

Report No.: EH/2009/30023 **Issue Date: Dec. 04, 2009** 

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# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 210

**Product Name:** POS terminal

**Brand Name:** ingenico **Model Name: iPA280** 

**Model Different:** N/A

FCC ID: XKBIPA280

IC: 2586D-IPA280

**Report No.:** EH/2009/30023

**Issue Date:** Dec. 04, 2009

**FCC Rule Part: §15.247** 

IC Rule Part: RSS-210 issue 7:2007, Annex 8

Prepared for: **INGENICO** 

1 rue Claude Chappe BP346. 07503 Guilher-

and-Granges - France

SGS Taiwan Ltd. Prepared by:

**Electronics & Communication Laboratory** 

No. 134, Wu Kung Rd., Wuku Industrial Zone,

Taipei County, Taiwan.



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## VERIFICATION OF COMPLIANCE

**Applicant: INGENICO** 

1 rue Claude Chappe BP346. 07503 Guilherand-Granges – France

**Product Name:** POS terminal

**Brand Name:** ingenico

FCC ID: XKBIPA280 IC: 2586D-IPA280

**Model No.:** iPA280 **Model Difference:** N/A

File Number: EH/2009/30023

Date of test: Nov. 25, 2009 ~ Dec. 04, 2009

**Date of EUT Received:** Mar. 27, 2009

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247 and IC RSS 210 issue 7: 2007 Annex 8.

The test results of this report relate only to the tested sample identified in this report.

| Test By:     | Jazz Huang            | Date | Dec. 04, 2009 |  |
|--------------|-----------------------|------|---------------|--|
|              | Jazz Huang / Engineer |      |               |  |
| Prepared By: | Gigi yeh              | Date | Dec. 04, 2009 |  |
|              | Gigi Yeh / Clerk      |      |               |  |
| Approved By: | Timent du             | Date | Dec. 04, 2009 |  |
| _            | Vincent Su / Manager  |      |               |  |

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## Version

| Version No. | Date          | Description                  |
|-------------|---------------|------------------------------|
| 00          | Dec. 04, 2009 | Initial creation of document |
|             |               |                              |

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## **GENERAL INFORMATION**

#### **Product Description** 1.1

#### General:

| Product Name:     | POS terminal   |                                       |  |
|-------------------|--|---------------------------------------|--|
| Brand Name:       | ingenico   |                                       |  |
| Model Name:       | iPA280   |                                       |  |
| Model Difference: | N/A  |                                       |  |
|                   | 3.6 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter |                                       |  |
| Power Supply      | Battery:   | Model: IPA200-BAT, Supplier: ingenico |  |
|                   | Adapter: Model: T010WM0512                                   |                                       |  |

### GSM / DCS:

| OSIVI / DCG.                                       | Operation Band                   | Frequency Range       | Rated Power |  |
|--|----------------------------------|-----------------------|-------------|--|
|  | GSM/GPRS/ EDGE<br>900, class10   | 824.2 MHz– 848.8 MHz  | 33 dBm      |  |
| Cellular Phone Standards Frequency Range and Power | DCS/ GPRS/ EDGE<br>1800, class10 | 880.2MHz – 914.8MHz   | 33 dBm      |  |
|  | GSM/ GPRS/ EDGE<br>850, class10  | 1710.2MHz – 1784.8MHz | 30 dBm      |  |
|  | DCS/ GPRS/ EDGE<br>1900, class10 | 1850.2MHz – 1909.8MHz | 30 dBm      |  |
| Type of Emission                                   | 300KGXW                          |                       |             |  |
| Hardware Version                                   | PVT                              |                       |             |  |
| Software Version 0.34.00.Q                         |                                  |                       |             |  |
| IMEI   | 354060011335375                  |                       |             |  |

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| WI  | Δ | N   |
|-----|---|-----|
| vvi |   | 1 7 |

| Frequency Range:       | 2412 – 2462 MHz  |
|------------------------|--|
| Channel number:        | 11 channels  |
| Max. Output Power:     | 802.11 b: 15.35 dBm (Peak)<br>802.11 g: 14.83 dBm (Peak)           |
| Modulation Technology: | DSSS, OFDM   |
| Modulation type:       | CCK, DQPSK, DBPSK for DSSS<br>64QAM. 16QAM, QPSK, BPSK for OFDM    |
| Transition Rate:       | 802.11 b: 1/2/5.5/11 Mbps;<br>802.11 g: 6/9/12/18/24/36/48/54 Mbps |
| Antenna Designation:   | PIFA Antenna / -0.51dBi.   |

The EUT is compliance with IEEE 802.11 b/g Standard.

## Bluetooth:

| Bluetooth Version                            | <ul> <li>V1.1 (GFSK)</li> <li>V1.2 (GFSK)</li> <li>V2.0 (GFSK)</li> <li>V2.0 + EDR (GFSK + /4DQPSK + 8DPSK)</li> <li>V2.1 + EDR (GFSK + /4DQPSK + 8DPSK)</li> </ul> |  |
|--|---|--|
| Frequency Range                              | 2402 – 2480MHz  |  |
| Channel number                               | 79 channels max.  |  |
| Rated Power                                  | 1.74 dBm (Peak)   |  |
| Modulation type                              | Frequency Hopping Spread Spectrum   |  |
| Antenna Designation PIFA Antenna / -0.42dBi. |   |  |

The EUT is compliance with Bluetooth 2.1 Standard.

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### RFID:

| Operating Frequency | 13.56MHz           |
|---------------------|--------------------|
| Transmit Power      | < 123dBuV/m at 3m. |
| Number of Channels  | 1                  |
| Operating Mode      | Point-to-Point     |
| Antenna Type        | Print antenna      |
| Module Type         | ASK                |

### GPS:

| Receiver Frequency              | L1 Band, 1575.42MHz |
|---------------------------------|---------------------|
| Frequency Conversion oscillator | 26MHz               |
| Antenna Designation             | mono pole           |

This test report applies for 802.11b/g WLAN.

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#### 1.2 **Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: XKBIPA280 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and IC: 2586D-IPA280 filing to comply with Industry Canada RSS-210 issue 7: 2007 Annex 8. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

#### 1.3 **Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2007.. Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 1.4 **Test Facility**

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-1.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

#### 1.5 **Special Accessories**

Not available for this EUT intended for grant.

#### 1.6 **Equipment Modifications**

Not available for this EUT intended for grant.

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### SYSTEM TEST CONFIGURATION

#### 2.1 **EUT Configuration**

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

#### 2.2 **EUT Exercise**

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

#### 2.3 **Test Procedure**

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m 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 and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

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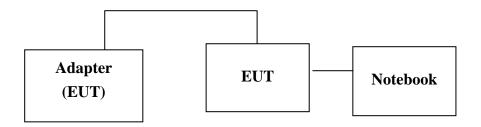


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## **Configuration of Tested System**

Fig. 2-1 AC Power line and Radiated Emission Configuration



**Table 2-1 Equipment Used in Tested System** 

| Item | Equipment     | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord            |
|------|---------------|-----------|--------------------|------------|------------|-----------------------|
| 1.   | WiFi Software | N/A       | WLAN eMapi         | N/A        | N/A        | N/A                   |
| 2.   | AC Adaptor    | LEI       | 1U18-2050200-WP    | N/A        | N/A        | 180cm,<br>Un-shielded |
| 3.   | Notebook      | IBM       | T40                | N/A        | Shielded   | Un-shielded           |

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## SUMMARY OF TEST RESULTS

| FCC Rules             | Description Of Test           | Result    |
|-----------------------|-------------------------------|-----------|
| §15.207(a)/           | AC Power Line Conducted Emis- | Compliant |
| RSS-Gen §7.2.2        | sion                          |           |
| §15.247(b)/           | Peak Output Power             | Compliant |
| §A8.4(2)              |                               |           |
| §15.247(b)/           | 6dB Bandwidth                 | Compliant |
| §A8.2                 |                               |           |
| §15.247(c)/           | 100 KHz Bandwidth Of          | Compliant |
| §A8.5                 | Frequency Band Edges          |           |
| §15.247(c)/           | Spurious Emission             | Compliant |
| §A8.5                 |                               |           |
| §15.247/,§A8.3(2)     | Peak Power Density            | Compliant |
| §15.203/              | Antenna Requirement           | Compliant |
| RSS-GEN 7.1.4,        |                               |           |
| RSS-210 issue 7,§A8.4 |                               |           |
| RSS-Gen §4.4.1        | 99% Power Bandwidth           | Compliant |
| MPE                   | Maximum Permissible Exposure  | Compliant |

## **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.

802.11 b mode: Channel low (2412MHz) · mid (2437MHz) and high (2462MHz) with 1Mbps data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz) · mid (2437MHz) and high (2462MHz) with 6Mbps data rate are chosen for full testing.

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## CONDUCTED EMISSION TEST

#### **5.1. Standard Applicable:**

According to §15.207 and RSS-Gen §7.2.2, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

| Frequency range |            | mits<br>(uV) |
|-----------------|------------|--------------|
| MHz             | 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           |

#### Note

## **5.2.** Measurement Equipment Used:

|                   | AC Power Line Conducted Emission Test Site |                         |            |            |            |  |  |  |  |
|-------------------|--|-------------------------|------------|------------|------------|--|--|--|--|
| EQUIPMENT         | MFR MODEL SERIAL LAST CAL DUE.             |                         |            |            |            |  |  |  |  |
| TYPE              |  | NUMBER                  | NUMBER     | CAL.       |            |  |  |  |  |
| EMI Test Receiver | R&S  | ESCS30                  | 828985/004 | 09/15/2009 | 09/14/2010 |  |  |  |  |
| LISN              | Rolf-Heine                                 | NNB-2/16Z               | 99012      | 02/18/2009 | 02/17/2010 |  |  |  |  |
| LISN              | FCC  | FCC-LISN-50/250-25-2-01 | 04034      | 02/18/2009 | 02/17/2010 |  |  |  |  |
| Coaxial Cables    | N/A  | WK CE Cable             | N/A        | 10/30/2009 | 10/29/2010 |  |  |  |  |

## 5.3. EUT Setup:

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.



