

FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.249

Equipment : **Wireless Touch Presenter E**
Model No. : **PE2000**
Brand Name : **Raytac**
Filing Type : **New Application**
Applicant : **Raytac Corp.**
12F, No.786, Zhongzheng Rd., Zhonghe City, Taipei County
23586, Taiwan
FCC ID : **SH6PE2000**
Manufacturer : **Raytac Corp.**
12F, No.786, Zhongzheng Rd., Zhonghe City, Taipei County
23586, Taiwan
Received Date : Oct. 07, 2008
Final Test Date : Oct. 09, 2008

Statement

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.



Testing Laboratory
1190
ILAC MRA

SPORTON International Inc.

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CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.249

Equipment : Wireless Touch Presenter E
Model No. : PE2000
Brand Name : Raytac
Applicant : Raytac Corp.
12F, No.786, Zhongzheng Rd., Zhonghe City, Taipei
County 23586, Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 07, 2008 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.


Wayne Hsu

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1 SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart C | | | | |
|---|---------------------|---|---------------|--------------------|
| Part | Rule Section | Description of Test | Result | Under Limit |
| 3.1 | 15.207 | AC Power Line Conducted Emissions | - | - |
| 3.2 | 15.249(a) | Field Strength of Fundamental Emissions | Complies | 9.98 dB |
| 3.3 | 15.215(c) | 20dB Spectrum Bandwidth | Complies | - |
| 3.4 | 15.249(a)/(d) | Radiated Emissions | Complies | 3.47 dB |
| 3.5 | 15.249(d) | Band Edge Emissions | Complies | 2.82 dB |
| 3.6 | 15.203 | Antenna Requirements | Complies | - |

| Test Items | Uncertainty | Remark |
|---|-----------------------|--------------------------|
| AC Power Line Conducted Emissions | ±2.3dB | Confidence levels of 95% |
| Field Strength of Fundamental Emissions | ±0.8dB | Confidence levels of 95% |
| 20dB Spectrum Bandwidth | ±8.5×10 ⁻⁸ | 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% |

2 GENERAL INFORMATION

2.1 Product Details

| Items | Description |
|--------------------------|------------------------------|
| Power Type | CR2032 battery * 1 |
| Modulation | GFSK |
| Frequency Range | 2400 ~ 2483MHz |
| Channel Number | 16 |
| Channel Band Width (99%) | 3.02 MHz |
| Max. Field Strength | 84.02 dBuV/m at 3m (Average) |
| Antenna | PCB track |

2.2 Table for Carrier Frequencies

| Frequency Band | Channel No. | Frequency |
|----------------|-------------|-----------|
| 2400 ~ 2483MHz | 1 | 2405 MHz |
| | 2 | 2410 MHz |
| | : | : |
| | 7 | 2435 MHz |
| | 8 | 2440 MHz |
| | 9 | 2445 MHz |
| | : | : |
| | 15 | 2475 MHz |
| | 16 | 2480 MHz |

2.3 Table for Test Modes

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 | Channel | Antenna |
|--|------|---------|---------|
| AC Power Line Conducted Emissions | - | - | - |
| Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth | CTX | 1/8/16 | 1 |
| Radiated Emissions 9kHz~1GHz | CTX | 8 | 1 |
| Radiated Emissions 1GHz~10 th Harmonic | CTX | 1/8/16 | 1 |
| Band Edge Emissions | CTX | 1/16 | 1 |

Note: CTX=continuously transmitting

2.4 Table for Testing Locations

| Test Site No. | Site Category | Location | FCC Reg. No. | IC File No. | VCCI Reg. No |
|---------------|---------------|----------|--------------|-------------|--------------|
| 03CH02-HY | SAC | Hwa Ya | 101377 | IC 4086B-1 | - |
| TH01-HY | OVEN Room | Hwa Ya | - | - | - |

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

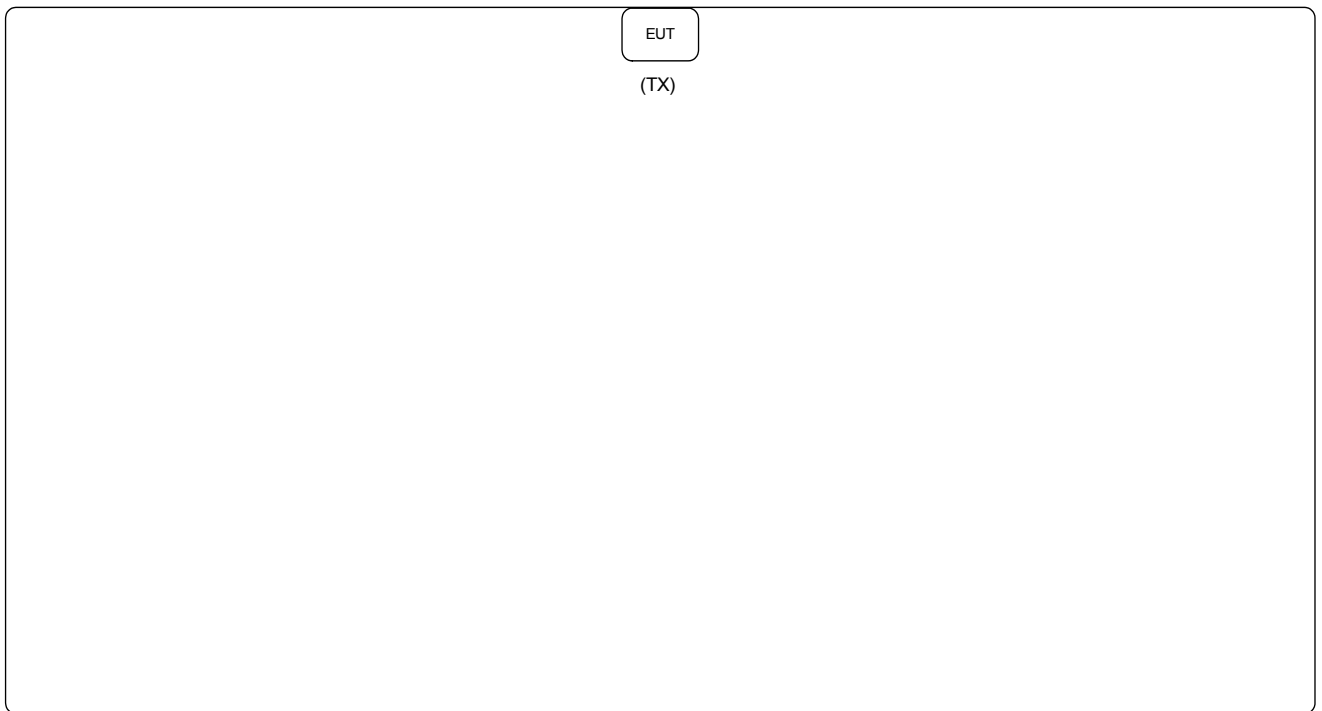
2.5 Table for Supporting Units

The EUT was tested alone.

