

# **SPORTON International Inc.**

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# **FCC RADIO TEST REPORT**

| Applicant's company    | Ralink Technology Corporation  |
|------------------------|--|
| Applicant Address      | 5F., No.36, Taiyuan St., Jhubei City, Hsinchu County 302, Taiwan,        |
|                        | R.O.C.   |
| FCC ID                 | VQF-RT3070HMC  |
| Manufacturer's company | Ralink Technology Corporation  |
| Manufacturer Address   | 5F., No.36, Taiyuan St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C. |

| Product Name     | 11b/g/n 111R WLAN Mini Card           |
|------------------|---------------------------------------|
| Brand Name       | Ralink                                |
| Model Name       | RT3070HMC                             |
| Test Rule        | 47 CFR FCC Part 15 Subpart C § 15.247 |
| Test Freq. Range | 2400 ~ 2483.5MHz                      |
| Received Date    | Sep. 23, 2009                         |
| Final Test Date  | Oct. 13, 2009                         |
| Submission Type  | Original Equipment                    |
|                  |                                       |



### Statement

Test result included in this report is for the Draft n and 802.11b/g part of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full. The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in ANSI C63.4-2003 and 47 CFR FCC Part 15 Subpart C. The test equipment used to perform the test is calibrated and traceable to NML/ROC.





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# History of This Test Report

Original Issue Date: Oct. 13, 2009

Report No.: FR9O0118

■ No additional attachment.

 $\hfill\Box$  Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|----------------|------------|-------------|
|                |            | •           |
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Certificate No.: CB9810023

### 1. CERTIFICATE OF COMPLIANCE

Product Name: 1

11b/g/n 1T1R WLAN Mini Card

Brand Name :

Ralink

Model Name :

RT3070HMC

Applicant:

Ralink Technology Corporation

Test Rule Part(s) :

47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Sep. 23, 2009 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Jordan Hsian 2019, 10.14

SPORTON INTERNATIONAL INC.



# 2. SUMMARY OF THE TEST RESULT

|      | Applied Standard: 47 CFR FCC Part 15 Subpart C |                                   |             |          |  |  |  |  |
|------|--|-----------------------------------|-------------|----------|--|--|--|--|
| Part | Rule Section                                   | Result                            | Under Limit |          |  |  |  |  |
| 4.1  | 15.207   | AC Power Line Conducted Emissions | Complies    | 9.29 dB  |  |  |  |  |
| 4.2  | 15.247(b)(3)                                   | Maximum Conducted Output Power    | Complies    | 5.09 dB  |  |  |  |  |
| 4.3  | 15.247(e)                                      | Power Spectral Density            | Complies    | 17.13 dB |  |  |  |  |
| 4.4  | 15.247(a)(2)                                   | 6dB Spectrum Bandwidth            | Complies    | -        |  |  |  |  |
| 4.5  | 15.247(d)                                      | Radiated Emissions                | Complies    | 0.03 dB  |  |  |  |  |
| 4.6  | 15.247(d)                                      | Band Edge Emissions               | Complies    | 0.19 dB  |  |  |  |  |
| 4.7  | 15.203   | Antenna Requirements              | Complies    | -        |  |  |  |  |

| Test Items                                  | Uncertainty           | Remark                   |
|---|-----------------------|--------------------------|
| AC Power Line Conducted Emissions           | ±2.3dB                | Confidence levels of 95% |
| Maximum Conducted Output Power              | ±0.8dB                | Confidence levels of 95% |
| Power Spectral Density                      | ±0.5dB                | Confidence levels of 95% |
| 6dB Spectrum Bandwidth                      | ±8.5×10 <sup>-8</sup> | Confidence levels of 95% |
| Radiated Emissions (9kHz~30MHz)             | ±0.8dB                | Confidence levels of 95% |
| Radiated Emissions (30MHz~1000MHz)          | ±1.9dB                | Confidence levels of 95% |
| Radiated / Band Edge Emissions (1GHz~18GHz) | ±1.9dB                | Confidence levels of 95% |
| Radiated Emissions (18GHz~40GHz)            | ±1.9dB                | Confidence levels of 95% |
| Temperature                                 | ±0.7°C                | Confidence levels of 95% |
| Humidity                                    | ±3.2%                 | Confidence levels of 95% |
| DC / AC Power Source                        | ±1.4%                 | Confidence levels of 95% |

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# 3. GENERAL INFORMATION

# 3.1. Product Details

### Draft n

| Items                    | Description                                       |
|--------------------------|---|
| Product Type             | WLAN (1TX, 1RX)                                   |
| Radio Type               | Intentional Transceiver                           |
| Power Type               | From host system                                  |
| Modulation               | see the below table for draft n                   |
| Data Modulation          | OFDM (BPSK / QPSK / 16QAM / 64QAM)                |
| Data Rate (Mbps)         | see the below table for Draft n                   |
| Frequency Range          | 2400 ~ 2483.5MHz                                  |
| Channel Number           | 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth    |
| Channel Band Width (99%) | MCS0 (20MHz): 17.60 MHz ; MCS0 (40MHz): 36.08 MHz |
| Conducted Output Power   | MCS0 (20MHz): 24.90 dBm ; MCS0 (40MHz): 24.91 dBm |
| Carrier Frequencies      | Please refer to section 3.4                       |
| Antenna                  | Please refer to section 3.3                       |

# 802.11b/g

| Items                    | Description  |
|--------------------------|--|
| Product Type             | WLAN (1TX, 1RX)  |
| Radio Type               | Intentional Transceiver                                      |
| Power Type               | From host system   |
| Modulation               | DSSS for IEEE 802.11b; OFDM for IEEE 802.11g                 |
| Data Modulation          | DSSS (BPSK / QPSK / CCK); OFDM (BPSK / QPSK / 16QAM / 64QAM) |
| Data Rate (Mbps)         | DSSS (1/ 2/ 5.5/11); OFDM (6/9/12/18/24/36/48/54)            |
| Frequency Range          | 2400 ~ 2483.5MHz   |
| Channel Number           | 11   |
| Channel Band Width (99%) | 11b: 14.44 MHz ; 11g: 16.44 MHz                              |
| Conducted Output Power   | 11b: 22.26 dBm ; 11g: 24.75 dBm                              |
| Carrier Frequencies      | Please refer to section 3.4                                  |
| Antenna                  | Please refer to section 3.3                                  |

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### Antenna & Band width

| Antenna         | Single (TX) |        |  |  |  |
|-----------------|-------------|--------|--|--|--|
| Band width Mode | 20 MHz      | 40 MHz |  |  |  |
| 802.11b         | V           | X      |  |  |  |
| 802.11g         | V           | Х      |  |  |  |
| Draft n         | V           | V      |  |  |  |

# Draft n spec

| MCC          |     |            |     |       | NC    | NCBPS NDBPS - |       | Datarate(Mbps) |       |         |         |         |  |
|--------------|-----|------------|-----|-------|-------|---------------|-------|----------------|-------|---------|---------|---------|--|
| MCS<br>Index | Nss | Modulation | R   | NBPSC | NC.   | ,BPS          | NL    | NDBF3          |       | 800nsGI |         | 400nsGI |  |
| index        |     |            |     |       | 20MHz | 40MHz         | 20MHz | 40MHz          | 20MHz | 40MHz   | 20MHz   | 40MHz   |  |
| 0            | 1   | BPSK       | 1/2 | 1     | 52    | 108           | 26    | 54             | 6.5   | 13.5    | 7.200   | 15      |  |
| 1            | 1   | QPSK       | 1/2 | 2     | 104   | 216           | 52    | 108            | 13.0  | 27.0    | 14.400  | 30      |  |
| 2            | 1   | QPSK       | 3/4 | 2     | 104   | 216           | 78    | 162            | 19.5  | 40.5    | 21.700  | 45      |  |
| 3            | 1   | 16-QAM     | 1/2 | 4     | 208   | 432           | 104   | 216            | 26.0  | 54.0    | 28.900  | 60      |  |
| 4            | 1   | 16-QAM     | 3/4 | 4     | 208   | 432           | 156   | 324            | 39.0  | 81.0    | 43.300  | 90      |  |
| 5            | 1   | 64-QAM     | 2/3 | 6     | 312   | 648           | 208   | 432            | 52.0  | 108.0   | 57.800  | 120     |  |
| 6            | 1   | 64-QAM     | 3/4 | 6     | 312   | 648           | 234   | 486            | 58.5  | 121.5   | 65.000  | 135     |  |
| 7            | 1   | 64-QAM     | 5/6 | 6     | 312   | 648           | 260   | 540            | 65.0  | 135.0   | 72.200  | 150     |  |
| 8            | 2   | BPSK       | 1/2 | 1     | 104   | 216           | 52    | 108            | 13.0  | 27.0    | 14.444  | 30      |  |
| 9            | 2   | QPSK       | 1/2 | 2     | 208   | 432           | 104   | 216            | 26.0  | 54.0    | 28.889  | 60      |  |
| 10           | 2   | QPSK       | 3/4 | 2     | 208   | 432           | 156   | 324            | 39.0  | 81.0    | 43.333  | 90      |  |
| 11           | 2   | 16-QAM     | 1/2 | 4     | 416   | 864           | 208   | 432            | 52.0  | 108.0   | 57.778  | 120     |  |
| 12           | 2   | 16-QAM     | 3/4 | 4     | 416   | 864           | 312   | 648            | 78.0  | 162.0   | 86.667  | 180     |  |
| 13           | 2   | 64-QAM     | 2/3 | 6     | 624   | 1296          | 416   | 864            | 104.0 | 216.0   | 115.556 | 240     |  |
| 14           | 2   | 64-QAM     | 3/4 | 6     | 624   | 1296          | 468   | 972            | 117.0 | 243.0   | 130.000 | 270     |  |
| 15           | 2   | 64-QAM     | 5/6 | 6     | 624   | 1296          | 520   | 1080           | 130.0 | 270.0   | 144.444 | 300     |  |

| Symbol | Explanation                             |  |
|--------|---|--|
| NSS    | Number of spatial streams               |  |
| R      | Code rate                               |  |
| NBPSC  | Number of coded bits per single carrier |  |
| NCBPS  | Number of coded bits per symbol         |  |
| NDBPS  | Number of data bits per symbol          |  |
| GI     | guard interval                          |  |