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## **5.4.** Measurement Procedure:

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

## 5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

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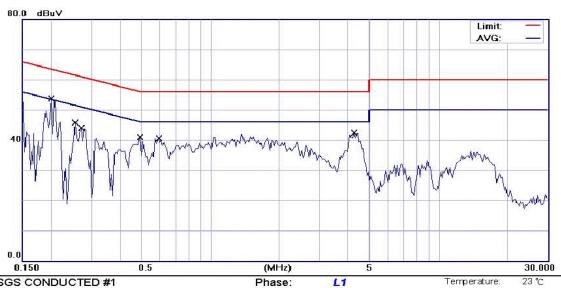


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## AC POWER LINE CONDUCTED EMISSION TEST DATA

| Operation Mode: | WLAN Link |           |      | Test Date: | Nov. 26, 2009 |
|-----------------|-----------|-----------|------|------------|---------------|
| Temperature:    | 23 ℃      | Humidity: | 60 % | Test By:   | Jazz          |



Power:

Distance:

AC120V/60Hz

Site SGS CONDUCTED #1

Limit: CISPR22/11 Class B Conduction(QP)

EUT: POS terminal

M/N: M81B Note: WIFI LINK

| No. | Mk. | Freq.  | Reading<br>Level | Factor | Measure-<br>ment | Limit | Over   |          |         |
|-----|-----|--------|------------------|--------|------------------|-------|--------|----------|---------|
|     |     | MHz    | dBu∀             | dB     | dBu∀             | dBuV  | dB     | Detector | Comment |
| 1   | *   | 0.2007 | 51.47            | 0.12   | 51.59            | 63.58 | -11.99 | QP       |         |
| 2   |     | 0.2007 | 37.40            | 0.12   | 37.52            | 53.58 | -16.06 | AVG      |         |
| 3   |     | 0.2548 | 39.54            | 0.11   | 39.65            | 61.60 | -21.95 | QP       |         |
| 4   |     | 0.2548 | 22.73            | 0.11   | 22.84            | 51.60 | -28.76 | AVG      |         |
| 5   |     | 0.2722 | 41.87            | 0.11   | 41.98            | 61.05 | -19.07 | QP       |         |
| 6   |     | 0.2722 | 30.08            | 0.11   | 30.19            | 51.05 | -20.86 | AVG      |         |
| 7   |     | 0.4941 | 38.04            | 0.07   | 38.11            | 56.10 | -17.99 | QP       |         |
| 8   |     | 0.4941 | 24.89            | 0.07   | 24.96            | 46.10 | -21.14 | AVG      |         |
| 9   |     | 0.5948 | 37.88            | 0.07   | 37.95            | 56.00 | -18.05 | QP       |         |
| 10  |     | 0.5948 | 24.87            | 0.07   | 24.94            | 46.00 | -21.06 | AVG      |         |
| 11  |     | 4.2805 | 39.54            | 0.15   | 39.69            | 56.00 | -16.31 | QP       |         |
| 12  |     | 4.2805 | 28.24            | 0.15   | 28.39            | 46.00 | -17.61 | AVG      |         |

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f (886-2) 2298-0488

Humidity:

Air Pressure:

hpa



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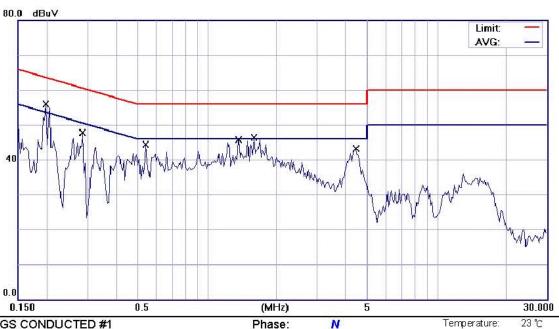
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Humidity:

Air Pressure:

60 %

hpa



Power:

Distance:

AC120V/60Hz

Site SGS CONDUCTED #1

Limit: CISPR22/11 Class B Conduction(QP)

EUT: POS terminal

M/N: M81B Note: WIFI LINK

| No. | Mk. | Freq.  | Reading<br>Level | Factor | Measure-<br>ment | Limit | Over   |          |         |
|-----|-----|--------|------------------|--------|------------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV             | dB     | dBu∀             | dBuV  | dB     | Detector | Comment |
| 1   |     | 0.1981 | 51.84            | 0.14   | 51.98            | 63.69 | -11.71 | QP       |         |
| 2   |     | 0.1981 | 37.74            | 0.14   | 37.88            | 53.69 | -15.81 | AVG      |         |
| 3   |     | 0.2871 | 47.01            | 0.13   | 47.14            | 60.61 | -13.47 | QP       |         |
| 4   |     | 0.2871 | 35.78            | 0.13   | 35.91            | 50.61 | -14.70 | AVG      |         |
| 5   |     | 0.5421 | 43.56            | 0.10   | 43.66            | 56.00 | -12.34 | QP       |         |
| 6   |     | 0.5421 | 32.80            | 0.10   | 32.90            | 46.00 | -13.10 | AVG      |         |
| 7   |     | 1.3702 | 38.58            | 0.13   | 38.71            | 56.00 | -17.29 | QP       |         |
| 8   |     | 1.3702 | 31.84            | 0.13   | 31.97            | 46.00 | -14.03 | AVG      |         |
| 9   |     | 1.6062 | 40.60            | 0.14   | 40.74            | 56.00 | -15.26 | QP       |         |
| 10  | *-  | 1.6062 | 34.27            | 0.14   | 34.41            | 46.00 | -11.59 | AVG      |         |
| 11  |     | 4.4540 | 38.18            | 0.18   | 38.36            | 56.00 | -17.64 | QP       |         |
| 12  |     | 4.4540 | 31.74            | 0.18   | 31.92            | 46.00 | -14.08 | AVG      |         |

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## PEAK OUTPUT POWER MEASUREMENT

## **6.1 Standard Applicable:**

According to  $\S15.247(a)(2)$ , (b)

- 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna
- elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its
- maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a
- reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods),
- the maximum conducted output power is the highest total transmit power occurring in any mode.
- (4) The conducted output power limit specified in paragraph (b) of this section is based

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and

- on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c)
- of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted
- output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1),
- (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the
- antenna exceeds 6 dBi.
- (c) Operation with directional antenna gains greater than 6 dBi.
- (1) Fixed point-to-point operation:
- (i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for
- fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for
- every 3 dB that the directional gain of the antenna exceeds 6 dBi.
- (ii) Systems operating in the 5725-5850 MHz band that are used exclusively for
- fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

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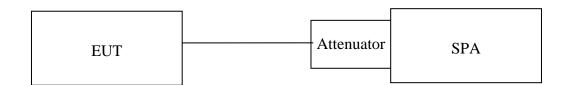
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According to RSS-210 issue 7,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

**6.2** Measurement Equipment Used:

| To the second se |              |                    |            |            |            |  |  |  |  |
|--|--------------|--------------------|------------|------------|------------|--|--|--|--|
| Conducted Emission Test Site   |              |                    |            |            |            |  |  |  |  |
| <b>EQUIPMENT</b>   | MFR          | MODEL              | SERIAL     | LAST       | CAL DUE.   |  |  |  |  |
| TYPE   |              | NUMBER             | NUMBER     | CAL.       |            |  |  |  |  |
| Spectrum Analyzer  | Agilent      | E4446A             | MY43360126 | 04/19/2008 | 04/18/2010 |  |  |  |  |
| Spectrum Analyzer  | Agilent      | E7405A             | US41160416 | 07/04/2009 | 07/03/2010 |  |  |  |  |
| Spectrum Analyzer  | R&S          | FSP 40             | 100034     | 02/22/2009 | 02/21/2010 |  |  |  |  |
| Low Loss Cable   | HUBER+SUHNER | SUCOFLEX<br>104PEA | N/A        | 01/05/2009 | 01/04/2010 |  |  |  |  |
| Attenuator   | Mini-Circuit | BW-S6W5            | N/A        | 07/05/2009 | 07/04/2010 |  |  |  |  |

## 6.3 .Test Set-up:



### **6.4 Measurement Procedure:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel power function, RBW, VBW = 1MHz, Bandwidth=26dB occupied Bandwidth)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

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## **6.5** Measurement Result:

802.11b

|    |           |       | Peak  | Power | Outpu    | t      |  |
|----|-----------|-------|-------|-------|----------|--------|--|
| СН | Frequency |       | Data  | Rate  | e Requir |        |  |
| CH | (MHz)     | 1     | 2     | 5.5   | 11       | Limit  |  |
| 1  | 2412      | 15.24 | 15.1  | 14.55 | 14.35    | 30 dBm |  |
| 6  | 2437      | 15.01 | 14.98 | 14.45 | 14.1     | 30 dBm |  |
| 11 | 2462      | 15.55 | 15.25 | 14.65 | 14.6     | 30 dBm |  |

# 802.11g

|    |           | Peak Power Output |       |       |       |       |       |       |       |          |
|----|-----------|-------------------|-------|-------|-------|-------|-------|-------|-------|----------|
| СН | Frequency |                   |       |       | Data  | Rate  |       |       |       | Required |
| Сп | (MHz)     | 6                 | 9     | 12    | 18    | 24    | 36    | 48    | 54    | Limit    |
| 1  | 2412      | 14.83             | 14.73 | 13.87 | 13.85 | 12.89 | 12.85 | 11.78 | 11.75 | 30 dBm   |
| 6  | 2437      | 14.06             | 14.53 | 13.59 | 13.55 | 12.75 | 12.7  | 11.69 | 11.56 | 30 dBm   |
| 11 | 2462      | 14.60             | 13.98 | 13.09 | 13.02 | 12.2  | 12.05 | 11.29 | 11.19 | 30 dBm   |

Cable loss = 0

Note: Refer to next page for plots.

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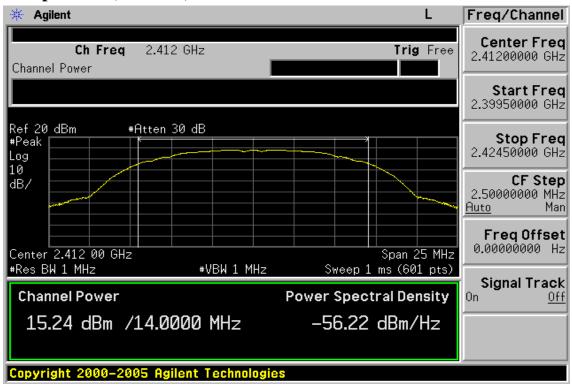


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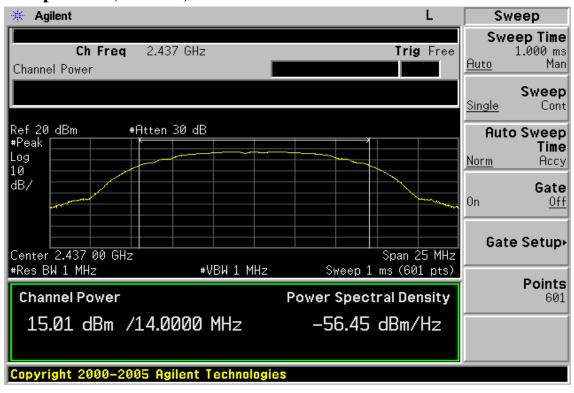
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## 802.11b, 1Mbps

## **Power Output Plot (CH Low)**



# **Power Output Plot (CH Mid)**



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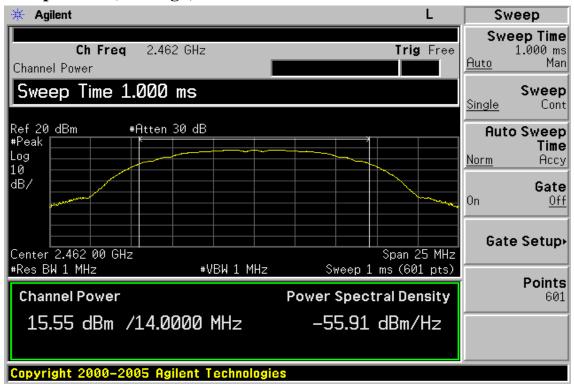
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# **Power Output Plot (CH High)**



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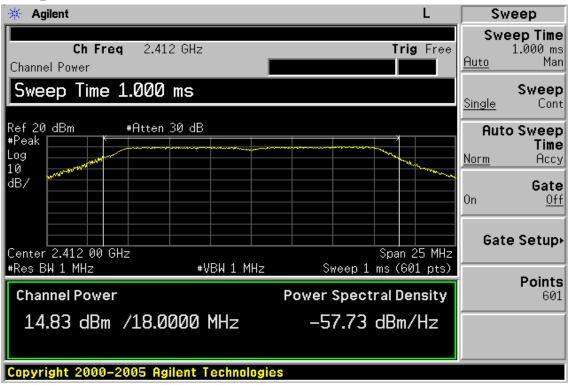


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## 802.11g, 6Mbps

## **Power Output Plot (CH Low)**



## **Power Output Plot (CH Mid)**



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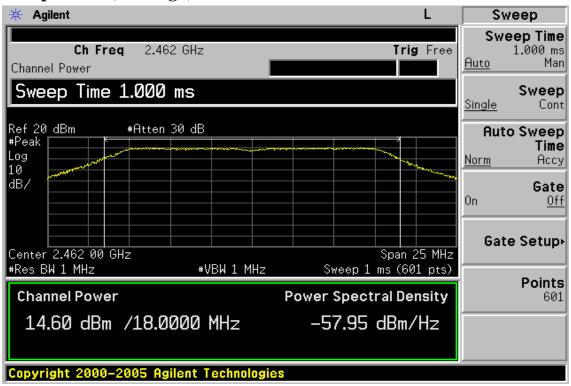
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# **Power Output Plot (CH High)**



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## 6dB Bandwidth

## 7.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz,2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

According to RSS 210 issue 7: 2007 Annex 8.2. Systems employing digital modulation techniques (which includes direct sequence) can now be certified under RSS-210 provided they comply with the following requirements: The minimum 6 dB bandwidth shall be at least 500 kHz.

