

# FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.225

**Equipment** : Mobile Computer  
**Brand Name** : CIPHERLAB  
**Model No.** : 8790  
**Filing Type** : New Application  
**Applicant** : CIPHERLAB Co., Ltd.  
12F, 333 Dunhua S. Rd., Sec. 2,  
Taipei, Taiwan 106  
**FCC ID** : Q3N-8790  
**Manufacturer** : CIPHERLAB Co., Ltd.  
12F, 333 Dunhua S. Rd., Sec. 2,  
Taipei, Taiwan 106  
**Received Date** : Feb. 03, 2012  
**Final Test Date** : Feb. 07, 2012

## 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 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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## History of This Test Report

Original Issue Date: Feb. 08, 2012

Report No.: FR211340

■ 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 § 15.225

Equipment : Mobile Computer

Brand Name : CIPHERLAB

Model No. : 8790

Applicant : CIPHERLAB Co., Ltd.  
12F, 333 Dunhua S. Rd., Sec. 2,  
Taipei, Taiwan 106

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 03, 2012 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 / Assistant Manager**

***SPORTON International Inc.***

*No. 52 Hwa Ya 1<sup>st</sup> 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 | 15.82 dB    |
| 3.2  | 15.225(a)    | Field Strength of Fundamental Emissions | Complies | 39.41 dB    |
| 3.3  | 15.215(c)    | 20dB Spectrum Bandwidth                 | Complies | -           |
| 3.4  | 15.225(d)    | Radiated Emissions                      | Complies | 6.57 dB     |
| 3.5  | 15.225(e)    | Frequency Stability                     | Complies | -           |
| 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 / Frequency Stability | ±8.5×10 <sup>-8</sup> | Confidence levels of 95% |
| Radiated / Band Edge Emissions (9kHz~30MHz)   | ±0.8dB                | Confidence levels of 95% |
| Radiated Emissions (30MHz~1000MHz)            | ±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

### 1.1 Product Details

| Items                    | Description                                       |
|--------------------------|---|
| Power Type               | 5Vdc from AC Adapter ; 3.7Vdc from Li-ion Battery |
| Modulation               | ASK   |
| Channel Number           | 1   |
| Channel Band Width (99%) | 2.24 kHz  |
| Max. Field Strength      | 63.67 dBuV/m at 10m (QP)                          |
| Test Freq. Range         | 13.553 ~ 13.567MHz                                |
| Carrier Frequencies      | 13.56 MHz (Ch. 1)                                 |
| Antenna                  | Integrate Antenna (Without any antenna connector) |

### 1.2 Accessories

| Accessories Information               |             |              |   |             |                                      |
|---------------------------------------|-------------|--------------|---|-------------|--------------------------------------|
| Accessories or 2nd Source or Key Part | AC Adapter  | Brand Name   | Adapter   | Model Name  | STD-05030V                           |
|                                       |             | Power Rating | I/P: 100 -240Vac, 0.48mA, O/P: 5Vdc, 3A             |             |                                      |
|                                       |             | Power Cord   | 1.5meter, non-shielded cable, with w/ ferrite core  |             |                                      |
|                                       | Battery     | Brand Name   | HighCell  | Model Name  | CT-1S1PL                             |
|                                       |             | Power Rating | 3.7Vdc, 4000mAh                                     | Type        | Li-ion                               |
|                                       | Power Cable | Brand Name   | N/A   | Model Name: | N/A                                  |
|                                       |             | Signal Line  | 1.0meter shielded cable without ferrite core        |             |                                      |
|                                       | USB Cable   | Brand Name   | CABLE MAX   | Model Name  | MOLEX16PM& DC3.8*1.0F+USB4P A TYPE M |
|                                       |             | Signal Line  | 1.2 meter, non-shielded cable, with w/ ferrite core |             |                                      |
|                                       | RFID Module | Brand Name   | Microprogram  | Model Name  | CIPHERLAB930                         |
|                                       | WWAN Module | Brand Name   | SIEMENS   | Model Name  | HC25                                 |
|                                       | WLAN Module | Brand Name   | AzureWave   | Model Name  | AW-GH321                             |
|                                       | BT Module   | Brand Name   | Atech   | Model Name  | BM-1023                              |

### 1.3 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 |
|---|---------------|---------|
| AC Power Line Conducted Emissions       | CTX           | -       |
| Radiated Emissions 30MHz~1GHz           | CTX           | 1       |
| Field Strength of Fundamental Emissions | CTX           | 1       |
| 20dB Spectrum Bandwidth                 | CTX           | 1       |
| Radiated Emissions 9kHz~30MHz           | CTX           | 1       |
| Band Edge Emissions                     | CTX           | 1       |
| Frequency Stability                     | Un-modulation | 1       |

Note: CTX=continuously transmitting.

### 1.4 Table for Testing Locations

| Test Site No. | Site Category | Location |
|---------------|---------------|----------|
| CO04-HY       | Conduction    | Hwa Ya   |
| TH01-HY       | OVEN Room     | Hwa Ya   |
| 10CH02-HY     | SAC           | Hwa Ya   |
| 03CH03-HY     | SAC           | Hwa Ya   |

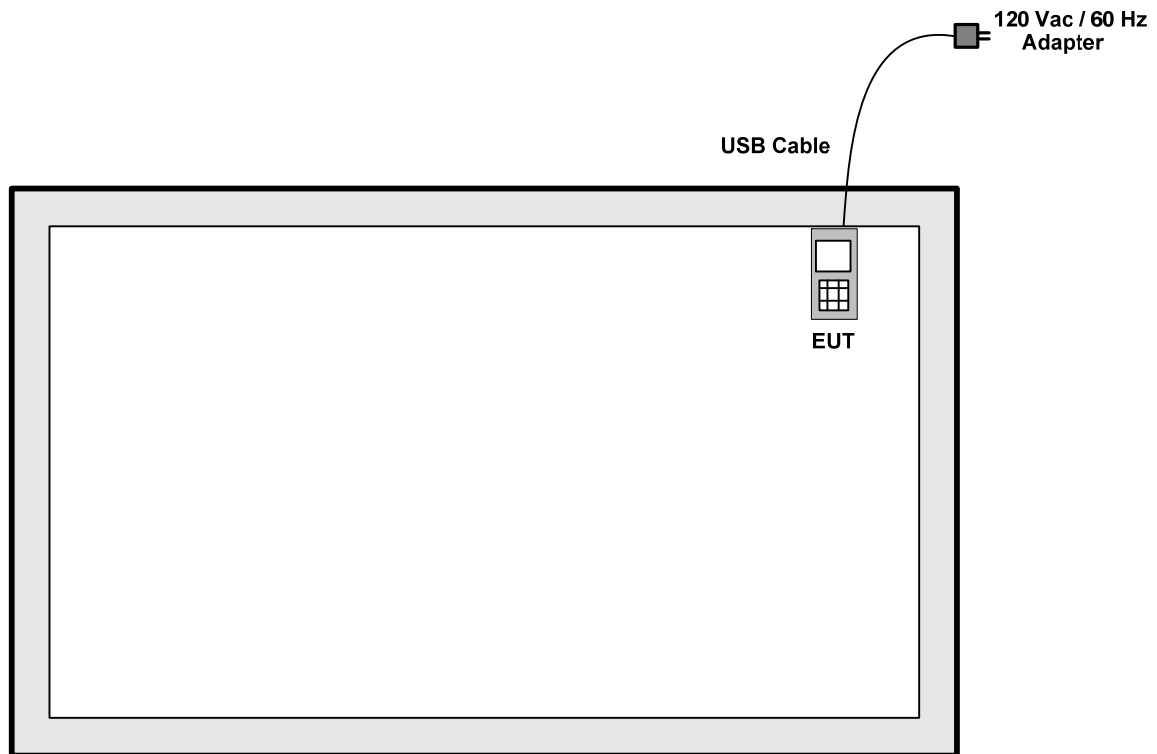
Semi Anechoic Chamber (SAC).

**1.5 Table for Supporting Units**

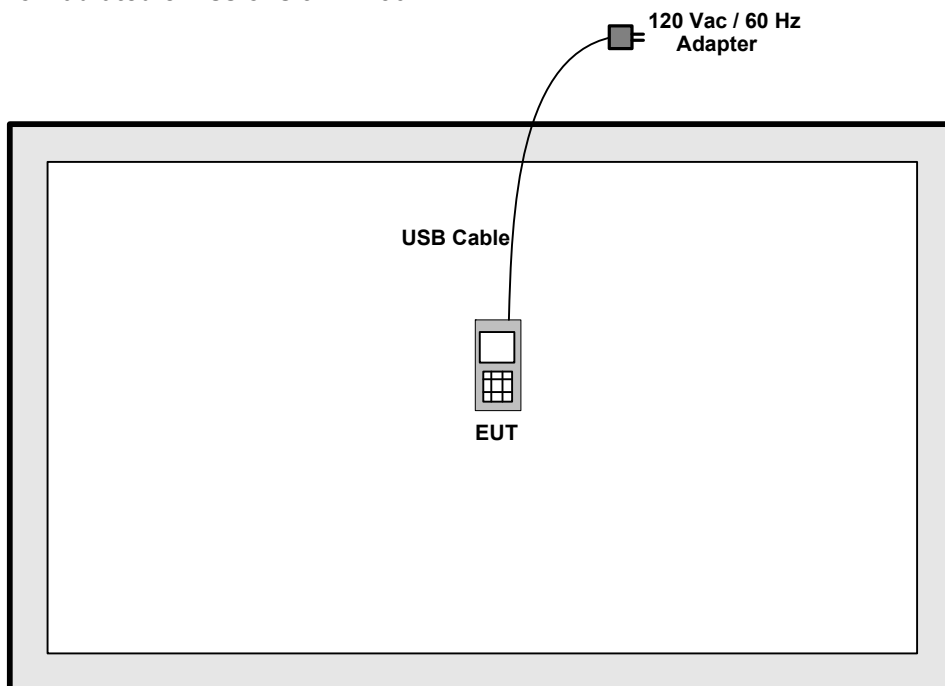
The EUT was tested alone.