#### 3.2. Accessories

N/A

### 3.3. Table for Filed Antenna

| Ant. | Brand  | Model Name       | Antenna Type Connector |       | Gain (dBi) | Remark |
|------|--------|------------------|------------------------|-------|------------|--------|
| A-1  | JOYMAX | IFF-A005MPRX-207 | PIFA Antenna           | I-PEX | 5.32       | TX/RX  |
| A-2  | JOYMAX | IFF-A005MPRX-207 | PIFA Antenna           | I-PEX | 5.32       | TX/RX  |
| B-1  | JOYMAX | TWX-614XSAXX-500 | Dipole Antenna         | I-PEX | 2.5        | TX/RX  |
| B-2  | JOYMAX | TWX-614XSAXX-500 | Dipole Antenna         | I-PEX | 2.5        | TX/RX  |

Note: There are two types of EUT.

EUT1 with one antenna connector.

EUT2 with two antenna connectors.

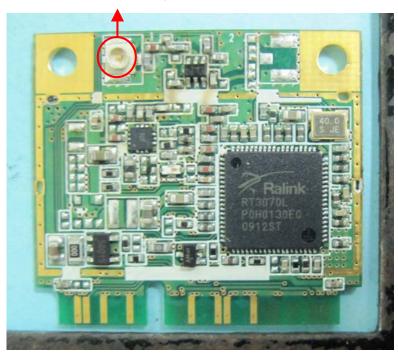
Please refer to the photos below for their configurations.

Note: There are 9 antennas provided to this EUT, please refer to Appendix C for further information.

Due to ant. A and B mentioned above are the highest gain value among two different types, only ant A and B were tested and recorded in this test report.

#### For EUT 1:

Connector 1: TX/RX



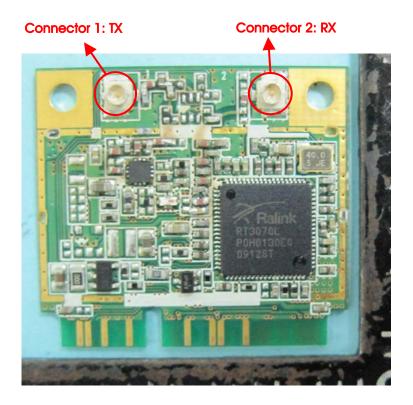
Connector 1 has both TX/RX function.

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### For EUT 2:



Connector 1 only has TX function.

Connector 2 only has RX function.

# 3.4. Table for Carrier Frequencies

There are two bandwidth systems for draft n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel  $3\sim$  Channel 9.

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|----------------|-------------|-----------|-------------|-----------|
|                | 1           | 2412 MHz  | 7           | 2442 MHz  |
|                | 2           | 2417 MHz  | 8           | 2447 MHz  |
| 2400 2483 5MU- | 3           | 2422 MHz  | 9           | 2452 MHz  |
| 2400~2483.5MHz | 4           | 2427 MHz  | 10          | 2457 MHz  |
|                | 5           | 2432 MHz  | 11          | 2462 MHz  |
|                | 6           | 2437 MHz  |             |           |



### 3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items  | Mode        | Data Rate | Channel | Ant. Connector |
|---|-------------|-----------|---------|----------------|
| AC Power Line Conducted Emissions                 | Normal Link | -         | -       | -              |
| Maximum Peak Conducted Output Power               | MCS0/20MHz  | 6.5 Mbps  | 1/6/11  | 1              |
|   | MCS0/40MHz  | 13.5 Mbps | 3/6/9   | 1              |
|   | 11b/BPSK    | 1 Mbps    | 1/6/11  | 1              |
|   | 11g/BPSK    | 6 Mbps    | 1/6/11  | 1              |
| Power Spectral Density                            | MCS0/20MHz  | 6.5 Mbps  | 1/6/11  | 1              |
| 6dB Spectrum Bandwidth                            | MCS0/40MHz  | 13.5 Mbps | 3/6/9   | 1              |
|   | 11b/BPSK    | 1 Mbps    | 1/6/11  | 1              |
|   | 11g/BPSK    | 6 Mbps    | 1/6/11  | 1              |
| Radiated Emissions 9kHz~1GHz                      | Normal Link | -         | -       | -              |
| Radiated Emissions 1GHz~10 <sup>th</sup> Harmonic | MCS0/20MHz  | 6.5 Mbps  | 1/6/11  | 1              |
|   | MCS0/40MHz  | 13.5 Mbps | 3/6/9   | 1              |
|   | 11b/BPSK    | 1 Mbps    | 1/6/11  | 1              |
|   | 11g/BPSK    | 6 Mbps    | 1/6/11  | 1              |
| Band Edge Emissions                               | MCS0/20MHz  | 6.5 Mbps  | 1/11    | 1              |
|   | MCS0/40MHz  | 13.5 Mbps | 3/9     | 1              |
|   | 11b/BPSK    | 1 Mbps    | 1/11    | 1              |
|   | 11g/BPSK    | 6 Mbps    | 1/11    | 1              |

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The following test modes were performed for all tests:

Mode 1. EUT 1 with PIFA antenna

Mode 2. EUT 2 with PIFA antenna

Mode 3. EUT 1 with Dipole antenna

Mode 4. EUT 2 with Dipole antenna

### For Conducted Emission test:

Due to Mode 1 and Mode 3 generated the worst test result, so it was recorded in this report.

#### For Radiated Emission tests:

Due to Mode 2 and Mode 4 generated the worst test result, so it was recorded in this report.

#### For Maximum Peak Conducted Output Power, Power Spectral Density and 6dB Spectrum Bandwidth test:

The difference between EUT 1 and EUT 2 is antenna connector, but their internal structure are identical.

Due to EUT 2 generated the worst test result, so only EUT 2 was tested and recorded.

Due to Mode 2 and Mode 4 generated the worst test result, so it was recorded in this report.

Note: During test, the extend-card was added the absorber to conform with customer's test request.

#### 3.6. Table for Testing Locations

| Test Site No. | Site Category | Location | FCC Reg. No. | IC File No. | VCCI Reg. No |
|---------------|---------------|----------|--------------|-------------|--------------|
| 03CH03-HY     | SAC           | Hwa Ya   | 480872       | IC 4088     | -            |
| CO04-HY       | Conduction    | Hwa Ya   | 480872       | IC 4088     | -            |
| TH01-HY       | OVEN Room     | Hwa Ya   | -            | -           | -            |

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

#### 3.7. Table for Supporting Units

| Support Unit | Brand  | Model      | FCC ID      |
|--------------|--------|------------|-------------|
| Notebook     | DELL   | PP25L      | E2K4965AGNM |
| Mouse        | iCooky | AMS0706W   | DoC         |
| Modem        | ACEEX  | DM1414     | IFAXDM1414  |
| Wireless AP  | Planex | GW-AP54SGX | N/A         |

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### 3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

#### <For EUT 2 with PIFA antenna >

#### Power Parameters of Draft n MCSO 20MHz

| Test Software Version | QA .     |          |          |  |  |  |
|-----------------------|----------|----------|----------|--|--|--|
| Frequency             | 2412 MHz | 2437 MHz | 2462 MHz |  |  |  |
| MCS0 20MHz            | 1E       | 1F       | 1E       |  |  |  |
| Frequency             | 2422 MHz | 2437 MHz | 2452 MHz |  |  |  |
| MCS0 40MHz            | 19       | 1F       | 1A       |  |  |  |

#### Power Parameters of IEEE 802.11b/g

| Test Software Version | QA       |          |          |  |  |
|-----------------------|----------|----------|----------|--|--|
| Frequency             | 2412 MHz | 2437 MHz | 2462 MHz |  |  |
| IEEE 802.11b          | 18       | 18       | 1B       |  |  |
| IEEE 802.11g          | 1E       | 1F       | 1F       |  |  |

#### <For EUT 2 with Dipole antenna >

#### Power Parameters of Draft n MCSO 20MHz

| Test Software Version | QA       |          |          |  |  |  |
|-----------------------|----------|----------|----------|--|--|--|
| Frequency             | 2412 MHz | 2437 MHz | 2462 MHz |  |  |  |
| MCS0 20MHz            | 1F       | 1F       | 1E       |  |  |  |
| Frequency             | 2422 MHz | 2437 MHz | 2452 MHz |  |  |  |
| MCS0 40MHz            | 1C       | 1F       | 15       |  |  |  |

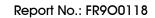
#### Power Parameters of IEEE 802.11b/g

| Test Software Version | QA .                     |    |    |  |  |  |
|-----------------------|--------------------------|----|----|--|--|--|
| Frequency             | 2412 MHz 2437 MHz 2462 N |    |    |  |  |  |
| IEEE 802.11b          | 19                       | 19 | 18 |  |  |  |
| IEEE 802.11g          | 1F                       | 1F | 1E |  |  |  |

During the test, the following programs under WIN XP were executed:

Executed "ping.exe" to link with the remote workstation to receive and transmit signal by LAN and WLAN. Executed "QA" the test program to control the EUT continuously transmit RF signal.