## 7.2 Measurement Equipment Used:

Refer to section 6.2 for details.

## 7.3 Test Set-up:

Refer to section 6.3 for details.

#### 7.4 Measurement Procedure:

- 1.Place the EUT on the table and set it in transmitting mode.
- 2.Remove the antenna from the EUT and then connect a low loss RF cable from the 3.antenna port to the spectrum analyzer.
- 3.Set the spectrum analyzer as RBW=100KHz, VBW = 3\*RBW, Span= 30M/50MHz, Sweep=auto
- 4. Mark the peak frequency and –6dB (upper and lower) frequency.
- 5. Repeat above procedures until all frequency measured were complete.

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### 7.5 Measurement Result:

### 802.11b

| 002:110 |                    |                    |        |
|---------|--------------------|--------------------|--------|
| СН      | Bandwidth<br>(MHz) | Bandwidth<br>(KHz) | Result |
| Lower   | 12.589             | > 500              | PASS   |
| Mid     | 12.584             | > 500              | PASS   |
| Higher  | 12.626             | > 500              | PASS   |

<sup>\*</sup>Offset 1dB

## 802.11g

| 002:115 |                    |                    |        |
|---------|--------------------|--------------------|--------|
| СН      | Bandwidth<br>(MHz) | Bandwidth<br>(KHz) | Result |
| Lower   | 16.453             | > 500              | PASS   |
| Mid     | 16.425             | > 500              | PASS   |
| Higher  | 16.460             | > 500              | PASS   |

<sup>\*</sup>Offset 1dB

Note: Refer to next page for plots.

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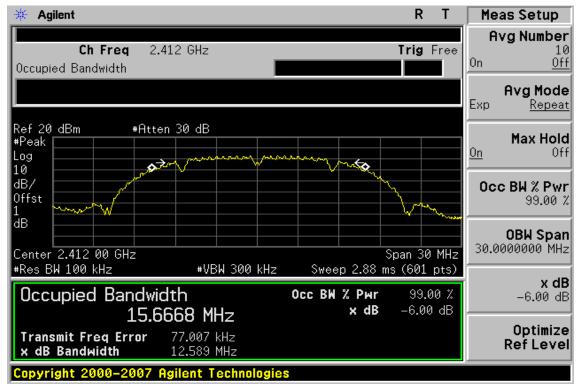


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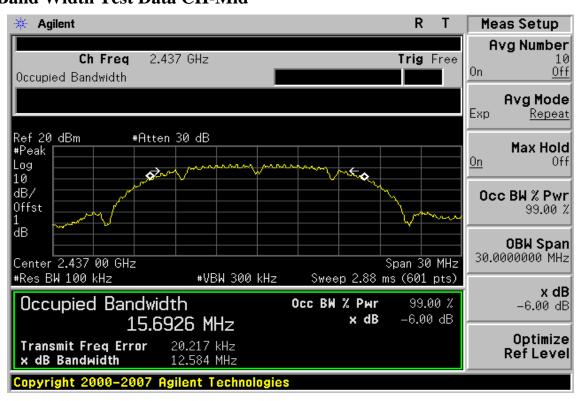
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802.11b

## 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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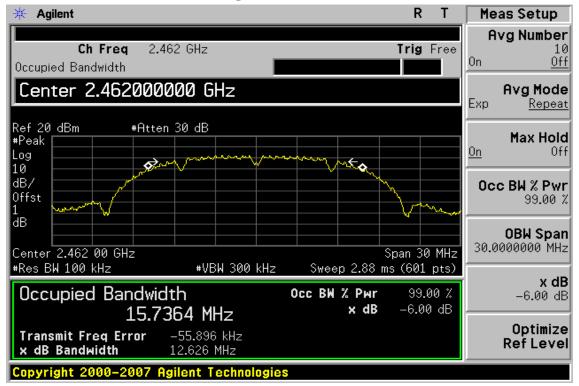
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# 6dB Band Width Test Data CH-High



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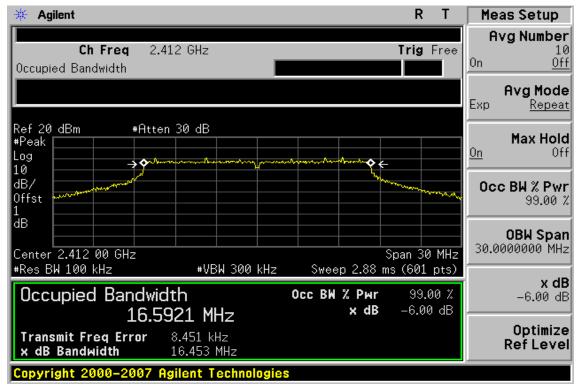


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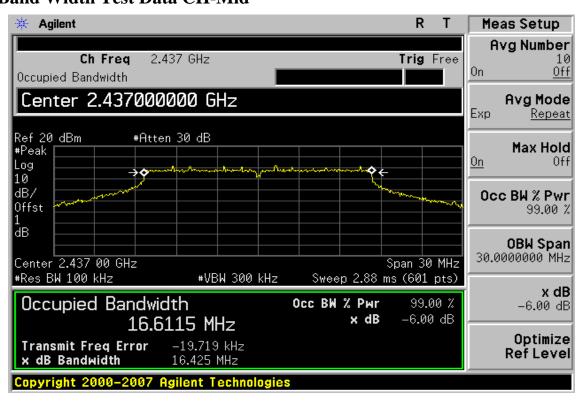
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802.11g

## 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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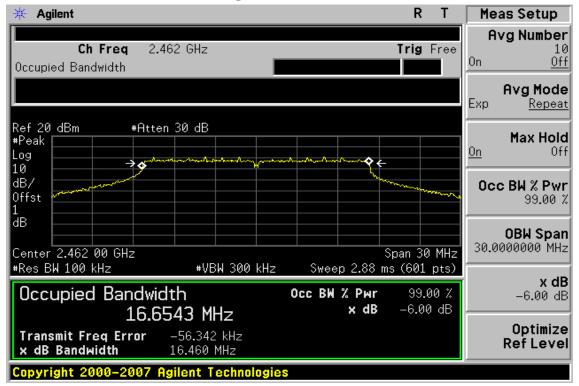
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# 6dB Band Width Test Data CH-High



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### 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

## 8.1 Standard Applicable:

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, 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).

According to RSS-210 issue 7,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

## **8.2** Measurement Equipment Used:

## 8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 8.2.2. Radiated emission:

|                   | Conducted Emission Test Site |                    |            |            |            |  |  |  |  |  |
|-------------------|------------------------------|--------------------|------------|------------|------------|--|--|--|--|--|
| EQUIPMENT         | MFR                          | MODEL              | SERIAL     | LAST       | CAL DUE.   |  |  |  |  |  |
| TYPE              |                              | NUMBER             | NUMBER     | CAL.       |            |  |  |  |  |  |
| Spectrum Analyzer | Agilent                      | E4446A             | MY43360126 | 04/19/2008 | 04/18/2010 |  |  |  |  |  |
| Spectrum Analyzer | Agilent                      | E7405A             | US41160416 | 07/04/2009 | 07/03/2010 |  |  |  |  |  |
| Spectrum Analyzer | R&S                          | FSP 40             | 100034     | 02/22/2009 | 02/21/2010 |  |  |  |  |  |
| Low Loss Cable    | HUBER+SUHNER                 | SUCOFLEX<br>104PEA | N/A        | 01/05/2009 | 01/04/2010 |  |  |  |  |  |
| Attenuator        | Mini-Circuit                 | BW-S6W5            | N/A        | 07/05/2009 | 07/04/2010 |  |  |  |  |  |

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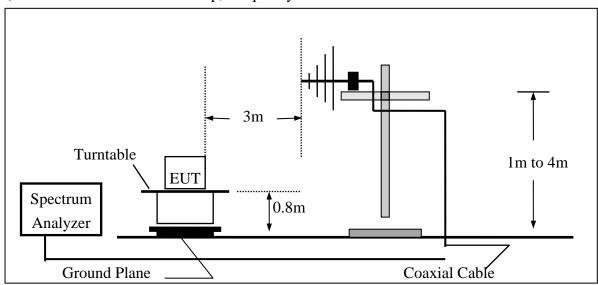
## 8.3 Test SET-UP:

## **8.3.1** Conducted Emission at antenna port:

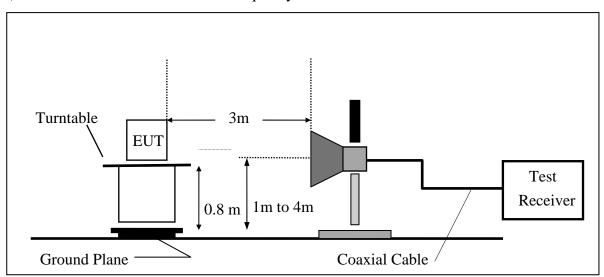
Refer to section 6.3 for details.

#### **8.3.2 Radiated emission:**

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



## (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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### **8.4 Measurement Procedure:**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
- 5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
- 6. Repeat above procedures until all frequency measured were complete.

