

EMC TEST REPORT

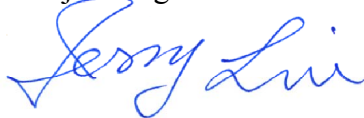
Report No. : EME-060130**Model No. : G-220 v2****Issued Date : Feb. 24, 2006**

Applicant : ZyXEL Communications Corporation
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Hsin-Chu, Taiwan

Test By : Intertek Testing Services Taiwan Ltd.
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Project Engineer



Jerry Liu

Reviewed By



Kevin Chen

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Summary of Tests**802.11g WLAN USB Adapter -Model: G-220 v2
FCC ID: I88G220V2**

| Test | Reference | Results |
|---------------------------------------|----------------|----------|
| Minimum 6dB Bandwidth test | 15.247(a)(2) | Complies |
| Maximum Output Power test | 15.247(b) | Complies |
| Radiated Spurious Emission test | 15.205, 15.209 | Complies |
| Power Spectrum Density test | 15.247(e) | Complies |
| Emission on the Band Edge test | 15.247(d) | Complies |
| AC Power Line Conducted Emission test | 15.207 | Complies |

1. General information**1.1 Identification of the EUT**

| | |
|---------------------------|-----------------------------------------------------------------------------------------------------------|
| Applicant | : ZyXEL Communications Corporation |
| Product | : 802.11g WLAN USB Adapter |
| Model No. | : G-220 v2 |
| FCC ID. | : I88G220V2 |
| Frequency Range | : 2412MHz ~ 2462MHz |
| Channel Number | : 11 channels |
| Frequency of Each Channel | : 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz |
| Type of Modulation | : DSSS, OFDM |
| Rated Power | : DC 5V |
| Power Cord | : N/A |
| Sample Received | : Feb. 6, 2006 |
| Test Date(s) | : Feb. 6, 2006 ~ Feb. 23, 2006 |

A FCC DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is an 802.11g WLAN USB Adapter, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: -0.27dBi max

Antenna Type: PCB antenna

Connector Type: N/A

1.4 Peripherals equipment

| Peripherals | Manufacturer | Product No. | Serial No. |
|-------------|--------------|-------------|------------|
| Notebook PC | HP | HSTNN-I04C | CNU5240W9N |
| PRINTER | HP | DeskJet 850 | SG5CQ170C0 |

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section § 15.205、§15.207、§15.209、§15.247 and ANSI C63.4/2003.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was supplied with 5Vdc from Notebook PC and it was running in operating mode.

Plug the EUT into Notebook PC via USB interface, then turn on the Notebook PC power and run the test program “ZD121xDual Band Evaluation Tool” under windows OS, which provide by manufacturer.

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found at 1Mbps data rate for 802.11b mode and 6Mbps data rate for 802.11g mode. The final tests were executed under these conditions and recorded in this report individually.

2.3 Test equipment

| Equipment | Brand | Frequency range | Model No. | Intertek ID No. | Next Cal. Date |
|-----------------------------------|-----------------|-----------------|---------------------|-----------------|----------------|
| EMI Test Receiver | Rohde & Schwarz | 9kHz~2.75GHz | ESCS 30 | EC303 | 04/17/2006 |
| EMI Test Receiver | Rohde & Schwarz | 20Hz~26.5GHz | ESMI | EC317 | 08/07/2006 |
| Spectrum Analyzer | Rohde & Schwarz | 9kHz~30GHz | FSP 30 | EC353 | 07/24/2006 |
| Spectrum Analyzer | Rohde & Schwarz | 20Hz~40GHz | FSEK 30 | EC365 | 11/01/2006 |
| Horn Antenna | SCHWARZBECK | 1GHz~18GHz | BBHA 9120 D | EC371 | 12/22/2007 |
| Bilog Antenna | SCHWARZBECK | 25MHz~2GHz | VULB 9168 | EC347 | 12/23/2007 |
| Pre-Amplifier | MITEQ | 100MHz~26.5GHz | 919981 | EC373 | 12/29/2006 |
| Pre-Amplifier | MITEQ | 26GHz~40GHz | 828825 | EC374 | 01/15/2008 |
| Wideband Peak Power Meter/ Sensor | Anritsu | 100MHz~18GHz | ML2497A/ MA2491A | EC396 | 11/10/2006 |
| Controller | HDGmbH | N/A | CM 100 | EP346 | N/A |
| Antenna Tower | HDGmbH | N/A | MA 240 | EP347 | N/A |
| LISN | Rohde & Schwarz | 9KHz~30MHz | ESH3-Z5 | EC344 | 01/15/2007 |

Note: 1. The above equipments are within the valid calibration period.

2. The test antennas (receiving antenna) are calibration per 3 years.

3. Minimum 6dB Bandwidth test

3.1 Operating environment

Temperature: 25 °C
Relative Humidity: 56 %
Atmospheric Pressure: 1023 hPa

3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC §15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 100kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table.

3.3 Measured data of Minimum 6dB Bandwidth test results

Test Mode: 802.11b(DSSS Modulation) operating mode

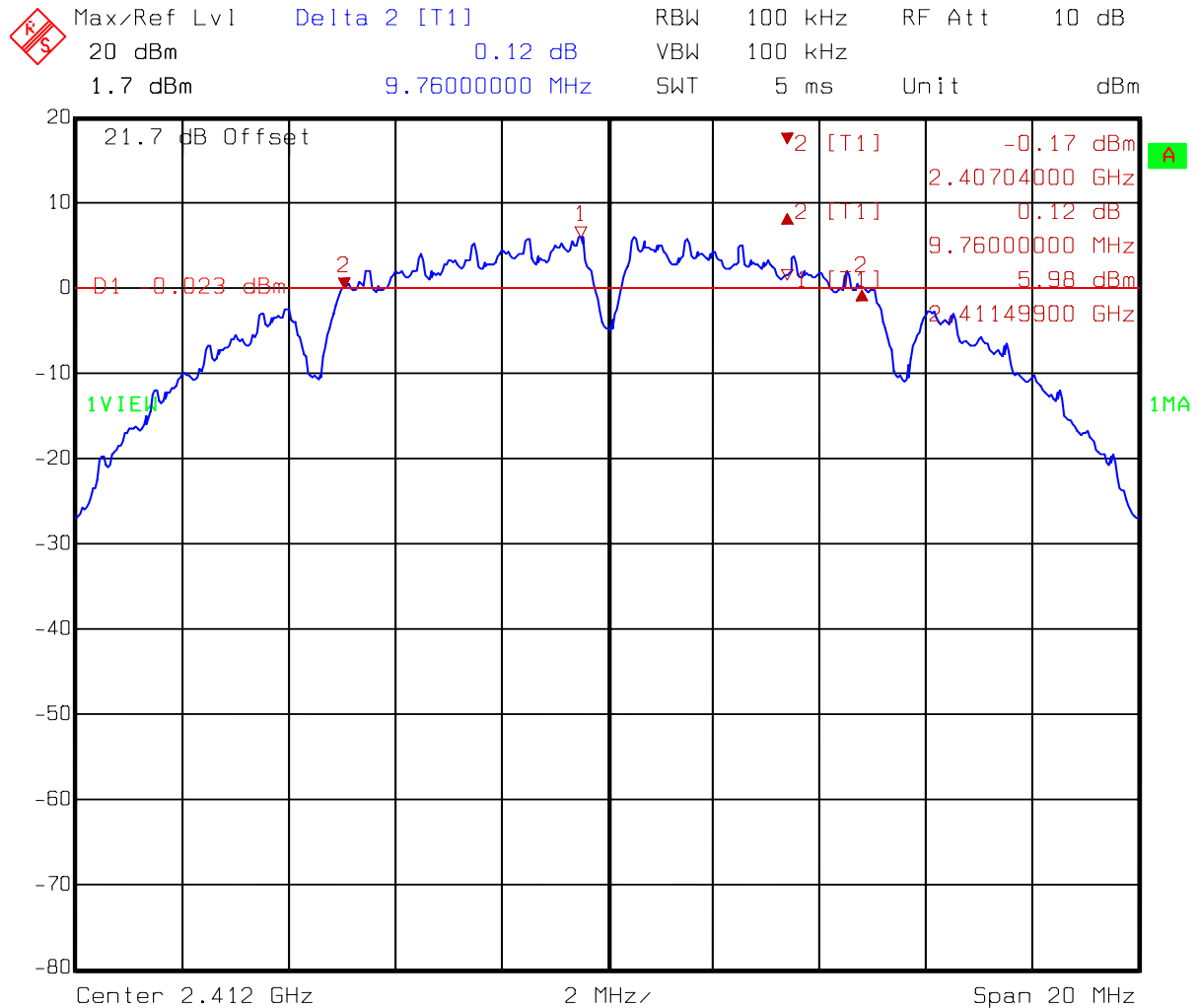
| Channel | Frequency (MHz) | Bandwidth (MHz) | Limit |
|--------------|-----------------|-----------------|----------|
| 1 (lowest) | 2412 | 9.76 | > 500kHz |
| 6 (middle) | 2437 | 9.72 | > 500kHz |
| 11 (highest) | 2462 | 10.12 | > 500kHz |

Test Mode: 802.11g(OFDM Modulation) operating mode

| Channel | Frequency (MHz) | Bandwidth (MHz) | Limit |
|--------------|-----------------|-----------------|----------|
| 1 (lowest) | 2412 | 16.64 | > 500kHz |
| 6 (middle) | 2437 | 16.56 | > 500kHz |
| 11 (highest) | 2462 | 16.56 | > 500kHz |

Please see the plot below.

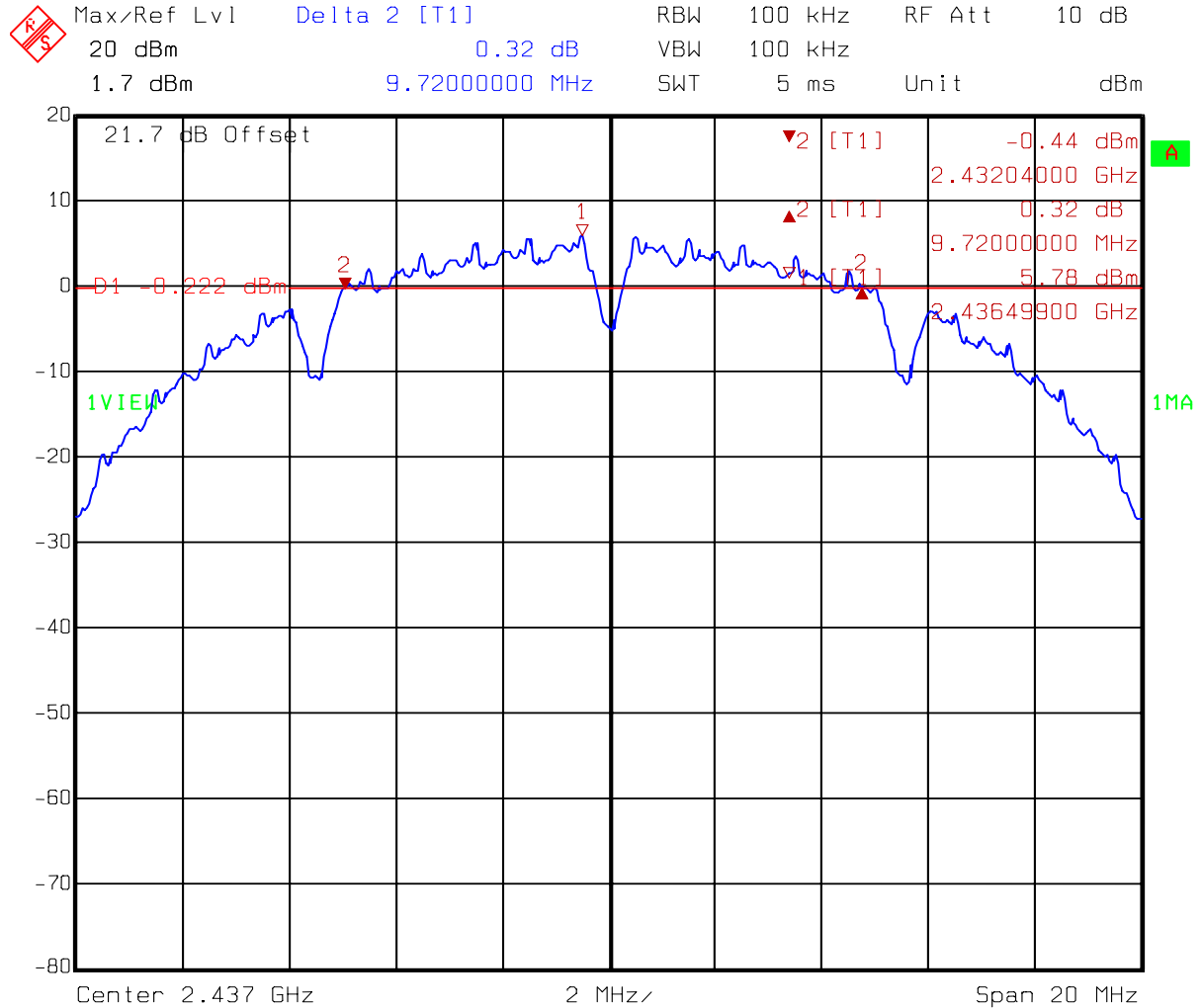
Test Mode: 802.11b(DSSS Modulation) operating mode