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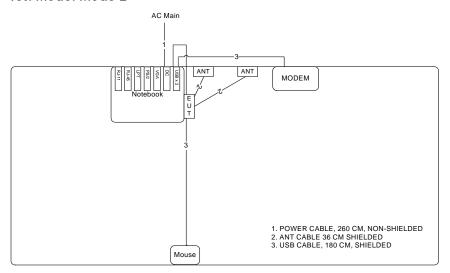


# 3.9. Test Configurations

### 3.9.1. Radiation Emissions Test Configuration

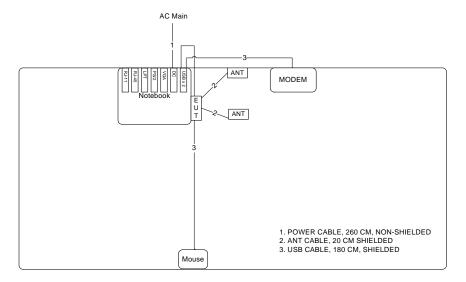
Test Configuration: 9KHz~1GHz

Test Mode: Mode 2



AP

Test Mode: Mode 4



AP

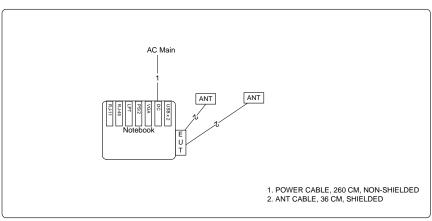
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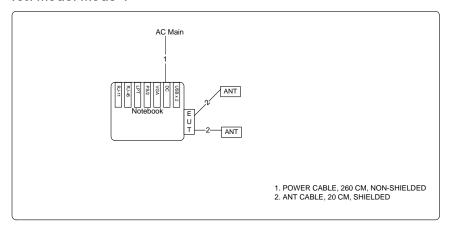


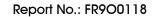
Test Configuration: above 1GHz

Test Mode: Mode 2



#### Test Mode: Mode 4

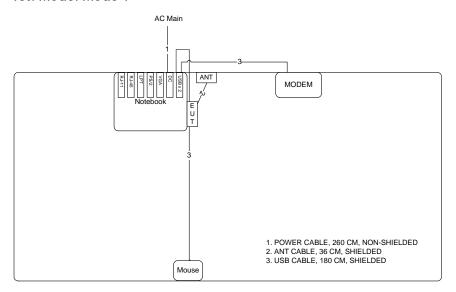






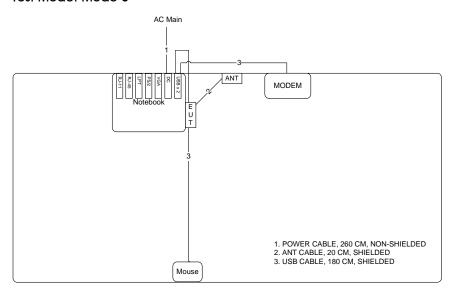
# 3.9.2. AC Power Line Conduction Emissions Test Configuration

#### Test Mode: Mode 1



AP

#### Test Mode: Mode 3



AP

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### 4. TEST RESULT

#### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

| Frequency (MHz) | QP Limit (dBuV) | AV Limit (dBuV) |
|-----------------|-----------------|-----------------|
| 0.15~0.5        | 66~56           | 56~46           |
| 0.5~5           | 56              | 46              |
| 5~30            | 60              | 50              |

#### 4.1.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 KHz    |

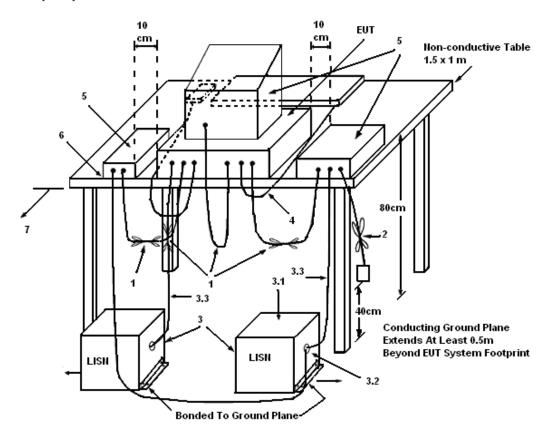
#### 4.1.3. Test Procedures

- Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far
  from the conducting wall of the shielding room and at least 80 centimeters from any other
  grounded conducting surface.
- 2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
- 4. The frequency range from 150 KHz to 30 MHz was searched.
- 5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 6. The measurement has to be done between each power line and ground at the power terminal.

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#### 4.1.4. Test Setup Layout



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . LISN can be placed on top of, or immediately beneath, reference ground plane.
- (3.1) All other equipment powered from additional LISN(s).
- (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
- (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

#### 4.1.5. Test Deviation

There is no deviation with the original standard.



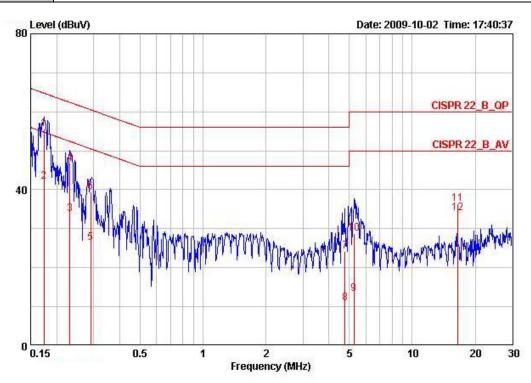
### 4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

### 4.1.7. Results of AC Power Line Conducted Emissions Measurement

#### <For EUT 1 with PIFA antenna>

| Temperature   | 24.3°C               | Humidity | 56.4% |
|---------------|----------------------|----------|-------|
| Test Engineer | Howar Sung           | Phase    | Line  |
| Configuration | Normal Link / Mode 1 |          |       |

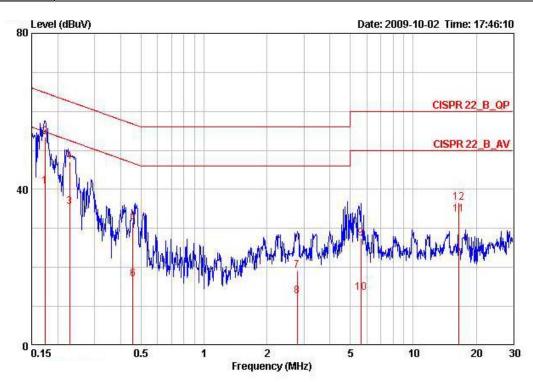


|        | Freq    | Level | Over<br>Limit | Limit<br>Line | Read<br>Level | LISN<br>Factor | Cable<br>Loss | Remark  |
|--------|---------|-------|---------------|---------------|---------------|----------------|---------------|---------|
|        | MHz     | dBuV  | dB            | dBuV          | dBuV          | dB             | dВ            |         |
| 1 @    | 0.17399 | 55.48 | -9.29         | 64.77         | 55.22         | 0.06           | 0.20          | QP      |
| 2      | 0.17399 | 41.96 | -12.81        | 54.77         | 41.70         | 0.06           | 0.20          | AVERAGE |
| 3      | 0.23162 | 33.75 | -18.65        | 52.39         | 33.50         | 0.05           | 0.20          | AVERAGE |
| 4      | 0.23162 | 46.61 | -15.79        | 62.39         | 46.36         | 0.05           | 0.20          | QP      |
| 4<br>5 | 0.28998 | 26.29 | -24.24        | 50.52         | 26.05         | 0.04           | 0.20          | AVERAGE |
| 6      | 0.28998 | 39.54 | -20.99        | 60.52         | 39.30         | 0.04           | 0.20          | QP      |
| 7      | 4.772   | 24.09 | -31.91        | 56.00         | 23.64         | 0.15           | 0.30          | QP      |
| 8<br>9 | 4.772   | 10.82 | -35.18        | 46.00         | 10.37         | 0.15           | 0.30          | AVERAGE |
| 9      | 5.256   | 13.39 | -36.61        | 50.00         | 12.92         | 0.17           | 0.30          | AVERAGE |
| 10     | 5.256   | 28.71 | -31.29        | 60.00         | 28.24         | 0.17           | 0.30          | QP      |
| 11     | 16.464  | 36.41 | -23.59        | 60.00         | 35.35         | 0.64           | 0.42          | QP      |
| 12     | 16.464  | 34.04 | -15.96        | 50.00         | 32.98         | 0.64           | 0.42          | AVERAGE |

