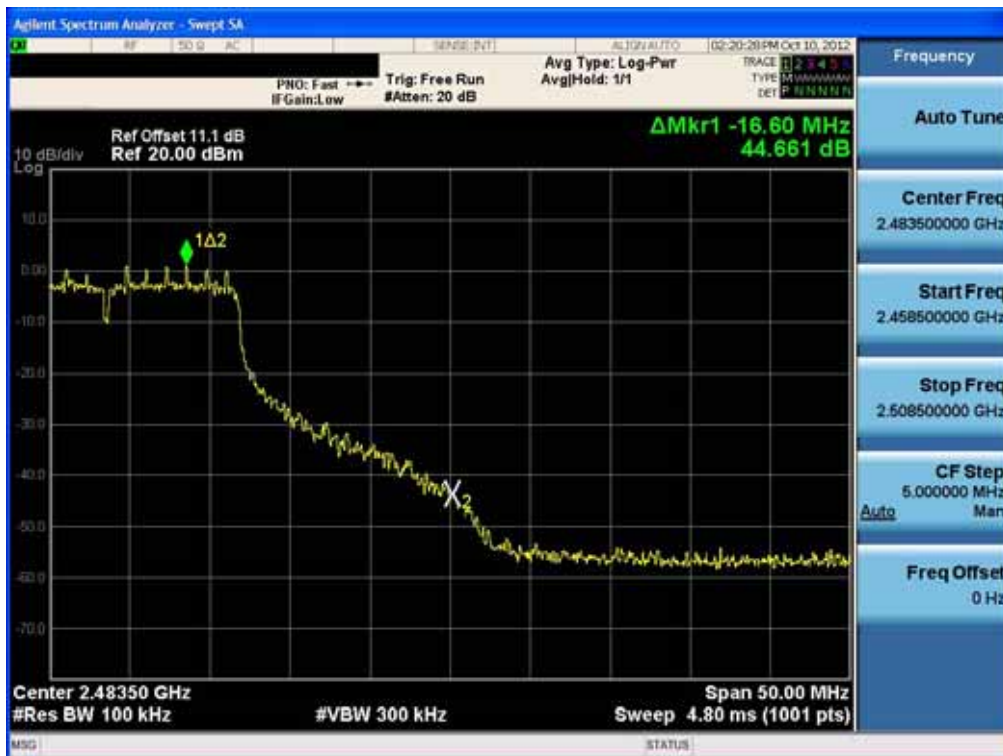
BandEdge (802.11b-CH11)



