# FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.249

| | | |
|---|---|---|
| **Equipment** | : | **Air Shuttle** |
| **Model No.** | : | **CW-AP01KT** |
| **Brand Name** | : | **CyWee** |
| **Filing Type** | : | **New Application** |
| **Applicant** | : | **CyWee Group Ltd.**<br>3F, 28 Jing Ye 1st Road, Lane 128,<br>Taipei, Taiwan 10462 |
| **FCC ID** | : | **WZS-CW-AP01KT** |
| **Manufacturer** | : | **CyWee Group Ltd.**<br>3F, 28 Jing Ye 1st Road, Lane 128,<br>Taipei, Taiwan 10462 |
| **Received Date** | : | Oct. 15, 2010 |
| **Final Test Date** | : | Nov. 19, 2010 |

## 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.



***SPORTON International Inc.***

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

# Table of Contents

# History of This Test Report

Original Issue Date: Nov. 30, 2010

Report No.: FR0O1402

■ No additional attachment.

□ Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|---|---|---|
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# CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.249

| | | |
|---|---|---|
| Equipment | : | Air Shuttle |
| Model No. | : | CW-AP01KT |
| Brand Name | : | CyWee |
| Applicant | : | CyWee Group Ltd.<br>3F, 28 Jing Ye 1st Road, Lane 128,<br>Taipei, Taiwan 10462 |

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 15, 2010 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.


***SPORTON International Inc.***

*No. 52 Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan 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 | Complies | 11.25 dB |
| 3.2 | 15.249(a) | Field Strength of Fundamental Emissions | Complies | 6.47 dB |
| 3.3 | 15.215(c) | 20dB Spectrum Bandwidth | Complies | - |
| 3.4 | 15.249(a)/(d) | Radiated Emissions | Complies | 1.56 dB |
| 3.5 | 15.249(d) | Band Edge Emissions | Complies | 3.72 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 | $\pm 8.5\times10^{-8}$ | 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℃ | 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 |
|---|---|
| Operating Frequency | 5725 ~5875 MHz (FM) |
| Channel Number | 3 |
| Channel Band Width (99%) | 9.872 MHz |
| Max. Field Strength | 97.07 dBuV/m at 1m (Average) |
| Antenna | Internal Antenna |

## 2.2 Accessories

Lithium Ion Indicators 3.7V 350 mAh

Mini-USB to USB Charging Cable

## 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 | Frequency |
|---|---|---|
| AC Power Line Conducted Emissions | Transmitter Mode | - |
| Field Strength of Fundamental Emissions<br>20dB Spectrum Bandwidth | CTX | 5760 MHz / 5780 MHz / 5820 MHz |
| Radiated Emissions 9kHz~1GHz | Normal Mode | - |
| Radiated Emissions 1GHz~10$^{th}$ Harmonic | CTX | 5760 MHz / 5780 MHz / 5820 MHz |
| Band Edge Emissions | CTX | 5760 MHz / 5820 MHz |

Note: CTX=continuously transmitting.

## 2.4 Table for Testing Locations

| Test Site No. | Site Category | Location |
|---|---|---|
| CO04-HY | Conduction | Hwa Ya |
| TH01-HY | OVEN Room | Hwa Ya |
| 03CH02-HY | SAC | Hwa Ya |

Semi Anechoic Chamber (SAC).

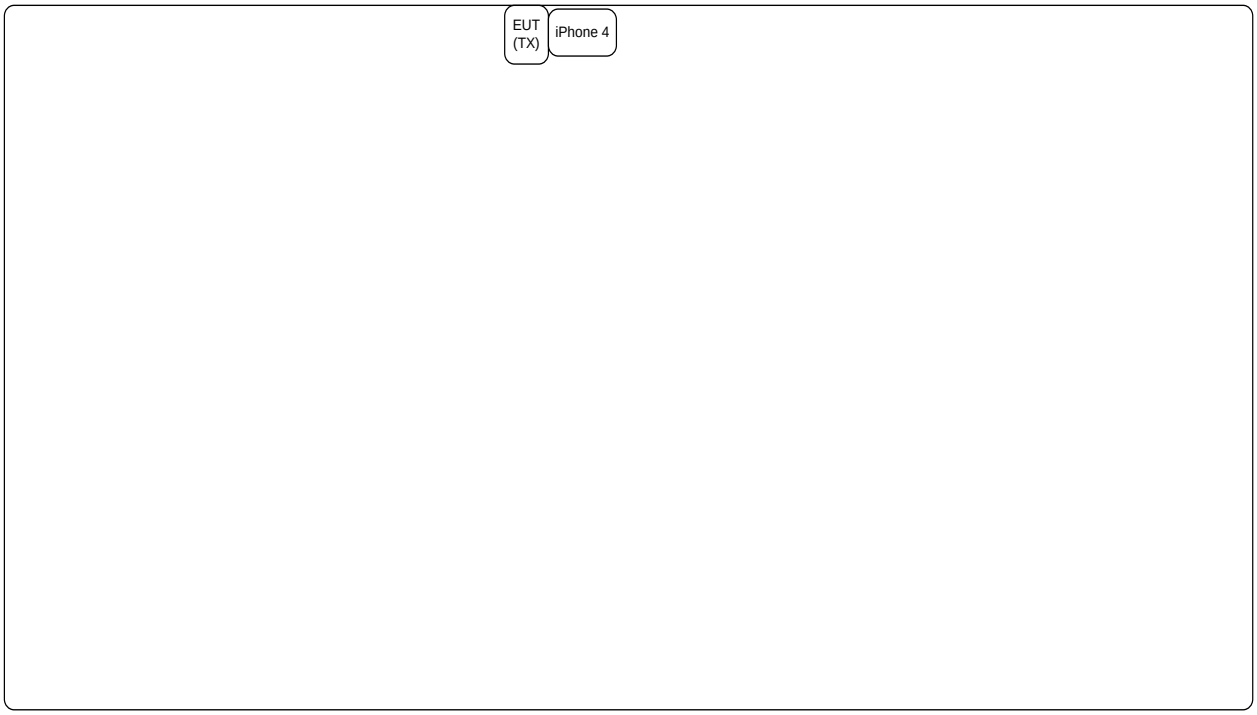
## 2.5 Table for Supporting Units

| Support Unit | Brand | Model | FCC ID | Remark |
|---|---|---|---|---|
| Notebook | DELL | 6400 | N/A | Conducted |
| iPod nano | Apple | A1051 | N/A | |
| (USB) Mouse | Microsoft | 1004 | DoC | |
| TV | JVC | TM-1700PN | N/A | |
| iPhone 4 | Apple | - | - | |
| Air Shuttle (Receiver) | CyWee | CW-AP01KT | WZS-CW-AP01KT | |
| iPhone 4 | Apple | - | - | Radiated |