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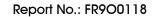
| Temperature   | 24.3°C               | Humidity | 56.4%   |
|---------------|----------------------|----------|---------|
| Test Engineer | Howar Sung           | Phase    | Neutral |
| Configuration | Normal Link / Mode 1 |          |         |



|        | Freq    | Level | Limit  | Line  | Level | Factor | Loss | Remark  |
|--------|---------|-------|--------|-------|-------|--------|------|---------|
|        | MHz     | dBuV  | dB     | dBuV  | dBuV  | dB     | dB   |         |
| 1      | 0.17399 | 40.70 | -14.07 | 54.77 | 40.41 | 0.09   | 0.20 | AVERAGE |
| 2 @    | 0.17399 | 53.43 | -11.34 | 64.77 | 53.14 | 0.09   | 0.20 | QP      |
| 3      | 0.22799 | 35.44 | -17.08 | 52.52 | 35.16 | 0.08   | 0.20 | AVERAGE |
| 4<br>5 | 0.22799 | 46.98 | -15.54 | 62.52 | 46.70 | 0.08   | 0.20 | QP      |
| 5      | 0.45630 | 31.50 | -25.26 | 56.76 | 31.23 | 0.07   | 0.20 | QP      |
| 6      | 0.45630 | 17.00 | -29.76 | 46.76 | 16.73 | 0.07   | 0.20 | AVERAGE |
| 7      | 2.794   | 19.20 | -36.80 | 56.00 | 18.89 | 0.11   | 0.20 | QP      |
| 8      | 2.794   | 12.57 | -33.43 | 46.00 | 12.26 | 0.11   | 0.20 | AVERAGE |
| 9      | 5.623   | 27.45 | -32.55 | 60.00 | 26.92 | 0.23   | 0.30 | QP      |
| 10     | 5.623   | 13.53 | -36.47 | 50.00 | 13.00 | 0.23   | 0.30 | AVERAGE |
| 11     | 16.464  | 33.64 | -16.36 | 50.00 | 32.57 | 0.65   | 0.42 | AVERAGE |
| 12     | 16.464  | 36.52 | -23.48 | 60.00 | 35.45 | 0.65   | 0.42 | QP      |

Note:

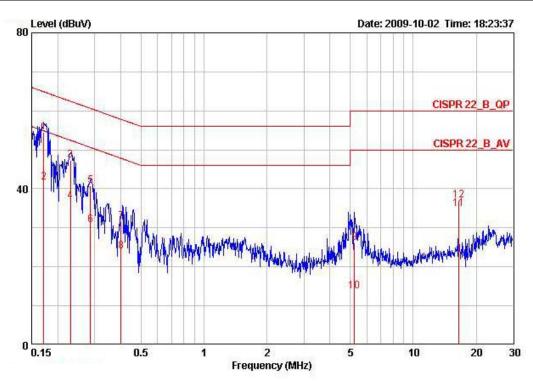
Level = Read Level + LISN Factor + Cable Loss.





### <For EUT 1 with Dipole antenna>

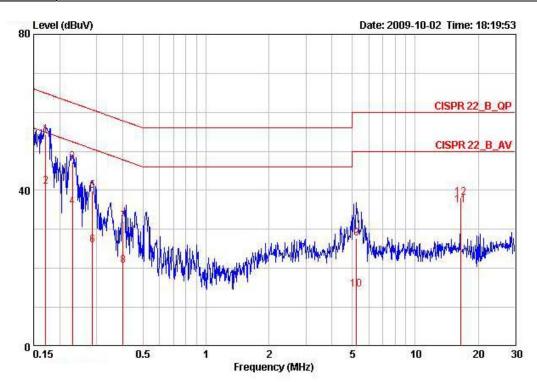
| Temperature   | 24.3°C               | Humidity | 56.4% |
|---------------|----------------------|----------|-------|
| Test Engineer | Howar Sung           | Phase    | Line  |
| Configuration | Normal Link / Mode 3 |          |       |



|                  | Freq    | Level | Over<br>Limit | Limit<br>Line | Read<br>Level | LISN<br>Factor | Cable<br>Loss | Remark  |
|------------------|---------|-------|---------------|---------------|---------------|----------------|---------------|---------|
|                  | MHz     | dBuV  | dB            | dBuV          | dBuV          | - dB           | dB            | -       |
| 1 @              | 0.17145 | 54.55 | -10.34        | 64.89         | 54.29         | 0.06           | 0.20          | QP      |
| 2                | 0.17145 | 41.53 | -13.36        | 54.89         | 41.27         | 0.06           | 0.20          | AVERAGE |
| 3                | 0.22985 | 47.37 | -15.09        | 62.46         | 47.12         | 0.05           | 0.20          | QP      |
| 2<br>3<br>4<br>5 | 0.22985 | 36.87 | -15.59        | 52.46         | 36.62         | 0.05           | 0.20          | AVERAGE |
| 5                | 0.28695 | 40.73 | -19.88        | 60.61         | 40.49         | 0.04           | 0.20          | QP      |
| 6                | 0.28695 | 30.65 | -19.96        | 50.61         | 30.41         | 0.04           | 0.20          | AVERAGE |
| 7                | 0.40151 | 31.69 | -26.13        | 57.82         | 31.46         | 0.03           | 0.20          | QP      |
| 8<br>9           | 0.40151 | 23.91 | -23.91        | 47.82         | 23.68         | 0.03           | 0.20          | AVERAGE |
| 9                | 5.249   | 26.25 | -33.75        | 60.00         | 25.78         | 0.17           | 0.30          | QP      |
| 10               | 5.249   | 13.83 | -36.17        | 50.00         | 13.36         | 0.17           | 0.30          | AVERAGE |
| 11               | 16.465  | 34.89 | -15.11        | 50.00         | 33.83         | 0.64           | 0.42          | AVERAGE |
| 12               | 16.465  | 36.98 | -23.02        | 60.00         | 35.92         | 0.64           | 0.42          | QP      |



| Temperature   | 24.3°C               | Humidity | 56.4%   |
|---------------|----------------------|----------|---------|
| Test Engineer | Howar Sung           | Phase    | Neutral |
| Configuration | Normal Link / Mode 3 |          |         |



|        | Freq    | Level | Limit  | Limit | Level | Factor | Labie | Remark  |
|--------|---------|-------|--------|-------|-------|--------|-------|---------|
|        | MHz     | dBuV  | dB     | dBuV  | dBuV  | dB     | dB    | 7       |
| 1 @    | 0.17164 | 54.34 | -10.54 | 64.88 | 54.05 | 0.09   | 0.20  | QP      |
| 2      | 0.17164 | 41.05 | -13.83 | 54.88 | 40.76 | 0.09   | 0.20  | AVERAGE |
| 3      | 0.22982 | 47.26 | -15.20 | 62.46 | 46.98 | 0.08   | 0.20  | QP      |
| 4      | 0.22982 | 35.76 | -16.70 | 52.46 | 35.48 | 0.08   | 0.20  | AVERAGE |
| 4<br>5 | 0.28710 | 39.89 | -20.71 | 60.61 | 39.62 | 0.07   | 0.20  | QP      |
| 6      | 0.28710 | 25.96 | -24.64 | 50.61 | 25.69 | 0.07   | 0.20  | AVERAGE |
| 7      | 0.40085 | 32.15 | -25.69 | 57.84 | 31.88 | 0.07   | 0.20  | QP      |
| 8      | 0.40085 | 20.62 | -27.22 | 47.84 | 20.35 | 0.07   | 0.20  | AVERAGE |
| 9      | 5.249   | 27.64 | -32.36 | 60.00 | 27.13 | 0.21   | 0.30  | QP      |
| 10     | 5.249   | 14.57 | -35.43 | 50.00 | 14.06 | 0.21   | 0.30  | AVERAGE |
| 11     | 16.464  | 36.13 | -13.87 | 50.00 | 35.06 | 0.65   | 0.42  | AVERAGE |
| 12     | 16.464  | 38.06 | -21.94 | 60.00 | 36.99 | 0.65   | 0.42  | QP      |

Note:

Level = Read Level + LISN Factor + Cable Loss.

### 4.2. Maximum Conducted Output Power Measurement

#### 4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

#### 4.2.2. Measuring Instruments and Setting

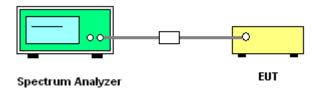
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting  |
|--------------------|--|
| Attenuation        | Auto   |
| Span Frequency     | Encompass the entire emissions bandwidth (EBW) of the signal |
| RB                 | 1 MHz  |
| VB                 | 3MHz   |
| Detector           | Peak   |
| Trace              | Max Hold   |
| Sweep Time         | Auto   |

#### 4.2.3 Test Procedures

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer.
- 2. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.
- 3. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

### 4.2.4. Test Setup Layout



#### 4.2.5. Test Deviation

There is no deviation with the original standard.