**1.6 Test Configurations**

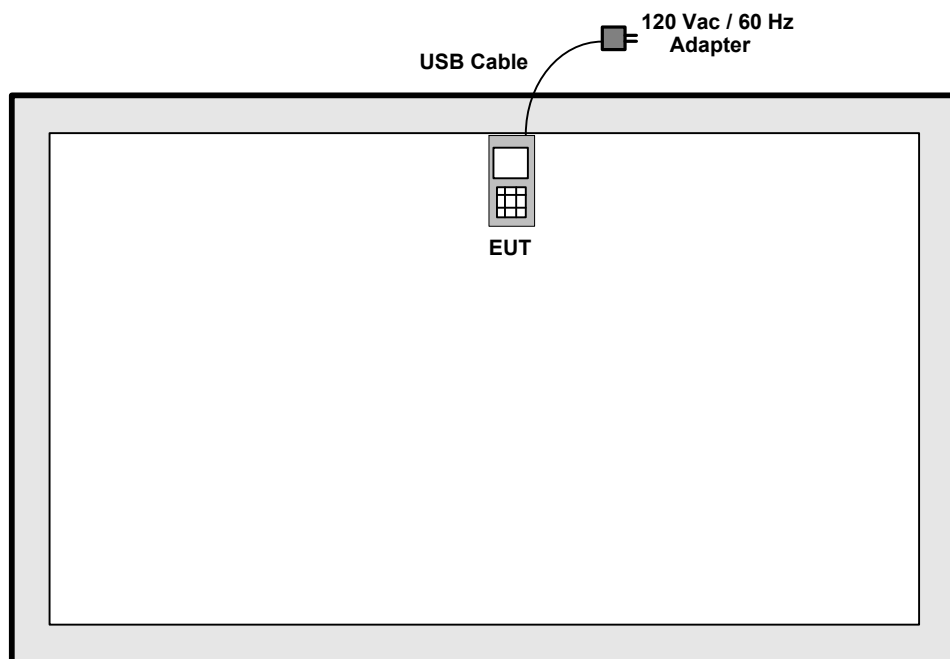
For conducted emissions



For radiated emissions 9kHz~30MHz



**For radiated emissions 30MHz~1GHz**



### 3. TEST RESULT

#### 3.1 AC Power Line Conducted Emissions Measurement

##### 1.6.1 Limit

For a Low-power Radio-frequency device 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              |

##### 1.6.2 Measuring Instruments and Setting

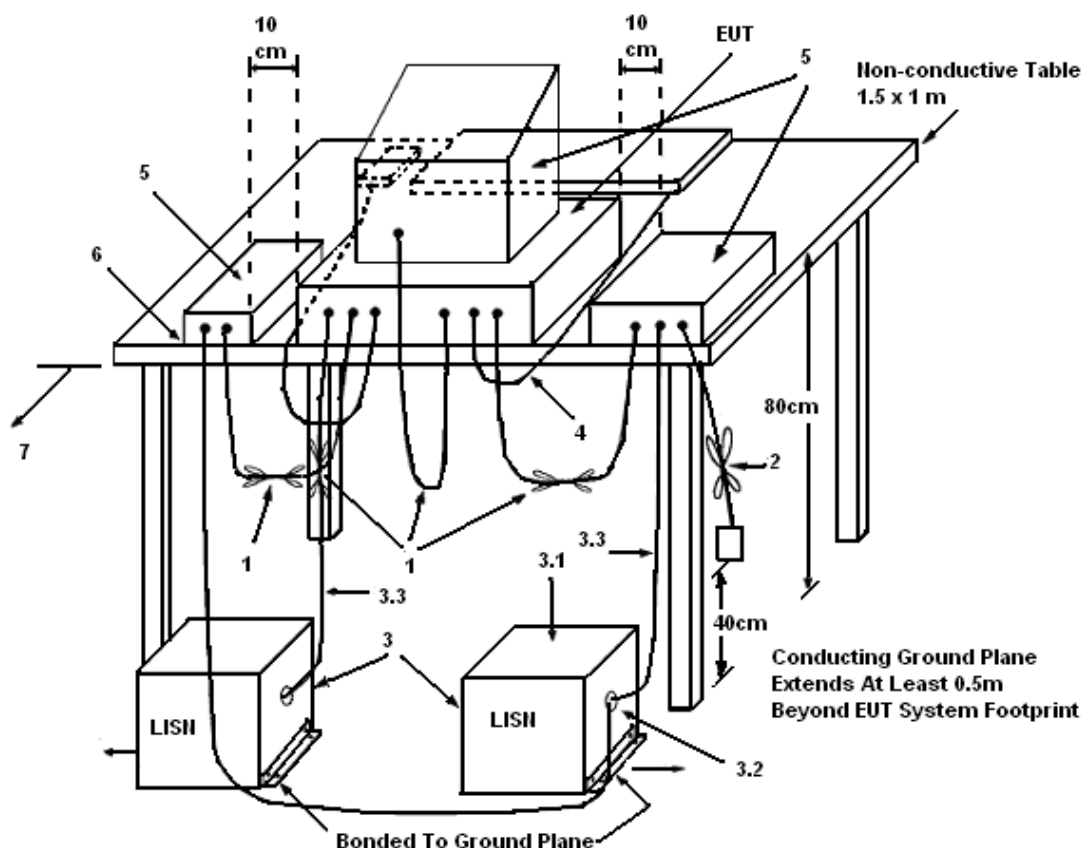
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

##### 1.6.3 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.

### 1.6.4 Test Setup Layout



#### LEGEND:

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

### 1.6.5 Test Deviation

There is no deviation with the original standard.

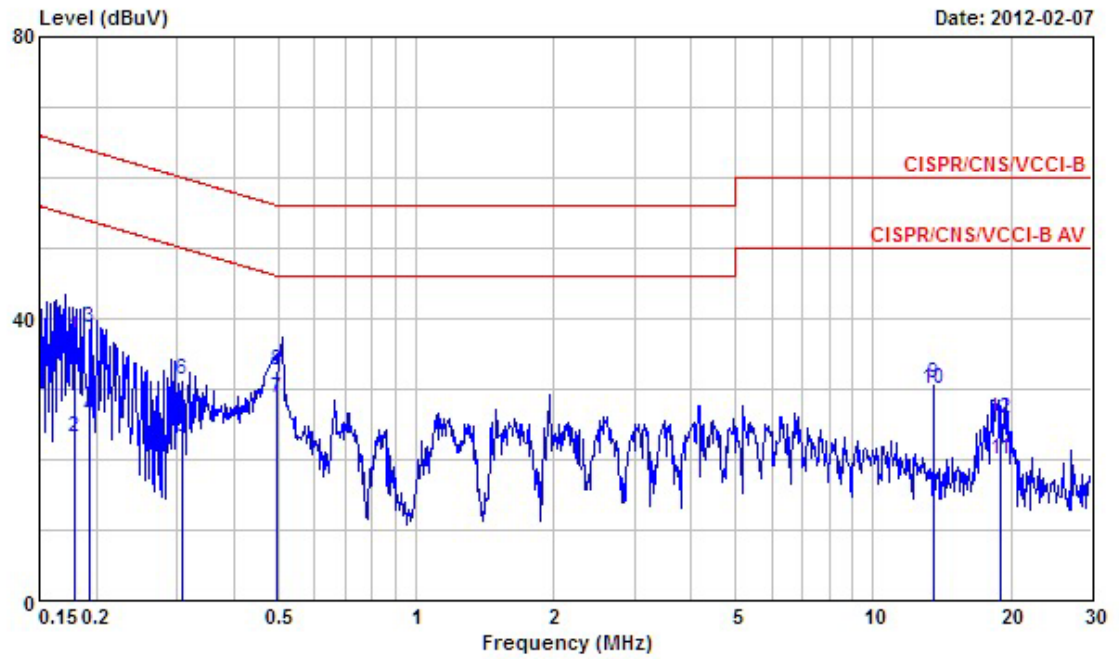
### 1.6.6 EUT Operation during Test

The EUT was placed on the test table and programmed in transmitting mode.

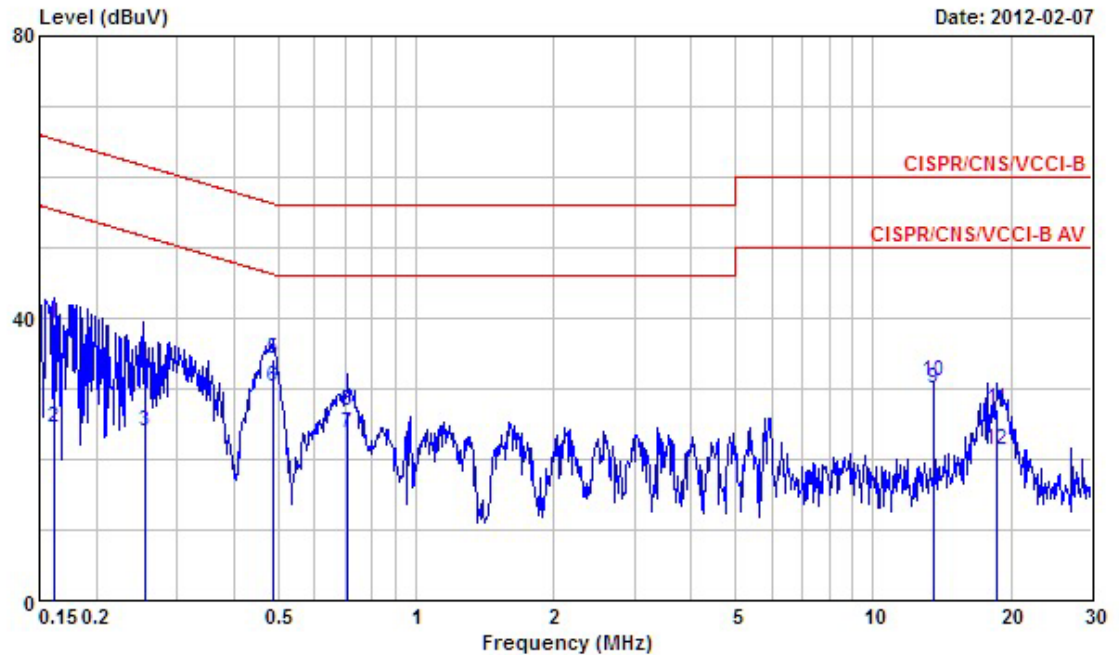
## 1.6.7 Results of AC Power Line Conducted Emissions Measurement

|                        |               |                      |                   |
|------------------------|---------------|----------------------|-------------------|
| <b>Final Test Date</b> | Feb. 07, 2012 | <b>Test Site No.</b> | CO04-HY           |
| <b>Temperature</b>     | 24.5°C        | <b>Humidity</b>      | 48%               |
| <b>Test Engineer</b>   | Assen         | <b>Configuration</b> | Transmitting Mode |