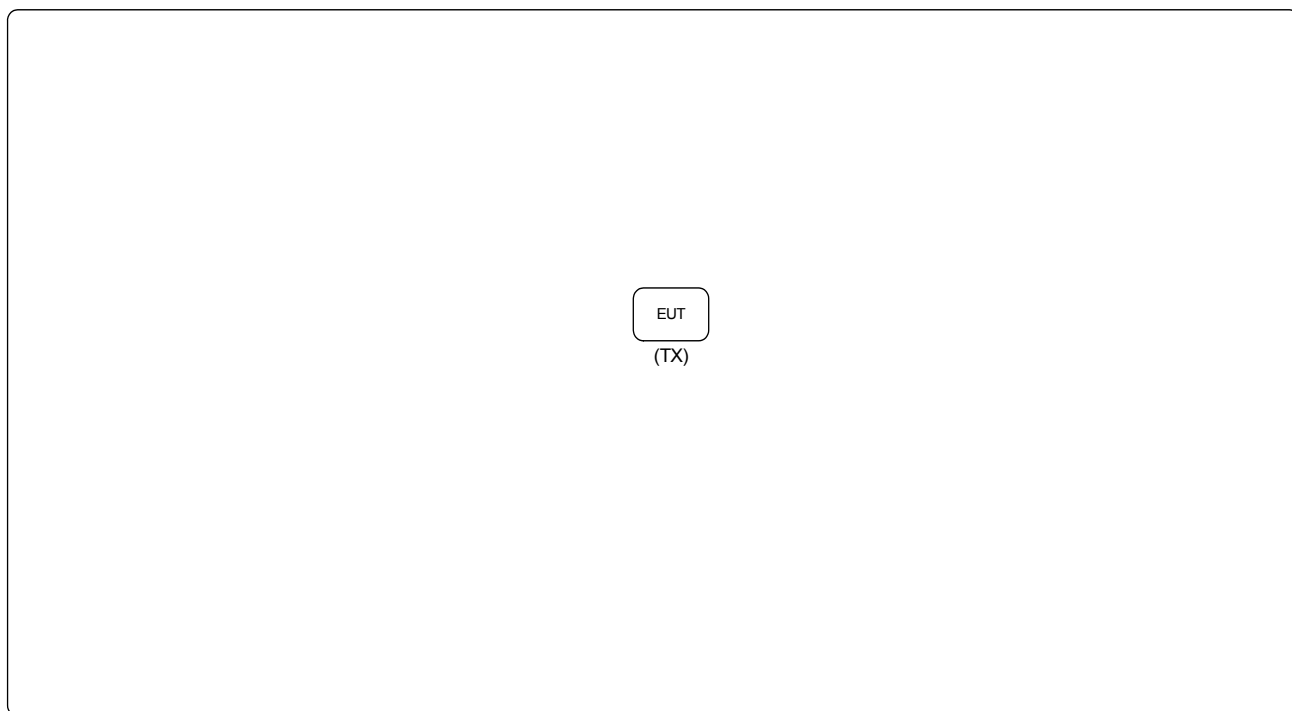
2.6 Test Configurations

2.6.1 Radiation Emissions Test Configuration

For radiated emissions 9kHz~1GHz



For radiated emissions above 1GHz



3 TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 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 |

3.1.2 Measuring Instruments and Setting

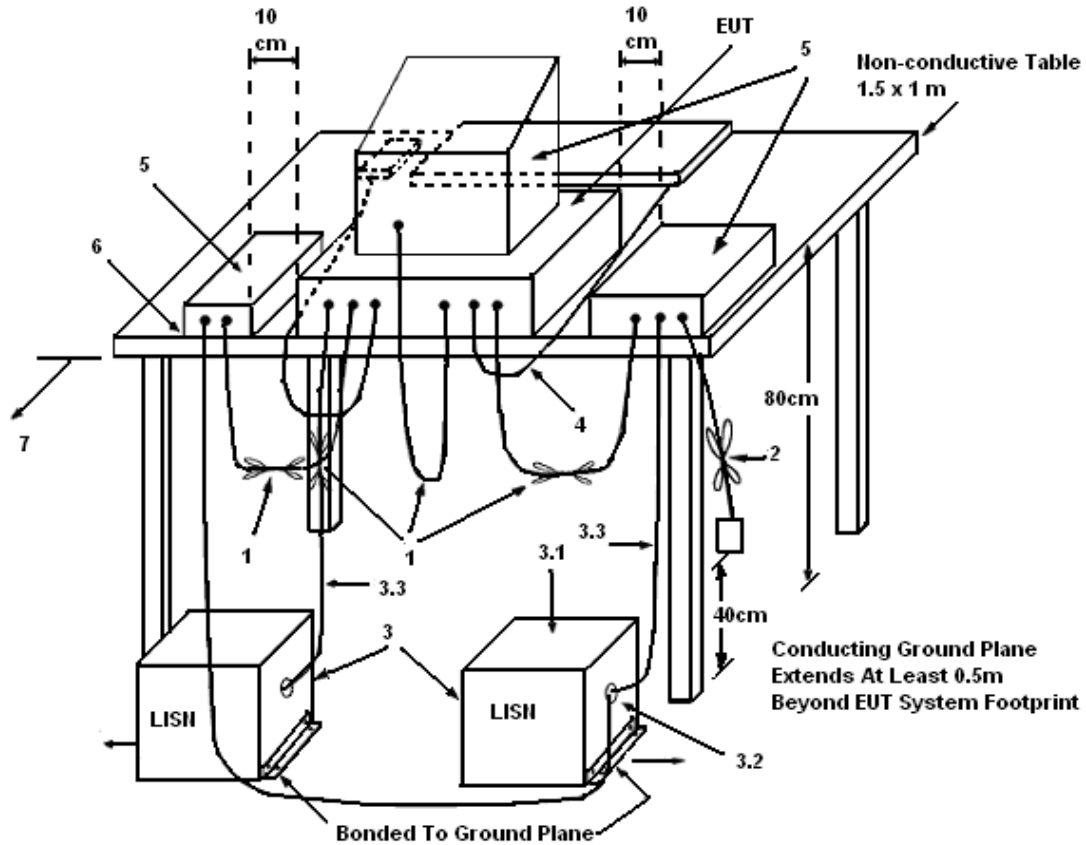
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 Test Procedures

1. 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.

3.1.4 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 Ω. 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.

3.1.5 Test Deviation

There is no deviation with the original standard.

3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

The transmitter is battery powered; there is no need to do this testing.

3.2 Field Strength of Fundamental Emissions Measurement

3.2.1 Limit

The field strength of fundamental emissions within these bands specified at a distance of 3 meters (measurement instrumentation employing an average detector) shall comply with the following table.

| Frequency Band (MHz) | Fundamental Emissions Limit (dBuV/m) at 3m |
|-----------------------------|---|
| 2400-2483.5 | 94 |
| 5725-5875 | 94 |

3.2.2 Measuring Instruments and Setting

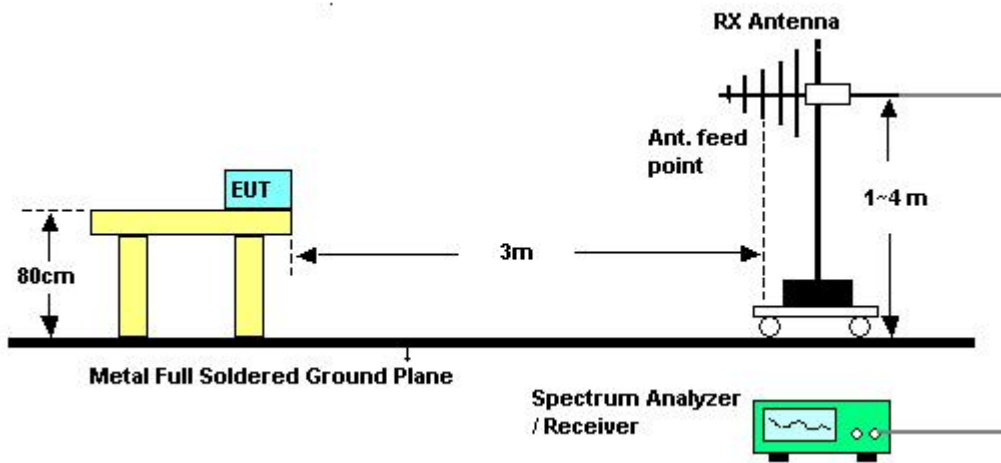
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Power Meter Parameter | Setting |
|------------------------------|---------------------------|
| RB | 1 MHz Peak / 1MHz Average |
| VB | 1 MHz Peak / 10Hz Average |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

3.2.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For Fundamental emissions, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of Field Strength of Fundamental Emissions

| | | | |
|---------------|---------------|----------------|----------------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 1/8/16 |

Channel 1

Vertical

| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 3 | 2404.620 | 96.13 | -17.87 | 114.00 | 64.87 | 28.26 | 3.00 | 0.00 | Peak | --- | --- |
| 3 | 2404.620 | 84.02 | -9.98 | 94.00 | 52.76 | 28.26 | 3.00 | 0.00 | Average | --- | --- |

Channel 8

Vertical

| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 2440.340 | 93.77 | -20.23 | 114.00 | 62.37 | 28.36 | 3.04 | 0.00 | Peak | --- | --- |
| 1 | 2440.340 | 81.66 | -12.34 | 94.00 | 50.26 | 28.36 | 3.04 | 0.00 | Average | --- | --- |

Channel 16

Vertical

| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 2479.860 | 90.35 | -23.65 | 114.00 | 58.84 | 28.45 | 3.06 | 0.00 | Peak | --- | --- |
| 1 | 2479.860 | 78.24 | -15.76 | 94.00 | 46.73 | 28.45 | 3.06 | 0.00 | Average | --- | --- |

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.3 20dB Spectrum Bandwidth Measurement

3.3.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (2400 ~ 2483MHz).