### BandEdge (802.11g-CH1)



### BandEdge (802.11g-CH11)



## BandEdge (802.11n-CH1)

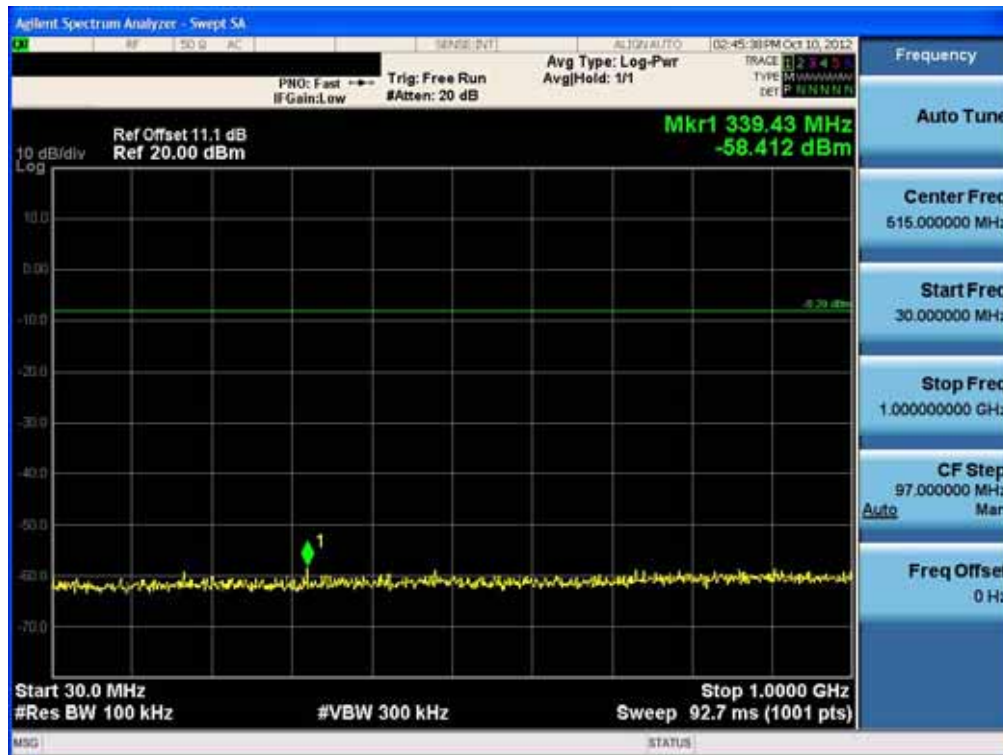


## BandEdge (802.11n-CH11)

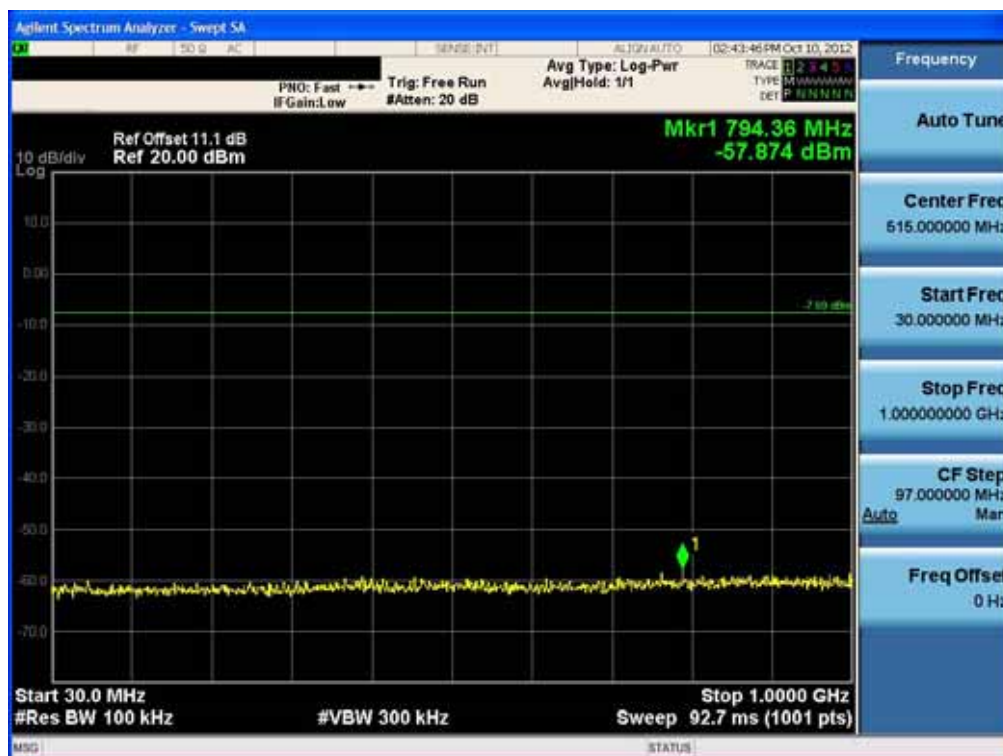


30 MHz ~ 1 GHz

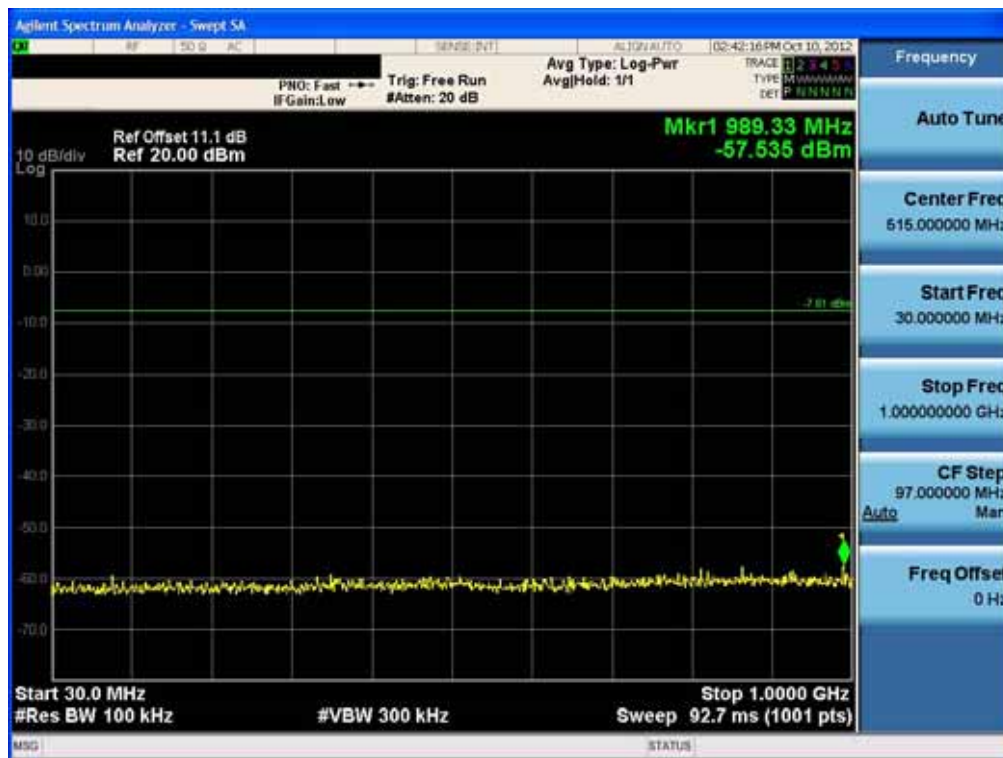
### Conducted Spurious Emission (802.11b-CH1)



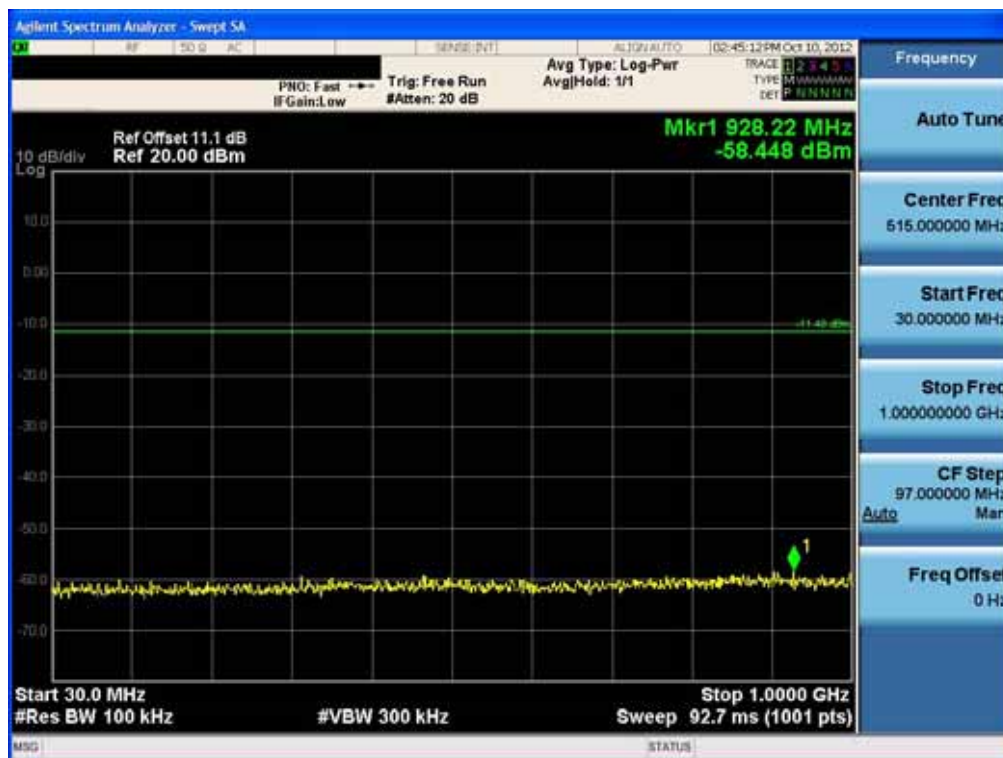
### Conducted Spurious Emission (802.11b-CH6)