Line



|    | Freq      | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  |
|----|-----------|-------|------------|------------|------------|-------------|------------|---------|
|    | MHz       | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |
| 1  | 0.1788700 | 37.42 | -27.12     | 64.54      | 37.04      | 0.30        | 0.08       | QP      |
| 2  | 0.1788700 | 23.09 | -31.45     | 54.54      | 22.71      | 0.30        | 0.08       | Average |
| 3  | 0.1927480 | 38.67 | -25.25     | 63.92      | 38.27      | 0.30        | 0.10       | QP      |
| 4  | 0.1927480 | 26.12 | -27.80     | 53.92      | 25.72      | 0.30        | 0.10       | Average |
| 5  | 0.3094290 | 23.25 | -26.74     | 49.99      | 22.85      | 0.30        | 0.10       | Average |
| 6  | 0.3094290 | 31.42 | -28.57     | 59.99      | 31.02      | 0.30        | 0.10       | QP      |
| 7  | 0.4954440 | 28.77 | -17.31     | 46.08      | 28.38      | 0.29        | 0.10       | Average |
| 8  | 0.4954440 | 32.61 | -23.47     | 56.08      | 32.22      | 0.29        | 0.10       | QP      |
| 9  | 13.560    | 30.91 | -29.09     | 60.00      | 29.80      | 0.51        | 0.60       | QP      |
| 10 | 13.560    | 29.94 | -20.06     | 50.00      | 28.83      | 0.51        | 0.60       | Average |
| 11 | 19.015    | 19.95 | -30.05     | 50.00      | 18.93      | 0.57        | 0.45       | Average |
| 12 | 19.015    | 25.67 | -34.33     | 60.00      | 24.65      | 0.57        | 0.45       | QP      |

**Neutral**

|    | Freq      | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  |
|----|-----------|-------|------------|------------|------------|-------------|------------|---------|
|    | MHz       | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |
| 1  | 0.1615500 | 39.30 | -26.08     | 65.38      | 38.97      | 0.26        | 0.07       | QP      |
| 2  | 0.1615500 | 24.59 | -30.79     | 55.38      | 24.26      | 0.26        | 0.07       | Average |
| 3  | 0.2558610 | 23.98 | -27.58     | 51.56      | 23.63      | 0.25        | 0.10       | Average |
| 4  | 0.2558610 | 32.51 | -29.05     | 61.56      | 32.16      | 0.25        | 0.10       | QP      |
| 5  | 0.4889010 | 34.08 | -22.11     | 56.19      | 33.74      | 0.24        | 0.10       | QP      |
| 6  | 0.4889010 | 30.37 | -15.82     | 46.19      | 30.03      | 0.24        | 0.10       | Average |
| 7  | 0.7084240 | 23.61 | -22.39     | 46.00      | 23.26      | 0.25        | 0.10       | Average |
| 8  | 0.7084240 | 26.82 | -29.18     | 56.00      | 26.47      | 0.25        | 0.10       | QP      |
| 9  | 13.560    | 30.02 | -19.98     | 50.00      | 28.99      | 0.43        | 0.60       | Average |
| 10 | 13.560    | 30.99 | -29.01     | 60.00      | 29.96      | 0.43        | 0.60       | QP      |
| 11 | 18.705    | 26.98 | -33.02     | 60.00      | 26.04      | 0.47        | 0.47       | QP      |
| 12 | 18.705    | 21.29 | -28.71     | 50.00      | 20.35      | 0.47        | 0.47       | Average |

Note:  
 Level = Read Level + LISN Factor + Cable Loss.

## 3.2 Field Strength of Fundamental Emissions and Mask Measurement

### 3.2.1 Limit

Field strength of fundamental emissions limit:

The field strength of fundamental emissions shall not exceed 15848 micorvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

| Frequencies (MHz)  | Field Strength (micorvolts/meter) | Field Strength (dB $\mu$ V/m) at 10m | Field Strength (dB $\mu$ V/m) at 3m |
|--------------------|-----------------------------------|--------------------------------------|-------------------------------------|
| 13.553 ~ 13.567MHz | 15848 at 30m                      | 103.08 (QP)                          | 124 (QP)                            |

Mask limit:

Mask limit:

| Rules and specifications |   | CFR 47 Part 15 section 15.225(a)-(d) |                                |                                |                               |
|--------------------------|---|--------------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Description              | Compliance with the spectrum mask is tested using a spectrum analyzer with RB set to a 1kHz for the band 13.553~13.567MHz |                                      |                                |                                |                               |
| Limit                    | Freq. of Emission (MHz)   | Field Strength (uV/m) at 30m         | Field Strength (dBuV/m) at 30m | Field Strength (dBuV/m) at 10m | Field Strength (dBuV/m) at 3m |
|                          | 1.705~13.110  | 30                                   | 29.5                           | 48.58                          | 69.5                          |
|                          | 13.110~13.410   | 106                                  | 40.5                           | 59.58                          | 80.5                          |
|                          | 13.410~13.553   | 334                                  | 50.5                           | 69.58                          | 90.5                          |
|                          | 13.553~13.567   | 15848                                | 84.0                           | 103.08                         | 124.0                         |
|                          | 13.567~13.710   | 334                                  | 50.5                           | 69.58                          | 90.5                          |
|                          | 13.710~14.010   | 106                                  | 40.5                           | 59.58                          | 80.5                          |
|                          | 14.010~30.000   | 30                                   | 29.5                           | 48.58                          | 69.5                          |

### 3.2.2 Measuring Instruments and Setting

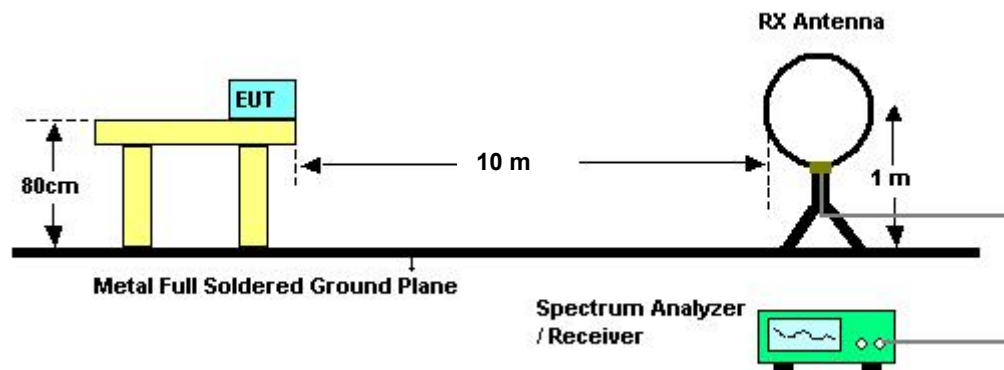
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameter | Setting               |
|--------------------|-----------------------|
| Attenuation        | Auto                  |
| Center Frequency   | Fundamental Frequency |
| RB                 | 9 kHz                 |
| Detector           | QP                    |

### 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 loop receiving antenna mounted 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 receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. 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.
6. Compliance with the spectrum mask is tested using a spectrum analyzer with RB set to a 1kHz for the band 13.553~13.567MHz.

### 3.2.4 Test Setup Layout



### 3.2.5 Test Deviation

There is no deviation with the original standard.