3.3.2 Measuring Instruments and Setting

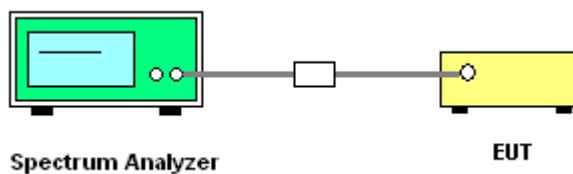
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameters | Setting |
|---------------------|------------------|
| Attenuation | Auto |
| Span Frequency | > 20dB Bandwidth |
| RB | 100 kHz |
| VB | 100 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser 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 20dB below carrier.

3.3.4 Test Setup Layout



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

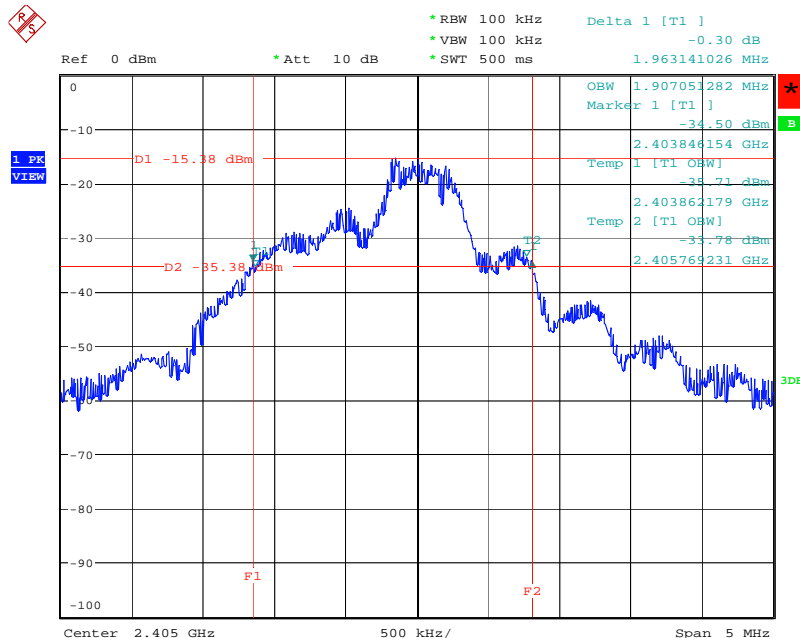
The EUT was programmed to be in continuously transmitting mode.

3.3.7 Test Result of 20dB Spectrum Bandwidth

| | | | |
|---------------|---------------|----------------|----------------|
| Test date | Oct. 09, 2008 | Test Site No. | TH01-HY |
| Temperature | 28°C | Humidity | 58% |
| Test Engineer | Murphy | Configurations | Channel 1/8/16 |

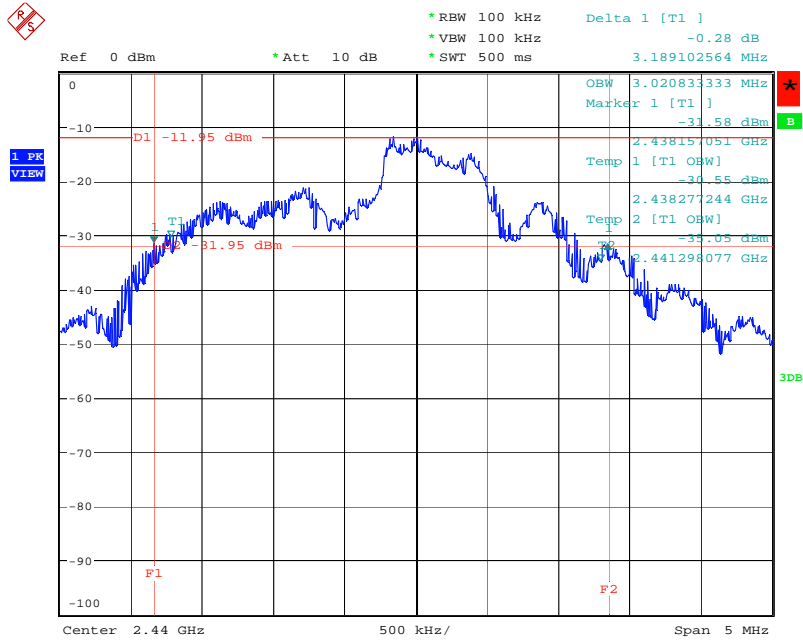
| Frequency | 20dB BW (MHz) | 99% OBW (MHz) | Frequency range (MHz) f _L > 2400MHz | Frequency range (MHz) f _H < 2483MHz | Test Result |
|-----------|---------------|---------------|---|---|-------------|
| 2405 MHz | 1.96 | 1.91 | 2403.8460 | - | Complies |
| 2440 MHz | 3.19 | 3.02 | - | - | Complies |
| 2480 MHz | 2.72 | 2.62 | - | 2481.0090 | Complies |

20 dB/99% Bandwidth Plot on 2405 MHz



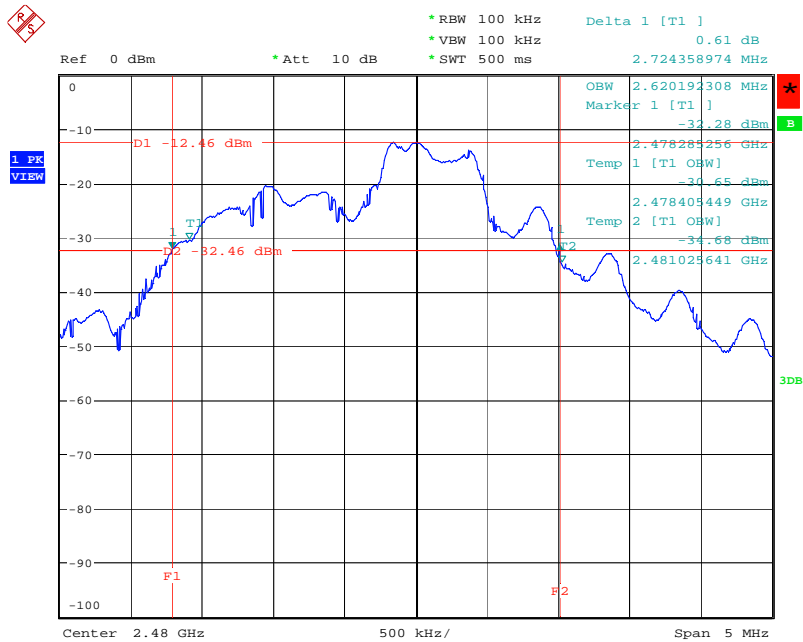
Date: 9.OCT.2008 11:00:57

20 dB/99% Bandwidth Plot on 2440 MHz



Date: 9.OCT.2008 11:06:16

20 dB/99% Bandwidth Plot on 2480 MHz



Date: 9.OCT.2008 11:09:59

3.4 Radiated Emissions Measurement

3.4.1 Limit

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|--------------------------|--|--------------------------------------|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

