

# FCC/IC RF Test Report

**APPLICANT** : Sony Mobile Communications AB  
**EQUIPMENT** : Smart phone  
**BRAND NAME** : SONY  
**TYPE NAME** : PM-0771-BV  
**FCC ID** : PY7PM-0771  
**IC** : 4170B-PM0771  
**STANDARD** : FCC Part 15 Subpart C §15.225  
IC RSS-210 issue 8

**CLASSIFICATION** : (DXX) Low Power Communication Device Transmitter

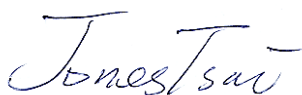
The product was received on Apr. 02, 2014 and testing was completed on Apr. 19, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



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Reviewed by: Joseph Lin / Supervisor



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Approved by: Jones Tsai / Manager



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FCC ID : PY7PM-0771

IC : 4170B-PM0771

Page Number : 1 of 32

Report Issued Date : Jun. 09, 2014

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## Table of Contents

|                                                                        |           |
|------------------------------------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION.....</b>                                     | <b>5</b>  |
| 1.1 Applicant.....                                                     | 5         |
| 1.2 Manufacturer.....                                                  | 5         |
| 1.3 Product Details .....                                              | 5         |
| 1.4 Accessories List.....                                              | 6         |
| 1.5 Table for Test Modes .....                                         | 6         |
| 1.6 Table for Testing Locations.....                                   | 6         |
| 1.7 Applied Standards.....                                             | 7         |
| 1.8 Table for Supporting Units .....                                   | 7         |
| 1.9 Test Configurations.....                                           | 8         |
| <b>2. TEST RESULT .....</b>                                            | <b>9</b>  |
| 2.1 AC Power Line Conducted Emissions Measurement .....                | 9         |
| 2.2 Field Strength of Fundamental Emissions and Mask Measurement ..... | 13        |
| 2.3 20dB Spectrum Bandwidth Measurement .....                          | 18        |
| 2.4 Radiated Emissions Measurement.....                                | 20        |
| 2.5 Frequency Stability Measurement.....                               | 27        |
| 2.6 Antenna Requirements .....                                         | 30        |
| <b>3. LIST OF MEASURING EQUIPMENT .....</b>                            | <b>31</b> |
| <b>4. TEST LOCATION.....</b>                                           | <b>32</b> |



## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FR440284D  | Rev. 01 | Initial issue of report | Jun. 09, 2014 |
|            |         |                         |               |
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## SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart C |                     |           |                                         |          |                                      |
|------------------------------------------------|---------------------|-----------|-----------------------------------------|----------|--------------------------------------|
| Part                                           | FCC Rule            | IC Rule   | Description of Test                     | Result   | Under Limit                          |
| 3.1                                            | 15.207              | Gen 7.2.2 | AC Power Line Conducted Emissions       | Complies | 10.80 dB at 13.558MHz                |
| 3.2                                            | 15.225(a)(b)(c)     | A2.6      | Field Strength of Fundamental Emissions | Complies | 63.53 dB at 13.560 MHz               |
| 3.3                                            | 2.1049              | -         | 20dB Spectrum Bandwidth                 | Complies | -                                    |
| 3.4                                            | 15.225(d)<br>15.209 | A2.6      | Radiated Emissions                      | Complies | 20.11 dB at 1.480 MHz for Quasi-Peak |
| 3.5                                            | 15.225(e)           | A2.6      | Frequency Stability                     | Complies | -                                    |
| 3.6                                            | 15.203              | -         | Antenna Requirements                    | Complies | -                                    |

| Test Items                         | Uncertainty | Remark                   |
|------------------------------------|-------------|--------------------------|
| AC Power Line Conducted Emissions  | ±2.26dB     | Confidence levels of 95% |
| Radiated Emissions (30MHz~1000MHz) | ±4.70dB     | Confidence levels of 95% |

## 1. GENERAL INFORMATION

### 1.1 Applicant

**Sony Mobile Communications AB**

Nya Vattentorget, 22188 Lund, Sweden

### 1.2 Manufacturer

**Compal Communications, INC.**

No. 385, Yangguang Street, Neihu, Taipei 11491, Taiwan

### 1.3 Product Details

For more detailed features description, please refer to the manufacturer's specifications or user's manual.

| Items                          | Description                                     |
|--------------------------------|-------------------------------------------------|
| <b>Power Type</b>              | 5Vdc from Adapter<br>4.2Vdc from Li-ion Battery |
| <b>Modulation</b>              | ASK                                             |
| <b>Channel Number</b>          | 1                                               |
| <b>Channel Bandwidth (99%)</b> | 2.240 kHz                                       |
| <b>Max. Field Strength</b>     | 60.47 dBμV/m                                    |
| <b>Test Freq. Range</b>        | 13.553 ~ 13.567MHz                              |
| <b>Carrier Frequencies</b>     | 13.56 MHz (Ch. 1)                               |
| <b>Antenna</b>                 | Loop antenna (Without any antenna connector)    |
| <b>EUT Stage</b>               | Production Unit                                 |

| EUT Information List   |            |            |            |                            |
|------------------------|------------|------------|------------|----------------------------|
| IMEI                   | HW Version | SW Version | S/N        | Performed Test Item        |
| IMEI : 004402452474269 | A          | 18.3.C.0.8 | ZH8002JUPJ | RF conducted measurement   |
| IMEI : 004402452477643 |            |            | ZH80038NS9 | Radiated Spurious Emission |
| IMEI : 004402452477734 |            |            | ZH8002JVQW | Conducted Emission         |