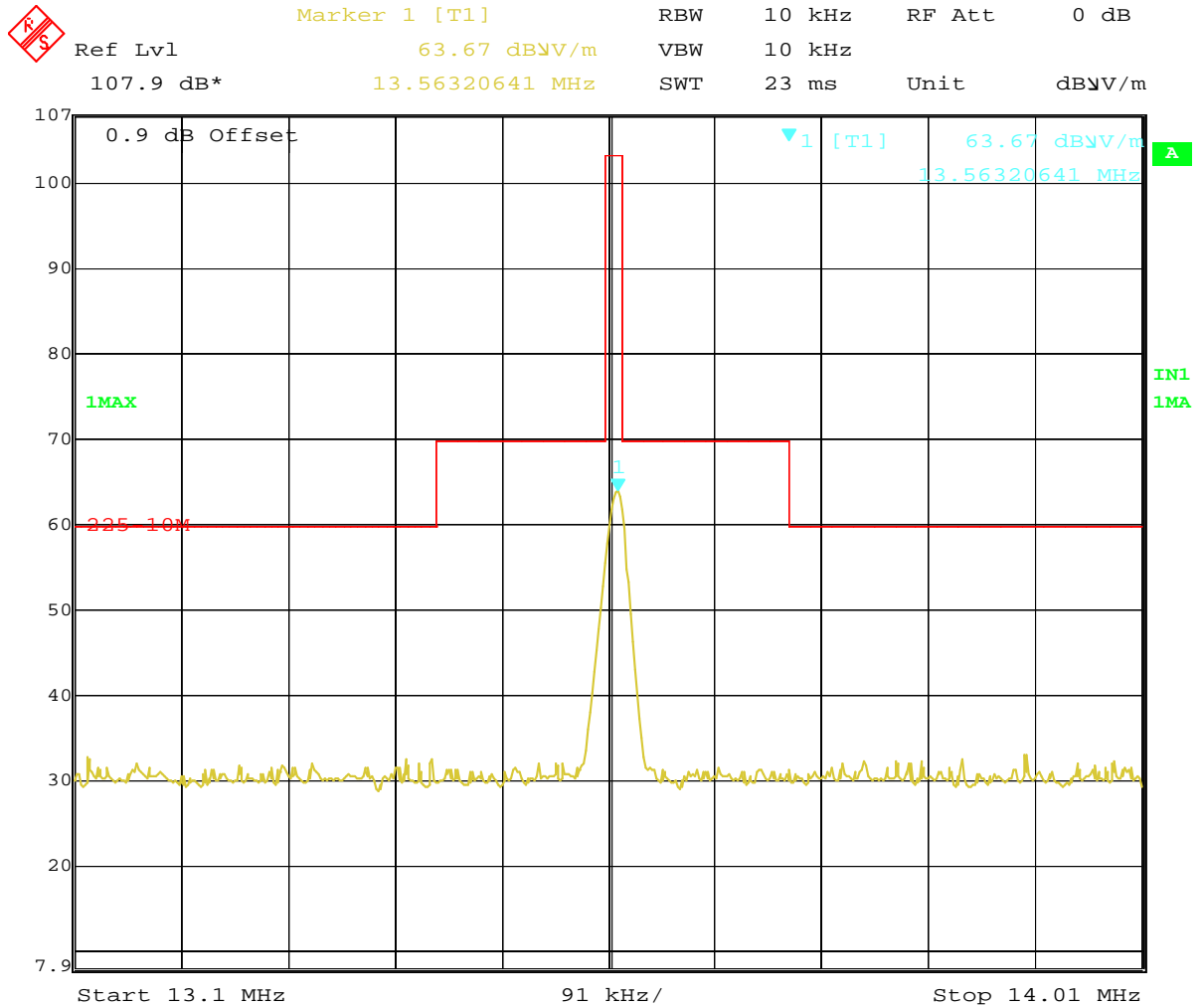
### 3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 3.2.7 Test Result of Field Strength of Fundamental Emissions

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Feb. 06, 2012 | <b>Test Site No.</b>  | 10CH02-HY |
| <b>Temperature</b>     | 22.4℃         | <b>Humidity</b>       | 73%       |
| <b>Test Engineer</b>   | Streak        | <b>Configurations</b> | Ch. 1     |

| Freq. (MHz) | Level (dBuV/m) | Over Limit (dB) | Limit Line (dBuV/m) at 10m | Remark |
|-------------|----------------|-----------------|----------------------------|--------|
| 13.56 MHz   | 63.67          | -39.41          | 103.08                     | QP     |



Date: 6.FEB.2012 10:48:01

## Note:

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

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

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

### 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 (13.553 ~ 13.567MHz).

#### 3.3.2 Measuring Instruments and Setting

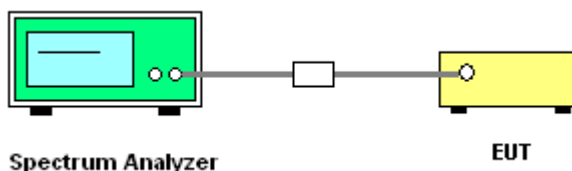
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameters | Setting          |
|---------------------|------------------|
| Attenuation         | Auto             |
| Span Frequency      | > 20dB Bandwidth |
| RB                  | 1 kHz            |
| VB                  | 1 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. For 20dB Bandwidth the resolution bandwidth of 1 kHz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. For 99% Occupied Bandwidth the resolution Bandwidth of 1 kHz and the video bandwidth of 1 kHz was used.

#### 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

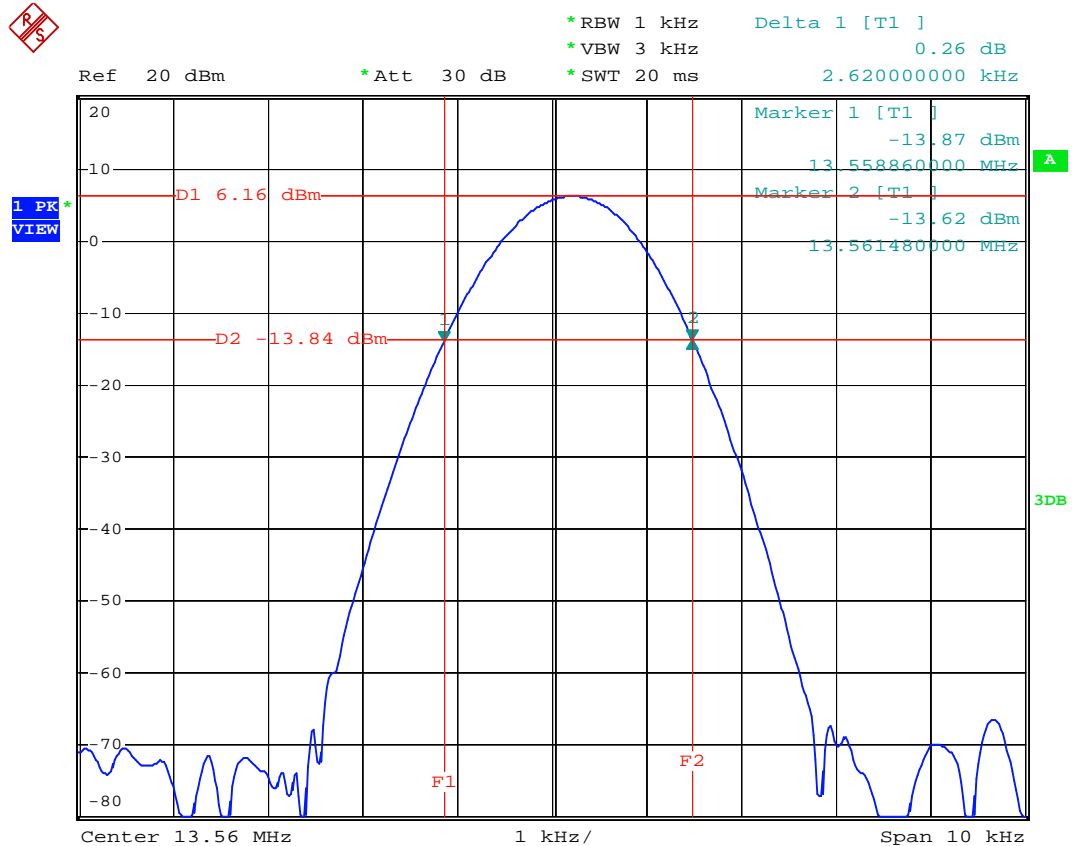
The EUT was programmed to be in continuously transmitting mode.

## 3.3.7 Test Result of 20dB Spectrum Bandwidth

|                 |               |                |         |
|-----------------|---------------|----------------|---------|
| Final Test Date | Feb. 06, 2012 | Test Site No.  | TH01-HY |
| Temperature     | 22.2°C        | Humidity       | 38%     |
| Test Engineer   | Ian           | Configurations | Ch. 1   |

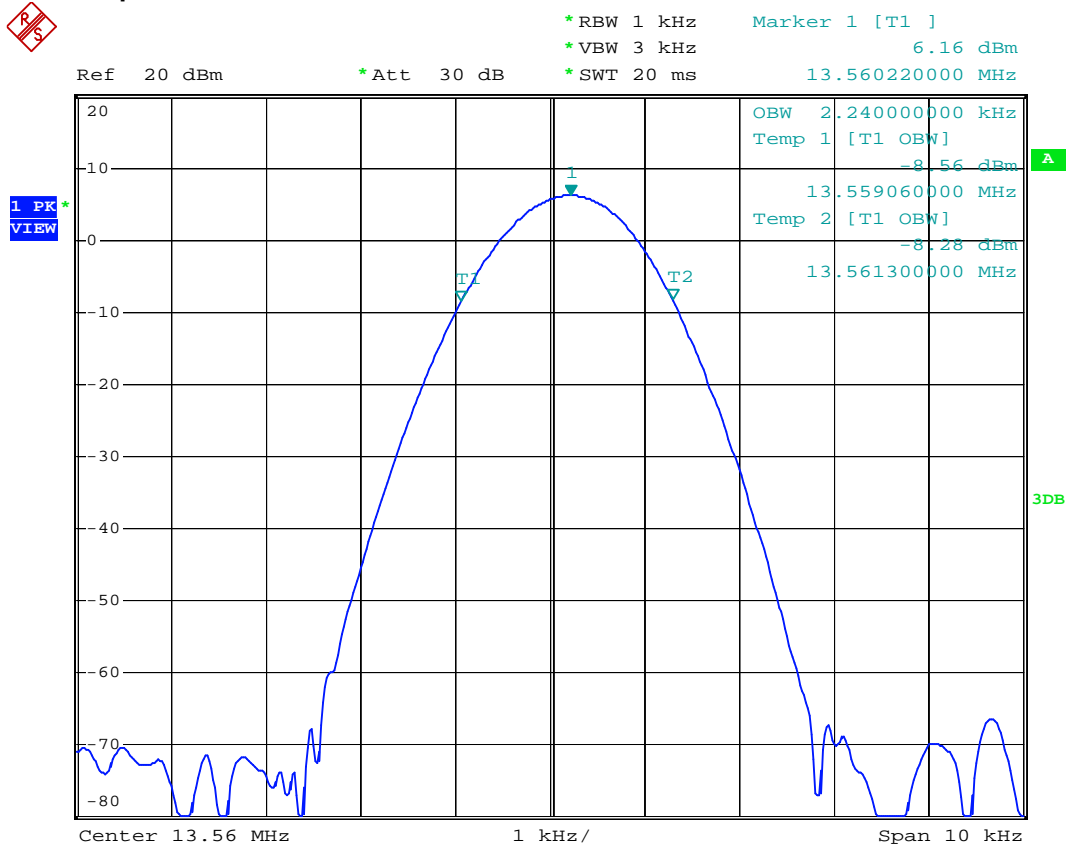
| Frequency | 20dB BW (kHz) | 99% OBW (kHz) | Frequency range (MHz)<br>$f_L > 13.553\text{MHz}$ | Frequency range (MHz)<br>$f_H < 13.567\text{MHz}$ | Test Result |
|-----------|---------------|---------------|---|---|-------------|
| 13.56 MHz | 2.62          | 2.24          | 13.5589   | 13.5615   | Complies    |

## 20 dB Bandwidth Plot on 13.56 MHz



Date: 7.FEB.2012 00:14:57

## 99% Occupied Bandwidth Plot on 13.56 MHz



Date: 7.FEB.2012 00:15:09

### 3.4 Radiated Emissions Measurement

#### 3.4.1 Limit

The field strength of any emissions which appear outside of 13.553 ~ 13.567MHz band shall not exceed the general radiated emissions limits in Section 15.209(a)

| Frequencies (MHz) | Field Strength (micровolts/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 receiver.