## 8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |  |  |  |  |
|-------|------------------------|--|--|--|--|--|
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |  |  |  |  |
|       | AF = Antenna Factor    |  |  |  |  |  |

#### **8.6 Measurement Result:**

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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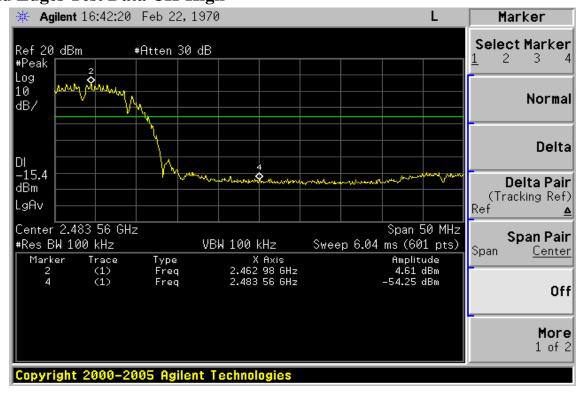
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# 802.11b **Band Edges Test Data CH-Low**



# **Band Edges Test Data CH-High**



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Radiated Emission: 802.11 b mode

TX CH Low Nov. 26, 2009 Operation Mode Test Date

Fundamental Frequency 2412 MHz Test By Jazz 25 °C Pol Ver. **Tmperature** 

Humidity 65 %

|             | Peak        | $\mathbf{AV}$ |         | Act     | ual FS        | Peak     | $\mathbf{AV}$ |                  |        |
|-------------|-------------|---------------|---------|---------|---------------|----------|---------------|------------------|--------|
| Freq.       | Reading     | Reading       | Ant./CL | Peak    | $\mathbf{AV}$ | Limit    | Limit         | Margin           | Remark |
| (MHz)       | (dBuV)      | (dBuV)        | CF(dB)  | (dBuV/m | ) (dBuV/m)    | (dBuV/m) | (dBuV/n       | n) ( <b>dB</b> ) |        |
| 2390.00     | 34.17       |               | -1.39   | 32.78   |               | 74.00    | 54.00         | -21.22           | Peak   |
| Operation : | Mode        | TX C          | H Low   |         |               | Test     | Date          | Nov. 26, 2       | 009    |
| Fundament   | tal Frequer | ncy 2412      | MHz     |         |               | Test     | By            | Jazz             |        |
| Temperatu   | re          | 25            |         |         |               | Pol      |               | Hor.             |        |
| Humidity    |             | 65 %          |         |         |               |          |               |                  |        |

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |                 |        |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|-----------------|--------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin          | Remark |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m       | ) ( <b>dB</b> ) |        |
| 2390.00 | 34.94   |               | -1.39   | 33.55    |               | 74.00    | 54.00         | -20.45          | Peak   |

#### Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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<sub>o</sub>
- (3) Spectrum Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200
- (4) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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Radiated Emission: 802.11 b mode

Operation Mode TX CH High Nov. 26, 2009 Test Date

Fundamental Frequency 2462 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak    | $\mathbf{AV}$ |               |        |
|---------|---------|---------------|---------|----------|---------------|---------|---------------|---------------|--------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit   | Limit         | Margin        | Remark |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m | (dBuV/m       | ( <b>dB</b> ) |        |
| 2483.56 | 33.80   |               | -0.92   | 32.88    |               | 74.00   | 54.00         | -21.12        | Peak   |

Operation Mode TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462 MHz Test By Jazz Temperature Pol Hor. 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | ıal FS        | Peak     | $\mathbf{AV}$ |                 |        |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|-----------------|--------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin          | Remark |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m       | ) ( <b>dB</b> ) |        |
| 2483.56 | 34.82   |               | -0.92   | 33.90    |               | 74.00    | 54.00         | -20.10          | Peak   |

### Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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<sub>o</sub>
- (3) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (4) Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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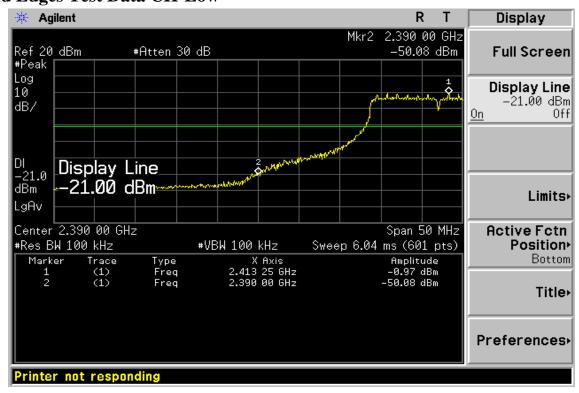
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802.11g **Band Edges Test Data CH-Low** 



# **Band Edges Test Data CH-High**



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Radiated Emission: 802.11 g mode

Operation Mode TX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412 MHz Test By Jazz Tmperature 25  $^{\circ}$ C Pol Ver.

Humidity 65 %

|             | Peak        | $\mathbf{AV}$ |         | Acti    | ıal FS        | Peak     | $\mathbf{AV}$ |                  |        |
|-------------|-------------|---------------|---------|---------|---------------|----------|---------------|------------------|--------|
| Freq.       | Reading     | Reading       | Ant./CL | Peak    | $\mathbf{AV}$ | Limit    | Limit         | Margin           | Remark |
| (MHz)       | (dBuV)      | (dBuV)        | CF(dB)  | (dBuV/m | (dBuV/m)      | (dBuV/m) | (dBuV/n       | n) ( <b>dB</b> ) |        |
| 2390.00     | 35.02       |               | -1.39   | 33.63   |               | 74.00    | 54.00         | -20.37           | Peak   |
| Operation 1 | Mode        | TX C          | CH Low  |         |               | Test     | Date          | Nov. 26, 2       | 009    |
| Fundament   | tal Frequer | ncy 2412      | MHz     |         |               | Test     | By            | Jazz             |        |
| Temperatu   | re          | 25 ℃          |         |         |               | Pol      |               | Hor.             |        |
| Humidity    |             | 65 %          |         |         |               |          |               |                  |        |

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |               |        |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|---------------|--------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin        | Remark |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m       | ( <b>dB</b> ) |        |
| 2390.00 | 38.12   |               | -1.39   | 36.73    |               | 74.00    | 54.00         | -17.27        | Peak   |

#### Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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<sub>o</sub>
- (3) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Radiated Emission: 802.11 g mode

Operation Mode TX CH High Nov. 26, 2009 Test Date

Fundamental Frequency 2462 MHz Test By Jazz 25 °C Pol Ver. Temperature

Humidity 65 %

|             | Peak        | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |                          |        |
|-------------|-------------|---------------|---------|----------|---------------|----------|---------------|--------------------------|--------|
| Freq.       | Reading     | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin                   | Remark |
| (MHz)       | (dBuV)      | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/n       | <b>1</b> ) ( <b>dB</b> ) |        |
| 2483.56     | 34.91       |               | -0.92   | 33.99    |               | 74.00    | 54.00         | -20.01                   | Peak   |
| Operation 1 | Mode        | TX C          | H High  |          |               | Test     | Date          | Nov. 26, 2               | 009    |
| Fundament   | tal Frequer | ncy 2462      | MHz     |          |               | Test     | By            | Jazz                     |        |
| Temperatu   | re          | 25 ℃          |         |          |               | Pol      |               | Hor.                     |        |
| Humidity    |             | 65 %          |         |          |               |          |               |                          |        |

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |               |        |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|---------------|--------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin        | Remark |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m       | ( <b>dB</b> ) |        |
| 2483.56 | 36.86   |               | -0.92   | 35.94    |               | 74.00    | 54.00         | -18.06        | Peak   |

#### Remark:

- (1) Data of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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<sub>o</sub>
- (3) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### SPURIOUS RADIATED EMISSION TEST

## 9.1 Standard Applicable

According to \$15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-210 issue 7,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

## 9.2 Measurement Equipment Used:

### 9.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

## 9.2.2. Radiated emission:

Refer to section 7.2 for details.

#### 9.3 Test SET-UP:

#### 9.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

#### 9.3.2. Radiated emission:

Refer to section 7.3 for details.

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#### 9.4 Measurement Procedure:

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. Repeat above procedures until all frequency measured were complete.

## 9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|-------|------------------------|--|
|       | RA = Reading Amplitude | AG = Amplifier Gain                        |
|       | AF = Antenna Factor    |  |

#### 9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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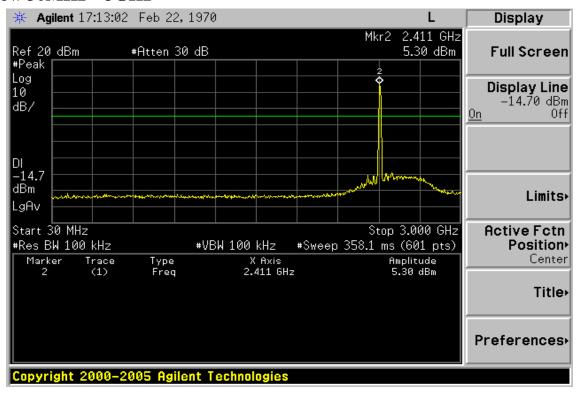
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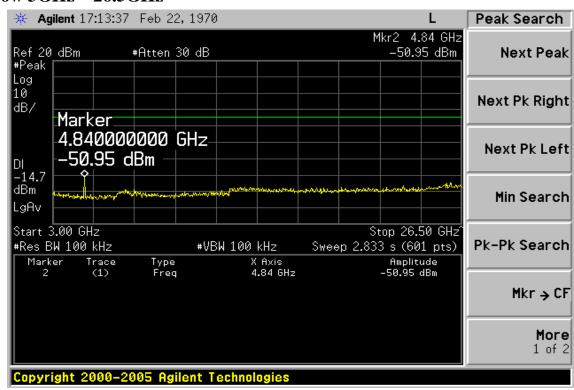
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# **Conducted Spurious Emission Measurement Result (802.11b)** Ch Low 30MHz - 3GHz



## Ch Low 3GHz – 26.5GHz



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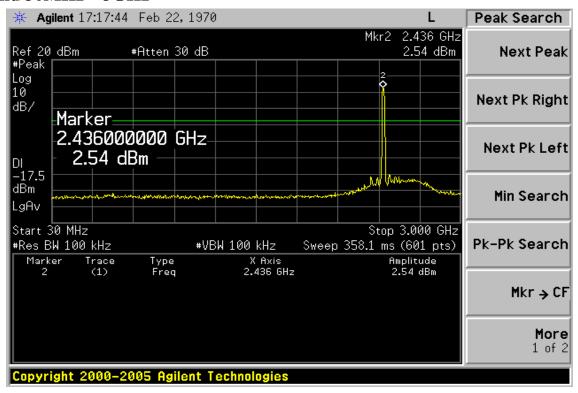
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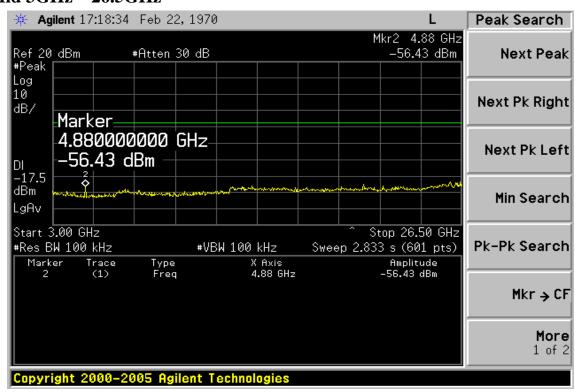
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## Ch Mid 30MHz – 3GHz