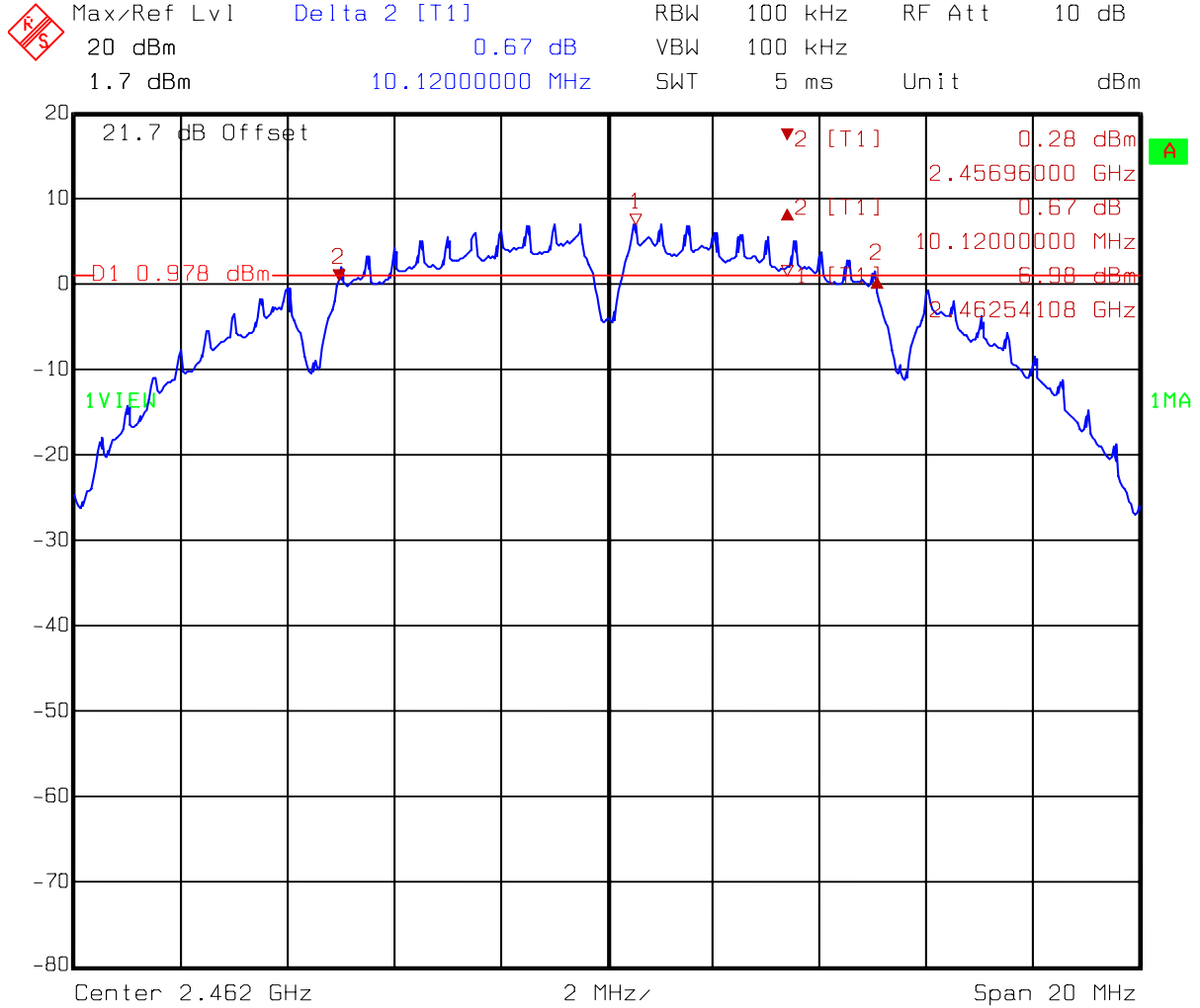
Title: 6dB Bandwidth

Comment A: Channel 1 at 802.11b mode

Date: 15.FEB.2006 09:05:26

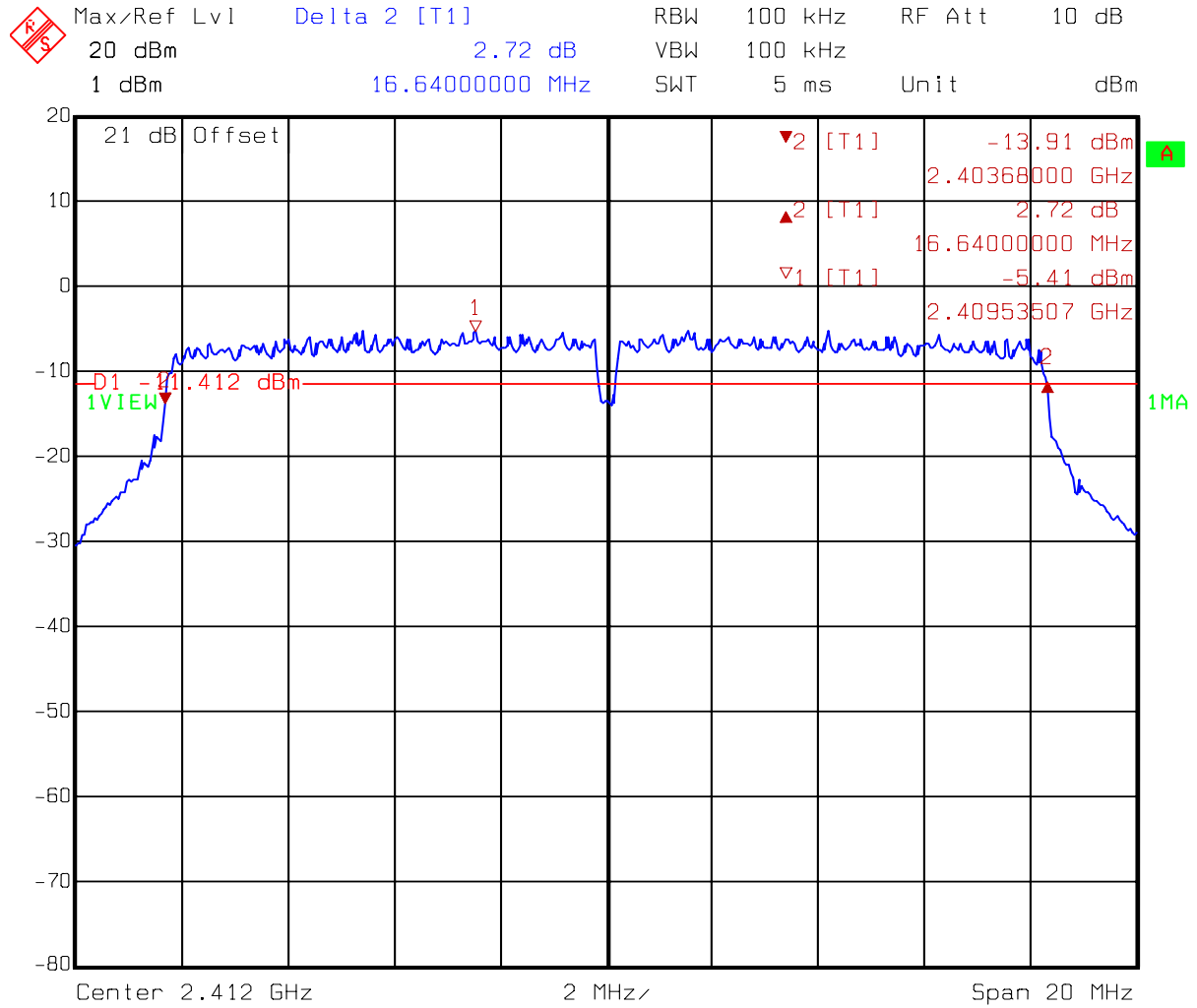


Title: 6dB Bandwidth
 Comment A: Channel 6 at 802.11b mode
 Date: 15.FEB.2006 09:08:56

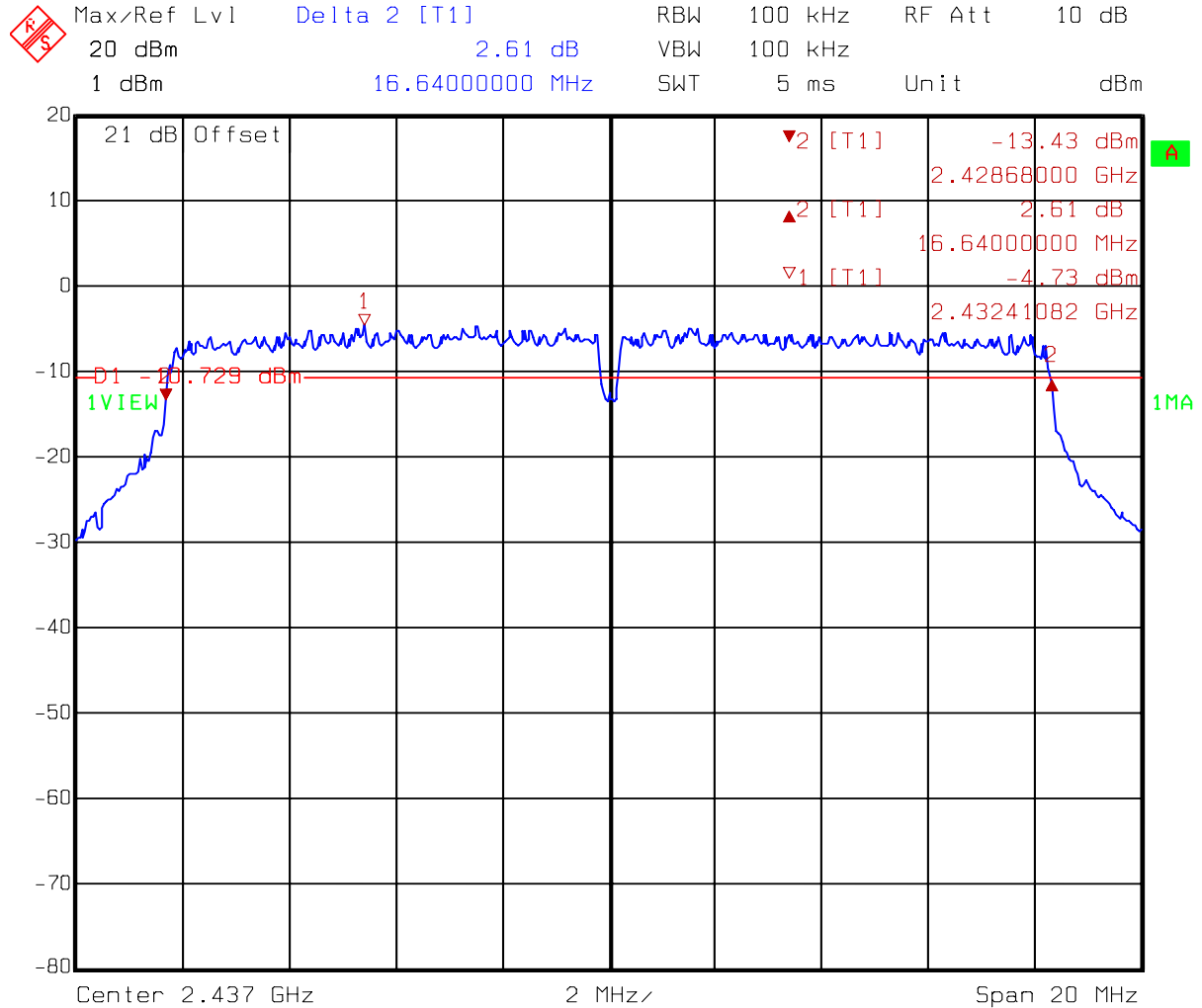


Title: 6dB Bandwidth
 Comment A: Channel 11 at 802.11b mode
 Date: 15.FEB.2006 09:13:10