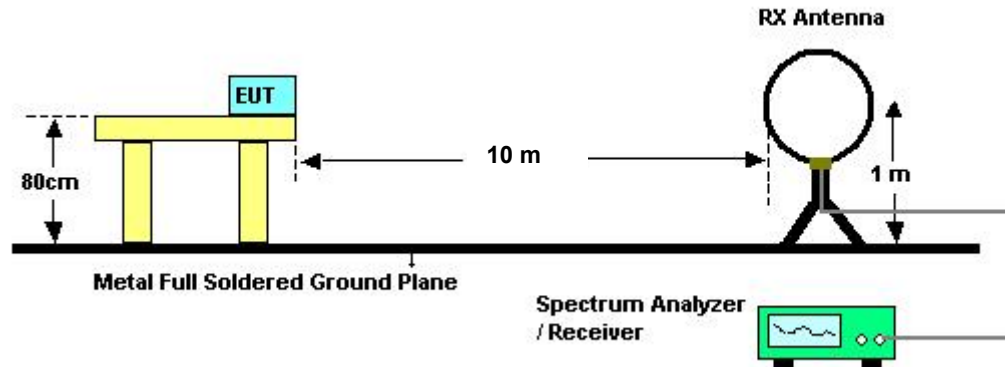
| Receiver Parameter     | Setting                          |
|------------------------|----------------------------------|
| Attenuation            | Auto                             |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP    |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for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

#### 3.4.3 Test Procedures

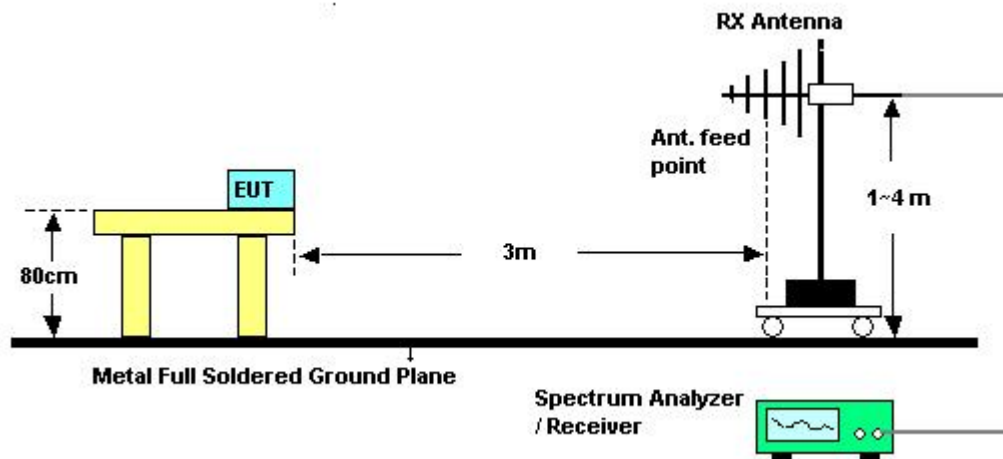
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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. 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.
7. 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



### 3.4.5 Test Deviation

There is no deviation with the original standard.

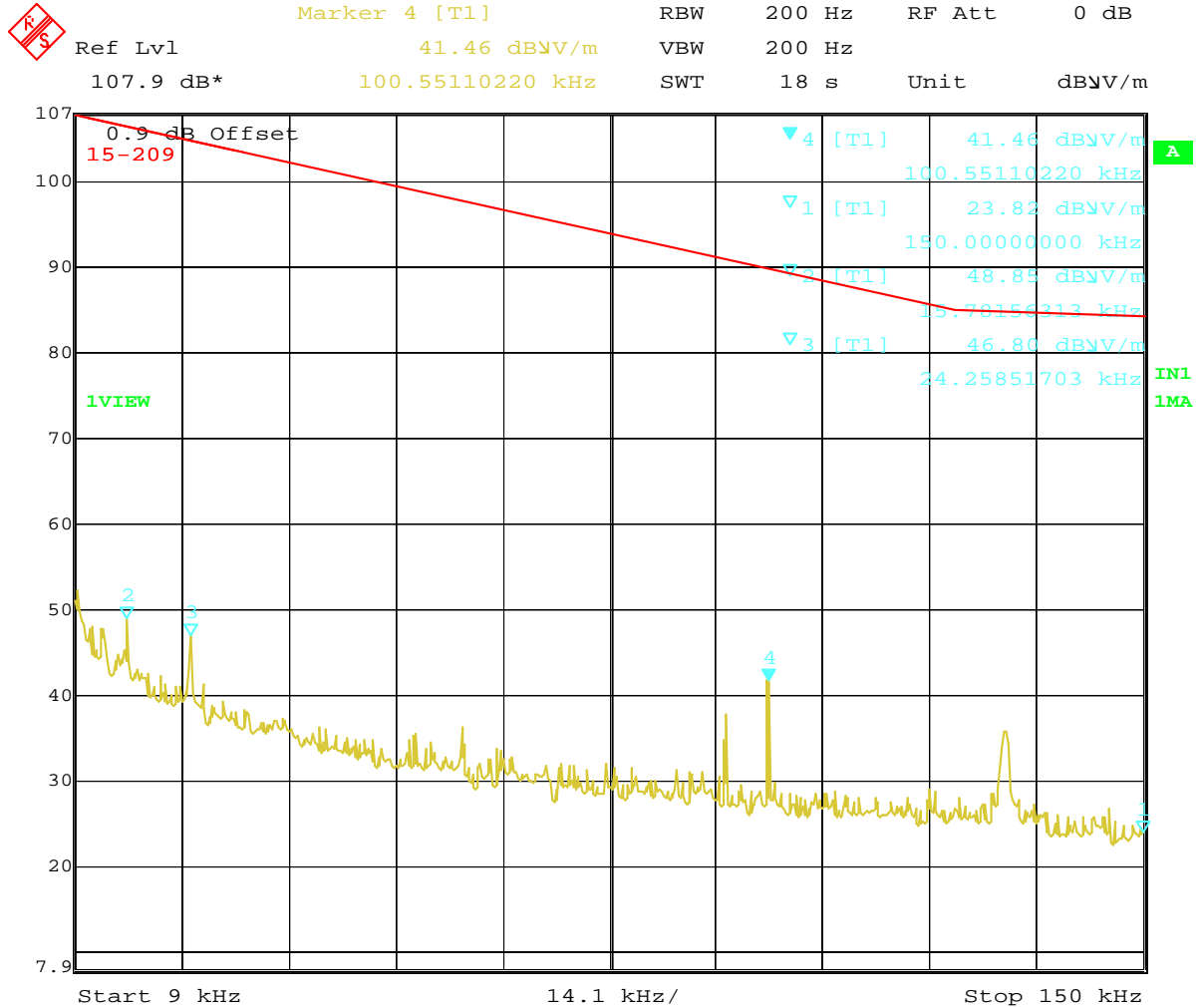
### 3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Feb. 06, 2012 | <b>Test Site No.</b>  | 10CH02-HY |
| <b>Temperature</b>     | 22.4℃         | <b>Humidity</b>       | 73%       |
| <b>Test Engineer</b>   | Streak        | <b>Configurations</b> | Ch. 1     |

## 9KHz~150KHz



Date: 6.FEB.2012 10:54:21

## 150KHz~2MHz



Ref Lvl

107.9 dB\*

Marker 2 [T1]