### Ch Mid 3GHz – 26.5GHz



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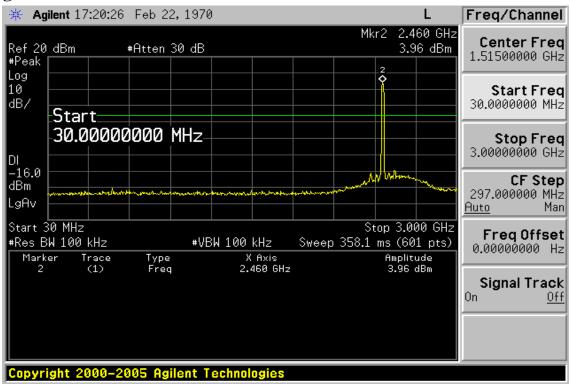
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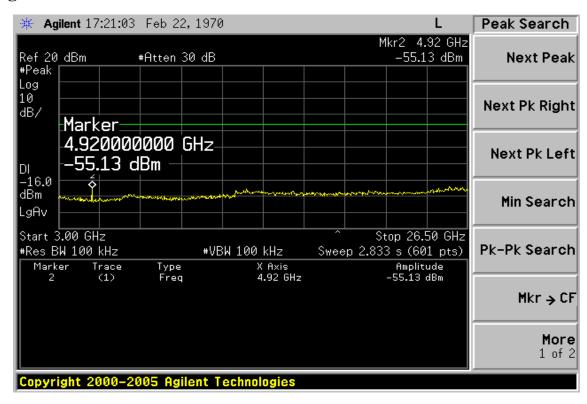
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# Ch High 30MHz - 3GHz



## Ch High 3GHz – 26.5GHz



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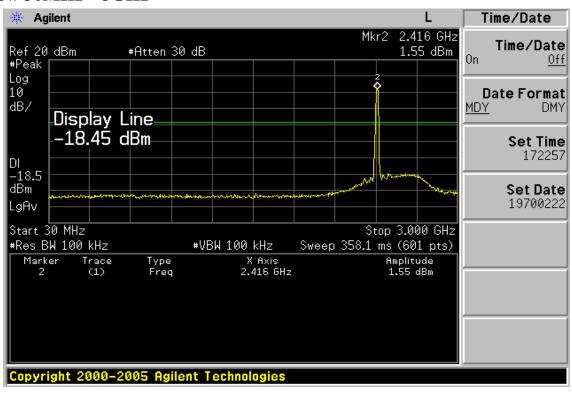
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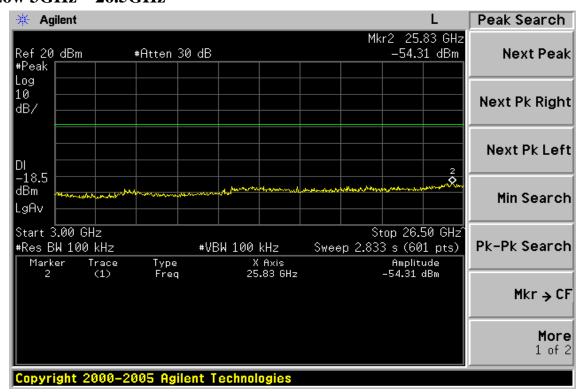
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# **Conducted Spurious Emission Measurement Result (802.11g)** Ch Low 30MHz - 3GHz



## Ch Low 3GHz - 26.5GHz



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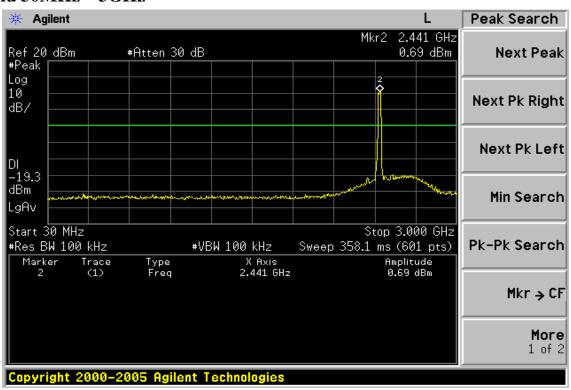
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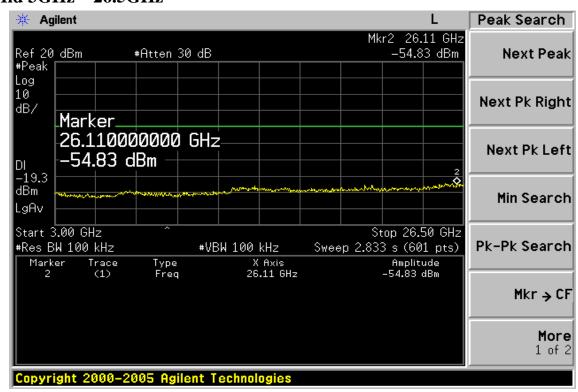
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## Ch Mid 30MHz – 3GHz



## Ch Mid 3GHz - 26.5GHz



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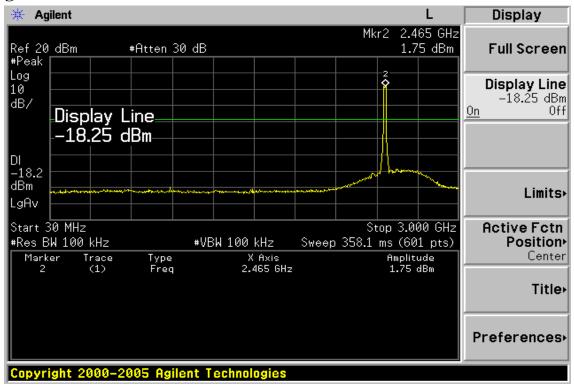
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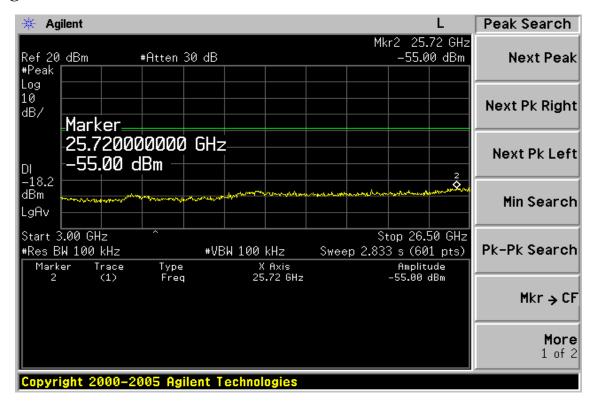
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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)

Operation Mode 802.11b TX CH Low Test Date Nov. 26, 2009

Test By Fundamental Frequency 2412MHz Jazz

Pol Temperature Ver./Hor. 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|-----------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)             |
| 70.74  | V        | Peak             | 45.10   | -16.27 | 28.83     | 40.00    | -11.17           |
| 90.14  | V        | Peak             | 46.40   | -17.62 | 28.78     | 43.50    | -14.72           |
| 162.89 | V        | Peak             | 36.76   | -13.57 | 23.19     | 43.50    | -20.31           |
| 201.69 | V        | Peak             | 37.11   | -15.55 | 21.56     | 43.50    | -21.94           |
| 293.84 | V        | Peak             | 38.06   | -13.19 | 24.87     | 46.00    | -21.13           |
| 410.24 | V        | Peak             | 35.51   | -9.64  | 25.87     | 46.00    | -20.13           |
|        |          |                  |         |        |           |          |                  |
| 38.73  | Н        | Peak             | 42.79   | -13.84 | 28.95     | 40.00    | -11.05           |
| 65.89  | Н        | Peak             | 43.30   | -15.09 | 28.21     | 40.00    | -11.79           |
| 162.89 | Н        | Peak             | 45.29   | -13.57 | 31.72     | 43.50    | -11.78           |
| 213.33 | Н        | Peak             | 46.89   | -15.16 | 31.73     | 43.50    | -11.77           |
| 332.64 | Н        | Peak             | 40.13   | -12.16 | 27.97     | 46.00    | -18.03           |
| 371.44 | Н        | Peak             | 41.35   | -11.02 | 30.33     | 46.00    | -15.67           |

### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)

Operation Mode 802.11b TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|-----------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)             |
| 70.74  | V        | Peak             | 45.29   | -16.27 | 29.02     | 40.00    | -10.98           |
| 90.14  | V        | Peak             | 45.86   | -17.62 | 28.24     | 43.50    | -15.26           |
| 213.33 | V        | Peak             | 37.57   | -15.16 | 22.41     | 43.50    | -21.09           |
| 293.84 | V        | Peak             | 38.16   | -13.19 | 24.97     | 46.00    | -21.03           |
| 410.24 | V        | Peak             | 35.40   | -9.64  | 25.76     | 46.00    | -20.24           |
| 487.84 | V        | Peak             | 33.92   | -8.57  | 25.35     | 46.00    | -20.65           |
|        |          |                  |         |        |           |          |                  |
| 38.73  | Н        | Peak             | 42.95   | -13.84 | 29.11     | 40.00    | -10.89           |
| 65.89  | Н        | Peak             | 42.39   | -15.09 | 27.30     | 40.00    | -12.70           |
| 162.89 | Н        | Peak             | 45.50   | -13.57 | 31.93     | 43.50    | -11.57           |
| 213.33 | Н        | Peak             | 47.75   | -15.16 | 32.59     | 43.50    | -10.91           |
| 332.64 | Н        | Peak             | 40.73   | -12.16 | 28.57     | 46.00    | -17.43           |
| 371.44 | Н        | Peak             | 41.55   | -11.02 | 30.53     | 46.00    | -15.47           |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)

Operation Mode 802.11b TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|-----------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)             |
| 65.89  | V        | Peak             | 45.17   | -15.09 | 30.08     | 40.00    | -9.92            |
| 90.14  | V        | Peak             | 45.24   | -17.62 | 27.62     | 43.50    | -15.88           |
| 201.69 | V        | Peak             | 37.21   | -15.55 | 21.66     | 43.50    | -21.84           |
| 293.84 | V        | Peak             | 37.81   | -13.19 | 24.62     | 46.00    | -21.38           |
| 410.24 | V        | Peak             | 35.40   | -9.64  | 25.76     | 46.00    | -20.24           |
| 487.84 | V        | Peak             | 35.13   | -8.57  | 26.56     | 46.00    | -19.44           |
|        |          |                  |         |        |           |          |                  |
| 65.89  | Н        | Peak             | 43.84   | -15.09 | 28.75     | 40.00    | -11.25           |
| 162.89 | Н        | Peak             | 45.36   | -13.57 | 31.79     | 43.50    | -11.71           |
| 213.33 | Н        | Peak             | 47.35   | -15.16 | 32.19     | 43.50    | -11.31           |
| 293.84 | Н        | Peak             | 39.43   | -13.19 | 26.24     | 46.00    | -19.76           |
| 332.64 | Н        | Peak             | 40.66   | -12.16 | 28.50     | 46.00    | -17.50           |
| 371.44 | Н        | Peak             | 42.03   | -11.02 | 31.01     | 46.00    | -14.99           |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)

802.11g TX CH Low Operation Mode Test Date Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|-----------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)             |
| 90.14  | V        | Peak             | 47.71   | -17.62 | 30.09     | 43.50    | -13.41           |
| 162.89 | V        | Peak             | 36.64   | -13.57 | 23.07     | 43.50    | -20.43           |
| 293.84 | V        | Peak             | 37.96   | -13.19 | 24.77     | 46.00    | -21.23           |
| 410.24 | V        | Peak             | 35.39   | -9.64  | 25.75     | 46.00    | -20.25           |
| 589.69 | V        | Peak             | 33.50   | -6.36  | 27.14     | 46.00    | -18.86           |
| 846.74 | V        | Peak             | 32.24   | -2.04  | 30.20     | 46.00    | -15.80           |
|        |          |                  |         |        |           |          |                  |
| 38.73  | Н        | Peak             | 43.52   | -13.84 | 29.68     | 40.00    | -10.32           |
| 150.28 | Н        | Peak             | 41.32   | -12.83 | 28.49     | 43.50    | -15.01           |
| 162.89 | Н        | Peak             | 44.82   | -13.57 | 31.25     | 43.50    | -12.25           |
| 213.33 | Н        | Peak             | 46.97   | -15.16 | 31.81     | 43.50    | -11.69           |
| 332.64 | Н        | Peak             | 40.49   | -12.16 | 28.33     | 46.00    | -17.67           |
| 371.44 | Н        | Peak             | 41.35   | -11.02 | 30.33     | 46.00    | -15.67           |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)