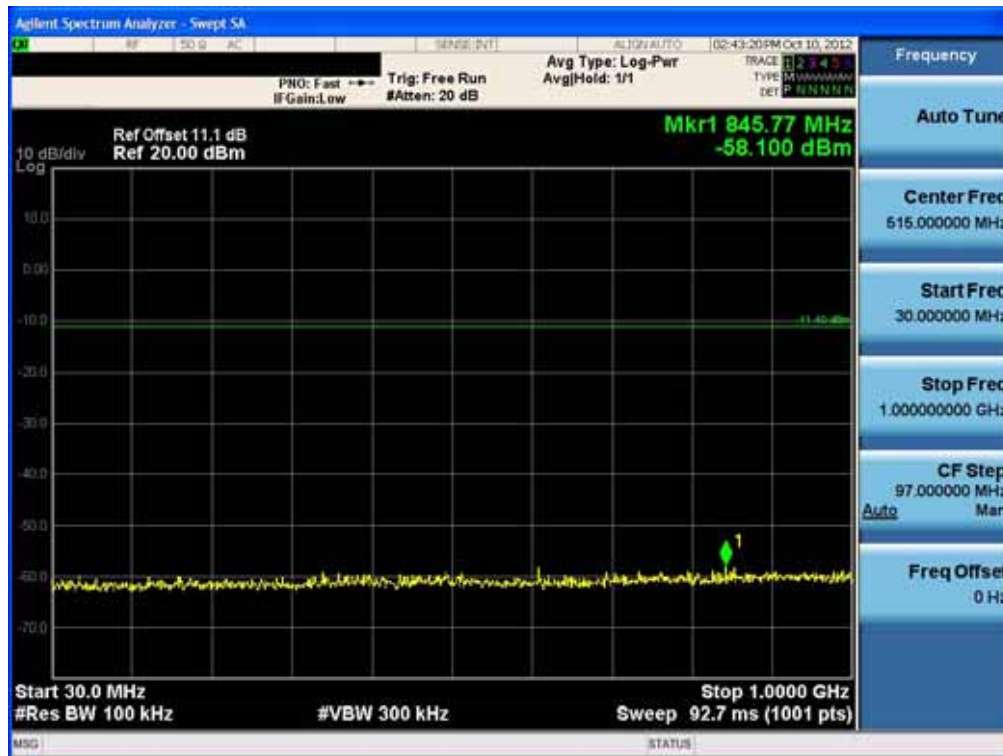
## Conducted Spurious Emission (802.11b-CH11)



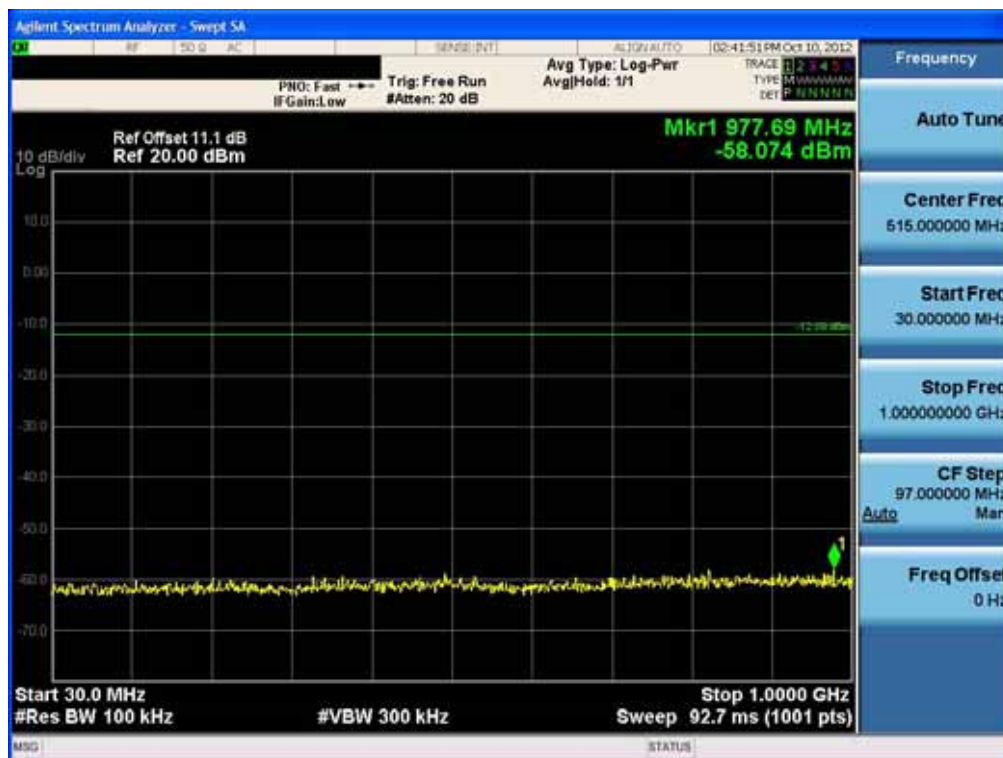
## Conducted Spurious Emission (802.11g-CH1)



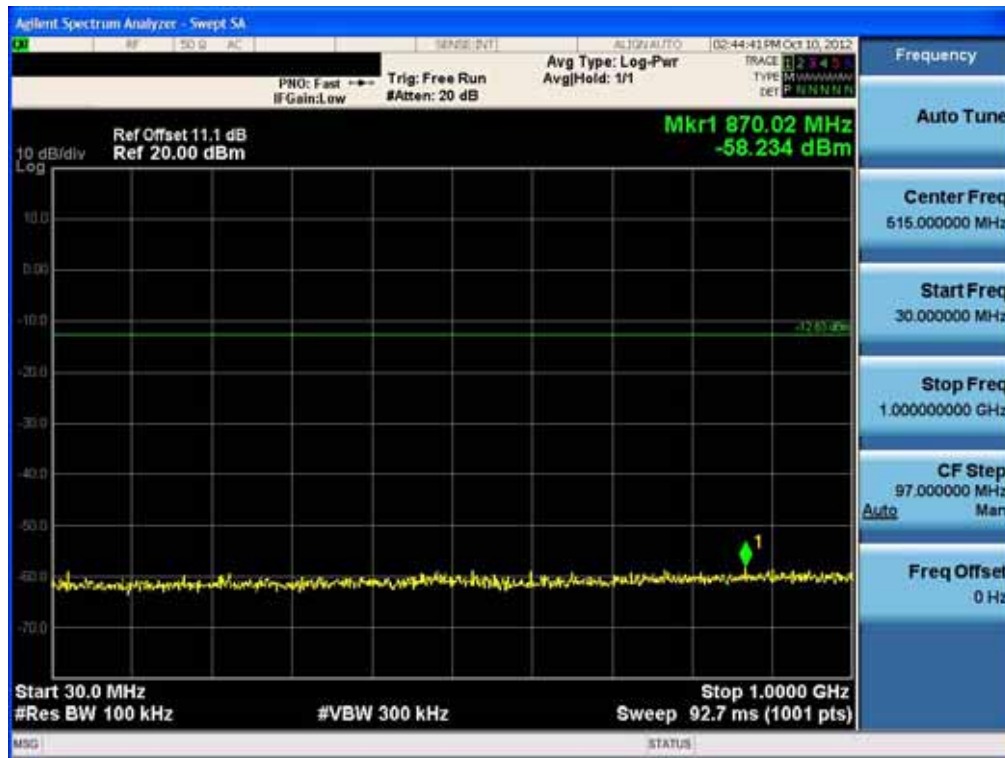
## Conducted Spurious Emission (802.11g-CH6)