3.4.2 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---------------------------|--|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

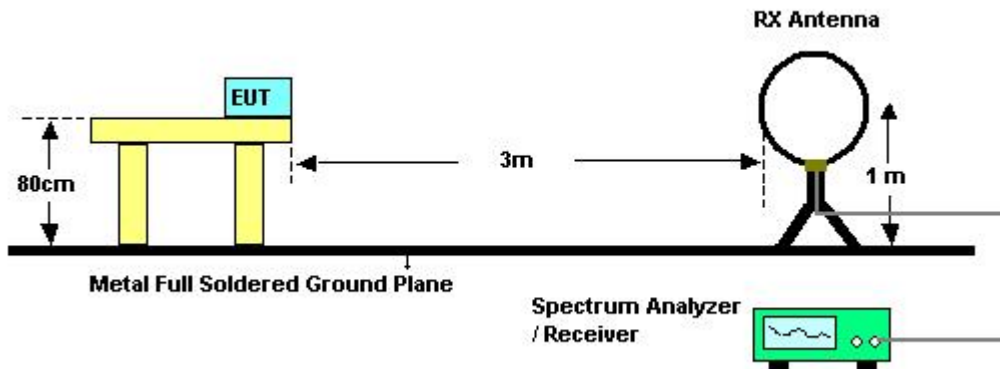
| Receiver Parameter | Setting |
|---------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

3.4.3 Test Procedures

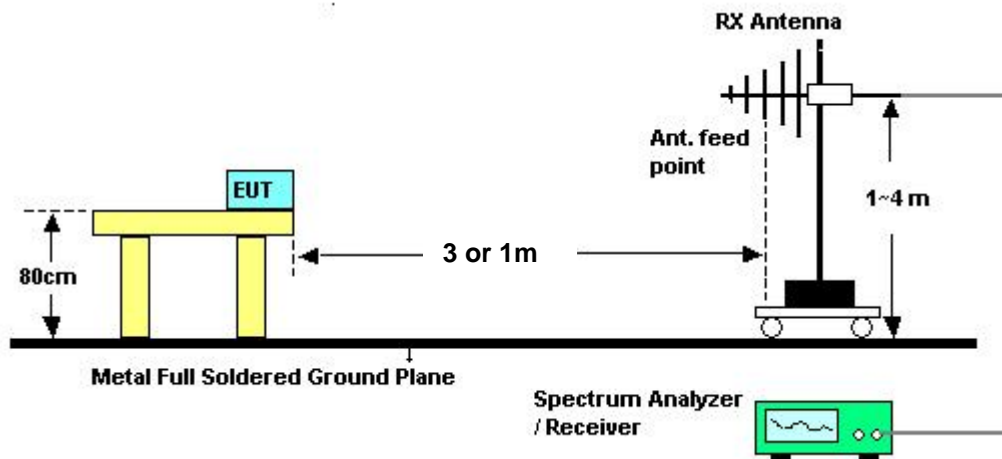
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

3.4.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

3.4.5 Test Deviation

There is no deviation with the original standard.

3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.4.7 Results of Radiated Emissions (9kHz~30MHz)

| | | | |
|----------------------|---------------|----------------------|-----------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | | |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Limit Line (dBuV) | Remark |
|--------------------|---------------------|------------------------|--------------------------|---------------|
| - | - | - | - | See Note |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

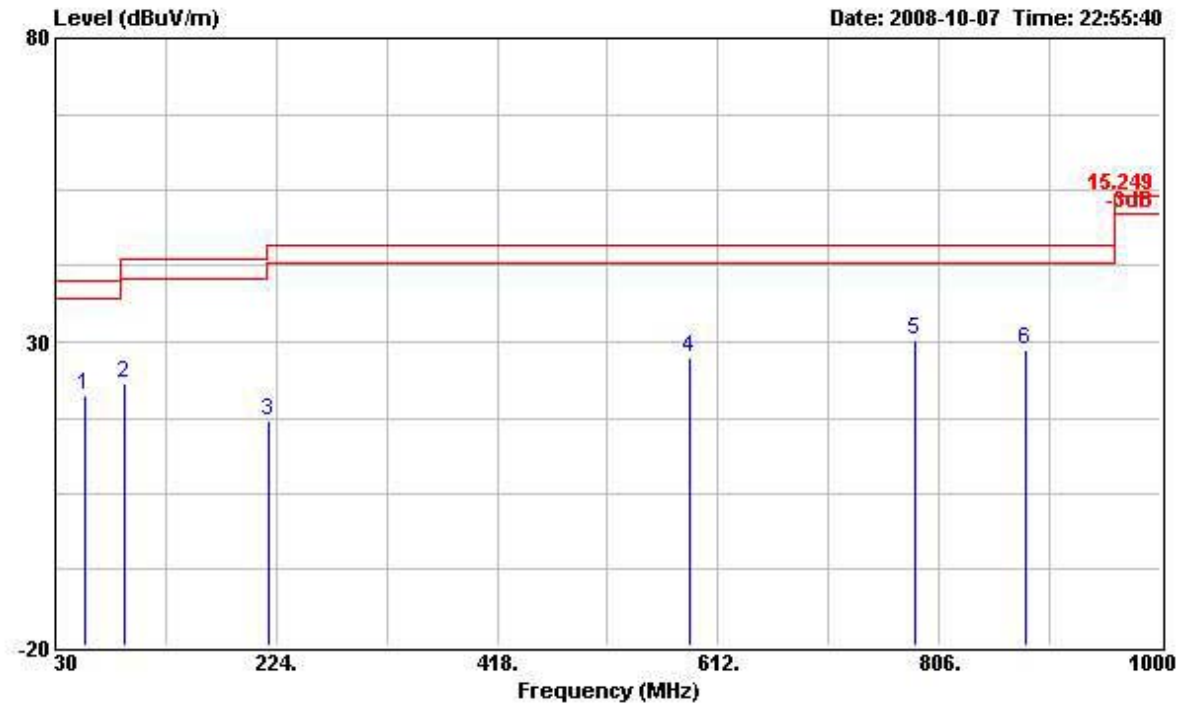
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