Operation Mode 802.11g TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | <b>Actual FS</b> | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|------------------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)         | (dBuV/m) | (dB)             |
| 90.14  | V        | Peak             | 47.79   | -17.62 | 30.17            | 43.50    | -13.33           |
| 162.89 | V        | Peak             | 36.70   | -13.57 | 23.13            | 43.50    | -20.37           |
| 252.13 | V        | Peak             | 35.23   | -13.72 | 21.51            | 46.00    | -24.49           |
| 293.84 | V        | Peak             | 37.74   | -13.19 | 24.55            | 46.00    | -21.45           |
| 410.24 | V        | Peak             | 36.00   | -9.64  | 26.36            | 46.00    | -19.64           |
| 798.24 | V        | Peak             | 32.50   | -3.08  | 29.42            | 46.00    | -16.58           |
|        |          |                  |         |        |                  |          |                  |
| 38.73  | Н        | Peak             | 43.24   | -13.84 | 29.40            | 40.00    | -10.60           |
| 65.89  | Н        | Peak             | 41.74   | -15.09 | 26.65            | 40.00    | -13.35           |
| 162.89 | Н        | Peak             | 44.80   | -13.57 | 31.23            | 43.50    | -12.27           |
| 213.33 | Н        | Peak             | 46.95   | -15.16 | 31.79            | 43.50    | -11.71           |
| 332.64 | Н        | Peak             | 40.55   | -12.16 | 28.39            | 46.00    | -17.61           |
| 371.44 | Н        | Peak             | 41.18   | -11.02 | 30.16            | 46.00    | -15.84           |

## Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)

802.11g TX CH High Operation Mode Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 60 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Mar-<br>gin |
|--------|----------|------------------|---------|--------|-----------|----------|------------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)             |
| 90.14  | V        | Peak             | 46.93   | -17.62 | 29.31     | 43.50    | -14.19           |
| 162.89 | V        | Peak             | 36.38   | -13.57 | 22.81     | 43.50    | -20.69           |
| 293.84 | V        | Peak             | 38.06   | -13.19 | 24.87     | 46.00    | -21.13           |
| 410.24 | V        | Peak             | 35.26   | -9.64  | 25.62     | 46.00    | -20.38           |
| 487.84 | V        | Peak             | 35.69   | -8.57  | 27.12     | 46.00    | -18.88           |
| 710.94 | V        | Peak             | 32.14   | -4.84  | 27.30     | 46.00    | -18.70           |
|        |          |                  |         |        |           |          |                  |
| 38.73  | Н        | Peak             | 43.44   | -13.84 | 29.60     | 40.00    | -10.40           |
| 65.89  | Н        | Peak             | 41.89   | -15.09 | 26.80     | 40.00    | -13.20           |
| 162.89 | Н        | Peak             | 45.03   | -13.57 | 31.46     | 43.50    | -12.04           |
| 213.33 | Н        | Peak             | 47.02   | -15.16 | 31.86     | 43.50    | -11.64           |
| 371.44 | Н        | Peak             | 41.58   | -11.02 | 30.56     | 46.00    | -15.44           |
| 449.04 | Н        | Peak             | 35.60   | -8.61  | 26.99     | 46.00    | -19.01           |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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#### Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz Pol Ver. Temperature 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 34.73   |               | 6.05    | 40.78    |               | 74.00    | 54.00         | -13.22 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14472.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 16884.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19296.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21708.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24120.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz Pol Temperature 23 Hor.

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 33.19   |               | 6.05    | 39.24    |               | 74.00    | 54.00         | -14.76 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14472.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 16884.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19296.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21708.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24120.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz Pol Ver. Temperature 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 34.06   |               | 6.17    | 40.23    |               | 74.00    | 54.00         | -13.77 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14622.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17059.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19496.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21933.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24370.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz Pol Temperature Hor. 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 33.80   |               | 6.17    | 39.97    |               | 74.00    | 54.00         | -14.03 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14622.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17059.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19496.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21933.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24370.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz Pol Ver. Temperature 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.63   |               | 6.28    | 39.91    |               | 74.00    | 54.00         | -14.09 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14772.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17234.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19696.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 22158.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24620.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode 802.11b TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz Pol Temperature Hor. 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.65   |               | 6.28    | 39.93    |               | 74.00    | 54.00         | -14.07 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14772.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17234.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19696.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 22158.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24620.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz Pol Ver. Temperature 25

Humidity 60 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 33.31   |               | 6.05    | 39.36    |               | 74.00    | 54.00         | -14.64 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14472.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 16884.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19296.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21708.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24120.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental (1) frequency
- Data of measurement within this frequency range shown " " in the table above means (2) the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 (5) ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz Pol Temperature Hor. 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 32.85   |               | 6.05    | 38.90    |               | 74.00    | 54.00         | -15.10 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14472.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 16884.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19296.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21708.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24120.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz Pol Ver. Temperature 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 33.58   |               | 6.17    | 39.75    |               | 74.00    | 54.00         | -14.25 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14622.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17059.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19496.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21933.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24370.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH Mid Test Date Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz Pol Temperature Hor. 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 34.12   |               | 6.17    | 40.29    |               | 74.00    | 54.00         | -13.71 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14622.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17059.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19496.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 21933.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24370.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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#### Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz Pol Ver. Temperature 23

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 32.78   |               | 6.28    | 39.06    |               | 74.00    | 54.00         | -14.94 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14772.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17234.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19696.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 22158.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24620.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode 802.11g TX CH High Test Date Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz 23 °C Pol Hor. Temperature

Humidity 54 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 34.46   |               | 6.28    | 40.74    |               | 74.00    | 54.00         | -13.26 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 14772.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 17234.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 19696.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 22158.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 24620.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- Spectrum AV Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11b RX CH Low **Test Date** Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 65.89  | V        | Peak             | 45.02   | -15.09 | 29.93     | 40.00    | -10.07      |
| 90.14  | V        | Peak             | 46.58   | -17.62 | 28.96     | 43.50    | -14.54      |
| 162.89 | V        | Peak             | 37.33   | -13.57 | 23.76     | 43.50    | -19.74      |
| 293.84 | V        | Peak             | 38.23   | -13.19 | 25.04     | 46.00    | -20.96      |
| 410.24 | V        | Peak             | 35.81   | -9.64  | 26.17     | 46.00    | -19.83      |
| 647.89 | V        | Peak             | 32.26   | -4.99  | 27.27     | 46.00    | -18.73      |
|        |          |                  |         |        |           |          |             |
| 65.89  | Н        | Peak             | 43.24   | -15.09 | 28.15     | 40.00    | -11.85      |
| 162.89 | Н        | Peak             | 45.66   | -13.57 | 32.09     | 43.50    | -11.41      |
| 213.33 | Н        | Peak             | 46.55   | -15.16 | 31.39     | 43.50    | -12.11      |
| 293.84 | Н        | Peak             | 39.60   | -13.19 | 26.41     | 46.00    | -19.59      |
| 332.64 | Н        | Peak             | 40.09   | -12.16 | 27.93     | 46.00    | -18.07      |
| 371.44 | Н        | Peak             | 41.93   | -11.02 | 30.91     | 46.00    | -15.09      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11b RX CH Mid **Test Date** Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 90.14  | V        | Peak             | 45.35   | -17.62 | 27.73     | 43.50    | -15.77      |
| 162.89 | V        | Peak             | 36.88   | -13.57 | 23.31     | 43.50    | -20.19      |
| 255.04 | V        | Peak             | 35.09   | -13.69 | 21.40     | 46.00    | -24.60      |
| 293.84 | V        | Peak             | 38.28   | -13.19 | 25.09     | 46.00    | -20.91      |
| 410.24 | V        | Peak             | 35.41   | -9.64  | 25.77     | 46.00    | -20.23      |
| 623.64 | V        | Peak             | 32.14   | -5.51  | 26.63     | 46.00    | -19.37      |
|        |          |                  |         |        |           |          |             |
| 67.83  | Н        | Peak             | 42.96   | -15.60 | 27.36     | 40.00    | -12.64      |
| 162.89 | Н        | Peak             | 45.20   | -13.57 | 31.63     | 43.50    | -11.87      |
| 213.33 | Н        | Peak             | 46.56   | -15.16 | 31.40     | 43.50    | -12.10      |
| 293.84 | Н        | Peak             | 39.73   | -13.19 | 26.54     | 46.00    | -19.46      |
| 371.44 | Н        | Peak             | 41.59   | -11.02 | 30.57     | 46.00    | -15.43      |
| 449.04 | H        | Peak             | 34.90   | -8.61  | 26.29     | 46.00    | -19.71      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11b RX CH High **Test Date** Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65%

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 90.14  | V        | Peak             | 47.49   | -17.62 | 29.87     | 43.50    | -13.63      |
| 162.89 | V        | Peak             | 37.55   | -13.57 | 23.98     | 43.50    | -19.52      |
| 293.84 | V        | Peak             | 38.61   | -13.19 | 25.42     | 46.00    | -20.58      |
| 410.24 | V        | Peak             | 35.36   | -9.64  | 25.72     | 46.00    | -20.28      |
| 487.84 | V        | Peak             | 34.24   | -8.57  | 25.67     | 46.00    | -20.33      |
| 683.19 | V        | Peak             | 32.66   | -5.23  | 27.43     | 46.00    | -18.57      |
|        |          |                  |         |        |           |          |             |
| 67.83  | Н        | Peak             | 43.57   | -15.60 | 27.97     | 40.00    | -12.03      |
| 162.89 | Н        | Peak             | 45.35   | -13.57 | 31.78     | 43.50    | -11.72      |
| 213.33 | Н        | Peak             | 46.61   | -15.16 | 31.45     | 43.50    | -12.05      |
| 332.64 | Н        | Peak             | 40.46   | -12.16 | 28.30     | 46.00    | -17.70      |
| 371.44 | Н        | Peak             | 41.57   | -11.02 | 30.55     | 46.00    | -15.45      |
| 449.04 | Н        | Peak             | 35.35   | -8.61  | 26.74     | 46.00    | -19.26      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11g RX CH Low **Test Date** Nov. 26, 2009

Fundamental Frequency 2412MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 65.89  | V        | Peak             | 45.23   | -15.09 | 30.14     | 40.00    | -9.86       |
| 90.14  | V        | Peak             | 46.35   | -17.62 | 28.73     | 43.50    | -14.77      |
| 162.89 | V        | Peak             | 36.83   | -13.57 | 23.26     | 43.50    | -20.24      |
| 293.84 | V        | Peak             | 38.45   | -13.19 | 25.26     | 46.00    | -20.74      |
| 410.24 | V        | Peak             | 35.79   | -9.64  | 26.15     | 46.00    | -19.85      |
| 487.84 | V        | Peak             | 34.27   | -8.57  | 25.70     | 46.00    | -20.30      |
|        |          |                  |         |        |           |          |             |
| 65.89  | Н        | Peak             | 44.13   | -15.09 | 29.04     | 40.00    | -10.96      |
| 162.89 | Н        | Peak             | 45.31   | -13.57 | 31.74     | 43.50    | -11.76      |
| 213.33 | Н        | Peak             | 46.65   | -15.16 | 31.49     | 43.50    | -12.01      |
| 332.64 | Н        | Peak             | 40.76   | -12.16 | 28.60     | 46.00    | -17.40      |
| 371.44 | Н        | Peak             | 40.74   | -11.02 | 29.72     | 46.00    | -16.28      |
| 449.04 | H        | Peak             | 35.70   | -8.61  | 27.09     | 46.00    | -18.91      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11g RX CH Mid **Test Date** Nov. 26, 2009