40.13 dB $\mu$ V/m

505.91182365 kHz

RBW

10 kHz

RF Att

0 dB

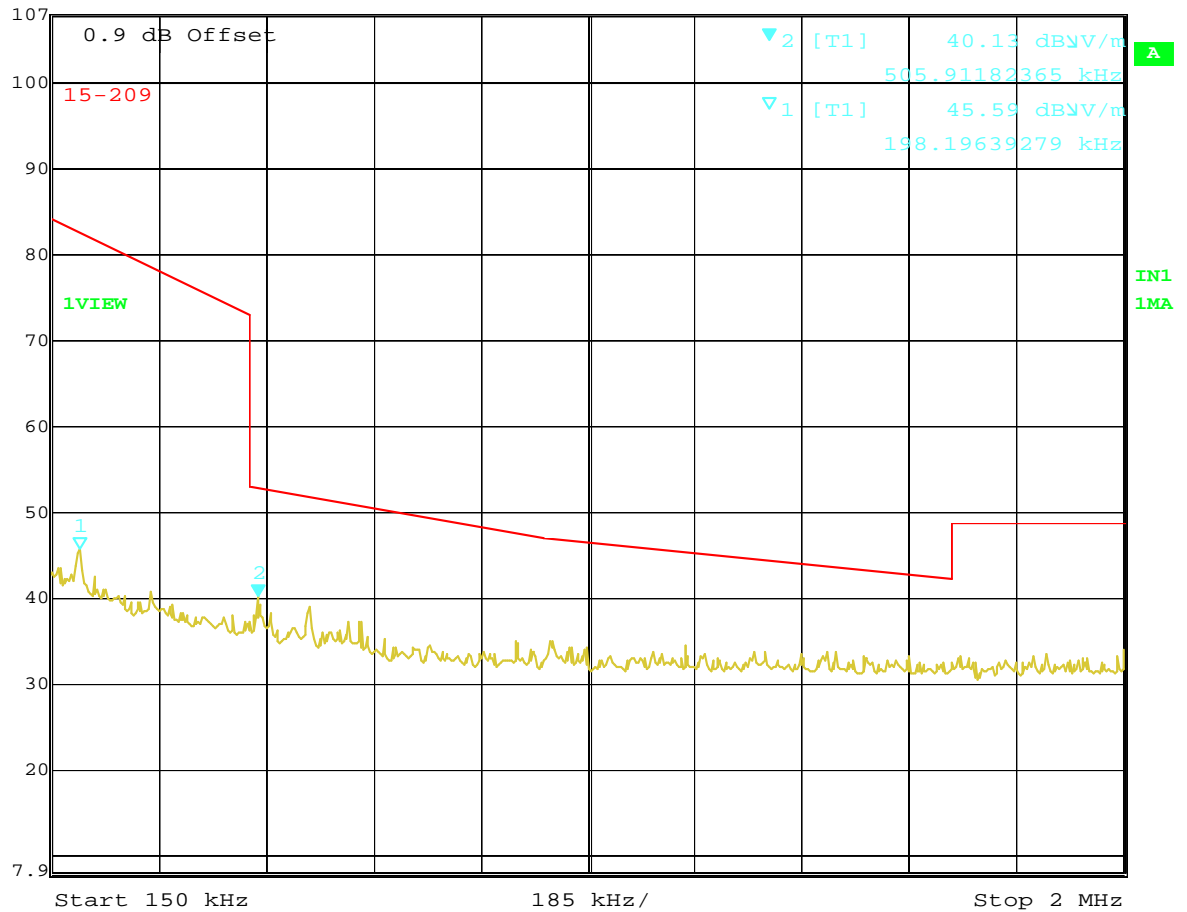
VBW

10 kHz

SWT

47 ms

Unit

dB $\mu$ V/m

Date: 6.FEB.2012 10:56:38

## 2MHz~8MHz



Ref Lvl

107.9 dB\*

Marker 2 [T1]

33.19 dBμV/m

7.11022044 MHz

RBW

10 kHz

RF Att

0 dB

VBW

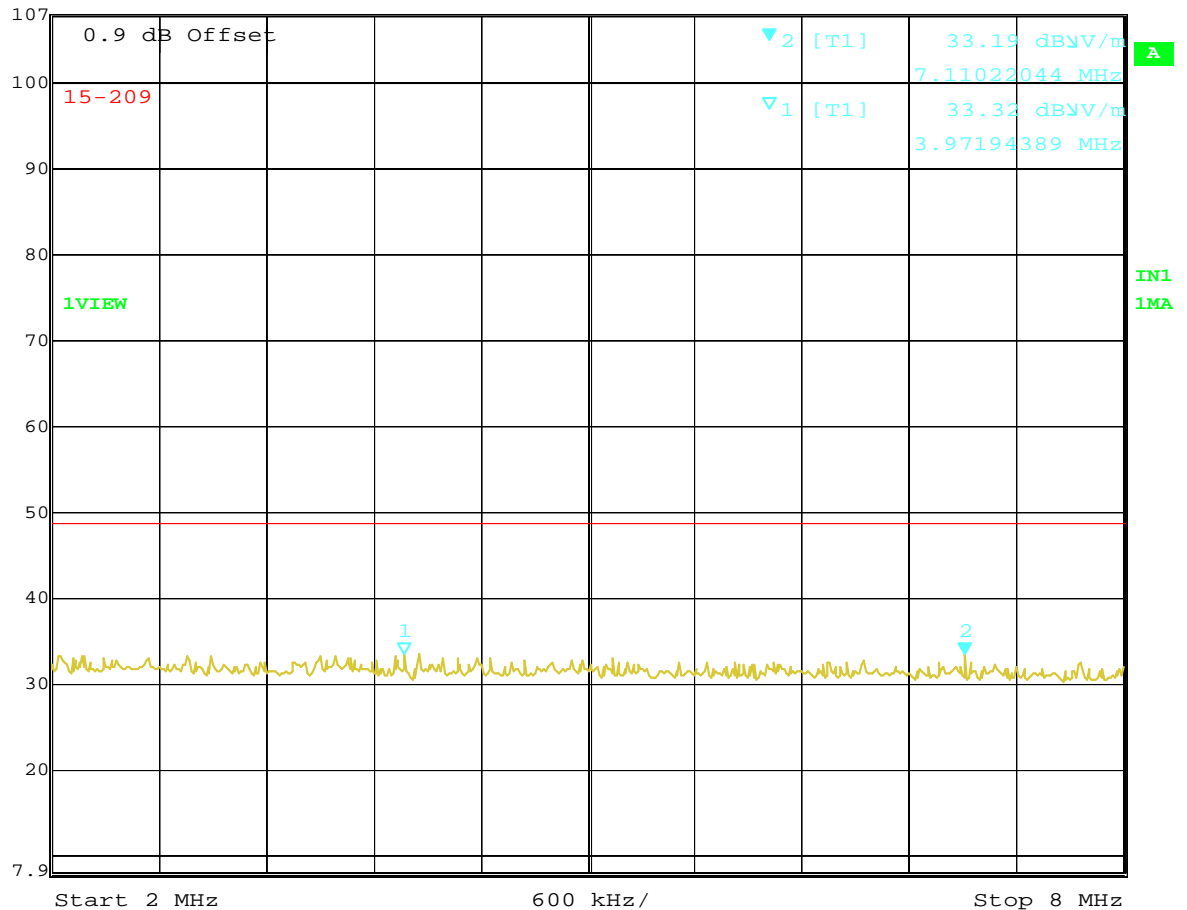
10 kHz

SWT

150 ms

Unit

dBμV/m



Date: 6.FEB.2012 10:59:01

## 8MHz~25MHz



Ref Lvl

107.9 dB\*

Marker 1 [T1]

63.52 dBV/m

13.55310621 MHz

RBW

10 kHz

RF Att

0 dB

VBW

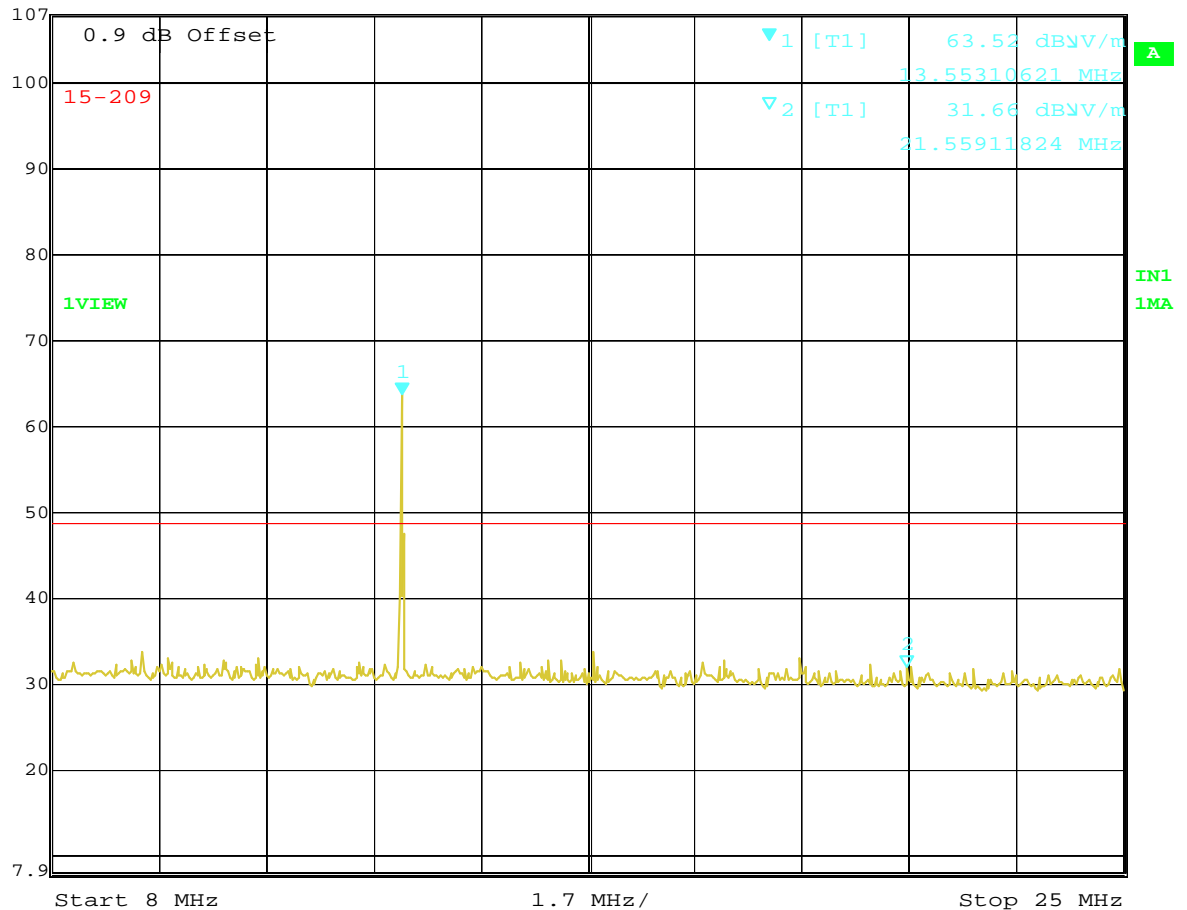
10 kHz

SWT

430 ms

Unit

dBV/m



Date: 6.FEB.2012 11:26:46

Marker 1 is the transmitter carrier frequency.