3.4.8 Results of Radiated Emissions (30MHz~1GHz)

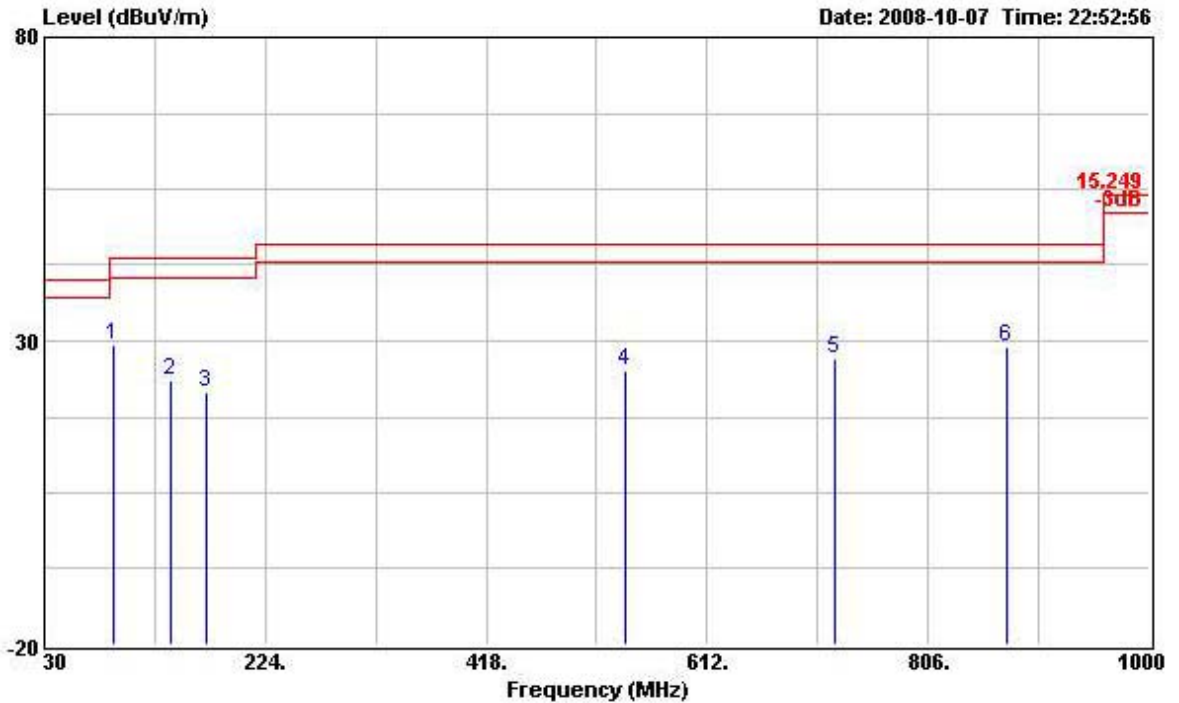
| | | | |
|---------------|---------------|----------------|-----------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 8 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|------------|--------------|------------|---------------|--------|---------|-----------|
| | MHz | dBUV/m | dB | dBUV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 55.220 | 21.12 | -18.88 | 40.00 | 42.15 | 8.27 | 1.50 | 30.80 | Peak | --- | --- |
| 2 | 90.140 | 23.03 | -20.47 | 43.50 | 42.40 | 9.50 | 1.93 | 30.80 | Peak | --- | --- |
| 3 | 218.180 | 17.12 | -28.88 | 46.00 | 32.79 | 11.95 | 2.94 | 30.56 | Peak | --- | --- |
| 4 | 586.780 | 27.38 | -18.62 | 46.00 | 32.51 | 19.79 | 4.72 | 29.64 | Peak | --- | --- |
| 5 | 785.630 | 30.17 | -15.83 | 46.00 | 33.69 | 20.06 | 5.45 | 29.03 | Peak | --- | --- |
| 6 | 882.630 | 28.59 | -17.41 | 46.00 | 31.47 | 20.07 | 5.80 | 28.75 | Peak | --- | --- |

Vertical



| Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|------|---------|------------|------------|------------|--------------|------------|---------------|------------|---------|-----------|
| MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 90.140 | 29.23 | -14.27 | 43.50 | 48.60 | 9.50 | 1.93 | 30.80 Peak | --- | --- |
| 2 | 141.550 | 23.65 | -19.85 | 43.50 | 40.20 | 11.78 | 2.39 | 30.72 Peak | --- | --- |
| 3 | 171.620 | 21.54 | -21.96 | 43.50 | 39.57 | 10.05 | 2.58 | 30.66 Peak | --- | --- |
| 4 | 540.220 | 24.98 | -21.02 | 46.00 | 31.89 | 18.43 | 4.44 | 29.78 Peak | --- | --- |
| 5 | 723.550 | 27.12 | -18.88 | 46.00 | 31.87 | 19.18 | 5.22 | 29.15 Peak | --- | --- |
| 6 | 874.870 | 28.99 | -17.01 | 46.00 | 31.94 | 20.09 | 5.73 | 28.77 Peak | --- | --- |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

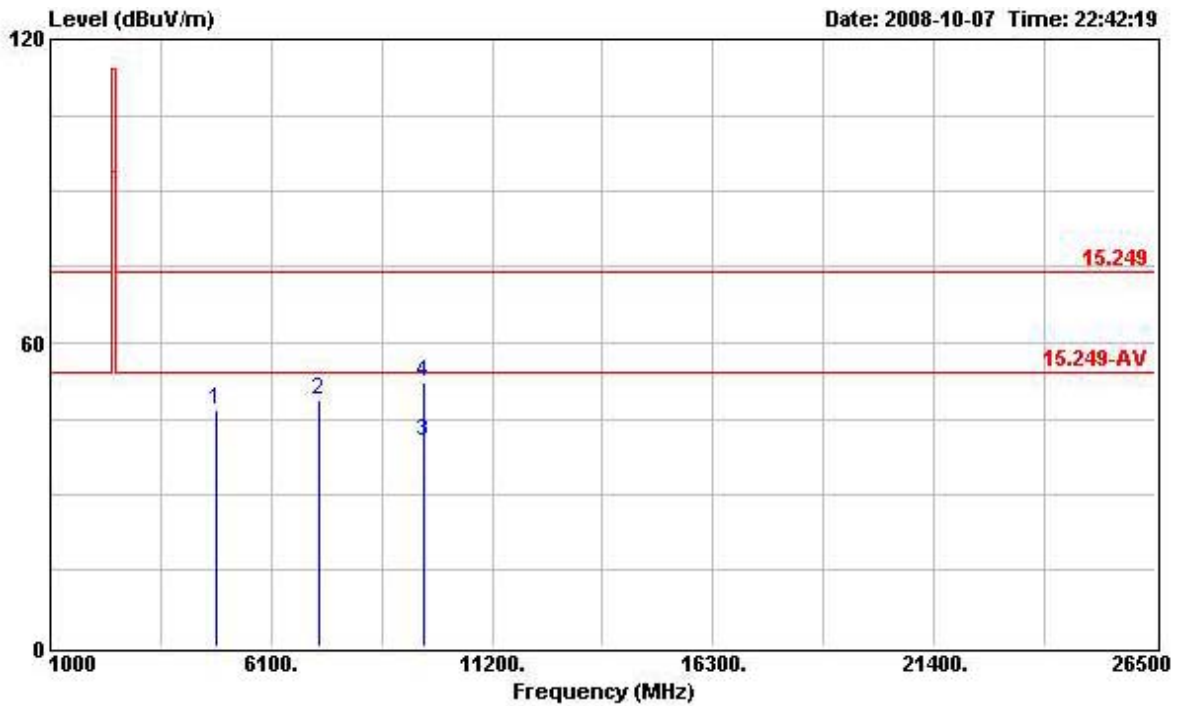
Emission level (dBUV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.4.9 Results for Radiated Emissions (1GHz~10th Harmonic)

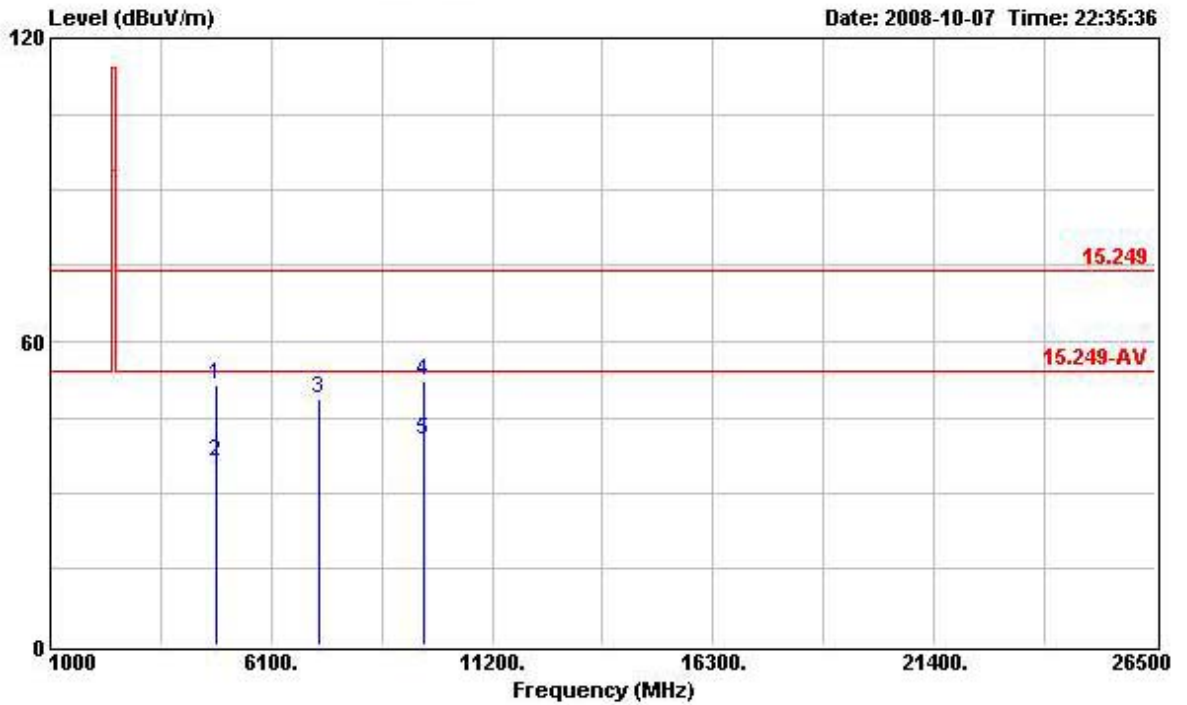
| | | | |
|---------------|---------------|----------------|-----------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 1 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4812.000 | 46.65 | -7.35 | 54.00 | 44.02 | 33.00 | 4.57 | 34.94 | Peak | --- | --- |
| 2 | 7212.000 | 48.78 | -5.22 | 54.00 | 42.46 | 35.94 | 5.62 | 35.24 | Peak | --- | --- |
| 3 | 9616.000 | 40.67 | -13.33 | 54.00 | 32.08 | 37.95 | 6.34 | 35.70 | Average | --- | --- |
| 4 | 9616.000 | 52.36 | -21.64 | 74.00 | 43.77 | 37.95 | 6.34 | 35.70 | Peak | --- | --- |