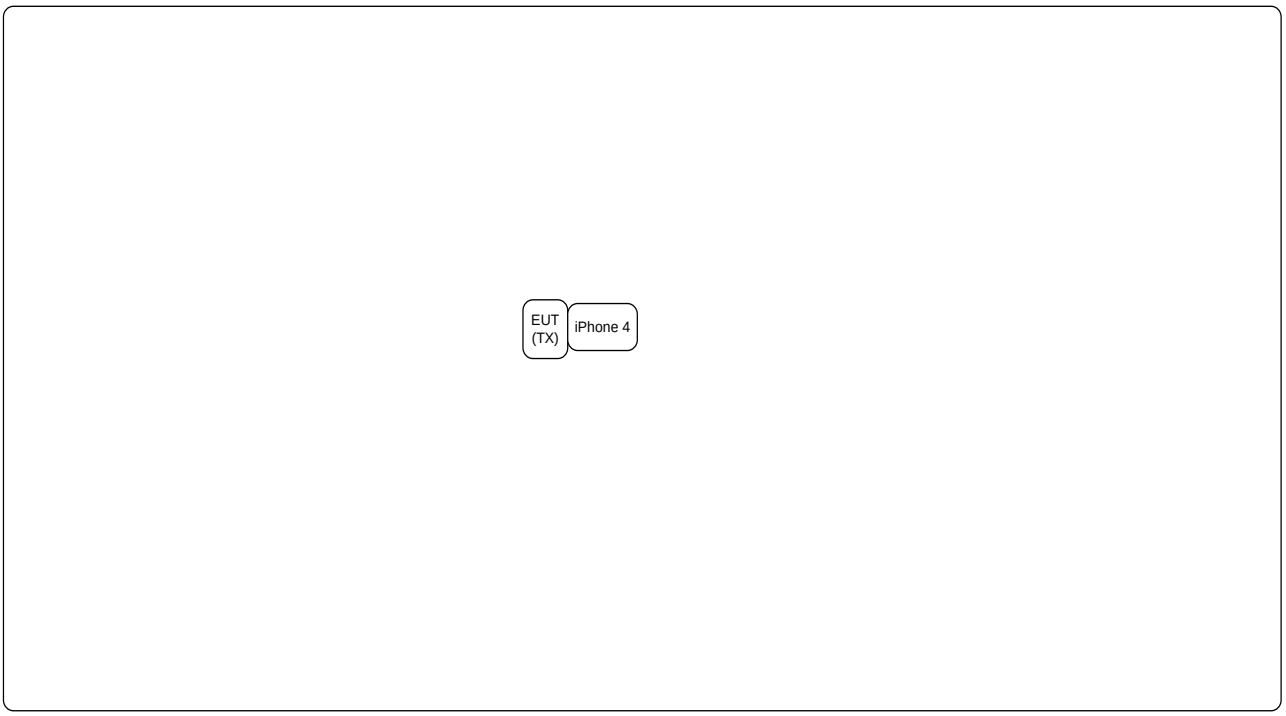
## 2.6 Test Configuration

### 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.

**Class B**

| 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

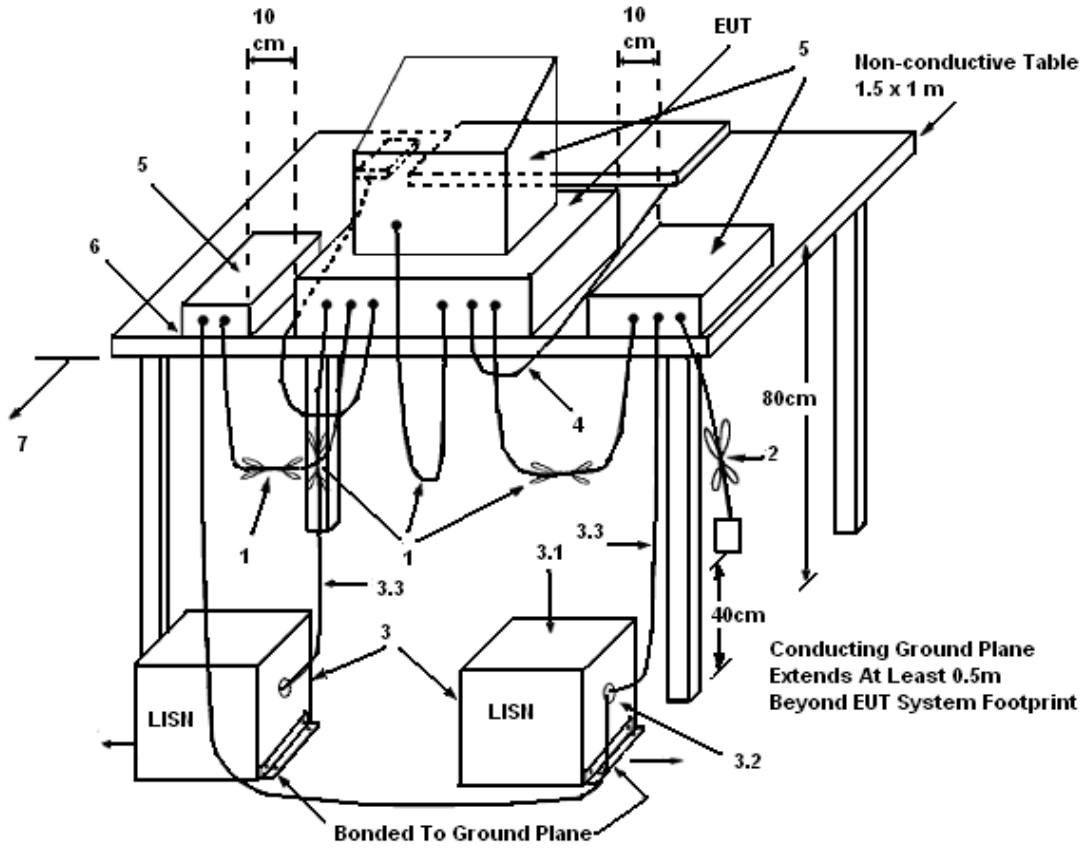
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

| 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. The EUT warm up about 15 minutes then start test.
2. 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.
3. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. 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.

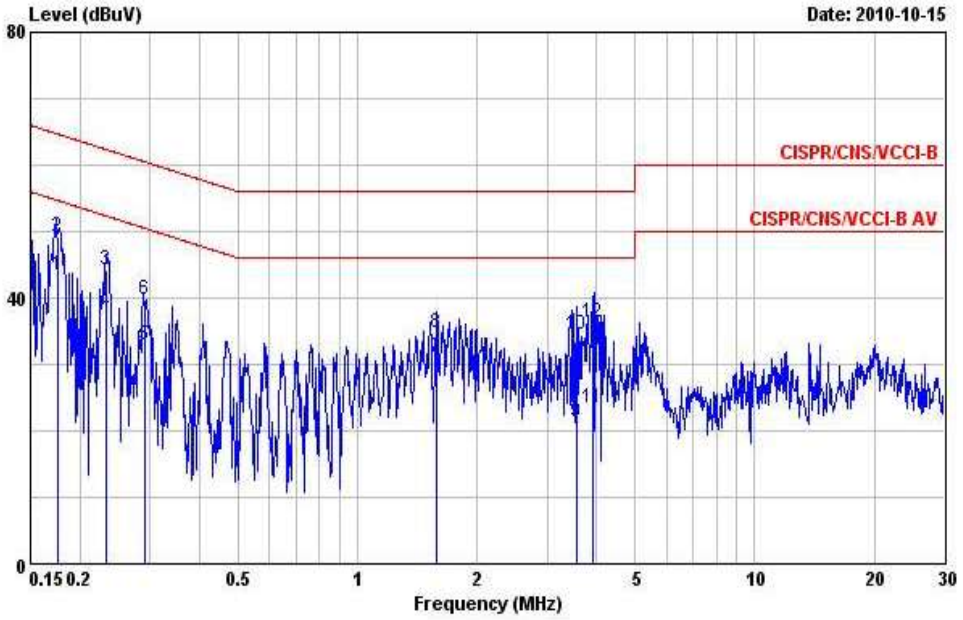
### 3.1.6 EUT Operation during Test

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

### 3.1.7 Results of AC Power Line Conducted Emissions Measurement

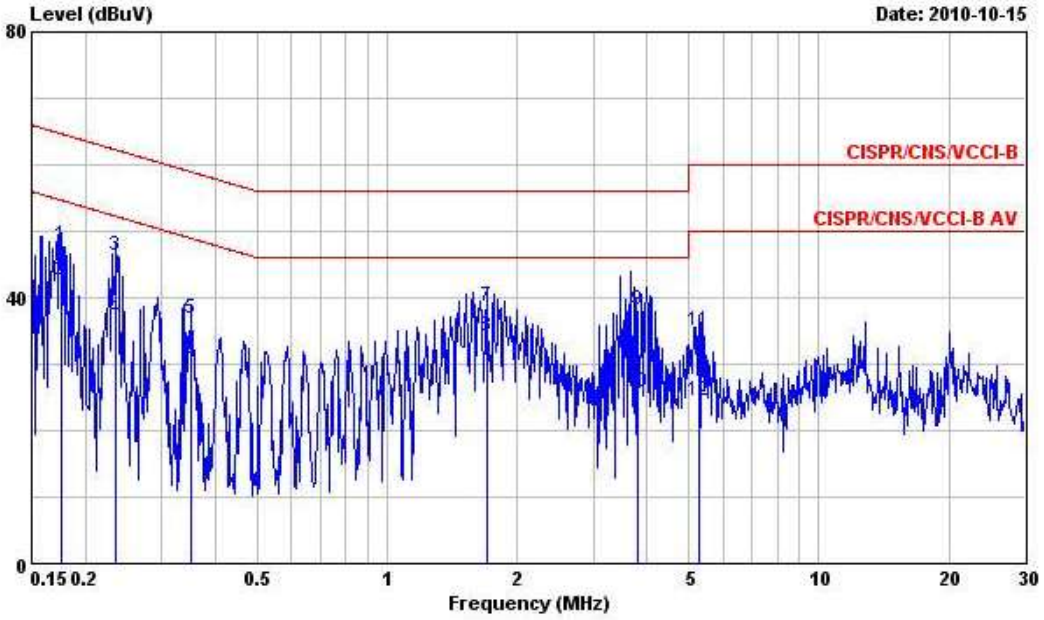
| | | | |
|---|---|---|---|
| **Final Test Date** | Oct. 15, 2010 | **Test Site No.** | CO04-HY |
| **Temperature** | 25℃ | **Humidity** | 48% |
| **Test Engineer** | Jason | **Configuration** | Transmitter Mode |