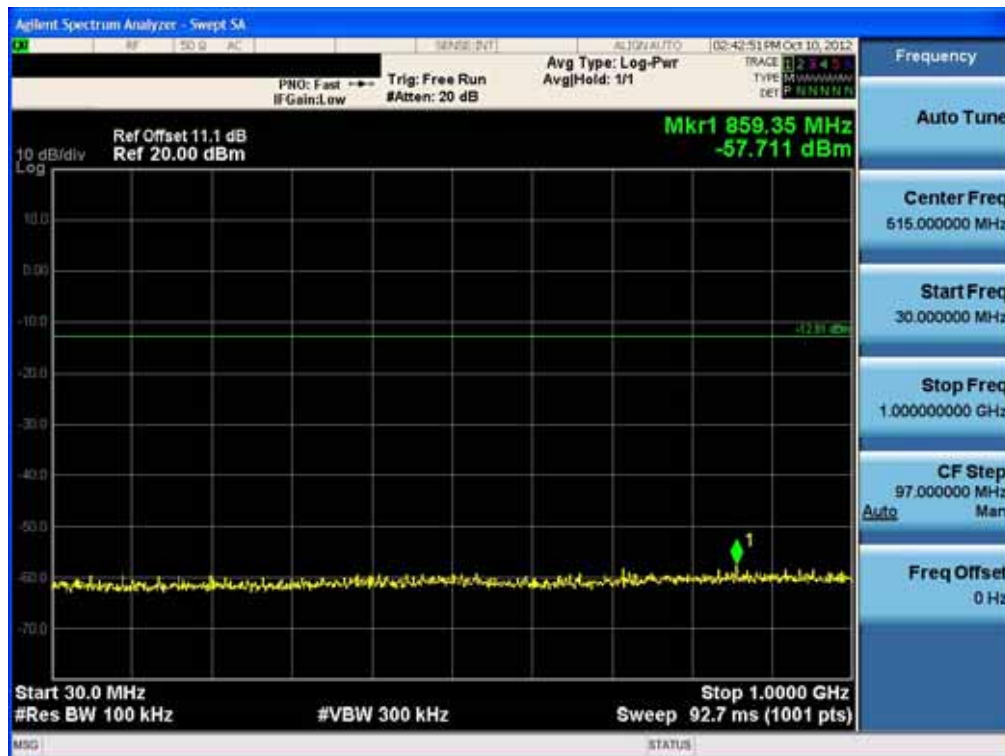
## Conducted Spurious Emission (802.11g-CH11)



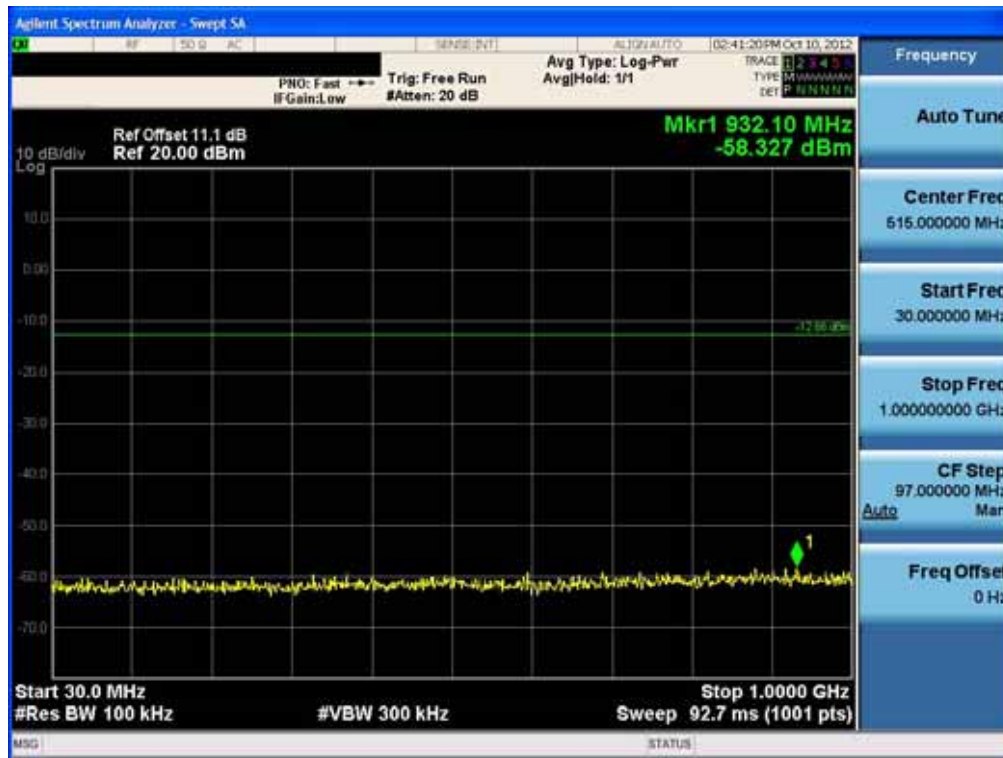
## Conducted Spurious Emission (802.11n-CH1)



## Conducted Spurious Emission (802.11n-CH6)



## Conducted Spurious Emission (802.11n-CH11)



|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

1 GHz ~ 26 GHz

### Conducted Spurious Emission (802.11b-CH1)



### Conducted Spurious Emission (802.11b-CH6)





### Conducted Spurious Emission (802.11g-CH6)



### Conducted Spurious Emission (802.11g-CH11)



## Conducted Spurious Emission (802.11n-CH1)



## Conducted Spurious Emission (802.11n-CH6)



## Conducted Spurious Emission (802.11n-CH11)



|                                 |                                    |                                                                |                                                  |
|---------------------------------|------------------------------------|----------------------------------------------------------------|--------------------------------------------------|
| FCC PT.15.247<br>TEST REPORT    | FCC CERTIFICATION REPORT           |                                                                | <a href="http://www.hct.co.kr">www.hct.co.kr</a> |
| Test Report No.<br>HCTR1210FR24 | Date of Issue:<br>October 17, 2012 | EUT Type:<br>Cellular/PCS CDMA & LTE Portable Router with WLAN | FCC ID:<br>RB2-R772                              |