## 25MHz~30MHz



Ref Lvl

107.9 dB\*

Marker 2 [T1]

31.79 dBμV/m

26.01202405 MHz

RBW

10 kHz

RF Att

0 dB

VBW

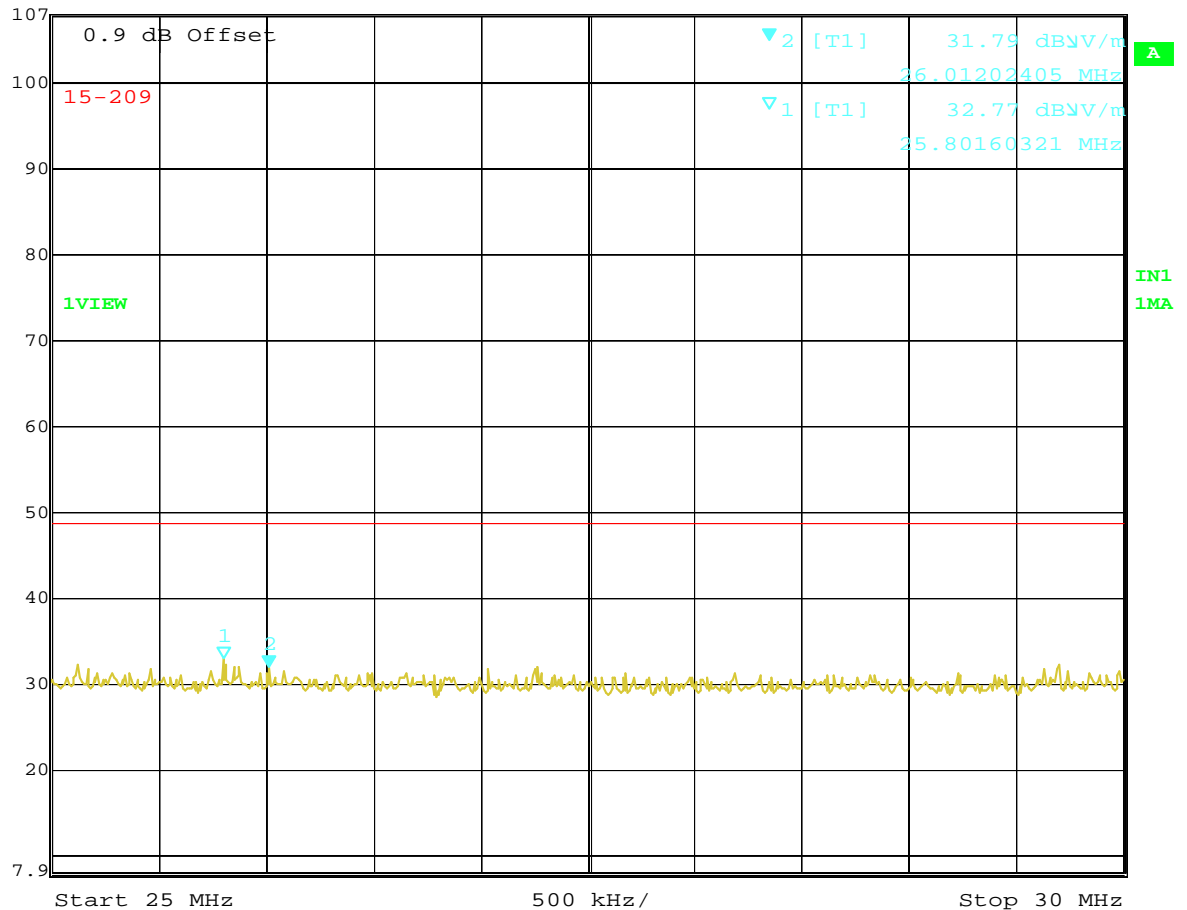
10 kHz

SWT

125 ms

Unit

dBμV/m



Date: 6.FEB.2012 11:03:39

## Note:

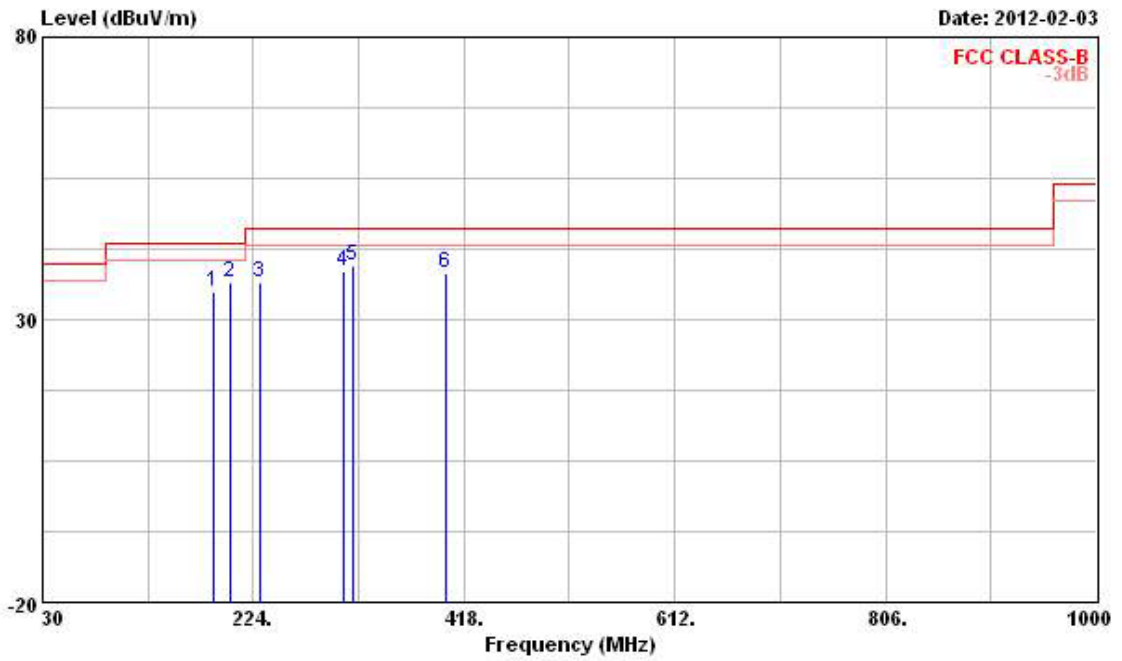
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

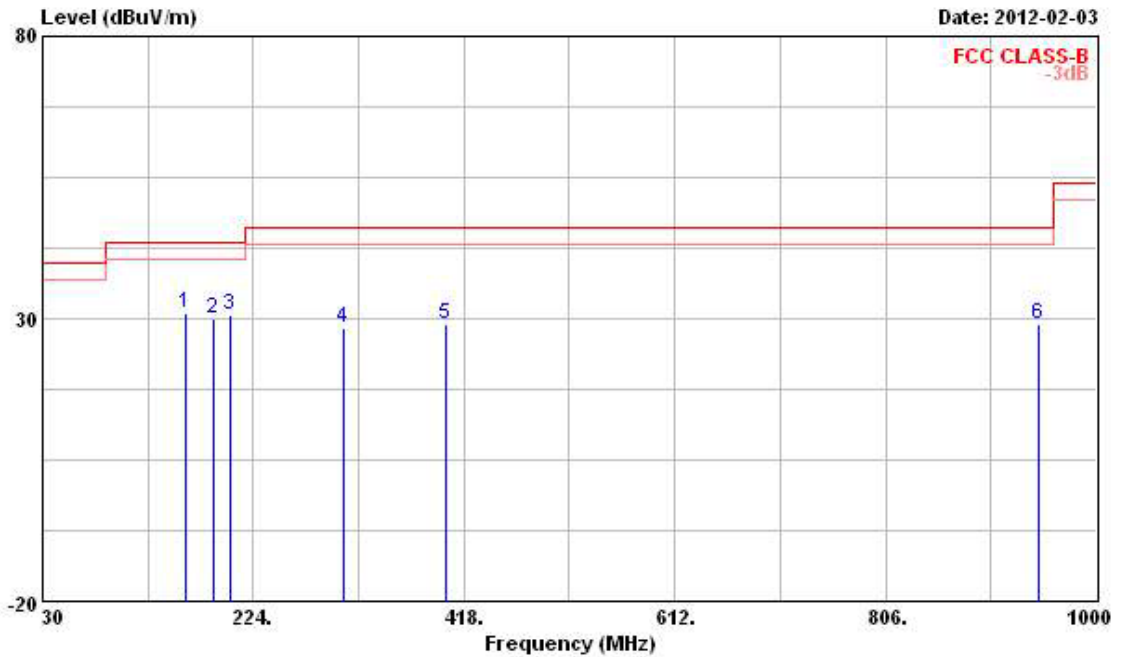
## 3.4.8 Results for Radiated Emissions (30MHz~1GHz)

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Feb. 03, 2012 | <b>Test Site No.</b>  | 03CH02-HY |
| <b>Temperature</b>     | 22.4℃         | <b>Humidity</b>       | 73%       |
| <b>Test Engineer</b>   | Streak        | <b>Configurations</b> | Ch. 1     |