***Line***




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | @0.1753880 | 43.45 | -11.25 | 54.70 | 42.85 | 0.30 | 0.30 | Average |
| 2 | @0.1753880 | 49.23 | -15.47 | 64.70 | 48.63 | 0.30 | 0.30 | QP |
| 3 | @0.2336500 | 44.13 | -18.19 | 62.32 | 43.55 | 0.30 | 0.28 | QP |
| 4 | @0.2336500 | 37.78 | -14.54 | 52.32 | 37.20 | 0.30 | 0.28 | Average |
| 5 | @0.2920970 | 32.98 | -17.48 | 50.46 | 32.48 | 0.30 | 0.20 | Average |
| 6 | 0.2920970 | 39.79 | -20.67 | 60.46 | 39.29 | 0.30 | 0.20 | QP |
| 7 | @ 1.581 | 31.12 | -14.88 | 46.00 | 30.69 | 0.30 | 0.13 | Average |
| 8 | 1.581 | 34.76 | -21.24 | 56.00 | 34.33 | 0.30 | 0.13 | QP |
| 9 | 3.570 | 21.36 | -24.64 | 46.00 | 20.81 | 0.34 | 0.21 | Average |
| 10 | 3.570 | 34.59 | -21.41 | 56.00 | 34.04 | 0.34 | 0.21 | QP |
| 11 | 3.920 | 23.44 | -22.56 | 46.00 | 22.88 | 0.34 | 0.22 | Average |
| 12 | @ 3.920 | 36.39 | -19.61 | 56.00 | 35.83 | 0.34 | 0.22 | QP |

***Neutral***




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | @0.1752380 | 47.90 | -16.81 | 64.71 | 47.34 | 0.26 | 0.30 | QP |
| 2 | @0.1752380 | 42.56 | -12.15 | 54.71 | 42.00 | 0.26 | 0.30 | Average |
| 3 | @0.2339560 | 46.26 | -16.05 | 62.31 | 45.73 | 0.25 | 0.28 | QP |
| 4 | @0.2339560 | 36.75 | -15.56 | 52.31 | 36.22 | 0.25 | 0.28 | Average |
| 5 | 0.3510120 | 36.93 | -22.01 | 58.94 | 36.55 | 0.24 | 0.14 | QP |
| 6 | @0.3510120 | 30.86 | -18.08 | 48.94 | 30.48 | 0.24 | 0.14 | Average |
| 7 | @ 1.698 | 38.59 | -17.41 | 56.00 | 38.18 | 0.27 | 0.14 | QP |
| 8 | @ 1.698 | 34.17 | -11.83 | 46.00 | 33.76 | 0.27 | 0.14 | Average |
| 9 | @ 3.803 | 38.06 | -17.94 | 56.00 | 37.56 | 0.29 | 0.21 | QP |
| 10 | 3.803 | 25.70 | -20.30 | 46.00 | 25.20 | 0.29 | 0.21 | Average |
| 11 | 5.268 | 34.95 | -25.05 | 60.00 | 34.37 | 0.32 | 0.26 | QP |
| 12 | 5.268 | 24.44 | -25.56 | 50.00 | 23.86 | 0.32 | 0.26 | Average |

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 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

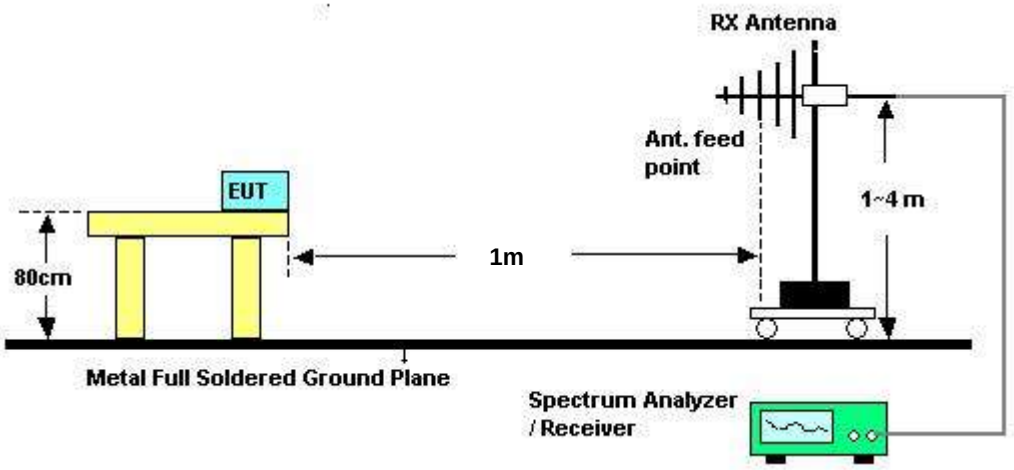
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 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

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 19, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Frequency<br>5760 MHz / 5780 MHz / 5820 MHz |

***5760 MHz***

***Horizontal***

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 2 | 5762.800 | 100.65 | -22.89 | 123.54 | 58.57 | 37.01 | 5.07 | 0.00 | Peak |
| 2 | 5759.000 | 96.89 | -6.65 | 103.54 | 54.81 | 37.01 | 5.07 | 0.00 | Average |

***5780 MHz***

***Horizontal***

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 2 | 5783.600 | 100.63 | -22.91 | 123.54 | 58.51 | 37.03 | 5.09 | 0.00 | Peak |
| 2 | 5779.000 | 97.01 | -6.53 | 103.54 | 54.89 | 37.03 | 5.09 | 0.00 | Average |

***5820 MHz***

***Horizontal***

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 2 | 5822.800 | 100.47 | -23.07 | 123.54 | 58.27 | 37.09 | 5.11 | 0.00 | Peak |
| 2 | 5819.600 | 97.07 | -6.47 | 103.54 | 54.87 | 37.09 | 5.11 | 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.

From 3m to 1m: Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Average limit line @ 1m = 94 (dBuV/m) + distance extrapolation factor [9.54 dB] = 103.54 (dBuV/m);

Peak limit line @ 1m = average limit line +20 dB = 123.54 (dBuV/m)

## 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 (5725 ~5875 MHz).

### 3.3.2 Measuring Instruments and Setting

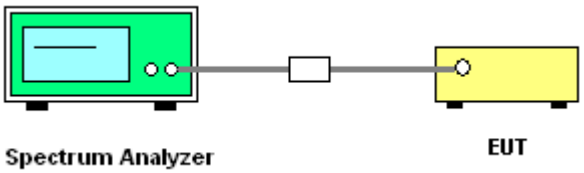
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 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 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 20dB below carrier.