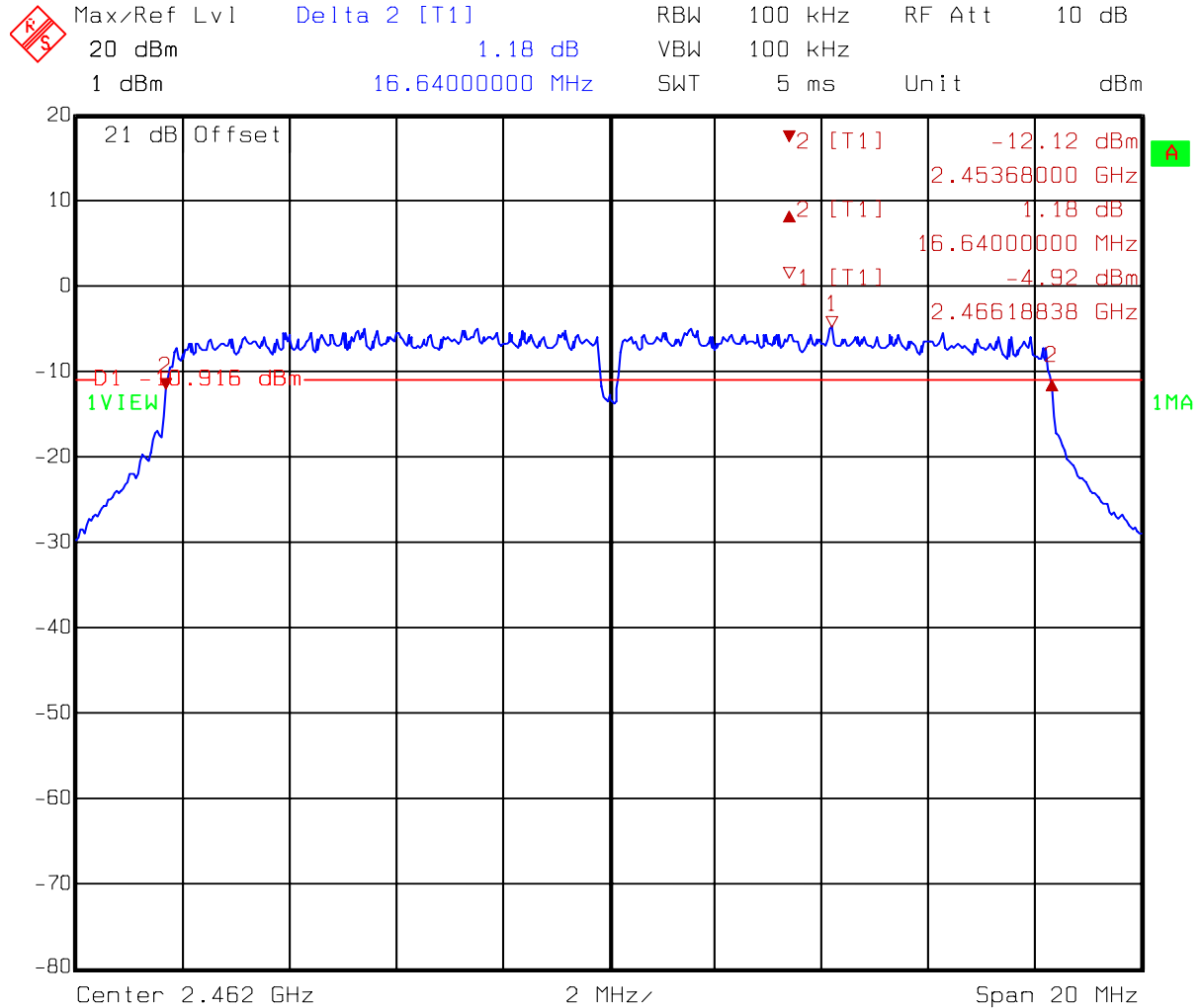
Test Mode: 802.11g(OFDM Modulation) operating mode



Title: 6dB Bandwidth
 Comment A: Channel 1 at 802.11g mode
 Date: 21.FEB.2006 10:38:02



Title: 6dB Bandwidth
 Comment A: Channel 6 at 802.11g mode
 Date: 21.FEB.2006 10:43:08



Title: 6dB Bandwidth
 Comment A: Channel 11 at 802.11g mode
 Date: 21.FEB.2006 10:45:05

4. Maximum Output Power test

4.1 Operating environment

Temperature: 23 °C
 Relative Humidity: 52 %
 Atmospheric Pressure: 1023 hPa

4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (1.7 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

4.3 Measured data of Maximum Output Power test results

Test Mode: 802.11b(DSSS Modulation) operating mode

| Channel | Freq. (MHz) | C.L. (dB) | Reading (dBm) | Conducted Peak Output Power | | Limit (W) |
|--------------|-------------|-----------|---------------|-----------------------------|-------|-----------|
| | | | | (dBm) | (mW) | |
| 1 (lowest) | 2412 | 1.7 | 17.97 | 19.67 | 92.68 | 1 |
| 6 (middle) | 2437 | 1.7 | 17.75 | 19.45 | 88.10 | 1 |
| 11 (highest) | 2462 | 1.7 | 17.49 | 19.19 | 82.99 | 1 |

Remark:

Conducted Peak Output Power = Reading + C.L.

Test Mode: 802.11g(OFDM Modulation) operating mode

| Channel | Freq. (MHz) | C.L. (dB) | Reading (dBm) | Conducted Peak Output Power | | Limit (W) |
|--------------|-------------|-----------|---------------|-----------------------------|--------|-----------|
| | | | | (dBm) | (mW) | |
| 1 (lowest) | 2412 | 1.7 | 22.94 | 22.94 | 196.79 | 1 |
| 6 (middle) | 2437 | 1.7 | 22.68 | 22.68 | 185.35 | 1 |
| 11 (highest) | 2462 | 1.7 | 22.32 | 22.32 | 170.61 | 1 |

Remark:

Conducted Peak Output Power = Reading + C.L.

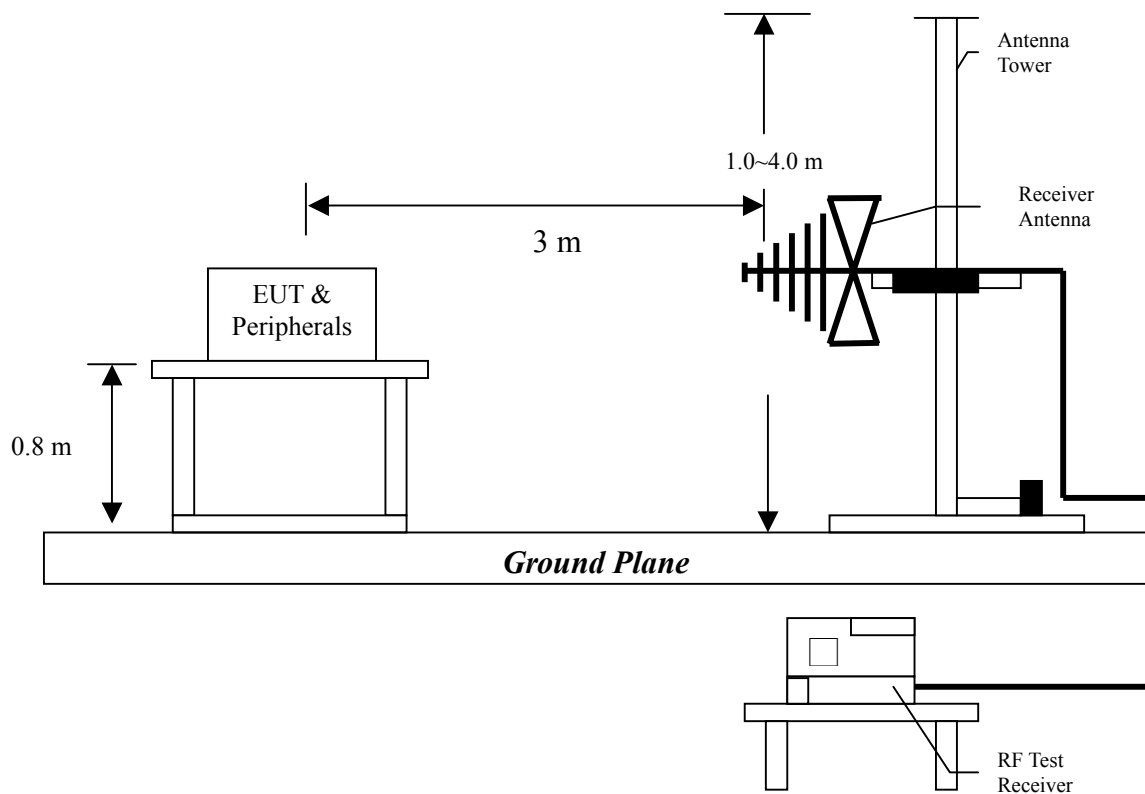
5. Radiated Emission test

5.1 Operating environment

Temperature: 23 °C
Relative Humidity: 60 %
Atmospheric Pressure: 1010 hPa

5.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

5.3 Emission limits

The spurious Emission shall test through the 10th harmonic. 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).

| Frequency (MHz) | Limits (dB μ V/m@3m) |
|--------------------|-----------------------------|
| 30-88 | 40 |
| 88-216 | 43.5 |
| 216-960 | 46 |
| Above 960 | 54 |

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.

Expanded uncertainty (k=2) of radiated emission measurement is 4.98 dB.

5.4 Radiated spurious emission test data

The radiated spurious emissions at

| Frequency(MHz) | Margin | Frequency(MHz) | Margin |
|----------------|--------|----------------|--------|
| 4824.00 | -0.98 | 4824.00 | -4.98 |
| 4824.00 | -0.3 | 4824.00 | -0.92 |
| 4874.00 | -1.05 | 4874.00 | -2.58 |
| 4874.00 | -1.92 | 4874.00 | -2.34 |
| 4924.00 | -1.1 | 4924.00 | -2.56 |
| 4924.00 | -19.71 | 4924.00 | -2.59 |
| 4924.00 | -1.96 | - | - |

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

5.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11b and 802.11g continuously transmitting mode. Channel 1, 6, 11 were verified. The worst case occurred at 802.11b Tx channel 1.

EUT : G-220 v2
Worst Case : 802.11b Tx at channel 1

| Antenna Polariz. (V/H) | Freq. (MHz) | Receiver Detector | Corr. Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Antenna high (cm) | Turn Table angle (degree) |
|------------------------|-------------|-------------------|---------------------|----------------|--------------------------|----------------------|-------------|-------------------|---------------------------|
| V | 171.62 | QP | 14.96 | 14.69 | 29.64 | 43.50 | -13.86 | 100 | 310 |
| V | 297.72 | QP | 13.95 | 13.73 | 27.68 | 46.00 | -18.32 | 102 | 301 |
| V | 365.62 | QP | 15.06 | 12.38 | 27.44 | 46.00 | -18.56 | 138 | 344 |
| V | 429.64 | QP | 17.64 | 11.46 | 29.10 | 46.00 | -16.90 | 186 | 135 |
| V | 499.48 | QP | 18.43 | 17.62 | 36.04 | 46.00 | -9.96 | 186 | 273 |
| V | 998.06 | QP | 25.49 | 17.31 | 42.80 | 54.00 | -11.20 | 169 | 321 |
| H | 198.78 | QP | 11.27 | 14.96 | 26.22 | 43.50 | -17.28 | 400 | 186 |
| H | 398.60 | QP | 16.74 | 13.15 | 29.89 | 46.00 | -16.11 | 232 | 56 |
| H | 499.48 | QP | 18.64 | 18.13 | 36.77 | 46.00 | -9.23 | 181 | 335 |
| H | 749.74 | QP | 22.95 | 11.84 | 34.79 | 46.00 | -11.21 | 129 | 162 |
| H | 798.24 | QP | 23.52 | 10.42 | 33.94 | 46.00 | -12.06 | 125 | 139 |
| H | 998.06 | QP | 25.83 | 14.03 | 39.85 | 54.00 | -14.15 | 100 | 230 |

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

5.4.2 Measurement results: frequency above 1GHz

EUT : G-220 v2

Test Condition : 802.11b Tx at channel 1

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4824.00 | PK | V | 36.07 | 37.77 | 51.32 | 53.02 | 54 | -0.98 | 101 | 279 |
| 4824.00 | PK | H | 36.07 | 37.77 | 52 | 53.7 | 54 | -0.3 | 102 | 126 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : G-220 v2
Test Condition : 802.11b Tx at channel 6

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4874.00 | PK | V | 36.07 | 37.77 | 53.57 | 55.27 | 74 | -18.73 | 102 | 277 |
| 4874.00 | AV | V | 36.07 | 37.77 | 51.25 | 52.95 | 54 | -1.05 | 102 | 277 |
| 4874.00 | PK | H | 36.07 | 37.77 | 52.54 | 54.24 | 74 | -19.76 | 101 | 135 |
| 4874.00 | AV | H | 36.07 | 37.77 | 50.38 | 52.08 | 54 | -1.92 | 101 | 135 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : G-220 v2

Test Condition : 802.11b Tx at channel 11

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4924.00 | PK | V | 36.07 | 37.77 | 51.2 | 52.9 | 54 | -1.1 | 102 | 253 |
| 4924.00 | PK | H | 36.07 | 37.77 | 52.59 | 54.29 | 74 | -19.71 | 100 | 128 |
| 4924.00 | AV | H | 36.07 | 37.77 | 50.34 | 52.04 | 54 | -1.96 | 100 | 128 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : G-220 v2
Test Condition : 802.11g Tx at channel 1

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4824.00 | PK | V | 36.07 | 37.77 | 47.32 | 49.02 | 54 | -4.98 | 101 | 277 |
| 4824.00 | PK | H | 36.07 | 37.77 | 51.38 | 53.08 | 54 | -0.92 | 101 | 126 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : G-220 v2
Test Condition : 802.11g Tx at channel 6

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4874.00 | PK | V | 36.07 | 37.77 | 49.72 | 51.42 | 54 | -2.58 | 103 | 277 |
| 4874.00 | PK | H | 36.07 | 37.77 | 49.96 | 51.66 | 54 | -2.34 | 102 | 137 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

EUT : G-220 v2
Test Condition : 802.11g Tx at channel 11

| Frequency (MHz) | Spectrum Analyzer Detector | Antenna Polariz. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) | Ant. high (cm) | Turn Table angle (degree) |
|--------------------|----------------------------------|------------------------------|-------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|----------------------|---------------------------------|
| 4924.00 | PK | V | 36.07 | 37.77 | 49.74 | 51.44 | 54 | -2.56 | 104 | 253 |
| 4924.00 | PK | H | 36.07 | 37.77 | 49.71 | 51.41 | 54 | -2.59 | 100 | 128 |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

6. Power Spectrum Density test

6.1 Operating environment

Temperature: 23 °C
Relative Humidity: 53 %
Atmospheric Pressure 1023 hPa

6.2 Test setup & procedure

The power spectrum density per FCC §15.247(e) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 10kHz, a span of 300kHz, and the sweep time set at 100 seconds. Power Density was read directly correction was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table.