#### 4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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# 4.2.7. Test Result of Maximum Conducted Output Power

### <For EUT 2 with PIFA antenna>

| Temperature   | 23°C      | Humidity       | 62%              |
|---------------|-----------|----------------|------------------|
| Test Engineer | Allen Liu | Configurations | Draft n / Mode 2 |

## Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 23.72                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.89                 | 30.00               | Complies |
| 11      | 2462 MHz  | 24.90                 | 30.00               | Complies |

### Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 3       | 2422 MHz  | 22.10                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.91                 | 30.00               | Complies |
| 9       | 2452 MHz  | 23.20                 | 30.00               | Complies |

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| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 2 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 19.93                 | 30.00               | Complies |
| 6       | 2437 MHz  | 20.45                 | 30.00               | Complies |
| 11      | 2462 MHz  | 22.26                 | 30.00               | Complies |

# Configuration IEEE 802.11g / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 23.83                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.68                 | 30.00               | Complies |
| 11      | 2462 MHz  | 24.75                 | 30.00               | Complies |

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# <For EUT 2 with Dipole antenna>

| Temperature   | 23°C      | Humidity       | 62%              |
|---------------|-----------|----------------|------------------|
| Test Engineer | Allen Liu | Configurations | Draft n / Mode 4 |

### Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 24.53                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.89                 | 30.00               | Complies |
| 11      | 2462 MHz  | 24.90                 | 30.00               | Complies |

### Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 3       | 2422 MHz  | 23.03                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.91                 | 30.00               | Complies |
| 9       | 2452 MHz  | 20.78                 | 30.00               | Complies |

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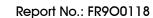
| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 4 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 20.65                 | 30.00               | Complies |
| 6       | 2437 MHz  | 20.93                 | 30.00               | Complies |
| 11      | 2462 MHz  | 21.10                 | 30.00               | Complies |

# Configuration IEEE 802.11g / Connector 1

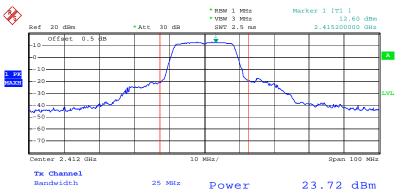
| Channel | Frequency | Conducted Power (dBm) | Max. Limit<br>(dBm) | Result   |
|---------|-----------|-----------------------|---------------------|----------|
| 1       | 2412 MHz  | 24.75                 | 30.00               | Complies |
| 6       | 2437 MHz  | 24.68                 | 30.00               | Complies |
| 11      | 2462 MHz  | 24.23                 | 30.00               | Complies |





#### <For EUT 2 with PIFA antenna>

### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2412 MHz



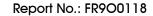
Date: 13.OCT.2009 18:06:18

#### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2437 MHz



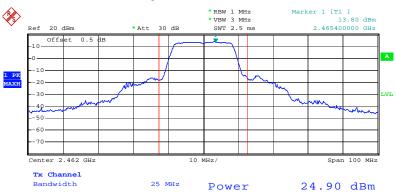
Date: 13.0CT.2009 18:05:02

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### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz



Date: 13.OCT.2009 18:07:24

### Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2422 MHz



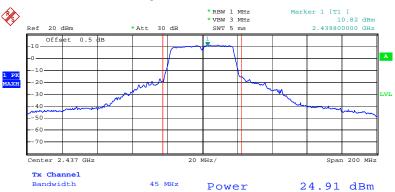
Date: 13.0CT.2009 18:10:28

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### Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2437 MHz



Date: 13.OCT.2009 18:12:01

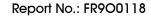
### Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2452 MHz



Date: 13.OCT.2009 18:14:48

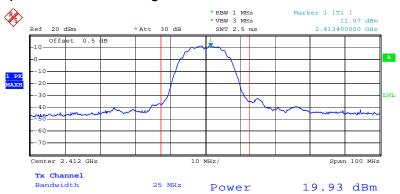
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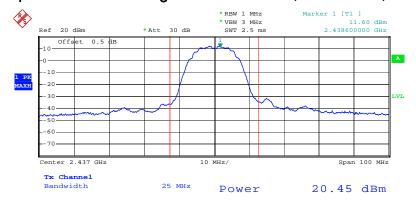


# Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



Date: 13.OCT.2009 17:44:21

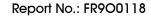
### Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz



Date: 13.OCT.2009 17:39:38

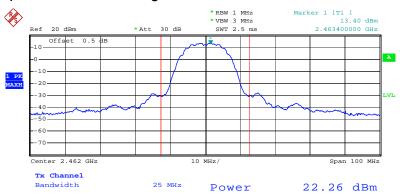
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# Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2462 MHz



Date: 13.OCT.2009 17:34:46

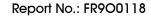
# Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2412 MHz



Date: 13.OCT.2009 17:48:48

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# Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2437 MHz



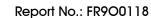
Date: 13.OCT.2009 17:49:38

# Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2462 MHz



Date: 13.OCT.2009 17:56:29

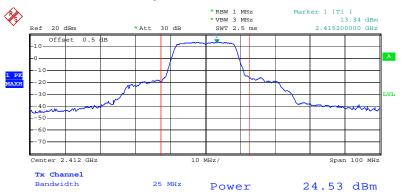
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#### <For EUT 2 with Dipole antenna>

### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2412 MHz



Date: 13.OCT.2009 18:02:18

### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2437 MHz

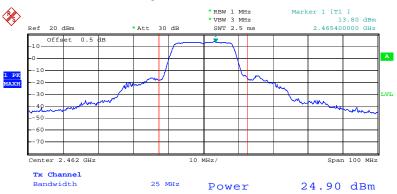


Date: 13.0CT.2009 18:05:02

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### Conducted Output Power Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz



Date: 13.OCT.2009 18:07:24

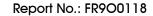
### Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2422 MHz



Date: 13.0CT.2009 18:11:09

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### Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2437 MHz



Date: 13.OCT.2009 18:12:01

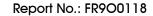
# Conducted Output Power Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2452 MHz



Date: 13.0CT.2009 18:14:08

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# Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



Date: 13.OCT.2009 17:29:54

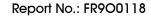
# Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz



Date: 13.OCT.2009 17:31:26

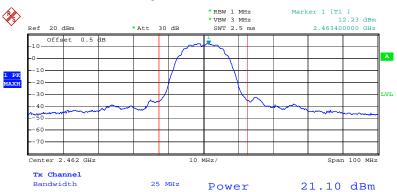
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 FCC ID: VQF-RT3070HMC
 Issued Date
 : Oct. 13, 2009





# Conducted Output Power Plot on Configuration IEEE 802.11b / Connector 1 / 2462 MHz



Date: 13.OCT.2009 17:33:43

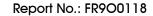
## Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2412 MHz



Date: 13.OCT.2009 17:48:12

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### Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2437 MHz



Date: 13.OCT.2009 17:49:38

## Conducted Output Power Plot on Configuration IEEE 802.11g / Connector 1 / 2462 MHz



Date: 13.OCT.2009 17:58:22

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### 4.3. Power Spectral Density Measurement

#### 4.3.1. Limit

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.

#### 4.3.2. Measuring Instruments and Setting

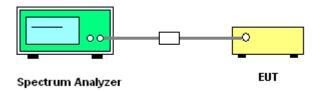
Please refer to section 5 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

| Spectrum Parameter | Setting  |
|--------------------|----------|
| Attenuation        | Auto     |
| Span Frequency     | 30 kHz   |
| RB                 | 3 kHz    |
| VB                 | 30 kHz   |
| Detector           | Peak     |
| Trace              | Max Hold |
| Sweep Time         | 10s      |

#### 4.3.3. Test Procedures

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer.
- 2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
- 3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
- 4. Set the span to 30kHz and the sweep time to 10s and record the maximum peak value.
- 5. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner.

#### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is no deviation with the original standard.



### 4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 4.3.7. Test Result of Power Spectral Density

#### <For EUT 2 with PIFA antenna>

| Temperature   | <b>23</b> ℃ | Humidity       | 62%              |
|---------------|-------------|----------------|------------------|
| Test Engineer | Allen Liu   | Configurations | Draft n / Mode 2 |

### Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 1       | 2412 MHz  | -11.03                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -9.79                       | 8.00                     | Complies |
| 11      | 2462 MHz  | -10.31                      | 8.00                     | Complies |

### Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 3       | 2422 MHz  | -14.29                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -11.25                      | 8.00                     | Complies |
| 9       | 2452 MHz  | -12.82                      | 8.00                     | Complies |

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| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 2 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 1       | 2412 MHz  | -12.46                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -9.13                       | 8.00                     | Complies |
| 11      | 2462 MHz  | -8.02                       | 8.00                     | Complies |

# Configuration IEEE 802.11g / Connector 1

| •       | _         |                             |                          |          |
|---------|-----------|-----------------------------|--------------------------|----------|
| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
| 1       | 2412 MHz  | -12.46                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -11.15                      | 8.00                     | Complies |
| 11      | 2462 MHz  | -10.78                      | 8.00                     | Complies |

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## <For EUT 2 with Dipole antenna>

| Temperature   | 23°C      | Humidity       | 62%              |
|---------------|-----------|----------------|------------------|
| Test Engineer | Allen Liu | Configurations | Draft n / Mode 4 |

### Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 1       | 2412 MHz  | -11.33                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -11.21                      | 8.00                     | Complies |
| 11      | 2462 MHz  | -11.15                      | 8.00                     | Complies |

### Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 3       | 2422 MHz  | -13.85                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -13.33                      | 8.00                     | Complies |
| 9       | 2452 MHz  | -16.65                      | 8.00                     | Complies |

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| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 4 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
|---------|-----------|-----------------------------|--------------------------|----------|
| 1       | 2412 MHz  | -12.14                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -12.19                      | 8.00                     | Complies |
| 11      | 2462 MHz  | -11.19                      | 8.00                     | Complies |

# Configuration IEEE 802.11g / Connector 1

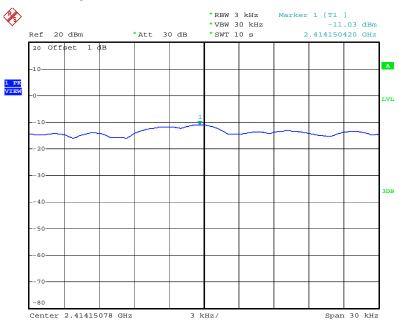
| •       | _         |                             |                          |          |
|---------|-----------|-----------------------------|--------------------------|----------|
| Channel | Frequency | Power Density<br>(dBm/3kHz) | Max. Limit<br>(dBm/3kHz) | Result   |
| 1       | 2412 MHz  | -12.49                      | 8.00                     | Complies |
| 6       | 2437 MHz  | -12.01                      | 8.00                     | Complies |
| 11      | 2462 MHz  | -11.90                      | 8.00                     | Complies |