### 3.3.4 Test Setup Layout




### 3.3.5 EUT Operation during Test

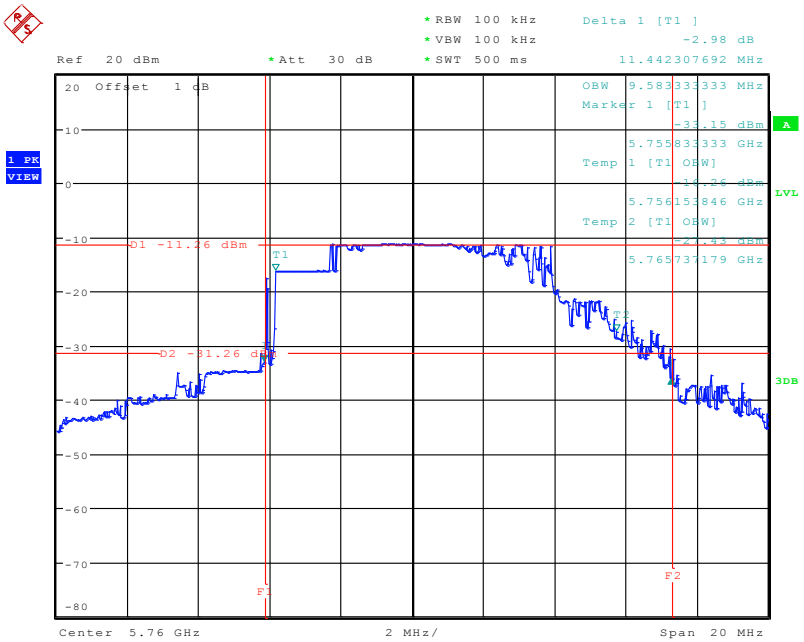
The EUT was programmed to be in continuously transmitting mode.

### 3.3.6 Test Result of 20dB Spectrum Bandwidth

| **Final Test Date** | Nov. 26, 2010 | **Test Site No.** | TH01-HY |
|---|---|---|---|
| **Temperature** | 22℃ | **Humidity** | 63% |
| **Test Engineer** | Cain | **Configuration** | Frequency<br>5760 MHz / 5780 MHz / 5820 MHz |

| **Frequency** | **20dB BW (MHz)** | **99% OBW (MHz)** | **Frequency range (MHz) fL＞2400MHz** | **Frequency range (MHz) fH＜2483.5MHz** | **Test Result** |
|---|---|---|---|---|---|
| 5760 | 11.442 | 9.583 | 5755.8333 | - | Complies |
| 5780 | 11.474 | 9.872 | - | - | Complies |
| 5820 | 11.378 | 9.872 | - | 5827.2436 | Complies |

**20 dB/99% Bandwidth Plot on 5760 MHz**

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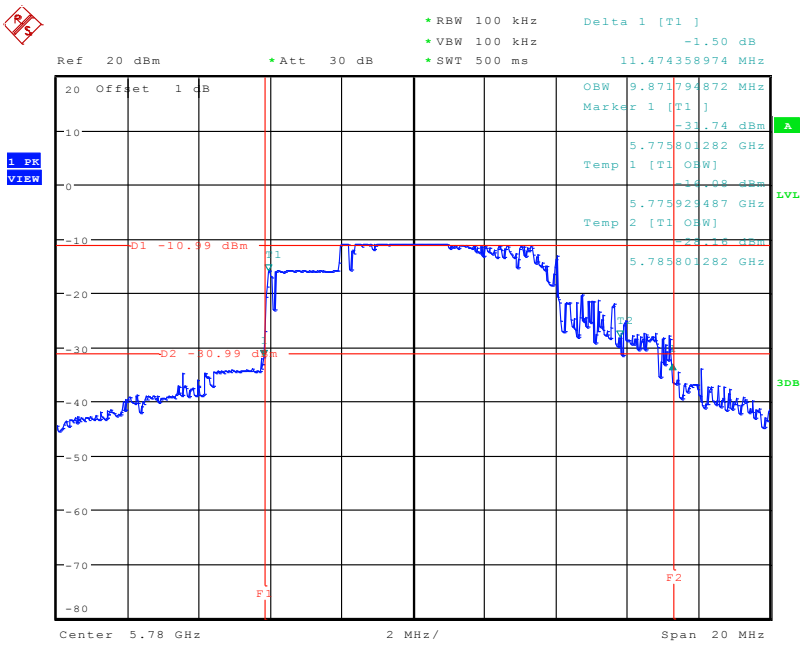
### 20 dB/99% Bandwidth Plot on 5780 MHz

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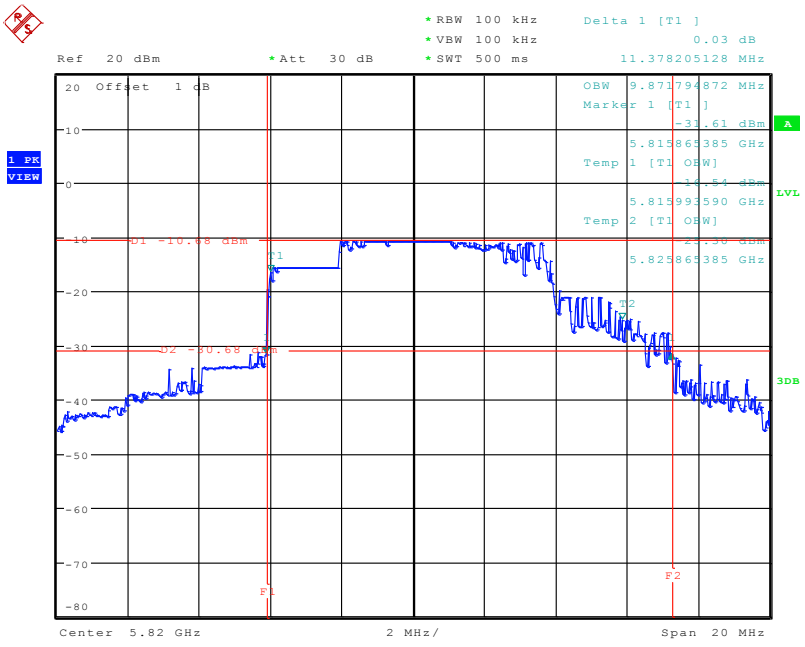
### 20 dB/99% Bandwidth Plot on 5820 MHz

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## 3.4 Radiated Emissions Measurement

### 3.4.1 Limit

Harmonic emissions limits comply with below 54dBuV/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 (microvolt/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 |

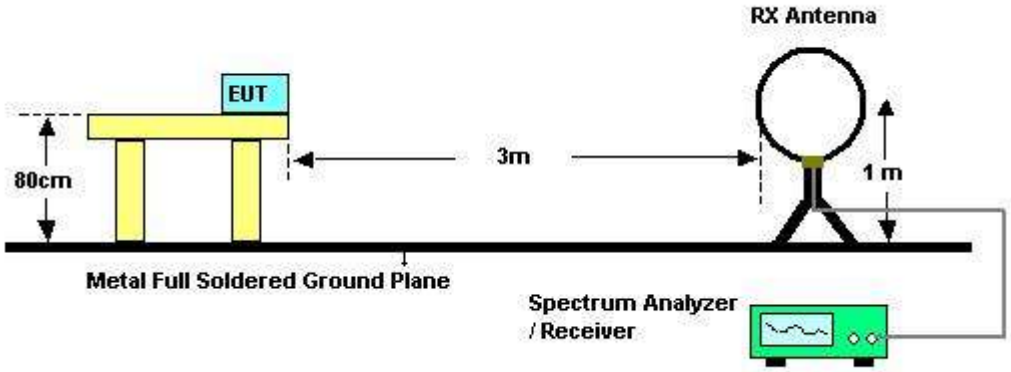
| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

### 3.4.3 Test Procedures

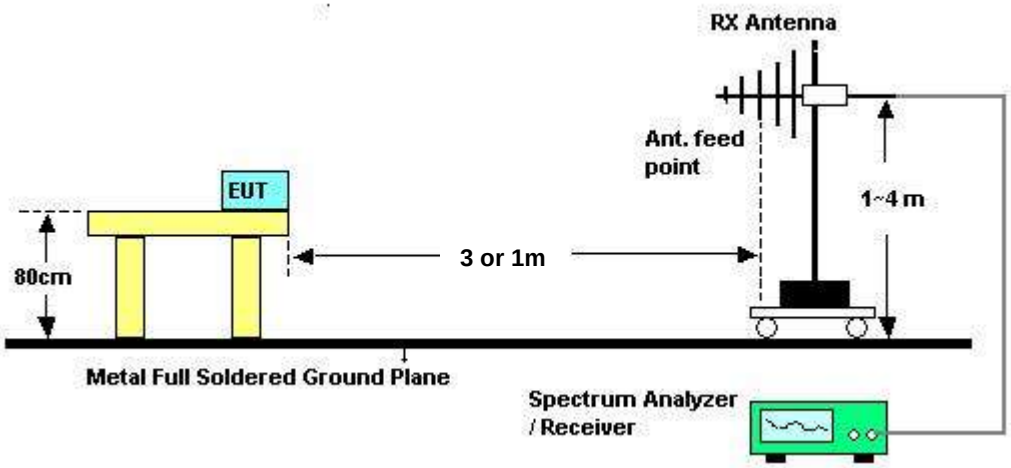
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / 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)

| | | | |
|---|---|---|---|
| **Final Test Date** | Oct. 15, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | | |

| 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.