Fundamental Frequency 2437MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65 %

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 72.68  | V        | Peak             | 45.67   | -16.62 | 29.05     | 40.00    | -10.95      |
| 90.14  | V        | Peak             | 48.22   | -17.62 | 30.60     | 43.50    | -12.90      |
| 162.89 | V        | Peak             | 36.87   | -13.57 | 23.30     | 43.50    | -20.20      |
| 293.84 | V        | Peak             | 38.48   | -13.19 | 25.29     | 46.00    | -20.71      |
| 410.24 | V        | Peak             | 35.31   | -9.64  | 25.67     | 46.00    | -20.33      |
| 523.73 | V        | Peak             | 38.56   | -8.08  | 30.48     | 46.00    | -15.52      |
|        |          |                  |         |        |           |          |             |
| 65.89  | Н        | Peak             | 42.34   | -15.09 | 27.25     | 40.00    | -12.75      |
| 162.89 | Н        | Peak             | 45.20   | -13.57 | 31.63     | 43.50    | -11.87      |
| 213.33 | Н        | Peak             | 46.71   | -15.16 | 31.55     | 43.50    | -11.95      |
| 332.64 | Н        | Peak             | 40.28   | -12.16 | 28.12     | 46.00    | -17.88      |
| 371.44 | Н        | Peak             | 40.94   | -11.02 | 29.92     | 46.00    | -16.08      |
| 449.04 | H        | Peak             | 35.80   | -8.61  | 27.19     | 46.00    | -18.81      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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## Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode 802.11g RX CH High **Test Date** Nov. 26, 2009

Fundamental Frequency 2462MHz Test By Jazz

Pol Ver./Hor. **Temperature** 25

Humidity 65%

| Freq.  | Ant.Pol. | Detector<br>Mode | Reading | Factor | Actual FS | Limit3m  | Safe Margin |
|--------|----------|------------------|---------|--------|-----------|----------|-------------|
| (MHz)  | H/V      | (PK/QP)          | (dBuV)  | (dB)   | (dBuV/m)  | (dBuV/m) | (dB)        |
| 90.14  | V        | Peak             | 46.69   | -17.62 | 29.07     | 43.50    | -14.43      |
| 162.89 | V        | Peak             | 37.38   | -13.57 | 23.81     | 43.50    | -19.69      |
| 293.84 | V        | Peak             | 38.63   | -13.19 | 25.44     | 46.00    | -20.56      |
| 410.24 | V        | Peak             | 35.11   | -9.64  | 25.47     | 46.00    | -20.53      |
| 487.84 | V        | Peak             | 34.49   | -8.57  | 25.92     | 46.00    | -20.08      |
| 848.68 | V        | Peak             | 32.02   | -2.01  | 30.01     | 46.00    | -15.99      |
|        |          |                  |         |        |           |          |             |
| 67.83  | Н        | Peak             | 43.18   | -15.60 | 27.58     | 40.00    | -12.42      |
| 162.89 | Н        | Peak             | 45.47   | -13.57 | 31.90     | 43.50    | -11.60      |
| 213.33 | Н        | Peak             | 46.53   | -15.16 | 31.37     | 43.50    | -12.13      |
| 332.64 | Н        | Peak             | 40.30   | -12.16 | 28.14     | 46.00    | -17.86      |
| 371.44 | Н        | Peak             | 41.40   | -11.02 | 30.38     | 46.00    | -15.62      |
| 449.04 | Н        | Peak             | 35.71   | -8.61  | 27.10     | 46.00    | -18.90      |

#### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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#### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH Low Test Date Nov. 26, 2009

Fundamental Frequency 2412 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 32.84   |               | 6.05    | 38.89    |               | 74.00    | 54.00         | -15.11 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH Low Nov. 26, 2009 **Test Date** 

Fundamental Frequency 2412 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 32.99   |               | 6.05    | 39.04    |               | 74.00    | 54.00         | -14.96 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH Mid Nov. 26, 2009 Test Date

Fundamental Frequency 2437 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 32.82   |               | 6.17    | 38.99    |               | 74.00    | 54.00         | -15.01 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH Mid Nov. 26, 2009 **Test Date** 

Fundamental Frequency 2437 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65%

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 34.38   |               | 6.17    | 40.55    |               | 74.00    | 54.00         | -13.45 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH High Nov. 26, 2009 Test Date

Fundamental Frequency 2462 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.99   |               | 6.28    | 40.27    |               | 74.00    | 54.00         | -13.73 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11b RX CH High Nov. 26, 2009 **Test Date** 

Fundamental Frequency 2462 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.29   |               | 6.28    | 39.57    |               | 74.00    | 54.00         | -14.43 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH Low Nov. 26, 2009 Test Date

Fundamental Frequency 2412 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 32.80   |               | 6.05    | 38.85    |               | 74.00    | 54.00         | -15.15 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH Low Nov. 26, 2009 Test Date

Fundamental Frequency 2412 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4824.0  | 32.95   |               | 6.05    | 39.00    |               | 74.00    | 54.00         | -15.00 | Peak |
| 7236.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9648.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12060.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH Mid Nov. 26, 2009 Test Date

Fundamental Frequency 2437 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 32.77   |               | 6.17    | 38.94    |               | 74.00    | 54.00         | -15.06 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH Mid Nov. 26, 2009 **Test Date** 

Fundamental Frequency 2437 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65%

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4874.0  | 33.45   |               | 6.17    | 39.62    |               | 74.00    | 54.00         | -14.38 | Peak |
| 7311.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9748.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12185.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH High Nov. 26, 2009 Test Date

Fundamental Frequency 2462 MHz Test By Jazz Pol Ver. Temperature 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.39   |               | 6.28    | 39.67    |               | 74.00    | 54.00         | -14.33 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode 802.11g RX CH High Nov. 26, 2009 **Test Date** 

Fundamental Frequency 2462 MHz Test By Jazz Pol Temperature Hor. 25

Humidity 65 %

|         | Peak    | $\mathbf{AV}$ |         | Actu     | al FS         | Peak     | $\mathbf{AV}$ |        |      |
|---------|---------|---------------|---------|----------|---------------|----------|---------------|--------|------|
| Freq.   | Reading | Reading       | Ant./CL | Peak     | $\mathbf{AV}$ | Limit    | Limit         | Margin |      |
| (MHz)   | (dBuV)  | (dBuV)        | CF(dB)  | (dBuV/m) | (dBuV/m)      | (dBuV/m) | (dBuV/m)      | (dB)   |      |
| 4924.0  | 33.48   |               | 6.28    | 39.76    |               | 74.00    | 54.00         | -14.24 | Peak |
| 7386.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 9848.0  |         |               |         |          |               | 74.00    | 54.00         |        |      |
| 12310.0 |         |               |         |          |               | 74.00    | 54.00         |        |      |

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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<sub>o</sub>
- (4) Spectrum Peak Setting: 1GHz-40GHz, RBW= 3MHz, VBW= 1MHz, Sweep time= 200
- (5) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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# 10 Peak Power Spectral Density

# 10.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

According to RSS-210 issue 7, §A8.2(2) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0 second duration.

# **10.2 Measurement Equipment Used:**

Refer to section 6.2 for details.

## 10.3 Test Set-up:

Refer to section 6.3 for details.

### 10.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

#### **Measurement Result:** 10.5

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## 802.11b

| СН   | RF Power Density | Cable loss | RF Power Density | Maximum Limit |
|------|------------------|------------|------------------|---------------|
|      | Reading (dBm)    | (dB)       | Level (dBm)      | (dBm)         |
| Low  | -8.69            | 0.00       | -8.69            | 8             |
| Mid  | -8.36            | 0.00       | -8.36            | 8             |
| High | -6.97            | 0.00       | -6.97            | 8             |

### 802.11g

| СН   | RF Power Density | Cable loss | RF Power Density | Maximum Limit |
|------|------------------|------------|------------------|---------------|
|      | Reading (dBm)    | (dB)       | Level (dBm)      | (dBm)         |
| Low  | -14.08           | 0.00       | -14.08           | 8             |
| Mid  | -13.05           | 0.00       | -13.05           | 8             |
| High | -13.41           | 0.00       | -13.41           | 8             |

Note: Refer to next page for plots.

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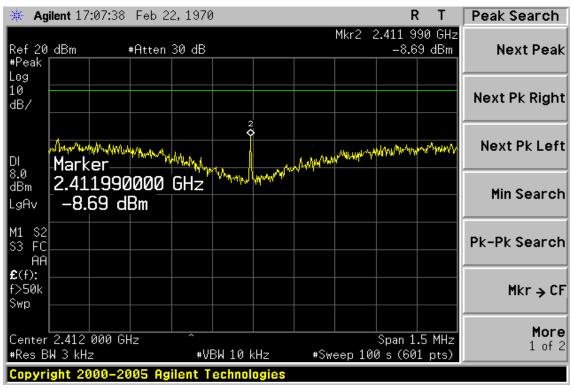
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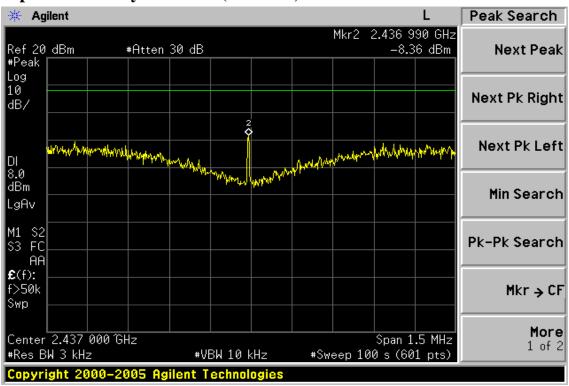
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802.11b **Power Spectral Density Test Plot (CH-Low)** 



# **Power Spectral Density Test Plot (CH-Mid)**



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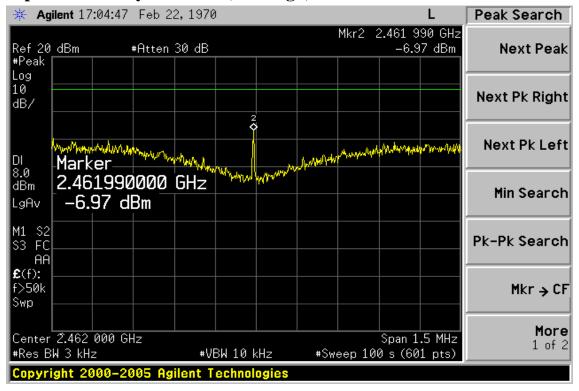
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# **Power Spectral Density Test Plot (CH-High)**