## 8.5 RADIATED MEASUREMENT.

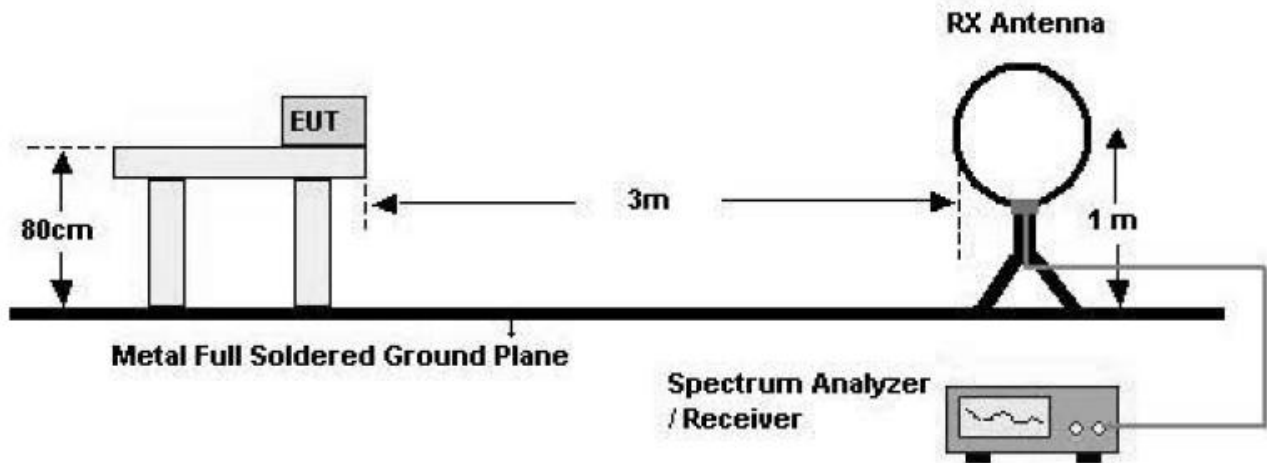
### 8.5.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

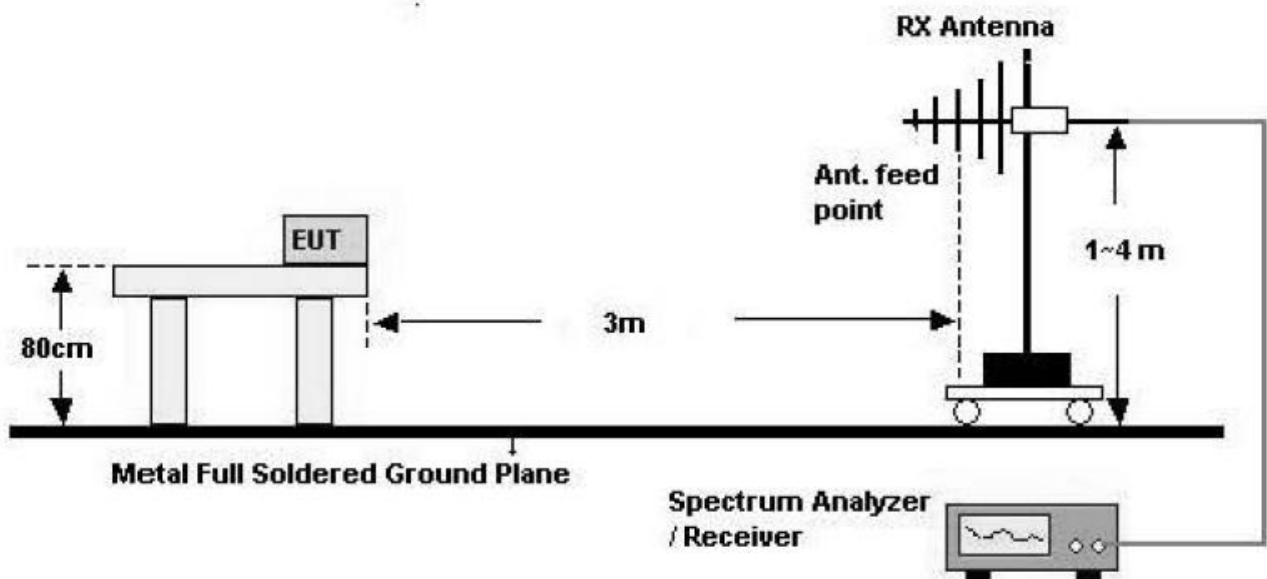
| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 – 0.490   | 2400/F(kHz)           | 300                      |
| 0.490 – 1.705   | 24000/F(kHz)          | 30                       |
| 1.705 – 30      | 30                    | 30                       |
| 30-88           | 100                   | 3                        |
| 88-216          | 150                   | 3                        |
| 216-960         | 200                   | 3                        |
| Above 960       | 500                   | 3                        |

## Test Configuration

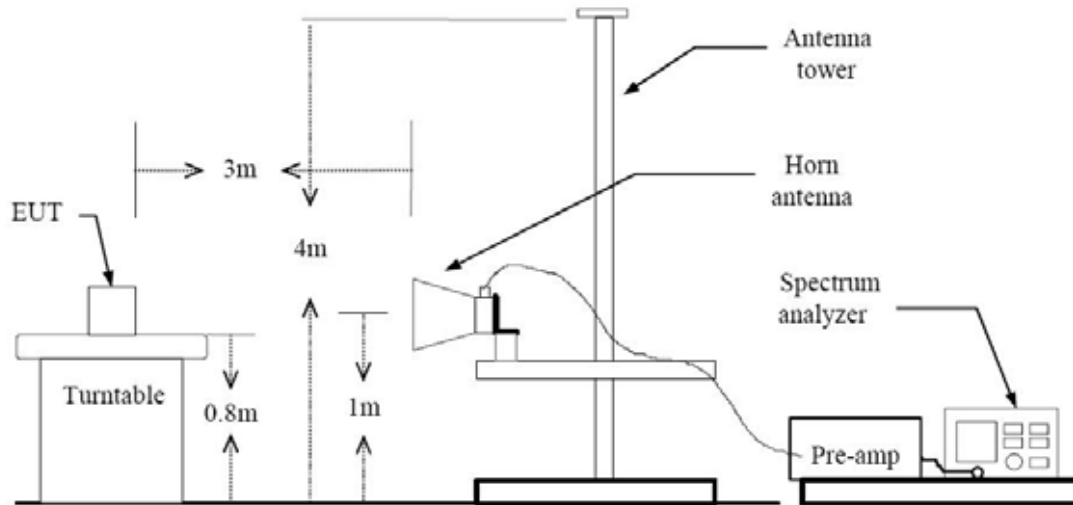
### Below 30 MHz



### 30 MHz - 1 GHz



## Above 1 GHz



### TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

## TEST RESULTS

**9 kHz – 30MHz**

**Operation Mode:** Normal Mode

| Frequency               | Reading    | Ant. factor | Cable loss | Ant. POL | Total        | Limit        | Margin |
|-------------------------|------------|-------------|------------|----------|--------------|--------------|--------|
| MHz                     | dB $\mu$ V | dB /m       | dB         | (H/V)    | dB $\mu$ V/m | dB $\mu$ V/m | dB     |
| No Critical peaks found |            |             |            |          |              |              |        |

### Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dB $\mu$ V) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

## TEST RESULTS

**Below 1 GHz**

**Operation Mode:** Normal Mode

| Frequency               | Reading    | Ant. factor | Cable loss | Ant. POL | Total        | Limit        | Margin |
|-------------------------|------------|-------------|------------|----------|--------------|--------------|--------|
| MHz                     | dB $\mu$ V | dB /m       | dB         | (H/V)    | dB $\mu$ V/m | dB $\mu$ V/m | dB     |
| No Critical peaks found |            |             |            |          |              |              |        |

### Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

## Above 1 GHz

|                     |          |
|---------------------|----------|
| Operation Mode:     | 802.11 b |
| Transfer Rate:      | 1 Mbps   |
| Operating Frequency | 2412     |
| Channel No.         | 01 Ch    |

| Frequency<br>[MHz] | Reading<br>dBuV | AN.+CL-AMP G<br>[dB] | ANT. POL<br>[H/V] | Total<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Detect |
|--------------------|-----------------|----------------------|-------------------|-------------------|-------------------|----------------|--------|
| 4824               | 52.07           | -0.79                | V                 | 51.28             | 74                | 22.72          | PK     |
| 4824               | 41.22           | -0.79                | V                 | 40.43             | 54                | 13.57          | AV     |
| 7236               | 48.91           | 9.08                 | V                 | 57.99             | 74                | 16.01          | PK     |
| 7236               | 35.41           | 9.08                 | V                 | 44.49             | 54                | 9.51           | AV     |
| 4824               | 52.26           | -0.79                | H                 | 51.47             | 74                | 22.53          | PK     |
| 4824               | 44.39           | -0.79                | H                 | 43.6              | 54                | 10.40          | AV     |
| 7236               | 49.10           | 9.08                 | H                 | 58.18             | 74                | 15.82          | PK     |
| 7236               | 35.51           | 9.08                 | H                 | 44.59             | 54                | 9.41           | AV     |

### Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

|                     |          |
|---------------------|----------|
| Operation Mode:     | 802.11 b |
| Transfer Rate:      | 1 Mbps   |
| Operating Frequency | 2437     |
| Channel No.         | 06 Ch    |

| Frequency<br>[MHz] | Reading<br>dBuV | AN.+CL-AMP G<br>[dB] | ANT. POL<br>[H/V] | Total<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Detect |
|--------------------|-----------------|----------------------|-------------------|-------------------|-------------------|----------------|--------|
| 4874               | 51.61           | -0.37                | V                 | 51.24             | 74                | 22.76          | PK     |
| 4874               | 39.77           | -0.37                | V                 | 39.40             | 54                | 14.60          | AV     |
| 7311               | 48.74           | 8.64                 | V                 | 57.38             | 74                | 16.62          | PK     |
| 7311               | 35.05           | 8.64                 | V                 | 43.69             | 54                | 10.31          | AV     |
| 4874               | 52.69           | -0.37                | H                 | 52.32             | 74                | 21.68          | PK     |
| 4874               | 43.60           | -0.37                | H                 | 43.23             | 54                | 10.77          | AV     |
| 7311               | 49.31           | 8.64                 | H                 | 57.95             | 74                | 16.05          | PK     |
| 7311               | 35.11           | 8.64                 | H                 | 43.75             | 54                | 10.25          | AV     |

#### Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

|                     |          |
|---------------------|----------|
| Operation Mode:     | 802.11 b |
| Transfer Rate:      | 1 Mbps   |
| Operating Frequency | 2462     |
| Channel No.         | 11 Ch    |

| Frequency<br>[MHz] | Reading<br>dBuV | AN.+CL-AMP G<br>[dB] | ANT. POL<br>[H/V] | Total<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Detect |
|--------------------|-----------------|----------------------|-------------------|-------------------|-------------------|----------------|--------|
| 4924               | 52.07           | -0.15                | V                 | 51.92             | 74.00             | 22.08          | PK     |
| 4924               | 42.22           | -0.15                | V                 | 42.07             | 54.00             | 11.93          | AV     |
| 7386               | 48.91           | 9.06                 | V                 | 57.97             | 74                | 16.03          | PK     |
| 7386               | 35.34           | 9.06                 | V                 | 44.4              | 54                | 9.6            | AV     |
| 4924               | 54.35           | -0.15                | H                 | 54.2              | 74                | 19.8           | PK     |
| 4924               | 46.57           | -0.15                | H                 | 46.42             | 54                | 7.58           | AV     |
| 7386               | 48.68           | 9.06                 | H                 | 57.74             | 74                | 16.26          | PK     |
| 7386               | 35.37           | 9.06                 | H                 | 44.43             | 54                | 9.57           | AV     |

#### Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
6. We have done 802.11b/g/n mode test. Worst case of EUT is 1 Mbps in 802.11b.
7. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

## 8.5.2 RADIATED RESTRICTED BAND EDGES

### Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

|                     |                    |
|---------------------|--------------------|
| Operation Mode:     | 802.11g            |
| Transfer Rate:      | 6 Mbps             |
| Operating Frequency | 2412 MHz, 2462 MHz |
| Channel No.         | 01 Ch, 11 Ch       |

| Frequency<br>[MHz] | Reading<br>dBuV | AN.+CL<br>[dB] | ANT. POL<br>[H/V] | Total<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Detect |
|--------------------|-----------------|----------------|-------------------|-------------------|-------------------|----------------|--------|
| 2390.0             | 35.22           | 33.90          | H                 | 69.12             | 74                | 4.88           | PK     |
| 2390.0             | 17.35           | 33.90          | H                 | 51.25             | 54                | 2.75           | AV     |
| 2390.0             | 33.79           | 33.90          | V                 | 67.69             | 74                | 6.31           | PK     |
| 2390.0             | 16.34           | 33.90          | V                 | 50.24             | 54                | 3.76           | AV     |
| 2483.5             | 32.90           | 33.99          | H                 | 66.89             | 74                | 7.11           | PK     |
| 2483.5             | 15.58           | 33.99          | H                 | 49.57             | 54                | 4.43           | AV     |
| 2483.5             | 31.20           | 33.99          | V                 | 65.19             | 74                | 8.81           | PK     |
| 2483.5             | 14.88           | 33.99          | V                 | 48.87             | 54                | 5.13           | AV     |

#### Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss
2. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.
3. We have done 802.11b/g/n mode test. . Worst case of EUT is 6 Mbps in 802.11g. Also, 802.11b has no spurious.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

## 8.6 POWERLINE CONDUCTED EMISSIONS

### Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBμV) |          |
|-----------------------|---------------|----------|
|                       | Quasi-peak    | Average  |
| 0.15 to 0.50          | 66 to 56      | 56 to 46 |
| 0.50 to 5             | 56            | 46       |
| 5 to 30               | 60            | 50       |

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. We are performed the AC Power Line Conducted Emission test for 11 Mbps, Ch.11 and 802.11b.  
Because 802.11b mode is worst case.