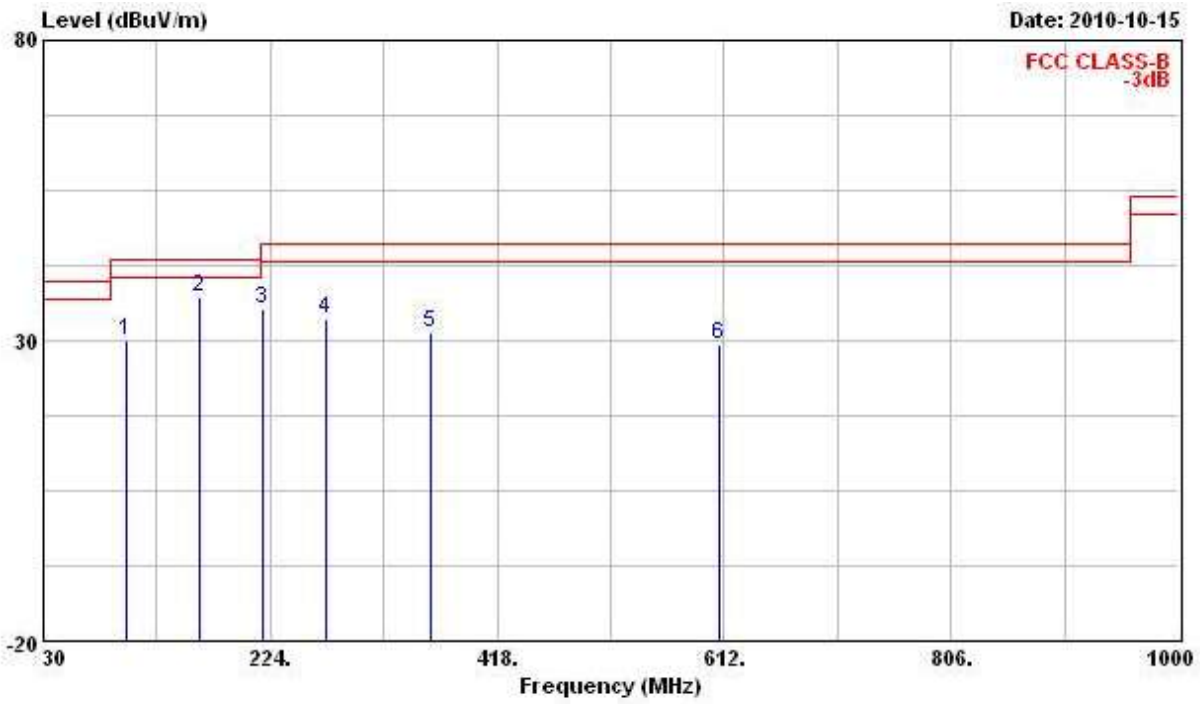
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

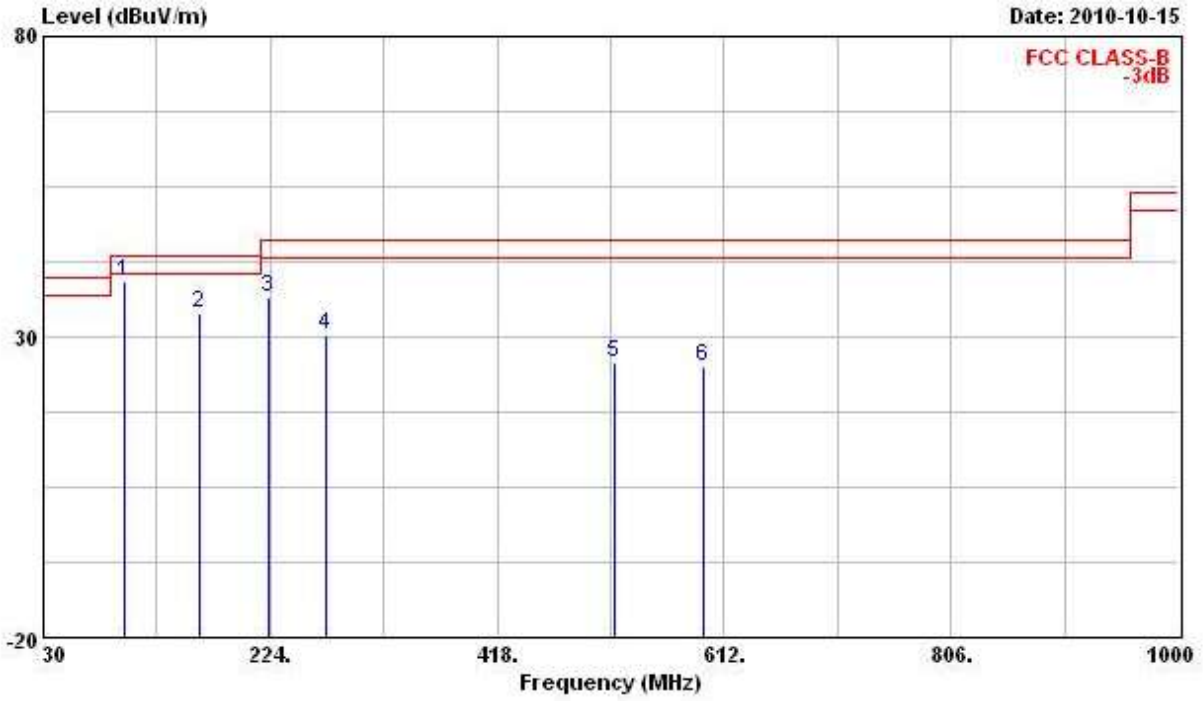
| | | | |
|---|---|---|---|
| **Final Test Date** | Oct. 15, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Normal Mode |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 101.780 | 30.02 | -13.48 | 43.50 | 44.55 | 11.44 | 1.67 | 27.64 | Peak |
| 2 | 163.860 | 37.37 | -6.13 | 43.50 | 53.21 | 9.92 | 2.15 | 27.91 | Peak |
| 3 | 218.180 | 35.18 | -10.82 | 46.00 | 51.52 | 9.20 | 2.51 | 28.05 | Peak |
| 4 | 272.500 | 33.78 | -12.22 | 46.00 | 45.59 | 13.40 | 2.89 | 28.10 | Peak |
| 5 | 361.740 | 31.41 | -14.59 | 46.00 | 41.06 | 15.28 | 3.34 | 28.27 | Peak |
| 6 | 607.150 | 29.41 | -16.59 | 46.00 | 35.29 | 19.35 | 4.60 | 29.82 | Peak |

***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 98.870 | 39.20 | -4.30 | 43.50 | 54.18 | 11.03 | 1.65 | 27.66 | Peak |
| 2 | 163.860 | 33.80 | -9.70 | 43.50 | 49.64 | 9.92 | 2.15 | 27.91 | Peak |
| 3 | 222.060 | 36.59 | -9.41 | 46.00 | 52.67 | 9.39 | 2.54 | 28.01 | Peak |
| 4 | 272.500 | 30.27 | -15.73 | 46.00 | 42.08 | 13.40 | 2.89 | 28.10 | Peak |
| 5 | 517.910 | 25.66 | -20.34 | 46.00 | 32.36 | 18.55 | 3.99 | 29.23 | Peak |
| 6 | 594.540 | 25.18 | -20.82 | 46.00 | 31.22 | 19.30 | 4.54 | 29.88 | Peak |

Note:

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

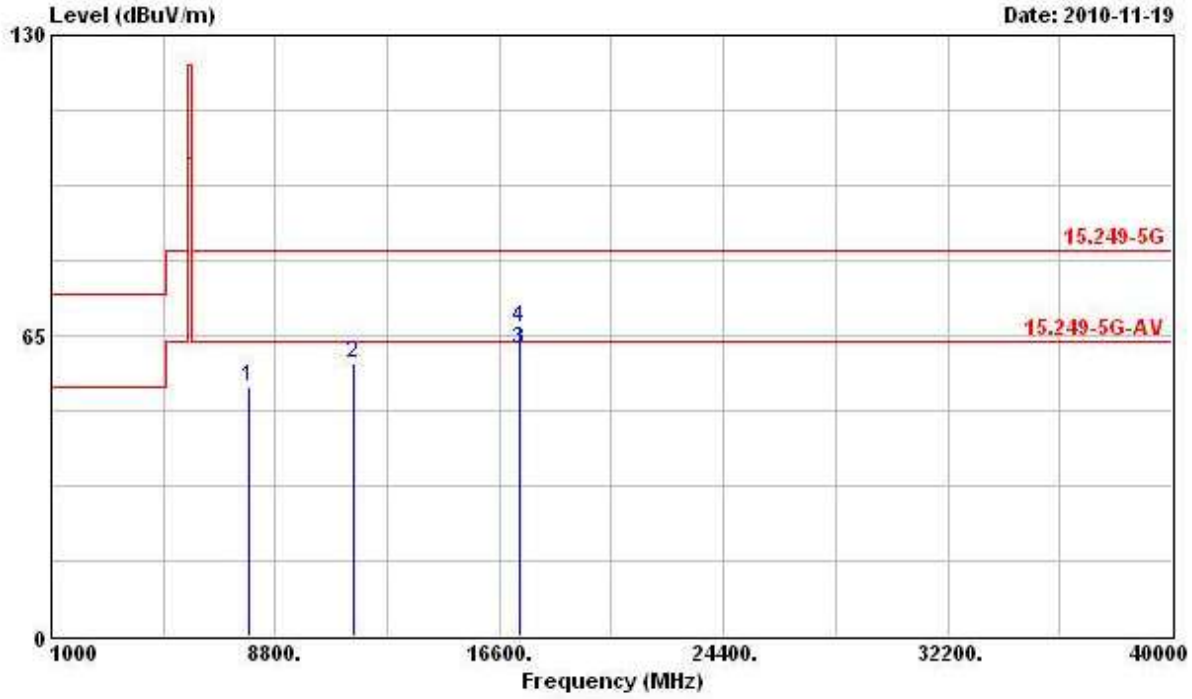
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

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

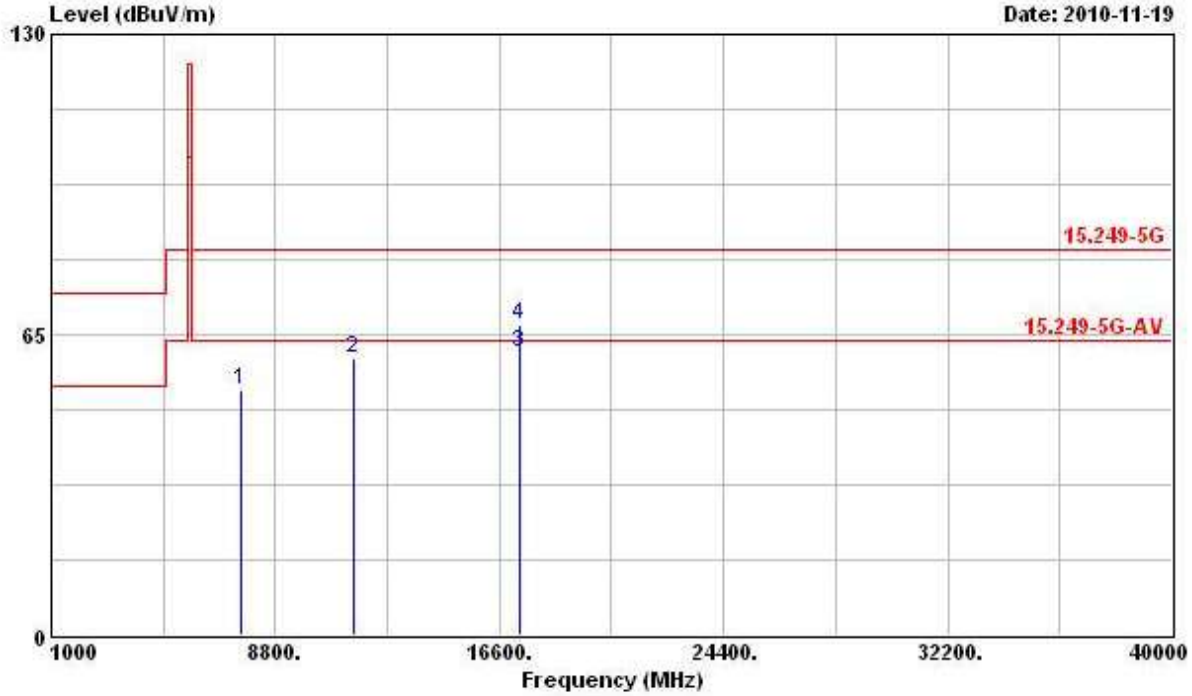
| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 19, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Frequency 5760 MHz |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 7844.000 | 53.93 | -9.61 | 63.54 | 44.41 | 38.11 | 5.75 | 34.34 | PK |
| 2 | @11518.000 | 59.21 | -4.33 | 63.54 | 45.63 | 40.61 | 6.63 | 33.66 | PK |
| 3 | @17280.000 | 61.98 | -1.56 | 63.54 | 42.14 | 43.53 | 8.54 | 32.23 | Average |
| 4 | 17280.000 | 66.62 | -16.92 | 83.54 | 46.78 | 43.53 | 8.54 | 32.23 | Peak |

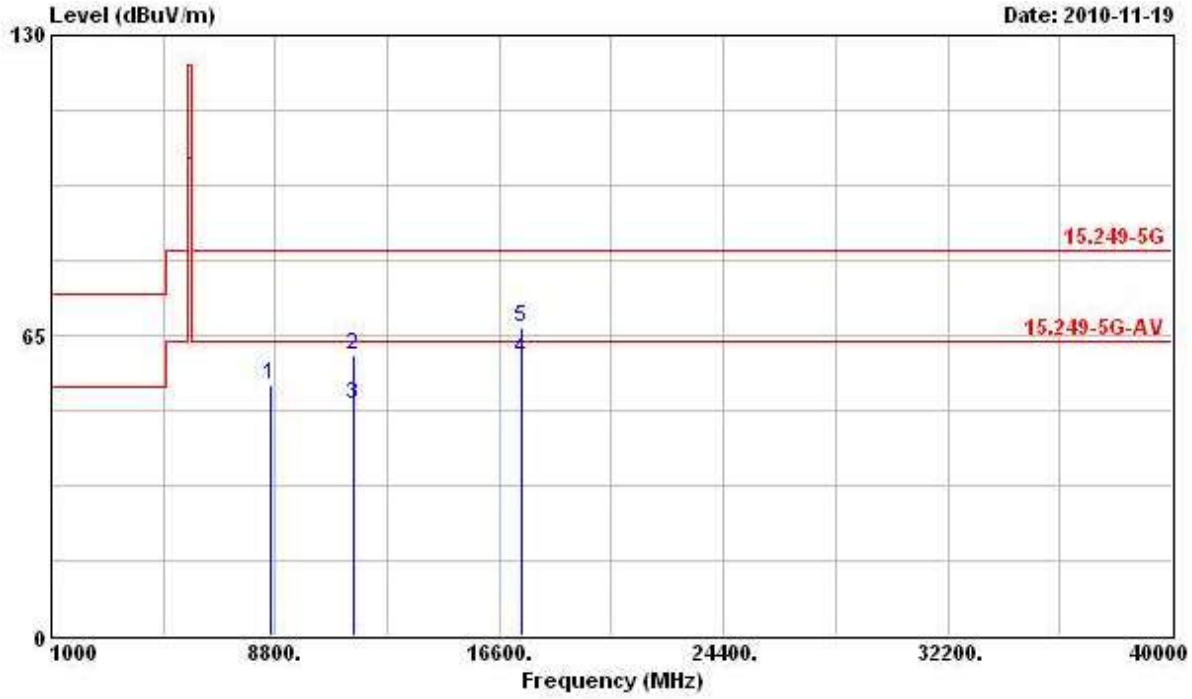
***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 7580.000 | 52.98 | -10.56 | 63.54 | 43.66 | 37.95 | 5.68 | 34.31 | PK |
| 2 | @11518.700 | 60.08 | -3.46 | 63.54 | 46.50 | 40.61 | 6.63 | 33.66 | PK |
| 3 | @17280.000 | 61.05 | -2.49 | 63.54 | 41.21 | 43.53 | 8.54 | 32.23 | Average |
| 4 | 17280.000 | 67.33 | -16.21 | 83.54 | 47.49 | 43.53 | 8.54 | 32.23 | Peak |