6.3 Measured data of Power Spectrum Density test results

Test Mode: 802.11b(DSSS Modulation) operating mode

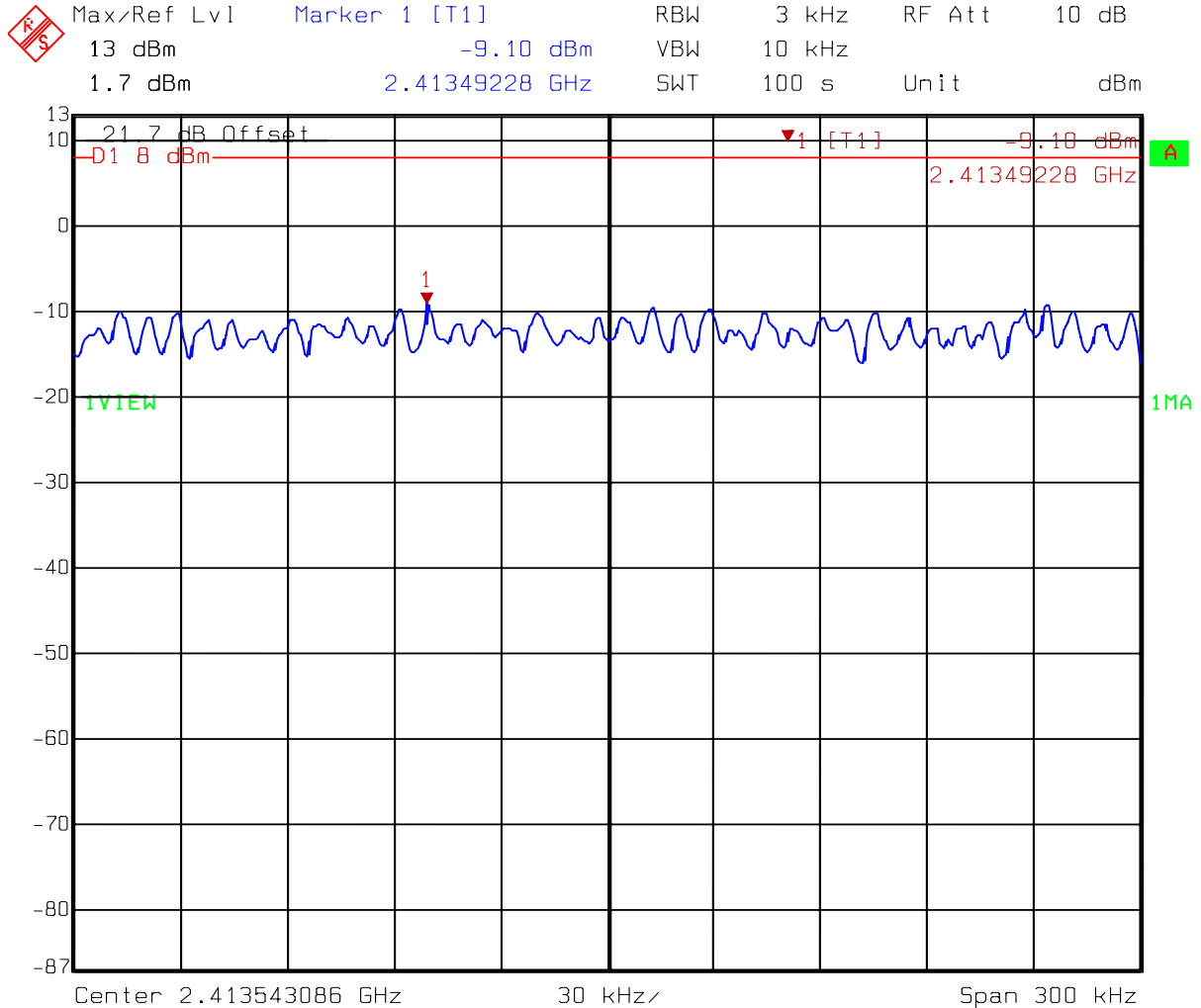
| Channel | Frequency (MHz) | Power spectrum density (dBm) | Limit (dBm) |
|--------------|-----------------|------------------------------|-------------|
| 1 (lowest) | 2412 | -9.10 | 8 |
| 6 (middle) | 2437 | -8.78 | 8 |
| 11 (highest) | 2462 | -10.13 | 8 |

Test Mode: 802.11g(OFDM Modulation) operating mode

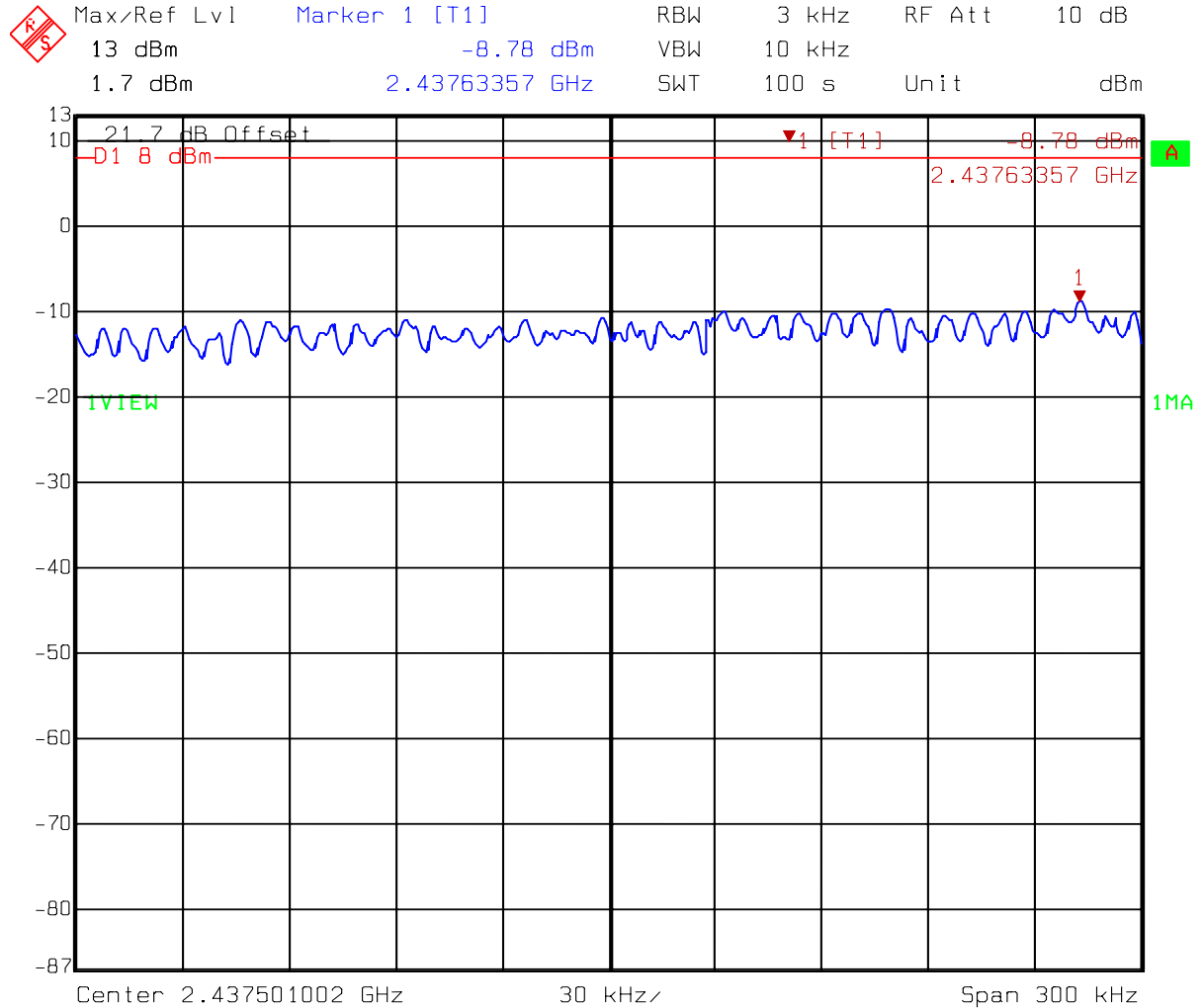
| Channel | Frequency (MHz) | Power spectrum density (dBm) | Limit (dBm) |
|--------------|-----------------|------------------------------|-------------|
| 1 (lowest) | 2412 | -19.89 | 8 |
| 6 (middle) | 2437 | -19.65 | 8 |
| 11 (highest) | 2462 | -19.87 | 8 |

Please see the plot below.

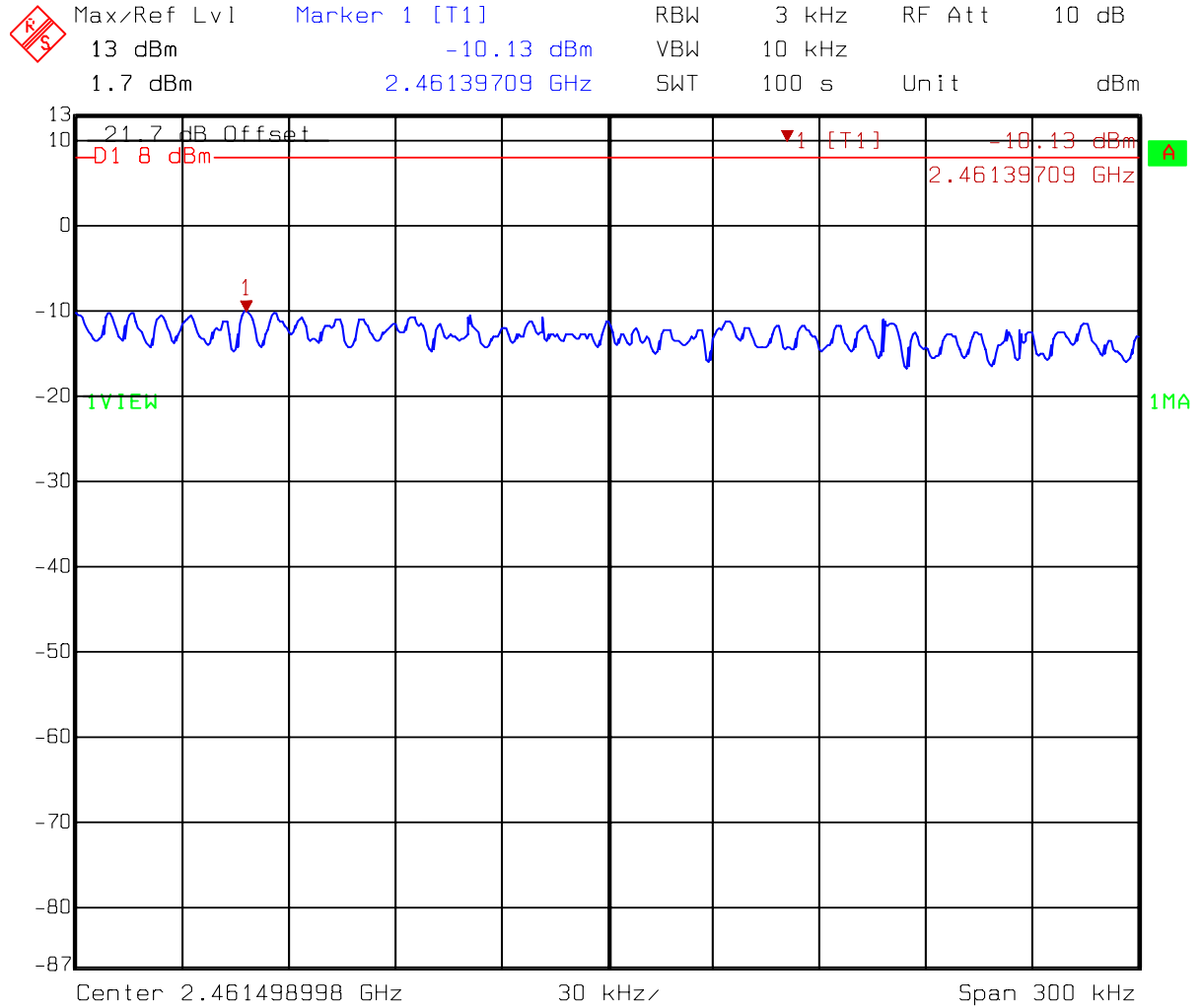
Test Mode: 802.11b(DSSS Modulation) operating mode



Title: Power Spectrum Density
 Comment A: Channel 1 at 802.11b mode
 Date: 15.FEB.2006 09:39:36