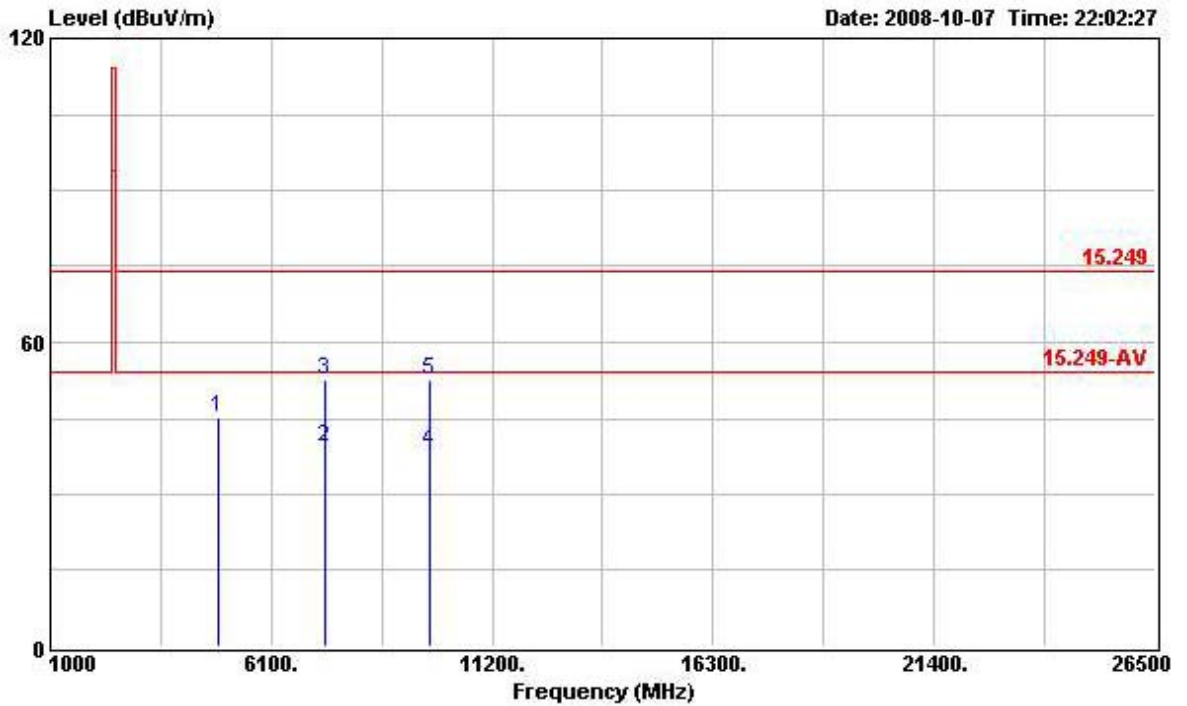
Vertical



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBUV/m | dB | dBUV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4812.000 | 51.57 | -22.43 | 74.00 | 48.94 | 33.00 | 4.57 | 34.94 | Peak | --- | --- |
| 2 | 4812.000 | 36.19 | -17.81 | 54.00 | 33.56 | 33.00 | 4.57 | 34.94 | Average | --- | --- |
| 3 | 7212.000 | 48.62 | -5.38 | 54.00 | 42.30 | 35.94 | 5.62 | 35.24 | Peak | --- | --- |
| 4 | 9616.000 | 52.02 | -21.98 | 74.00 | 43.43 | 37.95 | 6.34 | 35.70 | Peak | --- | --- |
| 5 | 9616.000 | 40.67 | -13.33 | 54.00 | 32.08 | 37.95 | 6.34 | 35.70 | Average | --- | --- |

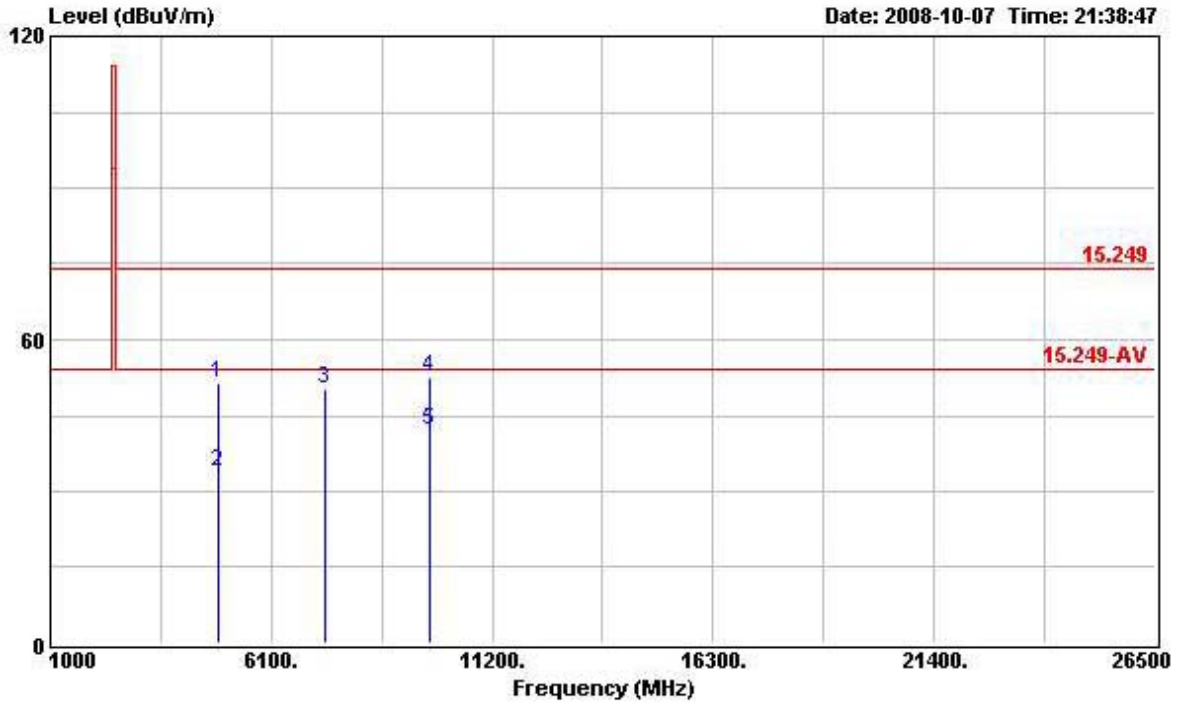
| | | | |
|---------------|---------------|----------------|-----------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 8 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4880.000 | 45.11 | -8.89 | 54.00 | 42.29 | 33.11 | 4.64 | 34.93 | Peak | --- | --- |
| 2 | 7320.000 | 39.18 | -14.82 | 54.00 | 32.55 | 36.25 | 5.64 | 35.26 | Average | --- | --- |
| 3 | 7320.000 | 52.53 | -21.47 | 74.00 | 45.90 | 36.25 | 5.64 | 35.26 | Peak | --- | --- |
| 4 | 9760.000 | 38.75 | -15.25 | 54.00 | 30.09 | 38.00 | 6.36 | 35.70 | Average | --- | --- |
| 5 | 9760.000 | 52.66 | -21.34 | 74.00 | 44.00 | 38.00 | 6.36 | 35.70 | Peak | --- | --- |