**Horizontal**

|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 188.110 | 34.95  | -8.55      | 43.50      | 49.59             | 10.48          | 2.34       | 27.46         | Peak   | ---     | ---       |
| 2 | 202.660 | 36.67  | -6.83      | 43.50      | 50.18             | 11.45          | 2.44       | 27.40         | Peak   | ---     | ---       |
| 3 | 229.820 | 36.54  | -9.46      | 46.00      | 48.91             | 12.33          | 2.64       | 27.34         | Peak   | ---     | ---       |
| 4 | 307.420 | 38.68  | -7.32      | 46.00      | 49.08             | 13.82          | 3.00       | 27.22         | Peak   | ---     | ---       |
| 5 | 316.150 | 39.43  | -6.57      | 46.00      | 49.71             | 13.96          | 3.03       | 27.27         | Peak   | ---     | ---       |
| 6 | 401.510 | 38.20  | -7.80      | 46.00      | 47.39             | 15.29          | 3.40       | 27.88         | Peak   | ---     | ---       |

## Vertical



|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 160.950 | 30.93  | -12.57     | 43.50      | 45.91             | 10.51          | 2.09       | 27.58         | Peak   | ---     | ---       |
| 2 | 188.110 | 29.89  | -13.61     | 43.50      | 44.53             | 10.48          | 2.34       | 27.46         | Peak   | ---     | ---       |
| 3 | 202.660 | 30.58  | -12.92     | 43.50      | 44.09             | 11.45          | 2.44       | 27.40         | Peak   | ---     | ---       |
| 4 | 307.420 | 28.43  | -17.57     | 46.00      | 38.83             | 13.82          | 3.00       | 27.22         | Peak   | ---     | ---       |
| 5 | 401.510 | 28.87  | -17.13     | 46.00      | 38.06             | 15.29          | 3.40       | 27.88         | Peak   | ---     | ---       |
| 6 | 947.620 | 28.85  | -17.15     | 46.00      | 29.54             | 21.21          | 5.52       | 27.42         | 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.

### 3.5 Frequency Stability Measurement

#### 3.5.1 Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

#### 3.5.2 Measuring Instruments and Setting

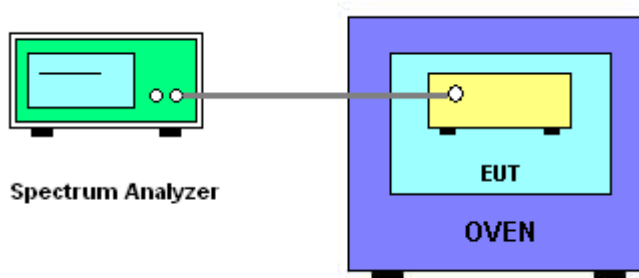
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting  |
|--------------------|--|
| Attenuation        | Auto   |
| Span Frequency     | Entire absence of modulation emissions bandwidth |
| RB                 | 1 kHz  |
| VB                 | 1 kHz  |
| Sweep Time         | Auto   |

#### 3.5.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 1 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f)/f_c \times 10^6$  ppm and the limit is less than  $\pm 100$ ppm.
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -20°C~50°C.

#### 3.5.4 Test Setup Layout



#### 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 un-modulation transmitting mode.

**3.5.7 Test Result of Frequency Stability**

|                        |               |                       |         |
|------------------------|---------------|-----------------------|---------|
| <b>Final Test Date</b> | Feb. 06, 2012 | <b>Test Site No.</b>  | TH01-HY |
| <b>Temperature</b>     | 22.2℃         | <b>Humidity</b>       | 38%     |
| <b>Test Engineer</b>   | Ian           | <b>Configurations</b> | Ch. 1   |

**Voltage vs. Frequency Stability**

| <b>Voltage</b>       | <b>Measurement Frequency (MHz)</b> |
|----------------------|------------------------------------|
| (V)                  | <b>13.56 MHz</b>                   |
| <b>126.5</b>         | 13.560160                          |
| <b>110</b>           | 13.560180                          |
| <b>93.5</b>          | 13.560220                          |
| Max. Deviation (MHz) | <b>0.000220</b>                    |
| Max. Deviation (ppm) | <b>16.2242</b>                     |

**Temperature vs. Frequency Stability**

| <b>Temperature</b>   | <b>Measurement Frequency (MHz)</b> |
|----------------------|------------------------------------|
| (℃)                  | <b>13.56 MHz</b>                   |
| <b>-20</b>           | 13.560240                          |
| <b>-10</b>           | 13.560260                          |
| <b>0</b>             | 13.560220                          |
| <b>10</b>            | 13.560180                          |
| <b>20</b>            | 13.560160                          |
| <b>30</b>            | 13.560180                          |
| <b>40</b>            | 13.560060                          |
| <b>50</b>            | 13.560020                          |
| Max. Deviation (MHz) | <b>0.000260</b>                    |
| Max. Deviation (ppm) | <b>19.1740</b>                     |

### **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. 20, 2011    | Conduction (CO04-HY) |
| LISN                | MessTec      | NNB-2/16Z | 99041      | 9kHz – 30MHz    | Mar. 10, 2011    | Conduction (CO04-HY) |
| LISN (Support Unit) | EMCO         | 3810/2NM  | 9703-1839  | 9kHz – 30MHz    | May 04, 2011     | Conduction (CO04-HY) |
| RF Cable-CON        | HUBER+SUHNER | RG213/U   | CB049      | 9kHz – 30MHz    | Apr. 21, 2011    | 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          | FSP 30       | 100023      | 9 KHz ~ 30 GHz   | Mar. 15, 2011    | Conducted (TH01-HY) |
| DC Power Source            | G.W.         | GPC-6030D    | C671845     | DC 1V ~ 60V      | Jun. 03, 2011    | Conducted (TH01-HY) |
| Temp. and Humidity Chamber | Giant Force  | GTH-225-20-S | MAB0103-001 | N/A              | Nov. 17, 2011    | Conducted (TH01-HY) |
| RF Cable-1m                | Jye Bao      | RG142        | CB034-1m    | 20 MHz ~ 7 GHz   | Dec. 01, 2011    | Conducted (TH01-HY) |
| RF Cable-2m                | Jye Bao      | RG142        | CB035-2m    | 20 MHz ~ 1 GHz   | Dec. 01, 2011    | Conducted (TH01-HY) |
| Signal Generator           | R&S          | SMR40        | 100116      | 10 MHz ~ 40 GHz  | Jun. 07, 2011    | Conducted (TH01-HY) |
| Power Sensor               | Anritsu      | MA2411B      | 1027452     | 300 MHz ~ 40 GHz | Jun. 16, 2011    | Conducted (TH01-HY) |
| Power Meter                | Anritsu      | ML2495A      | 1124009     | 300 MHz ~ 40 GHz | Jun. 20, 2011    | 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     | Jun. 09, 2011*   | Conducted (TH01-HY) |

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

## For Radiated emissions 9kHz~30MHz

| Instrument        | Manufacturer | Model No. | Serial No. | Characteristics   | Calibration Date | Remark                |
|-------------------|--------------|-----------|------------|-------------------|------------------|-----------------------|
| Amplifier         | AGILENT      | 8447D     | 2944A10827 | 100 KHz ~ 1.3 GHz | May 20, 2011     | Radiation (10CH02-HY) |
| Amplifier         | AGILENT      | 8447D     | 2944A10828 | 100 KHz ~ 1.3 GHz | May 16, 2011     | Radiation (10CH02-HY) |
| Receiver          | R&S          | ESI       | 838496/008 | 20 Hz ~ 7 GHz     | Apr. 24, 2011    | Radiation (10CH02-HY) |
| Spectrum Analyzer | R&S          | FSP7      | 100645     | 9 KHz ~ 7 GHz     | Jun. 01, 2011    | Radiation (10CH02-HY) |
| Turn Table        | HD           | DS 430    | 430/360    | 0 -360 degree     | N/A              | Radiation (10CH02-HY) |
| Antenna Mast      | HD           | MA240     | 240/664    | 1 m - 4 m         | N/A              | Radiation (10CH02-HY) |
| Antenna Mast      | HD           | MA240     | 240/667    | 1 m - 4 m         | N/A              | Radiation (10CH02-HY) |

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

## For Radiated emissions 30MHz~1GHz

| Instrument               | Manufacturer   | Model No. | Serial No. | Characteristics      | Calibration Date | Remark                |
|--------------------------|----------------|-----------|------------|----------------------|------------------|-----------------------|
| Spectrum Analyzer        | R&S            | FSP40     | 100305/040 | 9 kHz ~ 40 GHz       | Feb. 11, 2011    | Radiation (03CH02-HY) |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M    | 03CH02-HY  | 30 MHz ~ 1 GHz<br>3m | May 11, 2011     | Radiation (03CH02-HY) |
| Amplifier                | Agilent        | 8447D     | 2944A11146 | 100 kHz ~ 1.3 GHz    | Jul. 25, 2011    | Radiation (03CH02-HY) |
| RF Cable-R03m            | Jye Bao        | RG142     | CB021      | 30 MHz ~ 1 GHz       | Mar. 07, 2011    | Radiation (03CH02-HY) |
| Bilog Antenna            | SCHAFFNER      | CBL61128  | 2723       | 30 MHz ~ 2 GHz       | Oct. 22, 2011    | 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 (10CH02-HY)<br>(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.<br>TEL : 886-2-2696-2468<br>FAX : 886-2-2696-2255 |
| HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL : 886-3-327-3456<br>FAX : 886-3-318-0055         |
| LINKOU | ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C<br>TEL : 886-2-2601-1640<br>FAX : 886-2-2601-1695               |
| DUNGHU | ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.<br>TEL : 886-2-2631-4739<br>FAX : 886-2-2631-9740            |
| JUNGHE | ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.<br>TEL : 886-2-8227-2020<br>FAX : 886-2-8227-2626           |
| NEIHU  | ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C.<br>TEL : 886-2-2794-8886<br>FAX : 886-2-2794-9777         |
| JHUBEI | ADD : No.8, Lane 728, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.<br>TEL : 886-3-656-9065<br>FAX : 886-3-656-9085       |

## 6. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-110111

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  
Accreditation Program for Telecommunication Equipment  
Testing Laboratory  
Accreditation Program for BSMI Mutual Recognition  
Arrangement with Foreign Authorities

Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : January 11, 2011

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