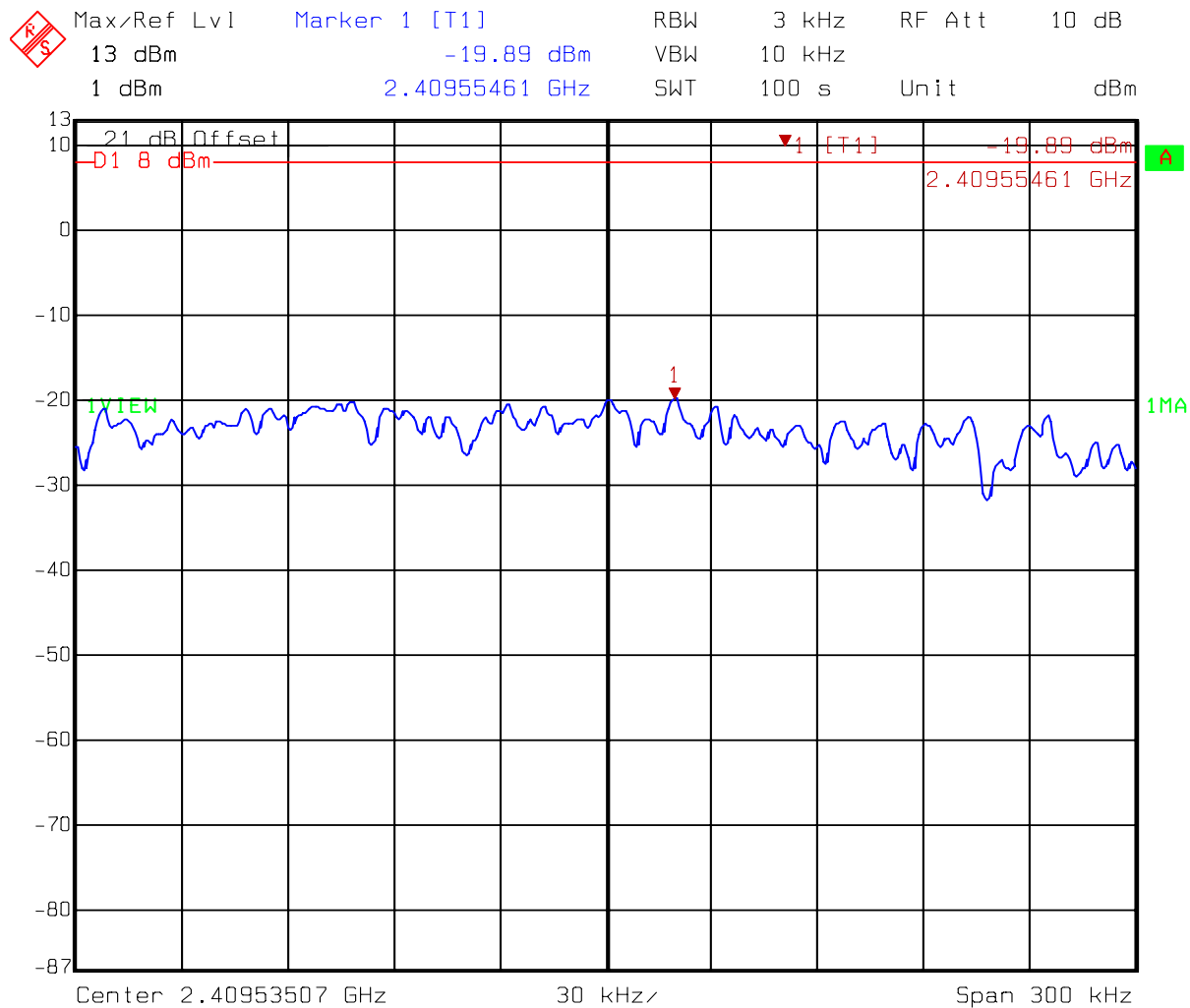


Title: Power Spectrum Density
 Comment A: Channel 6 at 802.11b mode
 Date: 15.FEB.2006 09:36:49

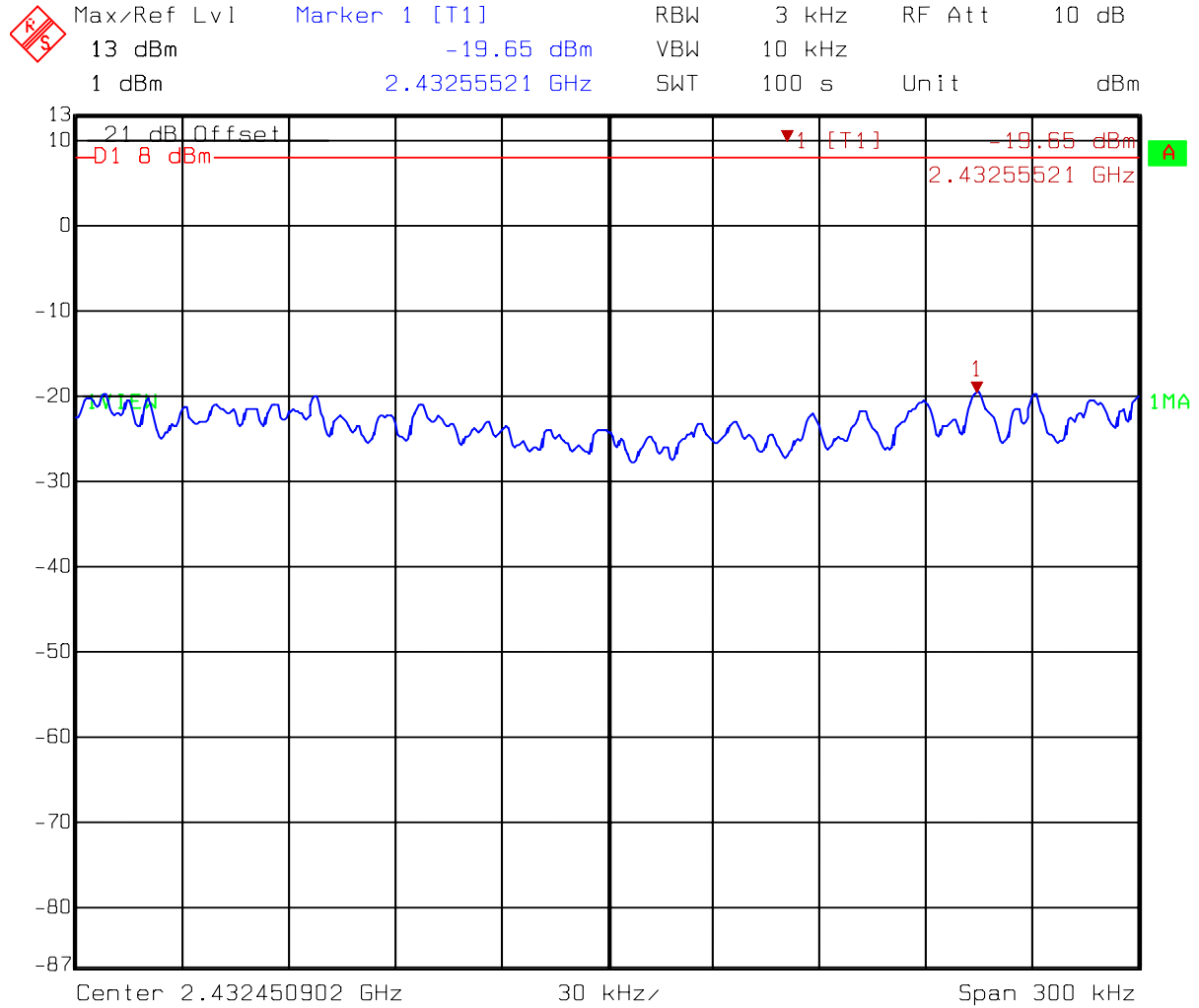


Title: Power Spectrum Density
 Comment A: Channel 11 at 802.11b mode
 Date: 15.FEB.2006 09:36:15

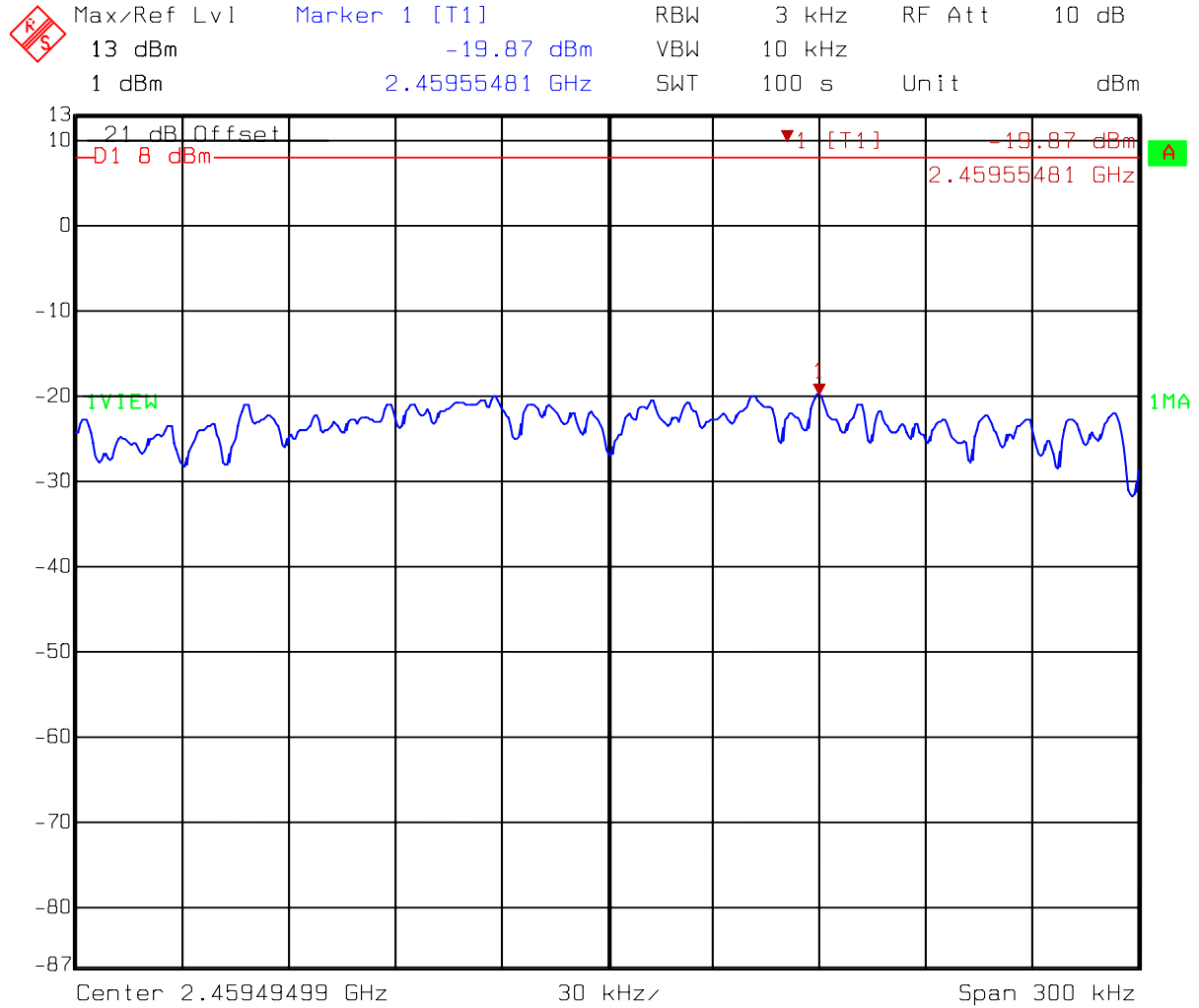
Test Mode: 802.11g(OFDM Modulation) operating mode



Title: Power Spectrum Density
 Comment A: Channel 1 at 802.11g mode
 Date: 21.FEB.2006 10:41:13



Title: Power Spectrum Density
 Comment A: Channel 6 at 802.11g mode
 Date: 21.FEB.2006 10:43:26



Title: Power Spectrum Density
 Comment A: Channel 11 at 802.11g mode
 Date: 21.FEB.2006 10:45:23

7. Emission on the band edge

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.1 Operating environment

| | | |
|----------------------|------|-----|
| Temperature: | 23 | °C |
| Relative Humidity: | 56 | % |
| Atmospheric Pressure | 1023 | hPa |

7.2 Test setup & procedure

The output of EUT was connected to spectrum analyzer via a 50ohm cable.