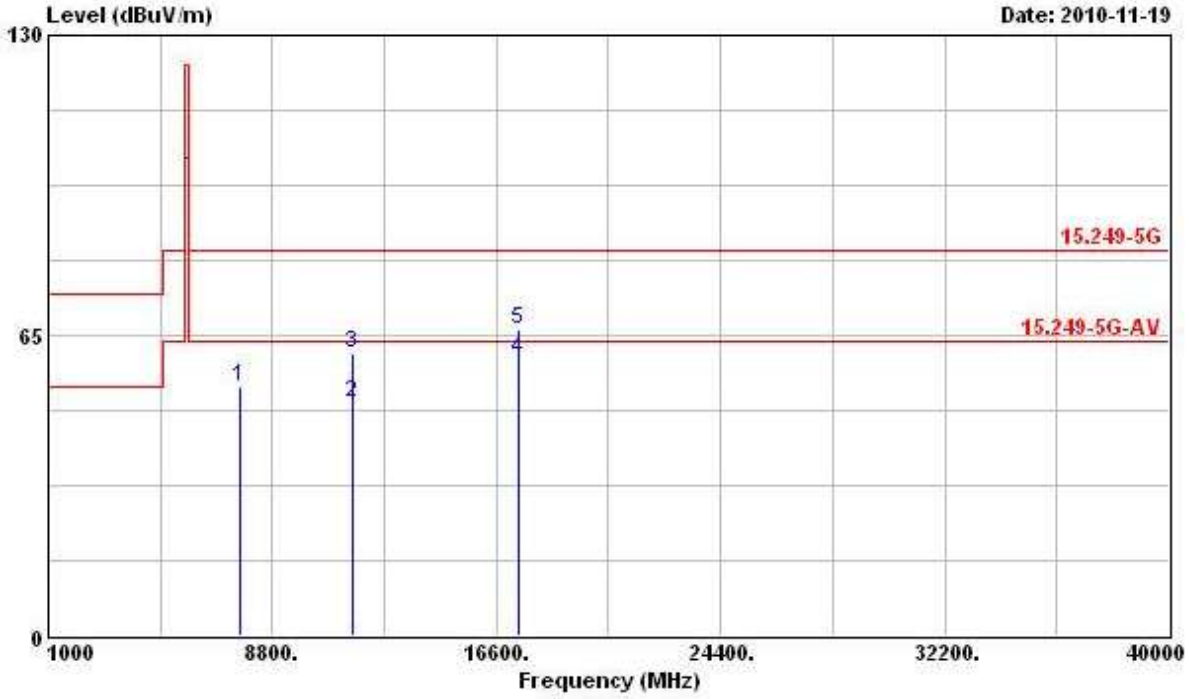
| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 19, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Frequency 5780 MHz |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 8608.000 | 54.45 | -9.09 | 63.54 | 44.36 | 38.41 | 5.99 | 34.31 | PK |
| 2 | 11558.000 | 60.56 | -22.98 | 83.54 | 46.95 | 40.62 | 6.63 | 33.64 | Peak |
| 3 | 11558.000 | 50.23 | -13.31 | 63.54 | 36.62 | 40.62 | 6.63 | 33.64 | Average |
| 4 | @17340.000 | 60.02 | -3.52 | 63.54 | 40.22 | 43.50 | 8.50 | 32.20 | Average |
| 5 | 17340.000 | 66.60 | -16.94 | 83.54 | 46.80 | 43.50 | 8.50 | 32.20 | Peak |

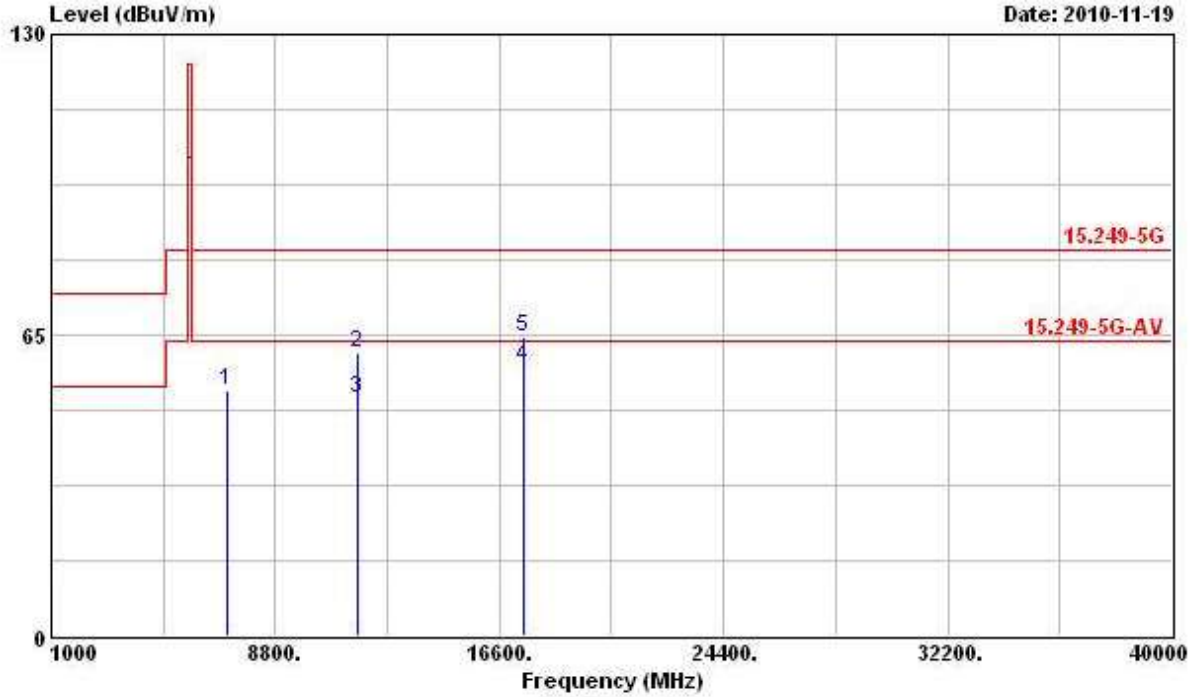
***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 7684.000 | 53.81 | -9.73 | 63.54 | 44.41 | 38.01 | 5.71 | 34.32 | PK |
| 2 | 11559.000 | 50.31 | -13.23 | 63.54 | 36.70 | 40.62 | 6.63 | 33.64 | Average |
| 3 | 11559.000 | 60.97 | -22.57 | 83.54 | 47.36 | 40.62 | 6.63 | 33.64 | Peak |
| 4 | @17340.000 | 59.88 | -3.66 | 63.54 | 40.08 | 43.50 | 8.50 | 32.20 | Average |
| 5 | 17340.000 | 66.44 | -17.10 | 83.54 | 46.64 | 43.50 | 8.50 | 32.20 | Peak |