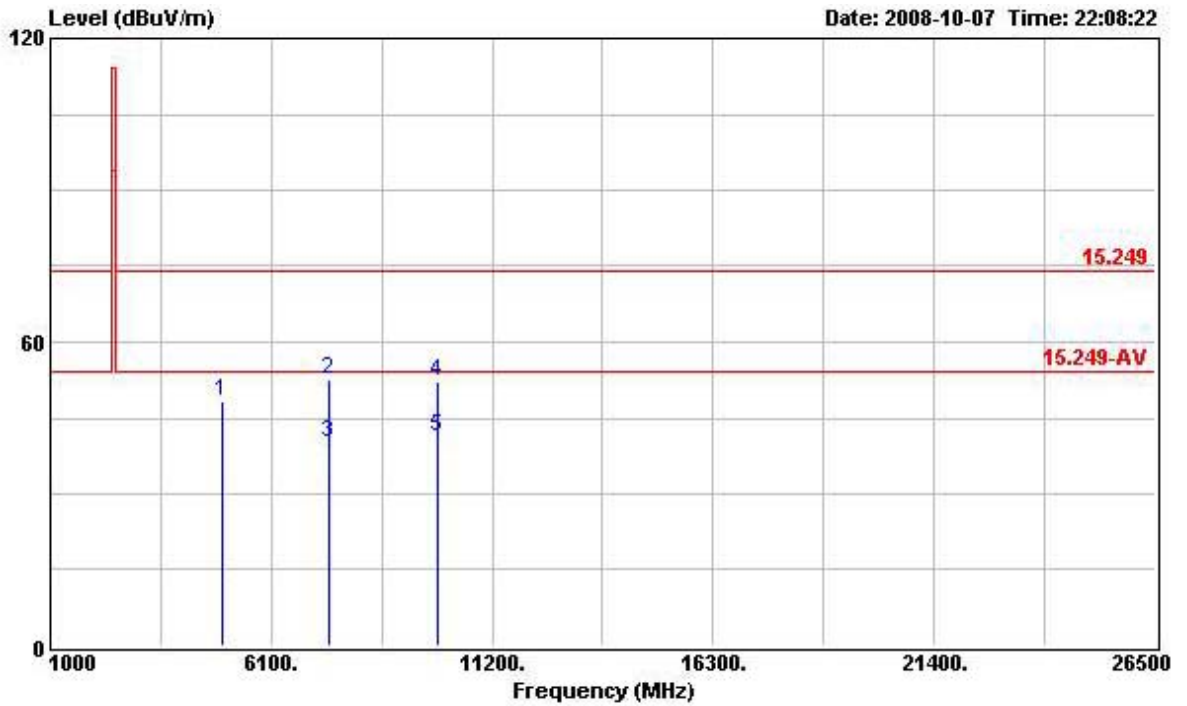
Vertical



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4880.000 | 51.46 | -22.54 | 74.00 | 48.64 | 33.11 | 4.64 | 34.93 | Peak | --- | --- |
| 2 | 4880.000 | 34.07 | -19.93 | 54.00 | 31.25 | 33.11 | 4.64 | 34.93 | Average | --- | --- |
| 3 | 7320.000 | 50.26 | -3.74 | 54.00 | 43.63 | 36.25 | 5.64 | 35.26 | Peak | --- | --- |
| 4 | 9760.000 | 52.44 | -21.56 | 74.00 | 43.78 | 38.00 | 6.36 | 35.70 | Peak | --- | --- |
| 5 | 9760.000 | 41.92 | -12.08 | 54.00 | 33.26 | 38.00 | 6.36 | 35.70 | Average | --- | --- |

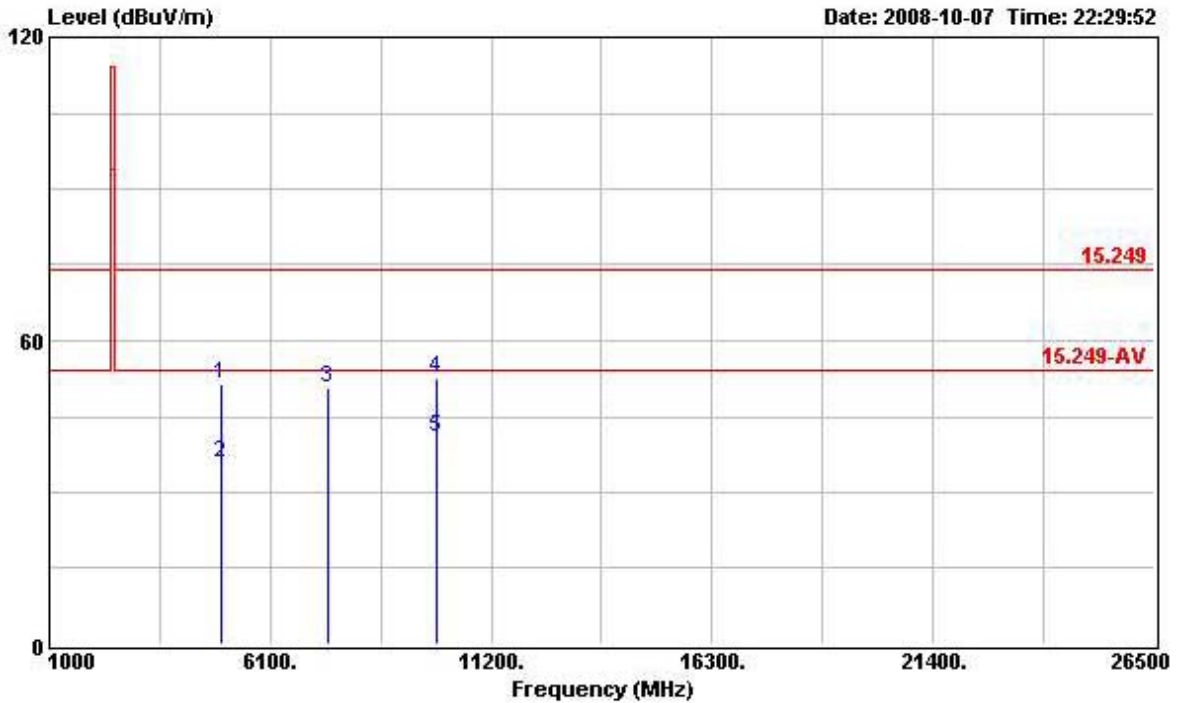
| | | | |
|---------------|---------------|----------------|------------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 16 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4964.000 | 48.23 | -5.77 | 54.00 | 45.18 | 33.24 | 4.72 | 34.91 | Peak | --- | --- |
| 2 | 7440.000 | 52.44 | -21.56 | 74.00 | 45.51 | 36.57 | 5.65 | 35.29 | Peak | --- | --- |
| 3 | 7440.000 | 40.21 | -13.79 | 54.00 | 33.28 | 36.57 | 5.65 | 35.29 | Average | --- | --- |
| 4 | 9920.000 | 52.12 | -21.88 | 74.00 | 43.36 | 38.07 | 6.39 | 35.70 | Peak | --- | --- |
| 5 | 9920.000 | 41.17 | -12.83 | 54.00 | 32.41 | 38.07 | 6.39 | 35.70 | Average | --- | --- |