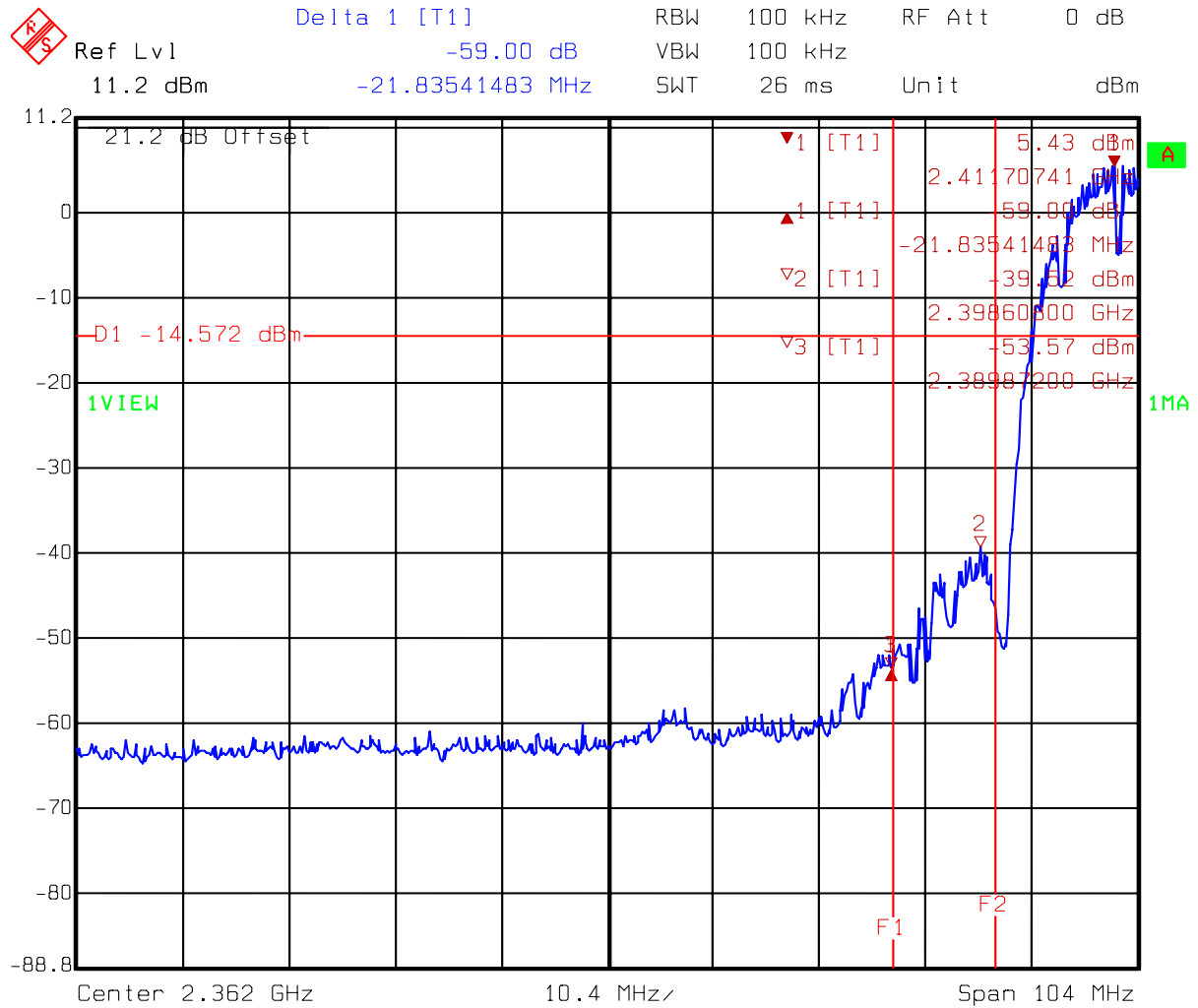
The setting of spectrum analyzer is:

| | | |
|----------|----------------|--------------|
| Peak: | RBW = 100kHz ; | VBW = 100kHz |
| Average: | RBW = 1MHz ; | VBW = 10Hz |

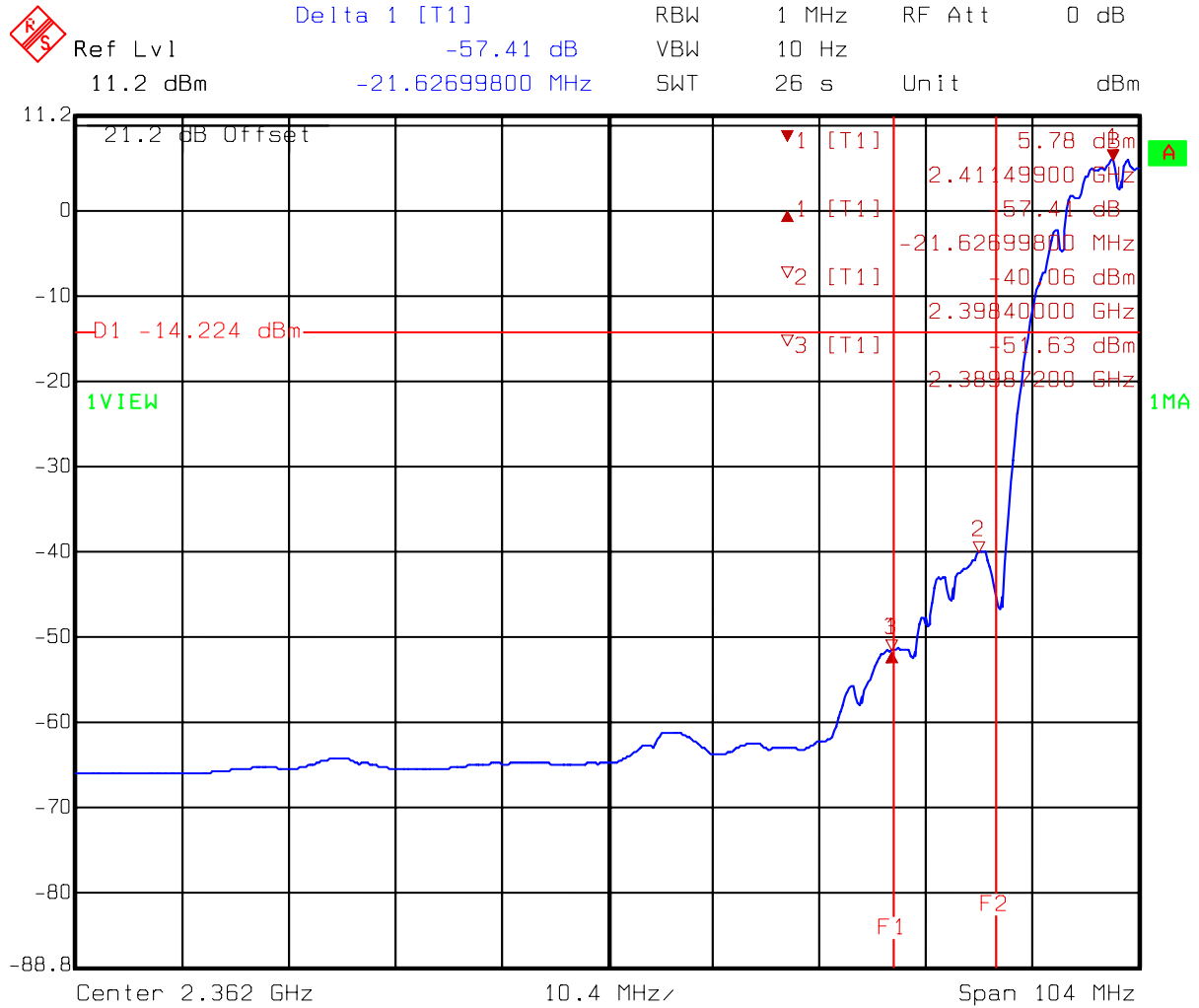
7.3 Test Result

7.3.1 Conducted Method

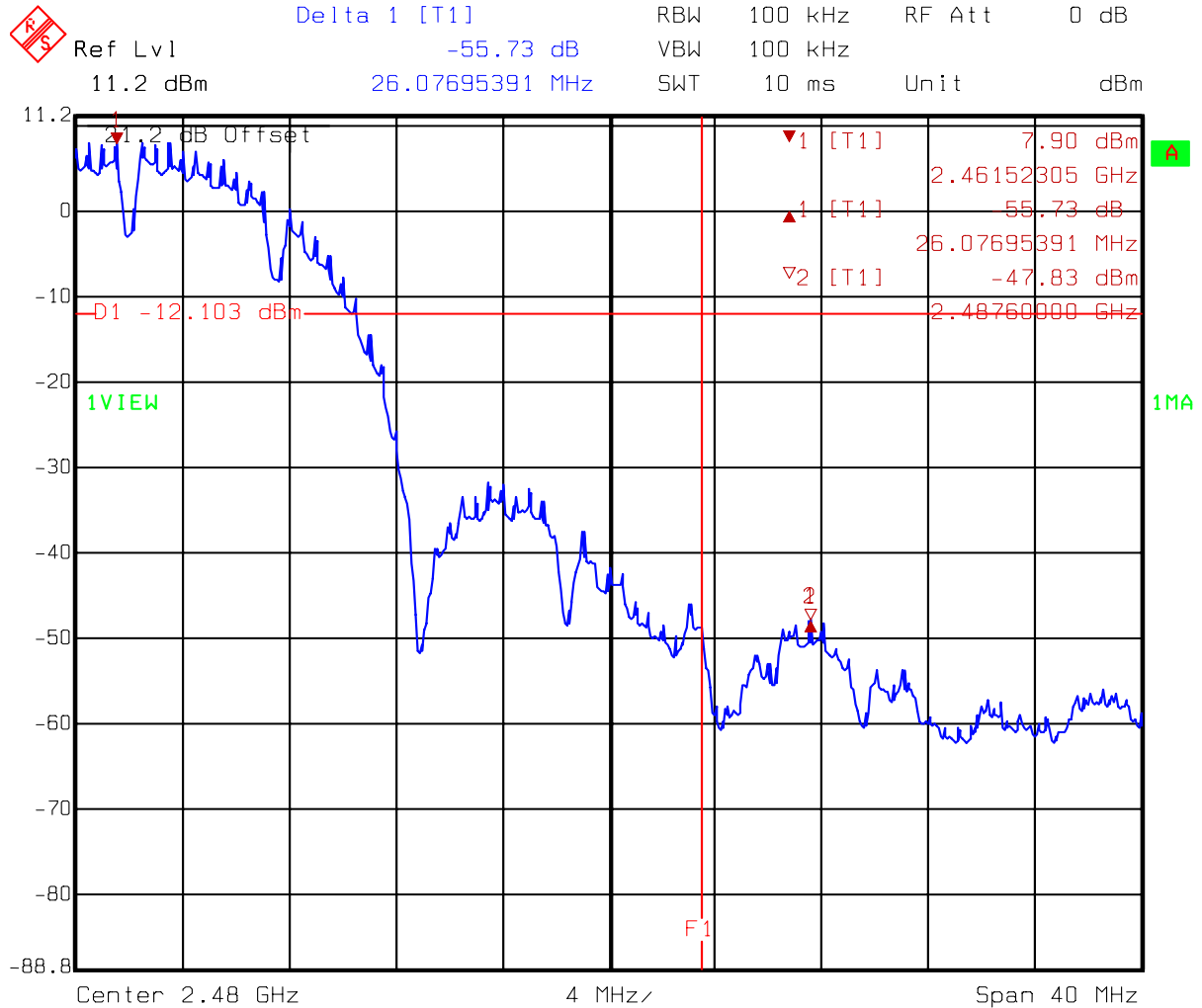
Test Mode: 802.11b(DSSS Modulation) operating mode



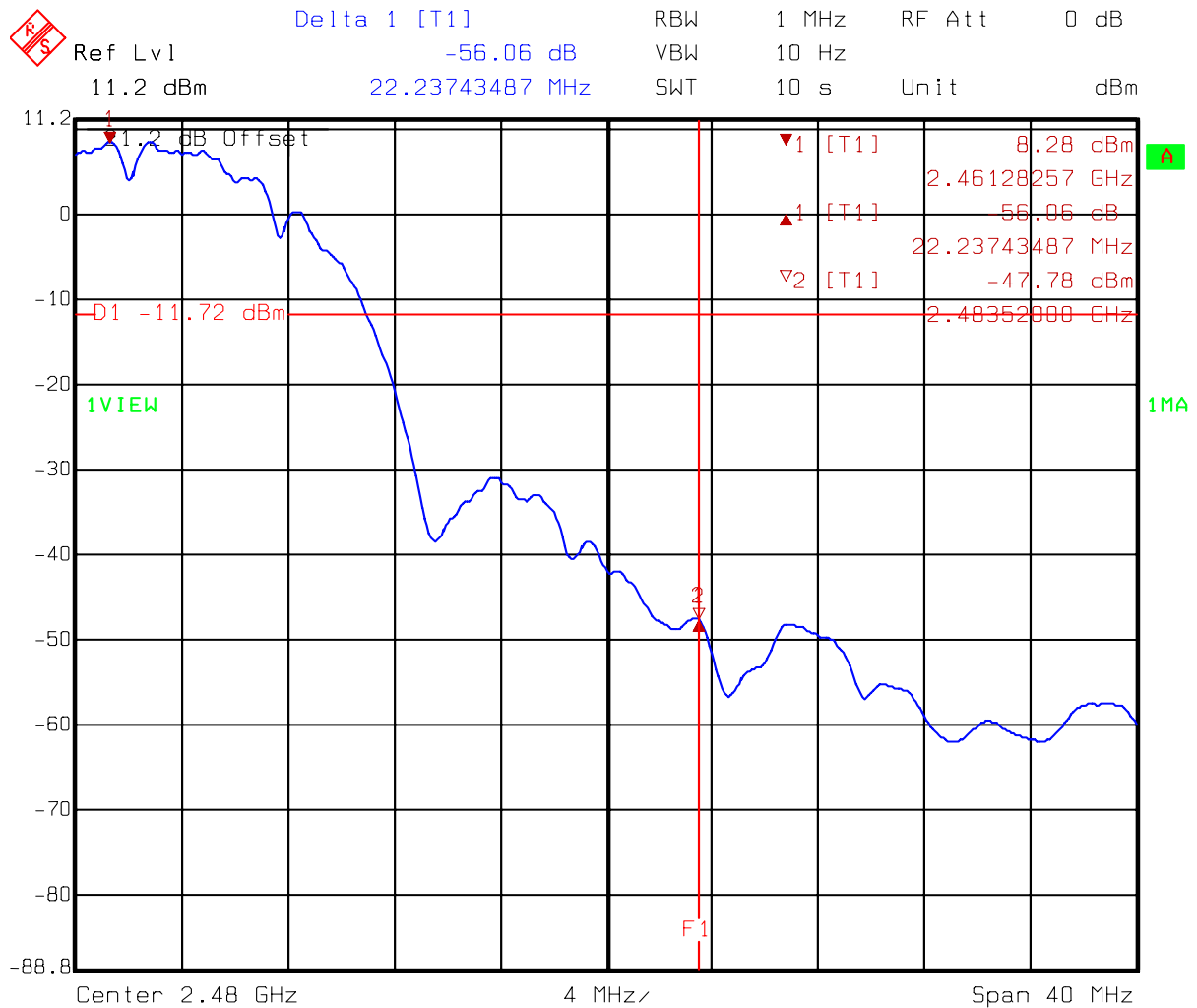
Title: Band Edge
Comment A: Channel 1 at 802.11b mode
F1=2390MHz F2=2400MHz (Peak Detect)
Date: 18.FEB.2006 10:42:53



```
Title:      Band Edge
Comment A:  Channel 1 at 802.11b mode
            F1=2390MHz F2=2400MHz (Average Detect)
Date:      18.FEB.2006  10:43:40
```