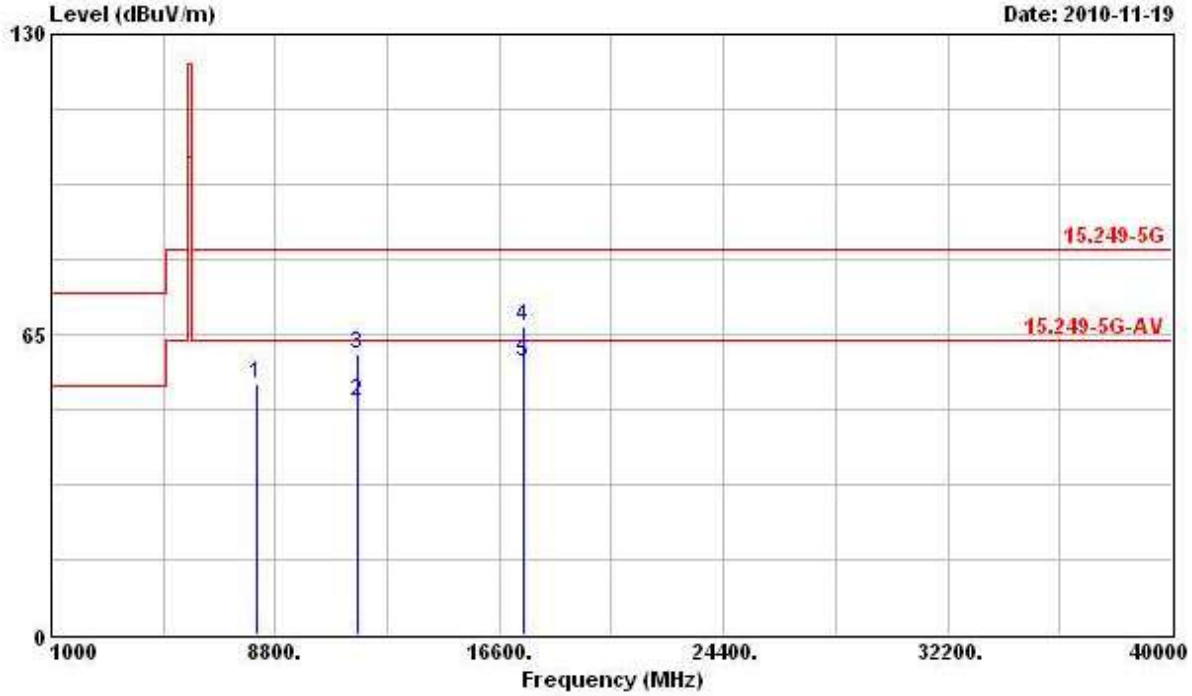
| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 19, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Frequency 5820 MHz |

***Horizontal***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 7096.000 | 53.07 | -10.47 | 63.54 | 43.92 | 37.82 | 5.61 | 34.28 | PK |
| 2 | 11639.000 | 61.19 | -22.35 | 83.54 | 47.50 | 40.66 | 6.64 | 33.61 | Peak |
| 3 | 11639.000 | 51.25 | -12.29 | 63.54 | 37.56 | 40.66 | 6.64 | 33.61 | Average |
| 4 | 17460.000 | 58.00 | -5.54 | 63.54 | 38.30 | 43.43 | 8.44 | 32.17 | Average |
| 5 | 17460.000 | 64.57 | -18.97 | 83.54 | 44.87 | 43.43 | 8.44 | 32.17 | Peak |

***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 8164.000 | 54.17 | -9.37 | 63.54 | 44.35 | 38.29 | 5.85 | 34.32 | PK |
| 2 | 11638.160 | 50.64 | -12.90 | 63.54 | 36.95 | 40.66 | 6.64 | 33.61 | Average |
| 3 | 11638.160 | 60.73 | -22.81 | 83.54 | 47.04 | 40.66 | 6.64 | 33.61 | Peak |
| 4 | 17460.000 | 66.52 | -17.02 | 83.54 | 46.82 | 43.43 | 8.44 | 32.17 | Peak |
| 5 | 17460.000 | 59.13 | -4.41 | 63.54 | 39.43 | 43.43 | 8.44 | 32.17 | 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 (microvolt/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 band edges.
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 Emissions

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 19, 2010 | **Test Site No.** | 03CH02-HY |
| **Temperature** | 25.9℃ | **Humidity** | 53% |
| **Test Engineer** | Daniel | **Configuration** | Frequency<br>5760 MHz / 5820 MHz |

***5760 MHz***

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 5717.200 | 73.71 | -9.83 | 83.54 | 31.72 | 36.95 | 5.04 | 0.00 | Peak |
| 3 | 5883.000 | 73.05 | -10.49 | 83.54 | 30.76 | 37.16 | 5.13 | 0.00 | Peak |
| 1 @ | 5702.800 | 59.76 | -3.78 | 63.54 | 17.77 | 36.95 | 5.04 | 0.00 | Average |
| 3 @ | 5877.200 | 59.38 | -4.16 | 63.54 | 17.09 | 37.16 | 5.13 | 0.00 | Average |

***5820 MHz***

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | |
| 1 | 5719.600 | 73.18 | -10.36 | 83.54 | 31.17 | 36.97 | 5.04 | 0.00 | Peak |
| 3 | 5895.000 | 73.03 | -10.51 | 83.54 | 30.69 | 37.18 | 5.16 | 0.00 | Peak |
| 1 @ | 5718.000 | 59.82 | -3.72 | 63.54 | 17.81 | 36.97 | 5.04 | 0.00 | Average |
| 3 @ | 5879.000 | 59.49 | -4.05 | 63.54 | 17.20 | 37.16 | 5.13 | 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.

From 3m to 1m: Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Average limit line @ 1m = 54 (dBuV/m) + distance extrapolation factor [9.54 dB] = 63.54 (dBuV/m);

Peak limit line @ 1m = average limit line +20 dB = 83.54 (dBuV/m)

## 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.

### 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 |
|---|---|---|---|---|---|---|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | Apr. 06, 2010 | Conduction (CO04-HY) |
| LISN | MessTec | NNB-2/16Z | 99041 | 9kHz – 30MHz | Mar. 23, 2010 | Conduction (CO04-HY) |
| LISN (Support Unit) | EMCO | 3810/2NM | 9703-1839 | 9kHz – 30MHz | Apr. 29, 2010 | Conduction (CO04-HY) |
| RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9kHz – 30MHz | Apr. 20, 2010 | Conduction (CO04-HY) |
| EMI Filter | LINDGREN | LRE-2030 | 2651 | < 450 Hz | N/A | Conduction (CO04-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 | FSU26.5 | 100015 | 20Hz ~ 26.5GHz | Nov. 18, 2010 | Conducted (TH01-HY) |
| DC Power Source | G.W. | GPC-6030D | C671845 | DC 1V ~ 60V | Apr. 16, 2010 | Conducted (TH01-HY) |
| Temp. and Humidity Chamber | Giant Force | GTH-225-20-S | MAB0103-001 | N/A | Aug. 05, 2010 | Conducted (TH01-HY) |
| RF CABLE-1m | Jye Bao | RG142 | CB034-1m | 20MHz ~ 7GHz | Dec. 02, 2009 | Conducted (TH01-HY) |
| RF CABLE-2m | Jye Bao | RG142 | CB035-2m | 20MHz ~ 1GHz | Dec. 02, 2009 | Conducted (TH01-HY) |
| Signal Generator | R&S | SMR40 | 100116 | 10MHz ~ 40GHz | Mar. 30, 2010 | Conducted (TH01-HY) |
| Power Sensor | Anritsu | MA2411B | 0917017 | 300MHz~40GHz | Dec. 03, 2009 | Conducted (TH01-HY) |
| Power Meter | Anritsu | ML2495A | 0949003 | 300MHz~40GHz | Dec. 03, 2009 | 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 | Jul. 26, 2010* | Conducted (TH01-HY) |

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

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP40 | 100305/040 | 9 kHz - 40GHz | Feb. 02, 2010 | Radiation (03CH02-HY) |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30 MHz - 1 GHz 3m | May 01, 2010 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8447D | 2944A11146 | 100 kHz – 1.3 GHz | Jul. 23, 2010 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8449B | 3008A02373 | 1GHz – 26.5 GHz | Jul. 23, 2010 | Radiation (03CH02-HY) |
| Horn Antenna | EMCO | 3115 | 6741 | 1GHz ~ 18GHz | May 20, 2010 | Radiation (03CH02-HY) |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz ~ 1GHz | Feb. 26, 2010 | Radiation (03CH02-HY) |
| RF Cable-HIGH | SUHNER | SUCOFLEX106 | 03CH02-HY | 1GHz~40GHz | Feb. 26, 2010 | Radiation (03CH02-HY) |
| Bilog Antenna | SCHAFFNER | CBL61128 | 2723 | 30 MHz - 2 GHz | Nov. 30, 2009 | 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) |

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

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9 kHz - 30 MHz | Jul. 29, 2010* | Radiation (03CH02-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 2nd 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. : L1190-100529

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, 2010 to January 09, 2013 |
| **Accredited Scope** | : | Testing Field, see described in the Appendix |
| **Specific Accreditation Program** | : | Accreditation Program for Designated Testing Laboratory for Commodities Inspection<br>Accreditation Program for Telecommunication Equipment Testing Laboratory<br>Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities |

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : May 29, 2010

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