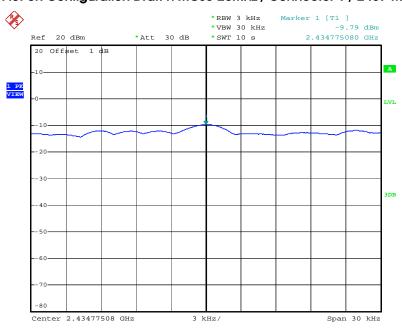
#### <For EUT 2 with PIFA antenna>

### Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2412 MHz



Date: 1.0CT.2009 22:03:00

# Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2437 MHz

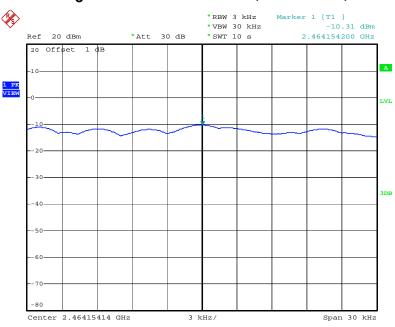


Date: 1.0CT.2009 22:05:03

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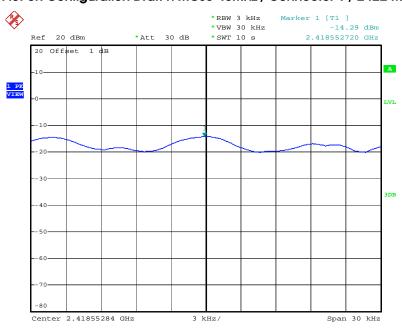


### Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz



Date: 1.OCT.2009 22:10:19

# Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2422 MHz

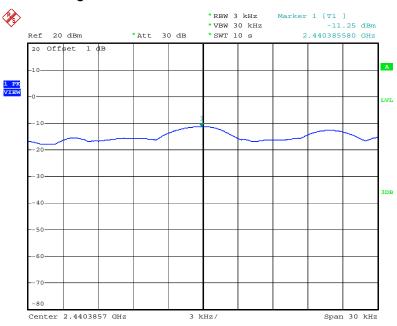


Date: 1.0CT.2009 21:55:59

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FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009

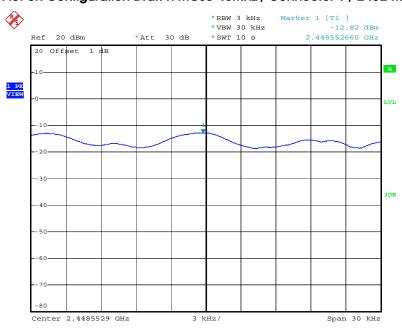


### Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2437 MHz



Date: 1.OCT.2009 21:53:58

# Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2452 MHz

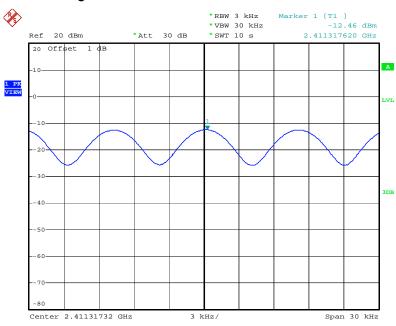


Date: 1.0CT.2009 21:58:18

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FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009

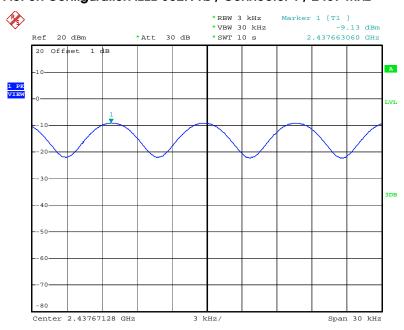


### Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



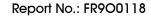
Date: 1.OCT.2009 22:43:38

# Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz



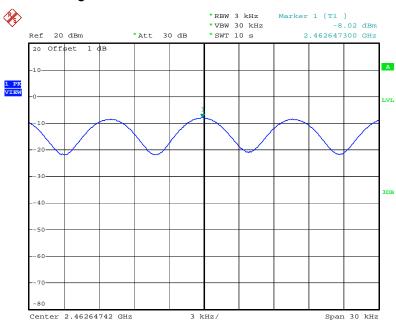
Date: 1.OCT.2009 22:45:47

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FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009



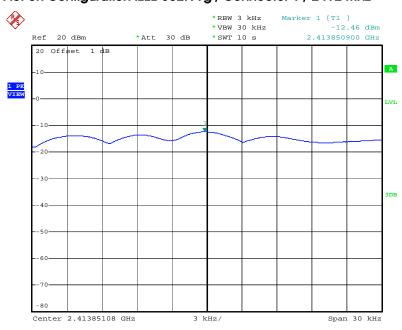


### Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2462 MHz

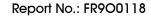


Date: 1.OCT.2009 22:47:57

# Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2412 MHz

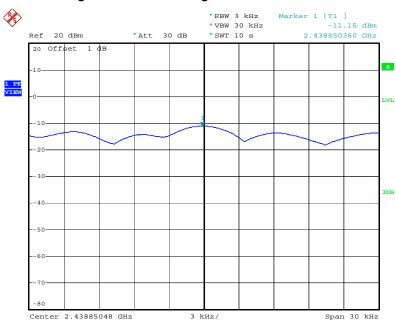


Date: 1.OCT.2009 22:23:44



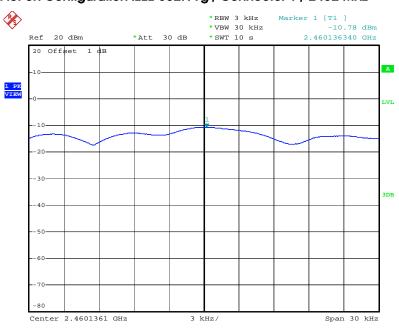


### Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2437 MHz



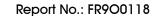
Date: 1.OCT.2009 22:21:34

# Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2462 MHz



Date: 1.OCT.2009 22:19:14

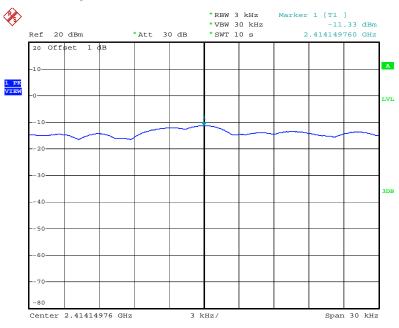
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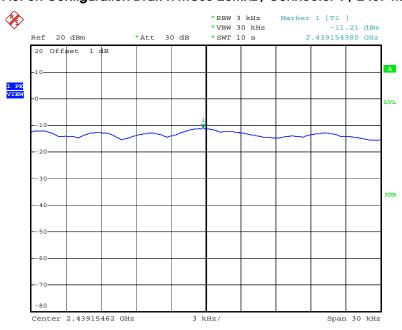
#### <For EUT 2 with Dipole antenna>

### Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2412 MHz



Date: 1.OCT.2009 21:05:11

# Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2437 MHz

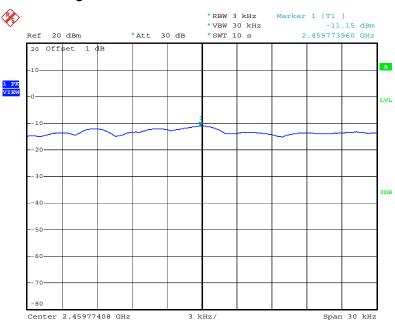


Date: 1.0CT.2009 21:07:21

Report Format Version: 01 Page No. : 47 of 146
FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009

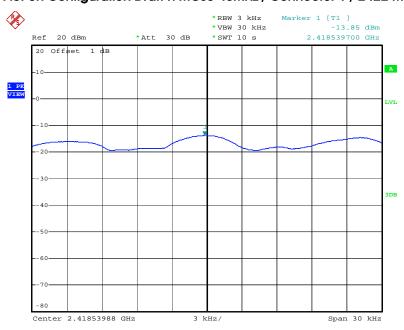


### Power Density Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz



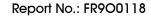
Date: 1.OCT.2009 21:09:26

# Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2422 MHz



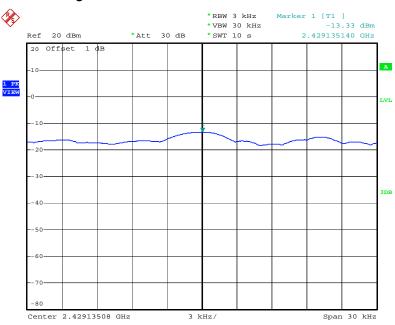
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Report Format Version: 01 Page No. : 48 of 146
FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009



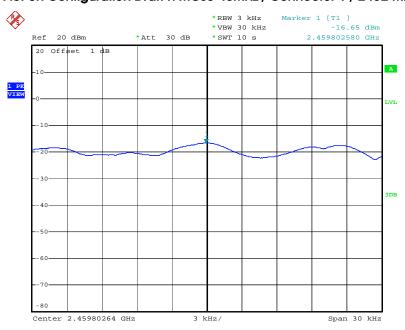


### Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2437 MHz



Date: 1.OCT.2009 21:17:37

# Power Density Plot on Configuration Draft n MCS0 40MHz / Connector 1 / 2452 MHz



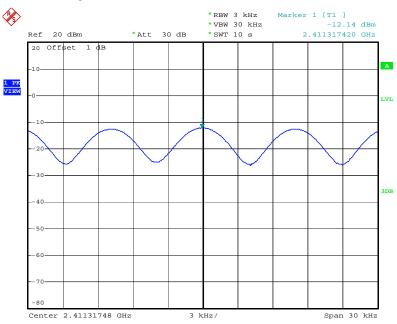
Date: 1.0CT.2009 21:31:15

Report Format Version: 01 Page No. : 49 of 146
FCC ID: VQF-RT3070HMC Issued Date : Oct. 13, 2009