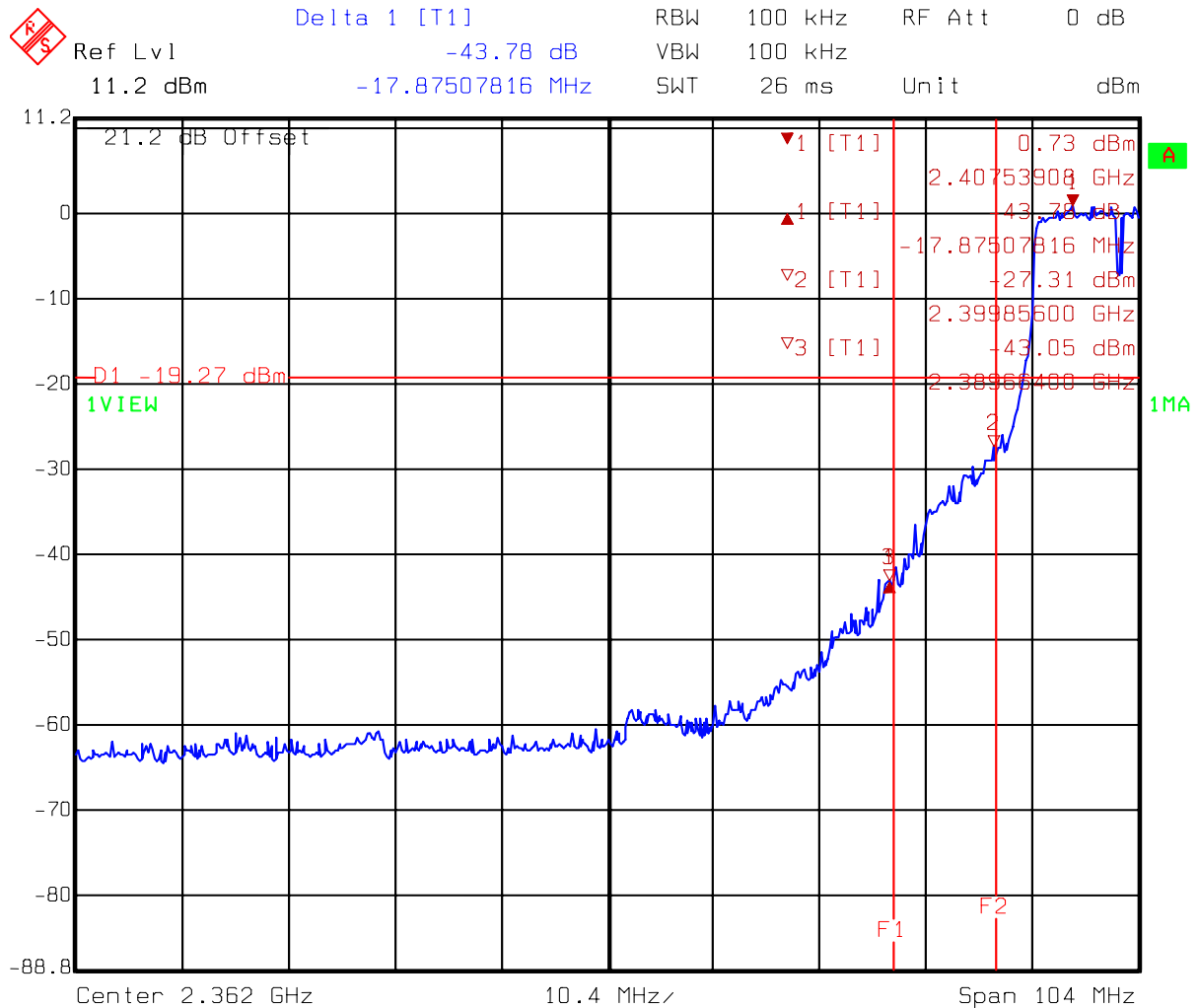


Title: Band Edge
 Comment A: Channel 11 at 802.11b mode
 F1=2483.5MHz (Peak Detect)
 Date: 18.FEB.2006 10:44:57

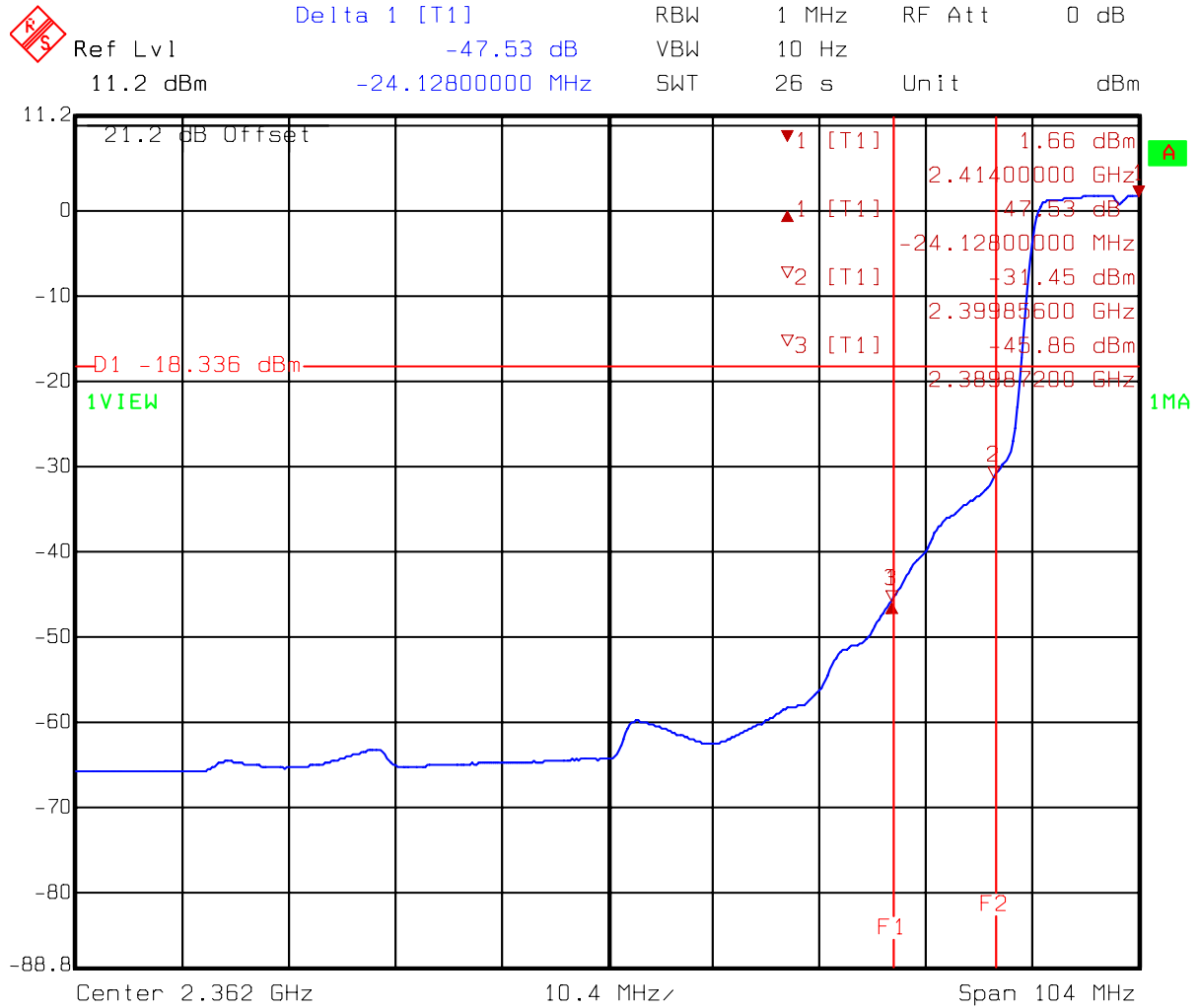


Title: Band Edge
 Comment A: Channel 11 at 802.11b mode
 F1=2483.5MHz (Average Detect)
 Date: 18.FEB.2006 10:45:42

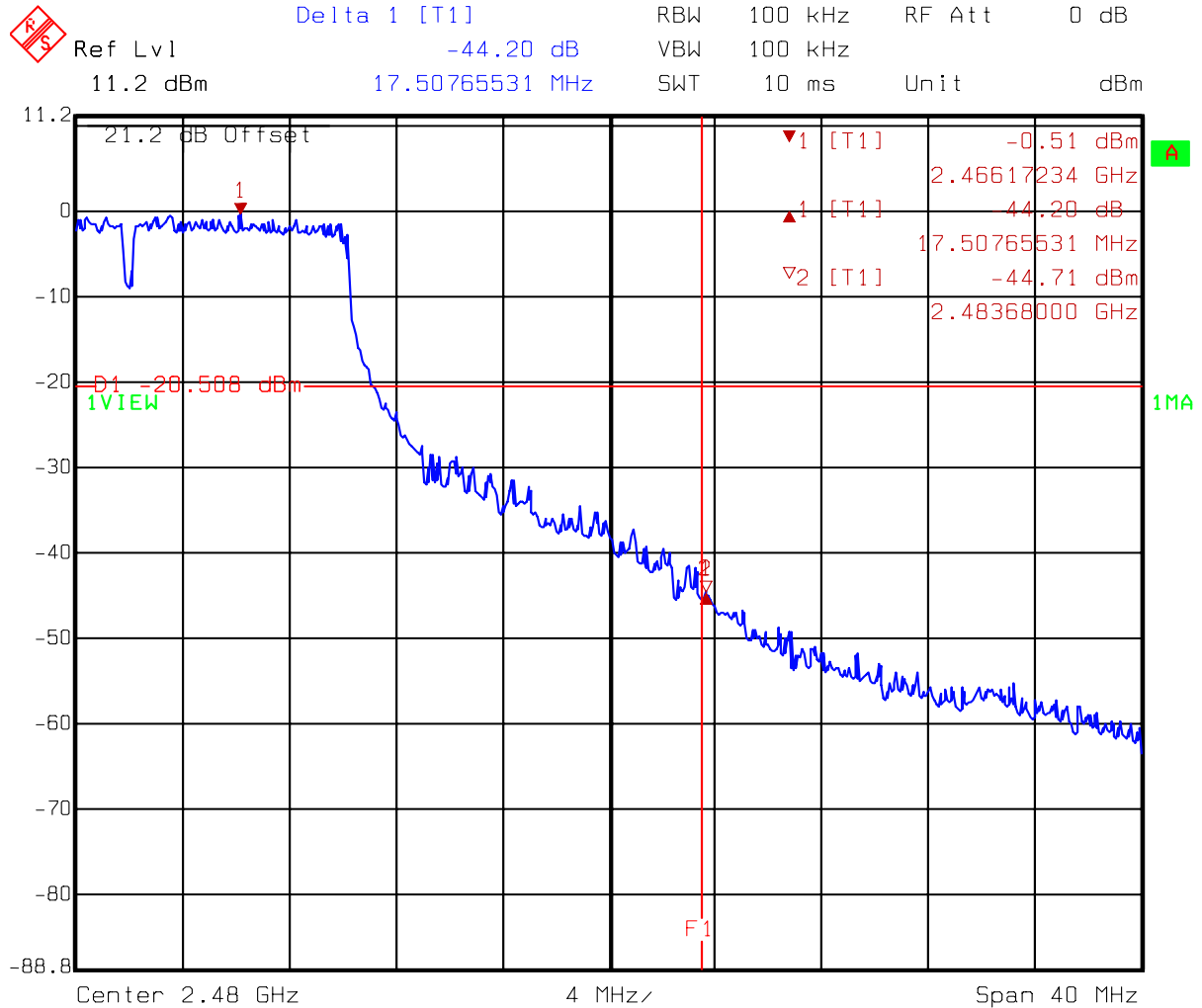
Test Mode: 802.11g(OFDM Modulation) operating mode