Note : We performed the AC Power Line Conducted Emission test using adaptor and PC.

■ RESULT PLOTS

Conducted Emissions (Line 1)

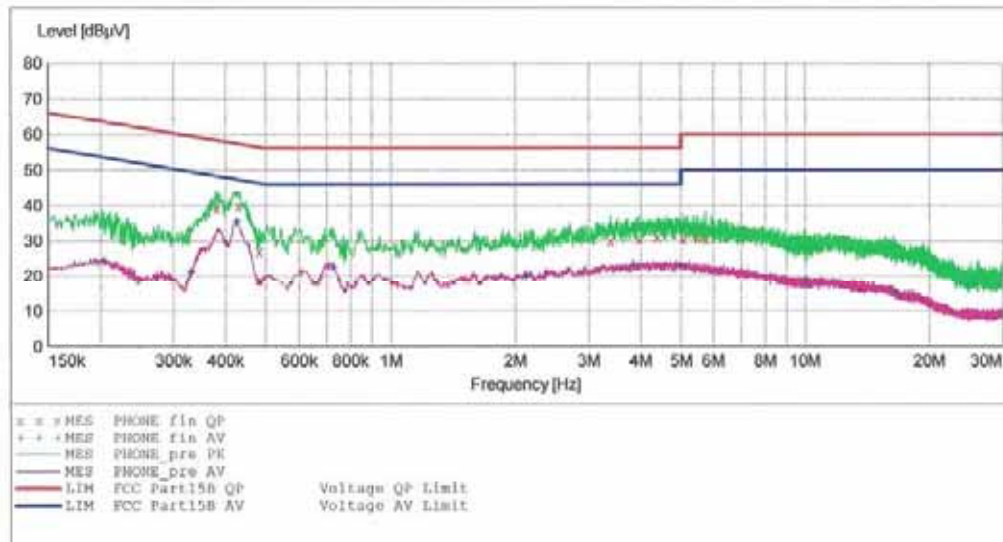
HCT

EMC

EUT: R772  
Manufacturer: FRANKLIN WIRELESS CORPORATION  
Operating Condition: WLAN MODE  
Test Site: SHIELD ROOM  
Operator: JS LEE  
Test Specification: FCC PART 15 B  
Comment: H

SCAN TABLE: "FCC PART 15 B(H)"

| Short Description: |           |         | FCC PART 15 CLASS B |            |           |            |
|--------------------|-----------|---------|---------------------|------------|-----------|------------|
| Start              | Stop      | Step    | Detector            | Meas. Time | IF Bandw. | Transducer |
| Frequency          | Frequency | Width   |                     |            |           |            |
| 150.0 kHz          | 500.0 kHz | 1.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |
| 500.0 kHz          | 5.0 MHz   | 4.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |
| 5.0 MHz            | 30.0 MHz  | 4.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |



MEASUREMENT RESULT: "PHONE\_fin QP"

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.381010         | 39.30         | 9.8          | 58            | 19.0         | ---  | --- |
| 0.431010         | 39.80         | 9.8          | 57            | 17.4         | ---  | --- |
| 0.482010         | 27.00         | 9.8          | 56            | 29.3         | ---  | --- |
| 3.384000         | 30.00         | 10.1         | 56            | 26.0         | ---  | --- |
| 3.960000         | 30.40         | 10.1         | 56            | 25.6         | ---  | --- |
| 4.396000         | 31.10         | 10.1         | 56            | 24.9         | ---  | --- |
| 5.076000         | 30.40         | 10.2         | 60            | 29.6         | ---  | --- |
| 5.484000         | 30.90         | 10.2         | 60            | 29.1         | ---  | --- |
| 5.756000         | 30.30         | 10.2         | 60            | 29.7         | ---  | --- |

**MEASUREMENT RESULT: "PHONE\_fin AV"**

10/16/2012 9:14AM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.204010         | 24.10         | 9.7          | 53            | 29.3         | ---  | --- |
| 0.331010         | 21.30         | 9.7          | 49            | 28.1         | ---  | --- |
| 0.426010         | 35.60         | 9.8          | 47            | 11.8         | ---  | --- |
| 0.728000         | 22.50         | 9.8          | 46            | 23.5         | ---  | --- |
| 2.116000         | 20.00         | 9.9          | 46            | 26.0         | ---  | --- |
| 3.832000         | 23.20         | 10.1         | 46            | 22.8         | ---  | --- |
| 5.000000         | 22.80         | 10.2         | 46            | 23.2         | ---  | --- |
| 10.064000        | 18.20         | 10.5         | 50            | 31.8         | ---  | --- |
| 16.596000        | 15.10         | 11.2         | 50            | 34.9         | ---  | --- |

## Conducted Emissions (Line 2)

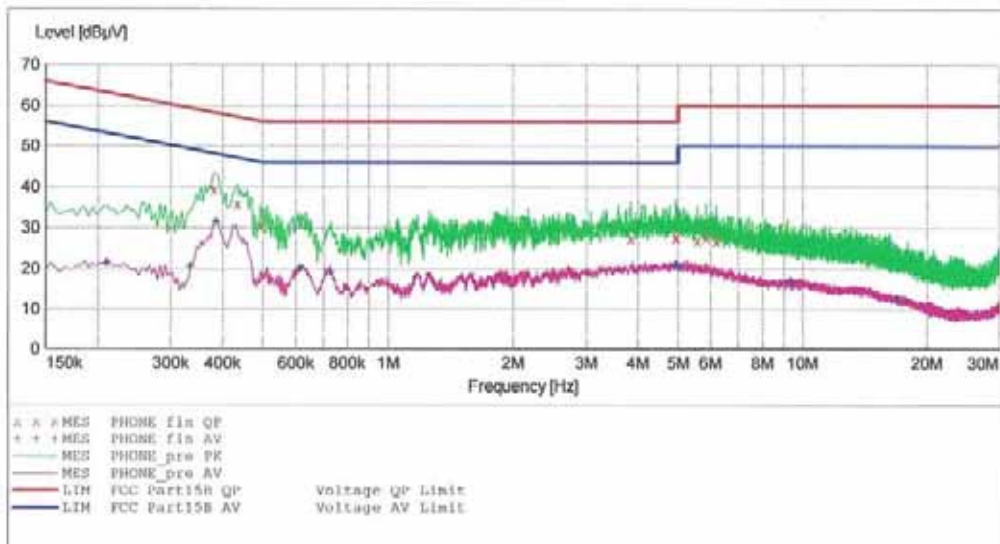
HCT

EMC

EUT: R772  
 Manufacturer: FRANKLIN WIRELESS CORPORATION  
 Operating Condition: WLAN MODE  
 Test Site: SHIELD ROOM  
 Operator: JS LEE  
 Test Specification: FCC PART 15 CLASS B  
 Comment: N