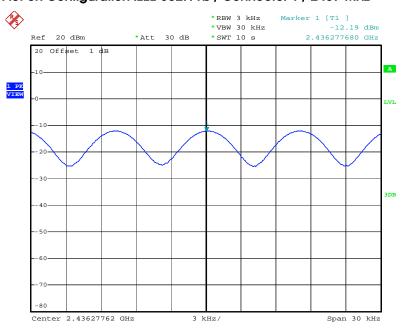


### Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



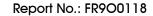
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# Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz



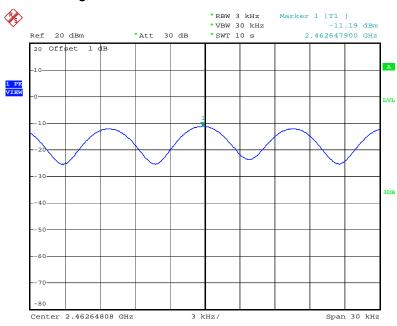
Date: 1.OCT.2009 20:50:02

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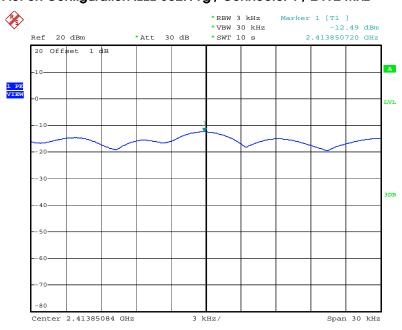


### Power Density Plot on Configuration IEEE 802.11b / Connector 1 / 2462 MHz



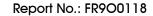
Date: 1.OCT.2009 20:52:24

# Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2412 MHz



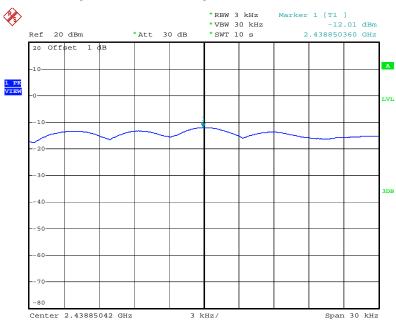
Date: 1.0CT.2009 20:58:08

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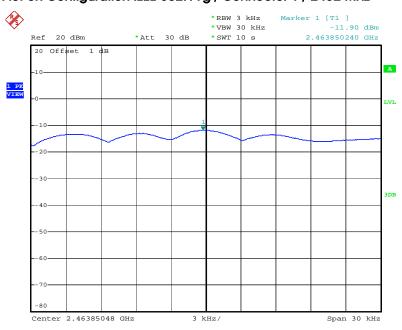


### Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2437 MHz



Date: 1.OCT.2009 21:00:26

# Power Density Plot on Configuration IEEE 802.11g / Connector 1 / 2462 MHz



Date: 1.0CT.2009 21:02:37

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### 4.4. 6dB Spectrum Bandwidth Measurement

#### 4.4.1. Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.4.2. Measuring Instruments and Setting

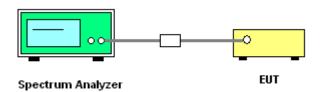
Please refer to section 5 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting         |
|---------------------|-----------------|
| Attenuation         | Auto            |
| Span Frequency      | > 6dB Bandwidth |
| RB                  | 100 kHz         |
| VB                  | 100 kHz         |
| Detector            | Peak            |
| Trace               | Max Hold        |
| Sweep Time          | Auto            |

#### 4.4.3. Test Procedures

- 1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
- 2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
- 3. Measured the spectrum width with power higher than 6dB below carrier.
- 4. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner.

### 4.4.4. Test Setup Layout



#### 4.4.5. Test Deviation

There is no deviation with the original standard.

#### 4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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### 4.4.7. Test Result of 6dB Spectrum Bandwidth

### <For EUT 2 with PIFA antenna>

| Temperature   | 23°C      | Humidity       | 62%              |
|---------------|-----------|----------------|------------------|
| Test Engineer | Allen Liu | Configurations | Draft n / Mode 2 |

# Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 17.64                  | 17.60                              | 500                 | Complies    |
| 6       | 2437 MHz  | 17.64                  | 17.60                              | 500                 | Complies    |
| 11      | 2462 MHz  | 17.64                  | 17.60                              | 500                 | Complies    |

# Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 3       | 2422 MHz  | 36.32                  | 36.00                              | 500                 | Complies    |
| 6       | 2437 MHz  | 36.40                  | 36.00                              | 500                 | Complies    |
| 9       | 2452 MHz  | 36.48                  | 36.08                              | 500                 | Complies    |

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| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 2 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 11.08                  | 14.32                              | 500                 | Complies    |
| 6       | 2437 MHz  | 11.08                  | 14.44                              | 500                 | Complies    |
| 11      | 2462 MHz  | 11.08                  | 14.44                              | 500                 | Complies    |

# Configuration IEEE 802.11g / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 16.56                  | 16.44                              | 500                 | Complies    |
| 6       | 2437 MHz  | 16.56                  | 16.44                              | 500                 | Complies    |
| 11      | 2462 MHz  | 16.56                  | 16.44                              | 500                 | Complies    |

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### <For EUT 2 with Dipole antenna>

| Temperature   | 23℃       | Humidity       | 62%              |
|---------------|-----------|----------------|------------------|
| Test Engineer | Allen Liu | Configurations | Draft n / Mode 4 |

# Configuration Draft n MCS0 20MHz / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 17.68                  | 17.60                              | 500                 | Complies    |
| 6       | 2437 MHz  | 17.60                  | 17.60                              | 500                 | Complies    |
| 11      | 2462 MHz  | 17.64                  | 17.60                              | 500                 | Complies    |

### Configuration Draft n MCS0 40MHz / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 3       | 2422 MHz  | 36.48                  | 36.00                              | 500                 | Complies    |
| 6       | 2437 MHz  | 36.40                  | 36.08                              | 500                 | Complies    |
| 9       | 2452 MHz  | 36.48                  | 36.00                              | 500                 | Complies    |

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| Temperature   | 23°C      | Humidity       | 62%                |
|---------------|-----------|----------------|--------------------|
| Test Engineer | Allen Liu | Configurations | 802.11b/g / Mode 4 |

# Configuration IEEE 802.11b / Connector 1

| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 11.08                  | 14.36                              | 500                 | Complies    |
| 6       | 2437 MHz  | 11.08                  | 14.32                              | 500                 | Complies    |
| 11      | 2462 MHz  | 11.08                  | 14.32                              | 500                 | Complies    |

# Configuration IEEE 802.11g / Connector 1

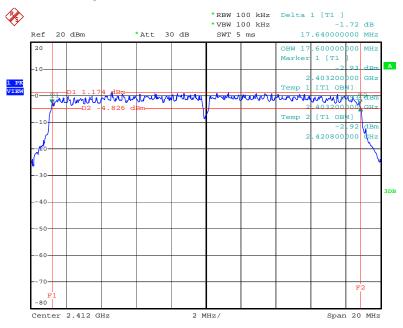
| Channel | Frequency | 6dB Bandwidth<br>(MHz) | 99% Occupied<br>Bandwidth<br>(MHz) | Min. Limit<br>(kHz) | Test Result |
|---------|-----------|------------------------|------------------------------------|---------------------|-------------|
| 1       | 2412 MHz  | 16.52                  | 16.44                              | 500                 | Complies    |
| 6       | 2437 MHz  | 16.52                  | 16.44                              | 500                 | Complies    |
| 11      | 2462 MHz  | 16.52                  | 16.44                              | 500                 | Complies    |

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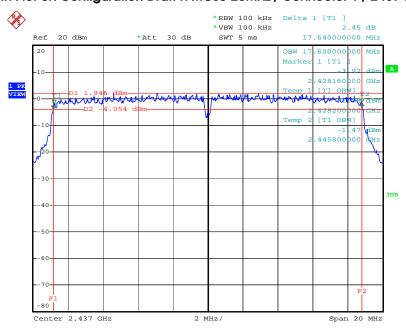
#### <For EUT 2 with PIFA antenna>

### 6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2412 MHz



Date: 1.OCT.2009 22:01:33

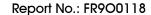
#### 6 dB Bandwidth Plot on Configuration Draft n MCSO 20MHz / Connector 1 / 2437 MHz



Date: 1.OCT.2009 22:03:35

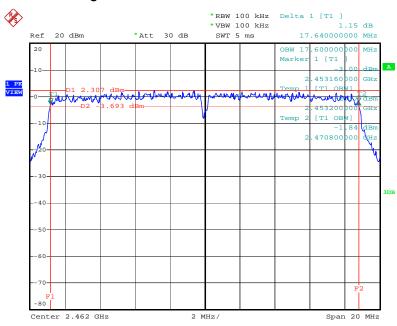
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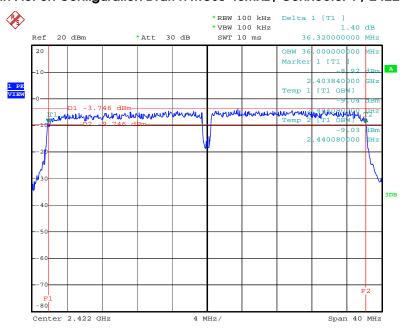