Vertical



| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|--------------|------------|---------------|---------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 4960.000 | 51.24 | -22.76 | 74.00 | 48.19 | 33.24 | 4.72 | 34.91 | Peak | --- | --- |
| 2 | 4960.000 | 36.01 | -17.99 | 54.00 | 32.96 | 33.24 | 4.72 | 34.91 | Average | --- | --- |
| 3 | 7440.000 | 50.53 | -3.47 | 54.00 | 43.60 | 36.57 | 5.65 | 35.29 | Peak | --- | --- |
| 4 | 9920.000 | 52.44 | -21.56 | 74.00 | 43.68 | 38.07 | 6.39 | 35.70 | Peak | --- | --- |
| 5 | 9920.000 | 40.91 | -13.09 | 54.00 | 32.15 | 38.07 | 6.39 | 35.70 | Average | --- | --- |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBUV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.5 Band Edge Emissions Measurement

3.5.1 Limit

Band edge emissions radiated outside of the specified frequency bands shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|------------------------------|--|--|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

3.5.2 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting |
|---------------------------|--|
| Attenuation | Auto |
| Span Frequency | 100 MHz |
| RB / VB | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |

3.5.3 Test Procedures

1. The test procedure is the same as section 3.2.3, only the frequency range investigated is limited to 2MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

3.5.4 Test Setup Layout

This test setup layout is the same as that shown in section 3.2.4.

3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.5.7 Test Result of Band Edge

| | | | |
|----------------------|---------------|-----------------------|---------------|
| Test date | Oct. 07, 2008 | Test Site No. | 03CH02-HY |
| Temperature | 26.6°C | Humidity | 56% |
| Test Engineer | Eddie | Configurations | Channel 1, 16 |

Channel 1

| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-------------|---------------|-------------------|-------------------|-------------------|---------------------|-------------------|----------------------|---------------|----------------|------------------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 1 | 2319.690 | 59.03 | -14.97 | 74.00 | 28.05 | 28.02 | 2.96 | 0.00 | Peak | --- | --- |
| 2 | 2400.000 | 71.18 | -2.82 | 74.00 | 39.97 | 28.21 | 3.00 | 0.00 | Peak | --- | --- |
| 1 | 2382.010 | 46.92 | -7.08 | 54.00 | 15.76 | 28.16 | 3.00 | 0.00 | Average | --- | --- |
| 2 | 2400.000 | 47.70 | -6.30 | 54.00 | 16.49 | 28.21 | 3.00 | 0.00 | Average | --- | --- |

Channel 16

| | Freq | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-------------|---------------|-------------------|-------------------|-------------------|---------------------|-------------------|----------------------|---------------|----------------|------------------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB | | cm | deg |
| 2 | 2483.500 | 69.72 | -4.28 | 74.00 | 38.21 | 28.45 | 3.06 | 0.00 | Peak | --- | --- |
| 2 | 2483.500 | 44.90 | -9.10 | 54.00 | 13.39 | 28.45 | 3.06 | 0.00 | Average | --- | --- |

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.6 Antenna Requirements

3.6.1 Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

3.6.2 Antenna Connector Construction

Please refer to section 2.1 in this test report; antenna connector complied with the requirements.

4 LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--------------------------|---------------------|------------------|-------------------|------------------------|-------------------------|--------------------------|
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30 MHz - 1 GHz 3m | May 12, 2008 | Radiation (03CH02-HY) |
| Amplifier | ADVANTEST | BB525C | CH300001 | 9 kHz - 2 GHz | Dec. 05, 2007 | Radiation (03CH02-HY) |
| Spectrum Analyzer | R&S | FSP40 | 100305/040 | 9 kHz - 40GHz | Jan. 10, 2008 | Radiation (03CH02-HY) |
| Bilog Antenna | SCHAFFNER | CBL61128 | 2723 | 30 MHz - 2 GHz | Dec. 22, 2007 | Radiation (03CH02-HY) |
| Turn Table | HD | DS 420 | 420/649/00 | 0 - 360 degree | N/A | Radiation (03CH02-HY) |
| Antenna Mast | HD | MA 240 | 240/559/00 | 1 m - 4 m | N/A | Radiation (03CH02-HY) |
| RF Cable-R03m | Jye Bao | RG142 | CB020 | 30 MHz - 1 GHz | Dec. 08, 2007 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8449B | 3008A02373 | 1GHz – 26.5 GHz | Jul. 16, 2008 | Radiation (03CH02-HY) |
| Horn Antenna | EMCO | 3115 | 6903 | 1GHz~18GHz | Apr. 21, 2008 | Radiation (03CH02-HY) |
| RF Cable-HIGH | SUHNER | SUCOFLEX106 | 03CH02-HY | 1GHz~40GHz | Dec. 12, 2007 | Radiation (03CH02-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|----------------------------|--------------|--------------|-------------|-----------------|------------------|---------------------|
| Spectrum Analyzer | R&S | FSP30 | 100023 | 9kHz ~ 30GHz | Jan. 10, 2008 | Conducted (TH01-HY) |
| Power Meter | R&S | NRVS | 100444 | DC ~ 40GHz | Jul. 11, 2008 | Conducted (TH01-HY) |
| Power Sensor | R&S | NRV-Z51 | 100458 | DC ~ 30GHz | Jul. 11, 2008 | Conducted (TH01-HY) |
| Power Sensor | R&S | NRV-Z32 | 100057 | 30MHz ~ 6GHz | Jul. 11, 2008 | Conducted (TH01-HY) |
| DC Power Source | G.W. | GPC-6030D | C671845 | DC 1V ~ 60V | Mar. 13, 2008 | Conducted (TH01-HY) |
| Temp. and Humidity Chamber | Giant Force | GTH-225-20-S | MAB0103-001 | N/A | Jul. 18, 2008 | Conducted (TH01-HY) |
| RF CABLE-1m | Jye Bao | RG142 | CB034-1m | 20MHz ~ 7GHz | Dec. 01, 2007 | Conducted (TH01-HY) |
| RF CABLE-2m | Jye Bao | RG142 | CB035-2m | 20MHz ~ 1GHz | Dec. 01, 2007 | Conducted (TH01-HY) |
| Vector Signal Generator | R&S | SMU200A | 102098 | 100kHz ~ 6GHz | Nov. 14, 2007 | Conducted (TH01-HY) |
| Signal Generator | R&S | SMR40 | 100116 | 10MHz ~ 40GHz | Mar. 10, 2008 | Conducted (TH01-HY) |
| oscilloscope | Tektonix | TDS380 | B016197 | 400MHz/ 2GS/s | Jun. 27, 2008 | Conducted (TH01-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|-----------------|--------------|-----------|-------------|-----------------|------------------|---------------------|
| AC Power Source | HPC | HPA-500W | HPA-9100024 | AC 0 ~ 300V | May 30, 2008* | Conducted (TH01-HY) |

Note: Calibration Interval of instruments listed above is two year.

5 TEST LOCATION

| | |
|--------|--|
| SHIJR | ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255 |
| HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055 |
| LINKOU | ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695 |
| DUNGHU | ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740 |
| JUNGHE | ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626 |
| NEIHU | ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777 |
| JHUBEI | ADD : No.8, Lane 728, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085 |

6 TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-070110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.

EMC & Wireless Communications Laboratory

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

- Accreditation Criteria : ISO/IEC 17025:2005
- Accreditation Number : 1190
- Originally Accredited : December 15, 2003
- Effective Period : January 10, 2007 to January 09, 2010
- Accredited Scope : Testing Field, see described in the Appendix
Accreditation Program for Designated Testing Laboratory
- Specific Accreditation Program : for Commodities Inspection
Accreditation Program for Telecommunication Equipment Testing Laboratory

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : January 10, 2007

PI, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.