### SCAN TABLE: "FCC PART 15 B(N)"

| Short Description: |           |         | FCC PART 15 CLASS B |            |           |            |
|--------------------|-----------|---------|---------------------|------------|-----------|------------|
| Start              | Stop      | Step    | Detector            | Meas. Time | IF Bandw. | Transducer |
| Frequency          | Frequency | Width   |                     |            |           |            |
| 150.0 kHz          | 500.0 kHz | 4.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |
| 500.0 kHz          | 5.0 MHz   | 4.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |
| 5.0 MHz            | 30.0 MHz  | 4.0 kHz | MaxPeak             | 10.0 ms    | 9 kHz     | None       |
|                    |           |         | Average             |            |           |            |



### MEASUREMENT RESULT: "PHONE\_fin QP"

10/16/2012 9:35AM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE  |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.382010      | 39.30      | 10.0      | 58         | 19.0      | ---  | --- |
| 0.434010      | 35.80      | 10.0      | 57         | 21.4      | ---  | --- |
| 0.494010      | 30.60      | 10.0      | 56         | 25.5      | ---  | --- |
| 3.840000      | 27.40      | 10.3      | 56         | 28.6      | ---  | --- |
| 4.936000      | 27.60      | 10.4      | 56         | 28.4      | ---  | --- |
| 4.964000      | 27.80      | 10.4      | 56         | 28.2      | ---  | --- |
| 5.568000      | 27.00      | 10.4      | 60         | 33.0      | ---  | --- |
| 5.848000      | 27.70      | 10.4      | 60         | 32.3      | ---  | --- |
| 6.184000      | 26.80      | 10.4      | 60         | 33.2      | ---  | --- |

**MEASUREMENT RESULT: "PHONE\_fin AV"**

10/16/2012 9:35AM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.210010         | 21.30         | 9.9          | 53            | 31.9         | ---  | --- |
| 0.334010         | 20.40         | 9.9          | 49            | 28.9         | ---  | --- |
| 0.386010         | 31.50         | 10.0         | 48            | 16.6         | ---  | --- |
| 0.616000         | 20.10         | 10.0         | 46            | 25.9         | ---  | --- |
| 0.728000         | 19.10         | 10.0         | 46            | 26.9         | ---  | --- |
| 4.936000         | 20.90         | 10.4         | 46            | 25.1         | ---  | --- |
| 5.000000         | 20.40         | 10.4         | 46            | 25.6         | ---  | --- |
| 9.400000         | 16.70         | 10.7         | 50            | 33.3         | ---  | --- |
| 16.844000        | 12.40         | 11.6         | 50            | 37.6         | ---  | --- |

## 9. LIST OF TEST EQUIPMENT

| Manufacturer          | Model / Equipment                                      | Calibration Interval | Calibration Due | Serial No.         |
|-----------------------|--------------------------------------------------------|----------------------|-----------------|--------------------|
| Rohde & Schwarz       | ENV216/ LISN                                           | Annual               | 02/09/2013      | 100073             |
| Schwarzbeck           | VULB 9168/ TRILOG Antenna                              | Biennial             | 02/09/2013      | 200                |
| Rohde & Schwarz       | ESI 40 / EMI TEST RECEIVER                             | Annual               | 05/03/2013      | 831564103          |
| Agilent               | E4440A/ Spectrum Analyzer                              | Annual               | 05/02/2013      | US45303008         |
| Agilent               | N9020A/ SIGNAL ANALYZER                                | Annual               | 07/31/2013      | MY51110020         |
| HD                    | MA240/ Antenna Position Tower                          | N/A                  | N/A             | 556                |
| EMCO                  | 1050/ Turn Table                                       | N/A                  | N/A             | 114                |
| HD GmbH               | HD 100/ Controller                                     | N/A                  | N/A             | 13                 |
| HD GmbH               | KMS 560/ SlideBar                                      | N/A                  | N/A             | 12                 |
| Rohde & Schwarz       | SCU-18/ Signal Conditioning Unit                       | Annual               | 09/11/2013      | 10094              |
| Schwarzbeck           | BBHA 9120D/ Horn Antenna                               | Biennial             | 10/17/2013      | 937                |
| Schwarzbeck           | BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)               | Biennial             | 10/26/2012      | BBHA9170342        |
| Rohde & Schwarz       | FSP / Spectrum Analyzer                                | Annual               | 02/09/2013      | 839117/011         |
| Agilent               | E4416A /Power Meter                                    | Annual               | 11/07/2012      | GB41291412         |
| Agilent               | E9327A /POWER SENSOR                                   | Annual               | 05/02/2013      | MY4442009          |
| Wainwright Instrument | WHF3.3/18G-10EF / High Pass Filter                     | Annual               | 05/02/2013      | 1                  |
| Wainwright Instrument | WHNX6.0/26.5G-6SS / High Pass Filter                   | Annual               | 05/02/2013      | 1                  |
| Wainwright Instrument | WHNX7.0/18G-8SS / High Pass Filter                     | Annual               | 05/02/2013      | 29                 |
| Wainwright Instrument | WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter | Annual               | 05/02/2013      | 1                  |
| Hewlett Packard       | 11636B/Power Divider                                   | Annual               | 11/07/2012      | 11377              |
| Hewlett Packard       | 11667B / Power Splitter                                | Annual               | 06/05/2013      | 05001              |
| DIGITAL               | EP-3010 /DC POWER SUPPLY                               | Annual               | 11/07/2012      | 3110117            |
| ITECH                 | IT6720 / DC POWER SUPPLY                               | Annual               | 11/07/2012      | 010002156287001199 |
| TESCOM                | TC-3000C / BLUETOOTH TESTER                            | Annual               | 11/14/2012      | 3000C000276        |
| Rohde & Schwarz       | CBT / BLUETOOTH TESTER                                 | Annual               | 05/02/2013      | 100422             |
| EMCO                  | 6502.LOOP ANTENNA                                      | Biennial             | 01/11/2014      | 9009-2536          |
| Agilent               | 8493C / Attenuator(10 dB)                              | Annual               | 07/30/2013      | 76649              |
| WEINSCHL              | 2-3 / Attenuator(3 dB)                                 | Annual               | 11/07/2013      | BR0617             |
| CERNEX                | CBLU1183540 / POWER AMP                                | Annual               | 07/27/2013      | 21691              |