### 6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz



Date: 1.OCT.2009 22:08:52

### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2422 MHz

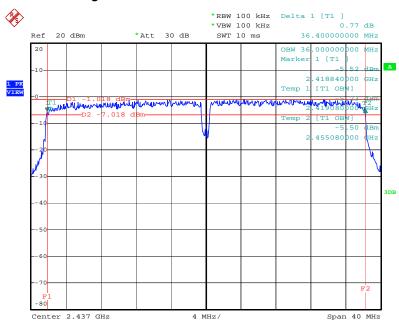


Date: 1.OCT.2009 21:54:32

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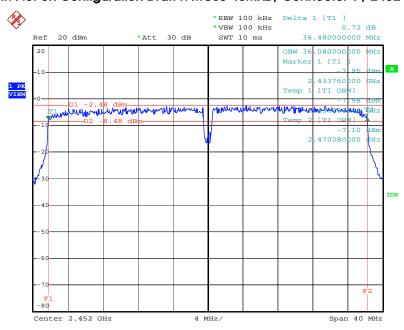


#### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2437 MHz



Date: 1.OCT.2009 21:52:31

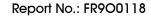
### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2452 MHz



Date: 1.OCT.2009 21:56:51

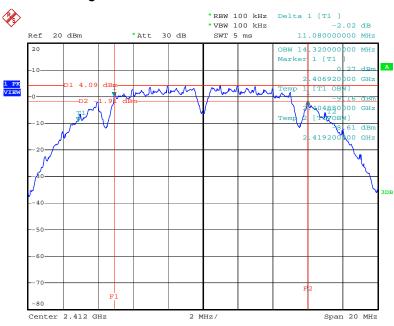
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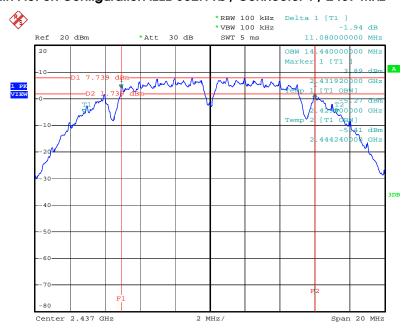


### 6 dB Bandwidth Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



Date: 1.OCT.2009 22:42:11

### 6 dB Bandwidth Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz

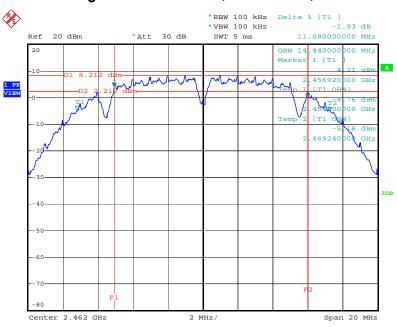


Date: 1.OCT.2009 22:44:19



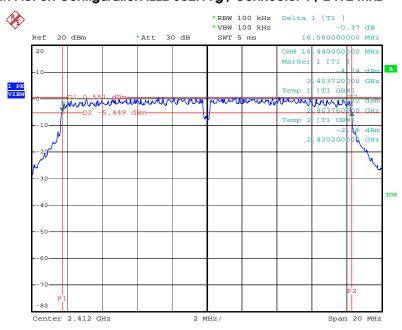


### 6 dB Bandwidth Plot on Configuration IEEE 802.11b / Connector 1 / 2462 MHz



Date: 1.OCT.2009 22:46:29

### 6 dB Bandwidth Plot on Configuration IEEE 802.11g / Connector 1 / 2412 MHz



Date: 1.OCT.2009 22:22:17

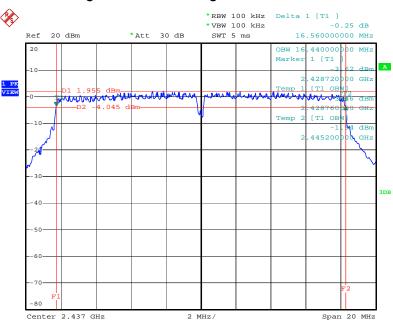
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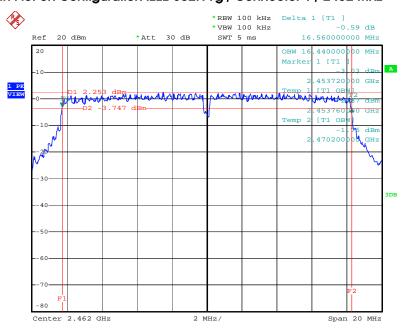


### 6 dB Bandwidth Plot on Configuration IEEE 802.11g / Connector 1 / 2437 MHz



Date: 1.OCT.2009 22:20:06

### 6 dB Bandwidth Plot on Configuration IEEE 802.11g / Connector 1 / 2462 MHz



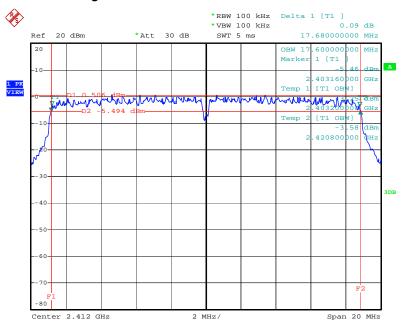
Date: 1.OCT.2009 22:17:47





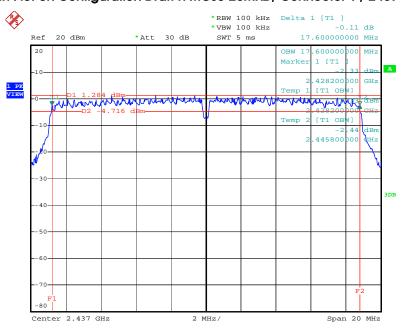
#### <For EUT 2 with Dipole antenna>

#### 6 dB Bandwidth Plot on Configuration Draft n MCSO 20MHz / Connector 1 / 2412 MHz



Date: 1.OCT.2009 21:03:44

#### 6 dB Bandwidth Plot on Configuration Draft n MCSO 20MHz / Connector 1 / 2437 MHz



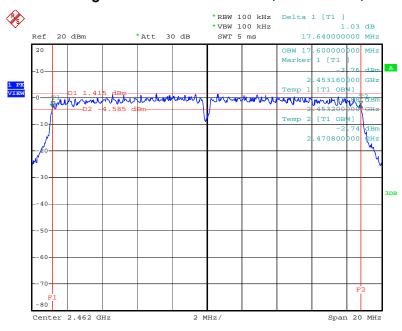
Date: 1.OCT.2009 21:05:53

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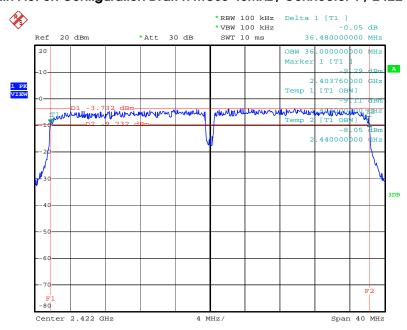


### 6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz / Connector 1 / 2462 MHz

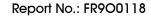


Date: 1.OCT.2009 21:07:59

### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2422 MHz

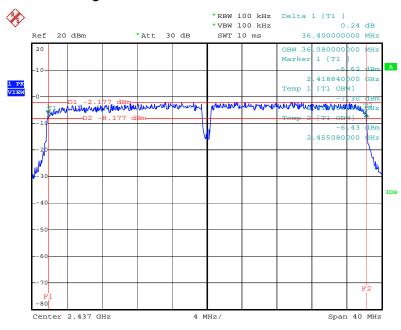


Date: 1.OCT.2009 21:13:29



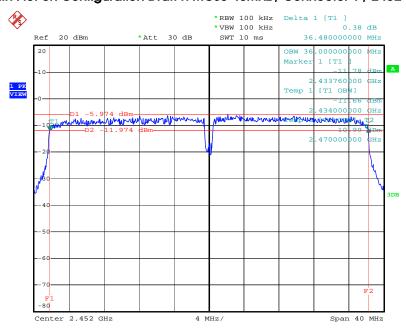


#### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2437 MHz



Date: 1.OCT.2009 21:16:10

### 6 dB Bandwidth Plot on Configuration Draft n MCSO 40MHz / Connector 1 / 2452 MHz



Date: 1.OCT.2009 21:29:48

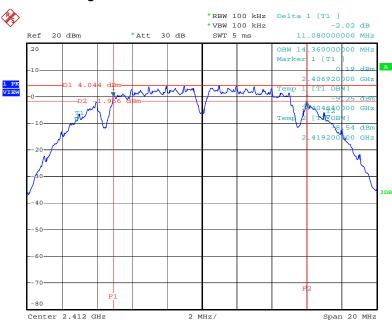
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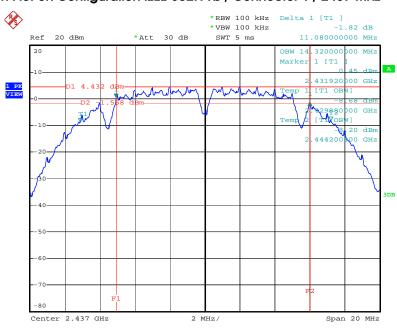


### 6 dB Bandwidth Plot on Configuration IEEE 802.11b / Connector 1 / 2412 MHz



Date: 1.OCT.2009 20:53:04

### 6 dB Bandwidth Plot on Configuration IEEE 802.11b / Connector 1 / 2437 MHz



Date: 1.OCT.2009 20:48:34

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