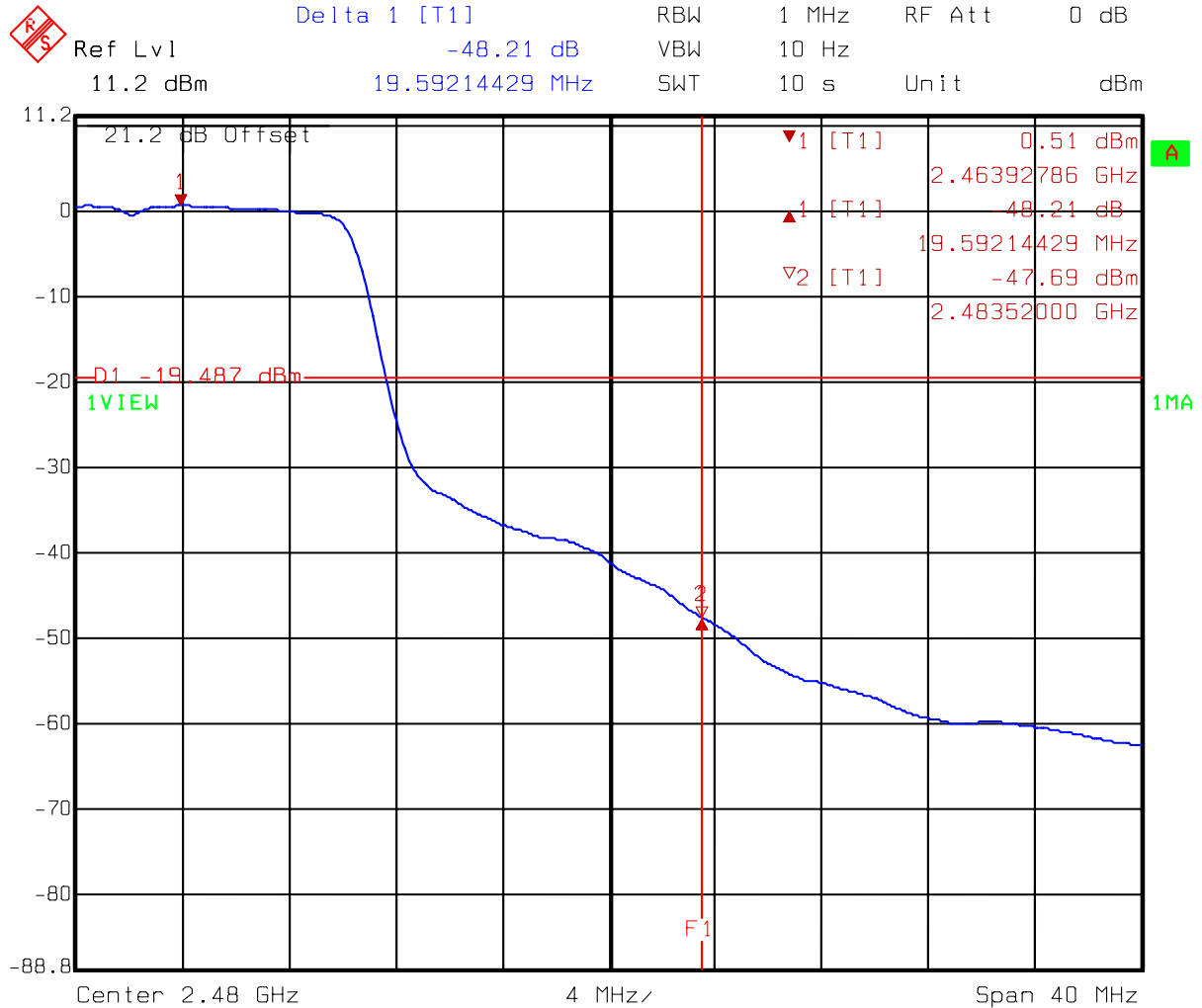
```
Title:      Band Edge
Comment A:  Channel 1 at 802.11g mode
            F1=2390MHz F2=2400MHz (Peak Detect)
Date:      18.FEB.2006  10:39:10
```



```
Title:      Band Edge
Comment A:  Channel 1 at 802.11g mode
            F1=2390MHz F2=2400MHz (Average Detect)
Date:      18.FEB.2006  10:39:56
```



Title: Band Edge
 Comment A: Channel 11 at 802.11g mode
 F1=2483.5MHz (Peak Detect)
 Date: 18.FEB.2006 10:32:59



Title: Band Edge
 Comment A: Channel 11 at 802.11g mode
 F1=2483.5MHz (Average Detect)
 Date: 18.FEB.2006 10:33:44

7.3.2 Radiated Method

Test Mode: 802.11b(DSSS Modulation) operating mode

| Channel | Detector | Radiated Method | Conducted Method | The Max. Field Strength in Restrict Band (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) |
|--------------|----------|-------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------|----------------------|-------------|
| | | Max. Field Strength of Fundamental @3m (dBuV/m) | Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc) | | | |
| | | A | B | | | |
| 1 (lowest) | PK | 111.52 | 59 | 52.52 | 74 | -21.48 |
| | AV | 107.58 | 57.41 | 50.17 | 54 | -3.83 |
| 11 (highest) | PK | 110.75 | 55.73 | 55.02 | 74 | -18.98 |
| | AV | 107.05 | 56.06 | 50.99 | 54 | -3.01 |

Remark: 1. $C = A - B$

2. $E = C - D$

Test Mode: 802.11g(OFDM Modulation) operating mode

| Channel | Detector | Radiated Method | Conducted Method | The Max. Field Strength in Restrict Band (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) |
|--------------|----------|-------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------|----------------------|-------------|
| | | Max. Field Strength of Fundamental @3m (dBuV/m) | Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc) | | | |
| | | A | B | | | |
| 1 (lowest) | PK | 110.72 | 43.78 | 66.94 | 74 | -7.06 |
| | AV | 101.44 | 47.53 | 53.91 | 54 | -0.09 |
| 11 (highest) | PK | 110.09 | 44.2 | 65.89 | 74 | -8.11 |
| | AV | 101.4 | 48.21 | 53.19 | 54 | -0.81 |

Remark: 1. $C = A - B$

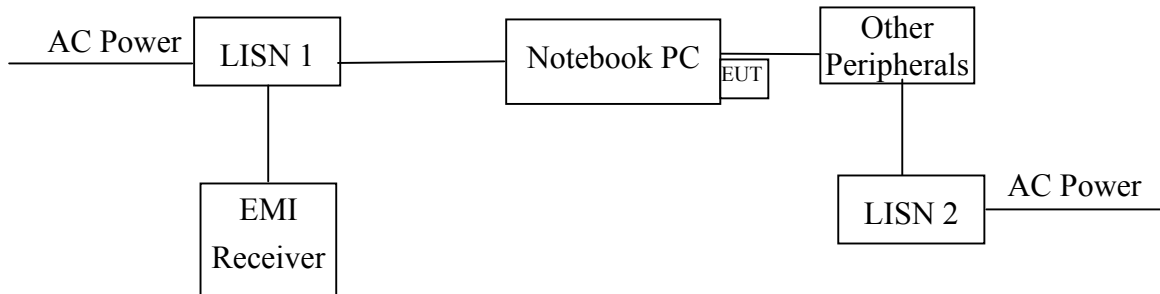
2. $E = C - D$

8. Power Line Conducted Emission test §FCC 15.207

8.1 Operating environment

Temperature: 23 °C
Relative Humidity: 52 %
Atmospheric Pressure 1023 hPa

8.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement. The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

8.3 Emission limit

| Freq. (MHz) | Conducted Limit (dBuV) | |
|----------------|------------------------|----------|
| | Q.P. | Ave. |
| 0.15~0.50 | 66 – 56* | 56 – 46* |
| 0.50~5.00 | 56 | 46 |
| 5.00~30.0 | 60 | 50 |

*Decreases with the logarithm of the frequency.

8.4 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.

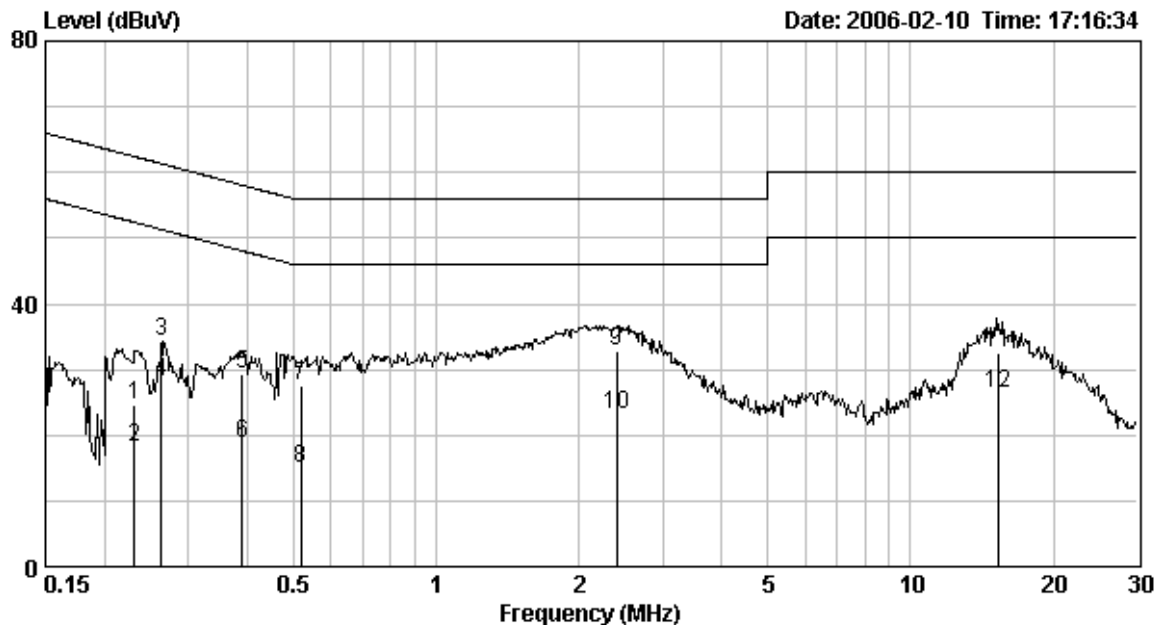
8.5 Power Line Conducted Emission test data

Phase : Line
 EUT : G-220 v2
 Test Condition : Normal operating mode

| Frequency (MHz) | Corr. Factor (dB) | Level | Limit | Level | Limit | Margin (dB) | |
|--------------------|-------------------------|--------------|--------------|--------------|--------------|----------------|--------|
| | | Qp (dBuV) | Qp (dBuV) | AV (dBuV) | Av (dBuV) | Qp | Av |
| 0.231 | 0.10 | 24.66 | 62.42 | 18.29 | 52.42 | -37.76 | -34.13 |
| 0.263 | 0.10 | 34.30 | 61.33 | 28.04 | 51.33 | -27.03 | -23.29 |
| 0.390 | 0.10 | 29.44 | 58.06 | 18.90 | 48.06 | -28.62 | -29.16 |
| 0.518 | 0.10 | 27.59 | 56.00 | 14.91 | 46.00 | -28.41 | -31.09 |
| 2.401 | 0.12 | 32.92 | 56.00 | 23.06 | 46.00 | -23.08 | -22.94 |
| 15.248 | 0.70 | 32.52 | 60.00 | 26.33 | 50.00 | -27.48 | -23.67 |

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral
 EUT : G-220 v2
 Test Condition : Normal operating mode

| Frequency (MHz) | Corr. Factor (dB) | Level Qp (dBuV) | Limit Qp (dBuV) | Level AV (dBuV) | Limit Av (dBuV) | Margin (dB) | |
|--------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|--------|
| | | | | | | Qp | Av |
| 0.150 | 0.10 | 33.37 | 65.98 | 14.42 | 55.98 | -32.61 | -41.56 |
| 0.265 | 0.10 | 32.77 | 61.29 | 24.35 | 51.29 | -28.52 | -26.94 |
| 0.466 | 0.10 | 30.10 | 56.59 | 17.55 | 46.59 | -26.49 | -29.04 |
| 0.610 | 0.10 | 30.62 | 56.00 | 16.62 | 46.00 | -25.38 | -29.38 |
| 2.559 | 0.13 | 32.03 | 56.00 | 22.33 | 46.00 | -23.97 | -23.67 |
| 12.296 | 0.29 | 28.04 | 60.00 | 22.17 | 50.00 | -31.96 | -27.83 |

Remark:

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