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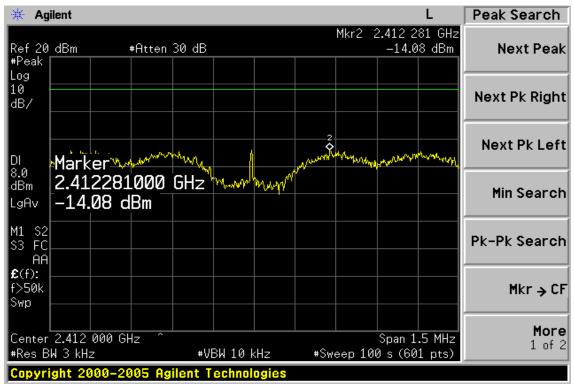
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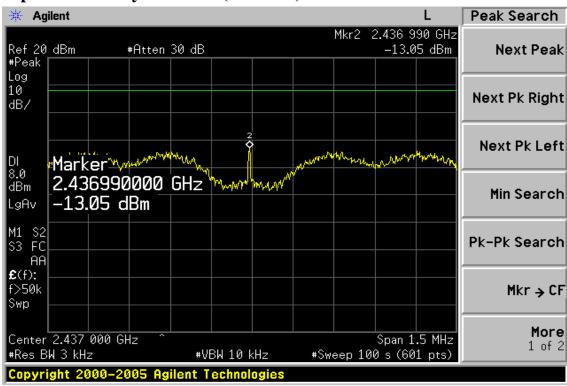
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802.11g **Power Spectral Density Test Plot (CH-Low)** 



# **Power Spectral Density Test Plot (CH-Mid)**



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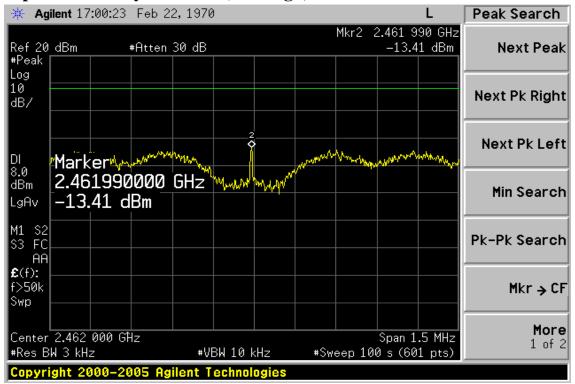
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# **Power Spectral Density Test Plot (CH-High)**



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# 11 ANTENNA REQUIREMENT

# 11.1. Standard Applicable:

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can

replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some

field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that

proper antenna is employed so that the limits in this Part are not exceeded.

According to RSS-GEN 7.1.4, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using

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the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

### 11.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is -0.51 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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# 12 99% Bandwidth Measurement

# 12.1. Standard Applicable:

RSS-Gen §4.4.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

# 12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 12.3. Test Set-up:

Refer to section 6.3 for details.

#### **12.4.** Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
- 4. Turn on the 99% bandwidth function, max reading...
- 5. Repeat above procedures until all frequency measured were complete.

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### 12.5. Measurement Result:

802.11h

| Frequency | Bandwidth |  |
|-----------|-----------|--|
| MHz       | (MHz)     |  |
| 2412      | 13.54     |  |
| 2437      | 14.48     |  |
| 2462      | 14.47     |  |

802.11g

| Frequency<br>MHz | Bandwidth |  |
|------------------|-----------|--|
|                  | (MHz)     |  |
| 2412             | 16.43     |  |
| 2437             | 16.44     |  |
| 2462             | 16.44     |  |

Note: Refer to next page for plots.

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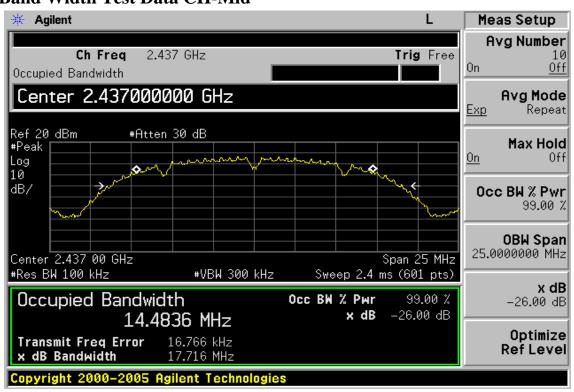
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### 802.11b

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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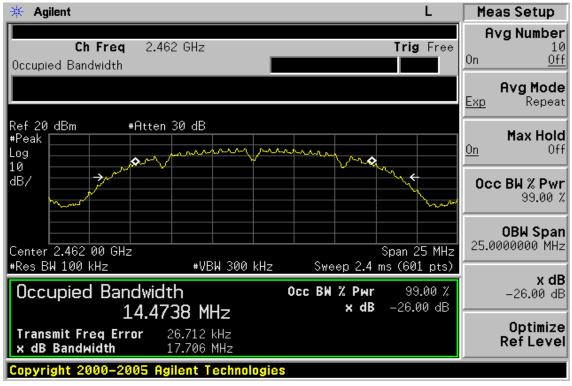
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# 99% Band Width Test Data CH-High



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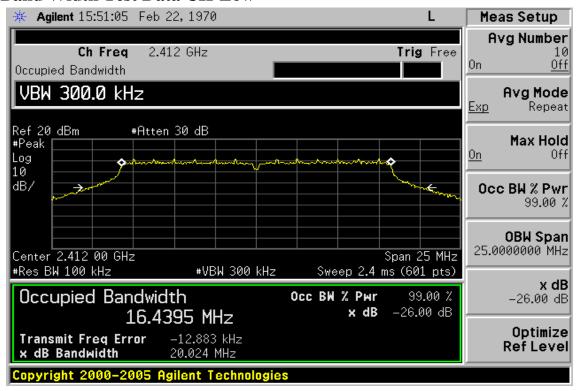


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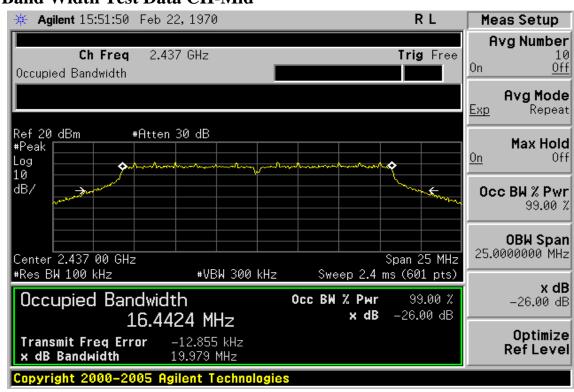
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# 802.11g

### 99% Band Width Test Data CH-Low



### 99% Band Width Test Data CH-Mid



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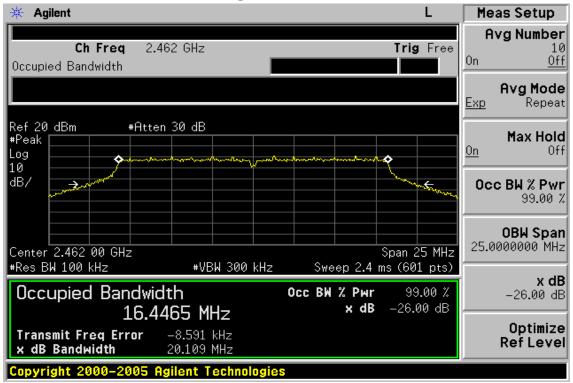
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# 99% Band Width Test Data CH-High



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# 13 Maximum Permissible Exposure (MPE)

# 13.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

| Frequency Range                                     | Electric Field | Magnetic Field | Power Density | Averaging Time |
|---|----------------|----------------|---------------|----------------|
| (MHz)   | Strength (V/m) | Strength (A/m) | $(mW/cm^2)$   | (minute)       |
| Limits for General Population/Uncontrolled Exposure |                |                |               |                |
| 0.3-1.34  | 614            | 1.63           | *(100)        | 30             |
| 1.34-30   | 824/f          | 2.19/f         | $*(180/f^2)$  | 30             |
| 30-300  | 27.5           | 0.073          | 0.2           | 30             |
| 300-1500  | /              | /              | F/1500        | 30             |
| 1500-15000  | /              | /              | 1.0           | 30             |

F = frequency in MHz

\* = Plane-wave equipment power density

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# 13.2 Maximum Permissible Exposure (MPE) Evaluation

#### 802.11b Power Table

| Frequency (MHz) | Reading<br>Power<br>(dBm) | Cable Loss | Output<br>Power<br>(dBm) | Output<br>Power<br>(W) | Limit<br>(W) |
|-----------------|---------------------------|------------|--------------------------|------------------------|--------------|
| 2412.00         | 15.24                     | 0.00       | 15.24                    | 0.03041                | 1            |
| 2437.00         | 15.01                     | 0.00       | 15.01                    | 0.02547                | 1            |
| 2462.00         | 15.55                     | 0.00       | 15.55                    | 0.02884                | 1            |

### MPE Prediction (802.11b)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

 $S=PG/4 \pi R^2$ 

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

| Maximum peak output power at antenna input terminal: | 15.55       | (dBm)     |
|--|-------------|-----------|
| Maximum peak output power at antenna input terminal: | 35.89219346 | (mW)      |
| Duty cycle:  | 100         | (%)       |
| Maximum Pav :  | 35.89219346 | (mW)      |
| Antenna gain (typical):                              | -0.51       | (dBi)     |
| Maximum antenna gain:                                | 0.889201118 | (numeric) |
| Prediction distance:                                 | 20          | (cm)      |
| Prediction frequency:                                | 2412        | (MHz)     |
|  |             |           |
| MPE limit for uncontrolled exposure at prediction    | 1           | (mW/cm2)  |
| Power density at predication frequency at 20 (cm)    | 0.0063526   | (mW/cm^2) |

### **Measurement Result**

The predicted power density level at 20 cm is 0.0064 mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2412MHz.

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### 802.11g Power Table

| Frequency (MHz) | Reading<br>Power<br>(dBm) | Cable Loss | Output<br>Power<br>(dBm) | Output<br>Power<br>(W) | Limit (W) |
|-----------------|---------------------------|------------|--------------------------|------------------------|-----------|
| 2412.00         | 14.83                     | 0.00       | 14.83                    | 0.03041                | 1         |
| 2437.00         | 14.06                     | 0.00       | 14.06                    | 0.02547                | 1         |
| 2462.00         | 14.60                     | 0.00       | 14.60                    | 0.02884                | 1         |

# MPE Prediction (802.11g)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

 $S=PG/4 \pi R^2$ 

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

| Maximum peak output power at antenna input terminal: | 14.83       | (dBm)     |
|--|-------------|-----------|
| Maximum peak output power at antenna input terminal: | 30.40885026 | (mW)      |
| Duty cycle:  | 100         | (%)       |
| Maximum Pav :  | 30.40885026 | (mW)      |
| Antenna gain (typical):                              | -0.51       | (dBi)     |
| Maximum antenna gain:                                | 0.889201118 | (numeric) |
| Prediction distance:                                 | 20          | (cm)      |
| Prediction frequency:                                | 2412        | (MHz)     |
|  |             |           |
| MPE limit for uncontrolled exposure at prediction    | 1           | (mW/cm2)  |
| Power density at predication frequency at 20 (cm)    | 0.0053821   | (mW/cm^2) |

### **Measurement Result**

The predicted power density level at 20 cm is 0.0054 mW/cm2. This is below the uncontrolled exposure limit of 1 mW/cm2 at 2412.

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