## 1.4 Accessories List

| Accessories List  |                                                        |
|-------------------|--------------------------------------------------------|
| <b>AC Adapter</b> | Model No. : EP800                                      |
|                   | Type No. : CAA-0002016-US B                            |
|                   | SN : 1112W28321732 (for Radiated Spurious Emission)    |
|                   | 3113W23610674 (for AC power line Conducted Emission)   |
| <b>Battery</b>    | Model No. : LIS1551ERPC                                |
|                   | Type No. : F-4993-128-0                                |
| <b>Earphone</b>   | Model No. : MH410c                                     |
|                   | Type No. : AG-1100                                     |
|                   | SN : 12522047001ADD8 (for Radiated Spurious Emission)  |
|                   | 12481A10036502 (for AC power line Conducted Emission)  |
| <b>USB Cable</b>  | Model No. : AHAB EC450                                 |
|                   | Type No. : AI-0700                                     |
|                   | SN : 132512DA0631054 (for Radiated Spurious Emission)  |
|                   | 132212DF3297482 (for AC power line Conducted Emission) |

## 1.5 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                                                                                                                                                                                                                            |                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| AC Power Line Conducted Emissions                                                                                                                                                                                                     | Field Strength of Fundamental Emissions |
| 20dB Spectrum Bandwidth                                                                                                                                                                                                               | Frequency Stability                     |
| Radiated Emissions 9kHz~30MHz                                                                                                                                                                                                         | Radiated Emissions 30MHz~1GHz           |
| <b>Note:</b><br>1. The EUT was programmed to be in continuously transmitting mode.<br>2. The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT. |                                         |

## 1.6 Table for Testing Locations

| Test Site No. | Site Category | Location |
|---------------|---------------|----------|
| CO05-HY       | Conduction    | Hwa Ya   |
| TH02-HY       | OVEN Room     | Hwa Ya   |
| 03CH07-HY     | SAC           | Hwa Ya   |

Note : Semi Anechoic Chamber (SAC).

## 1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.225
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 issue 8

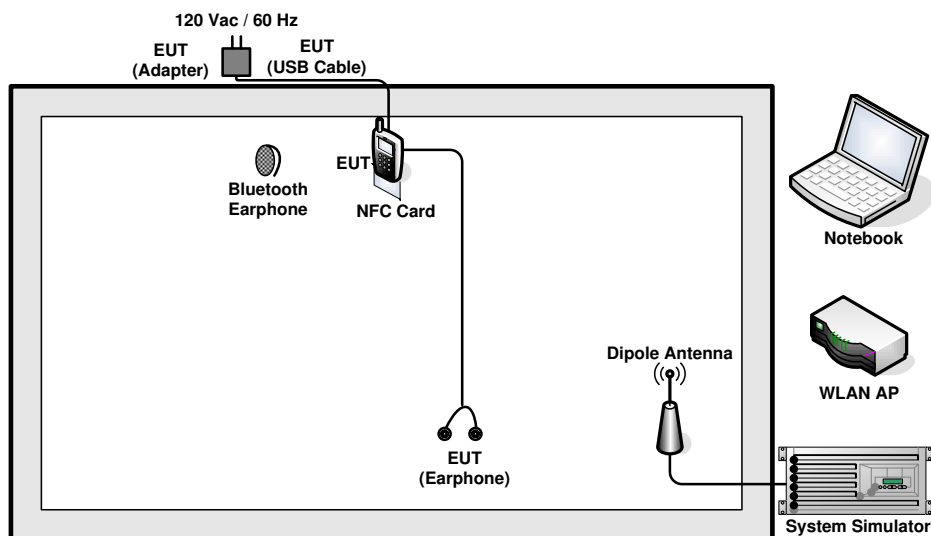
## 1.8 Table for Supporting Units

| Support Unit       | Manufacturer  | Model          | FCC ID                                       |
|--------------------|---------------|----------------|----------------------------------------------|
| Base Station       | R&S           | CMU200         | N/A                                          |
| WLAN AP            | D-Link        | DIR-628        | KA2DIR628A2                                  |
| Bluetooth Earphone | Sony Ericsson | SBH20          | PY7-RD0010                                   |
| Notebook           | DELL          | Latitude E6320 | FCC DoC/<br>Contains FCC ID:<br>QDS-BRCM1054 |
| SD Card            | SanDisk       | MicroSD HC     | N/A                                          |
| NFC Card           | Metro Taipei  | Easy Card      | N/A                                          |

♦

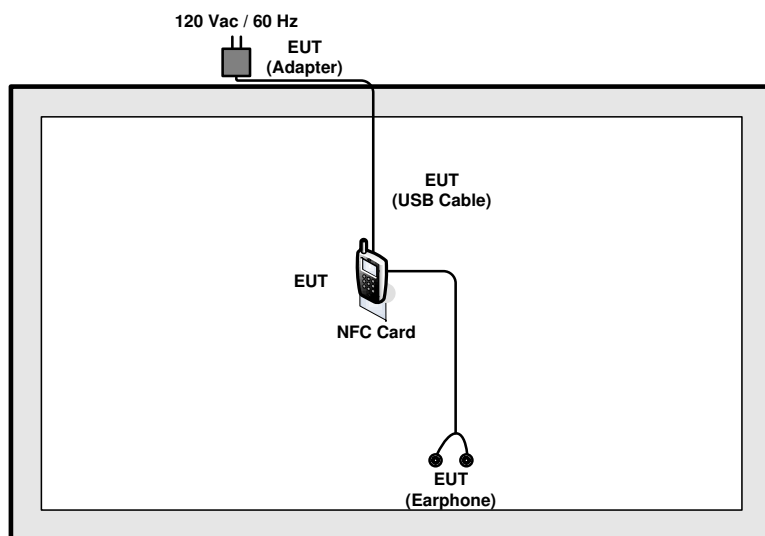
## 1.9 Test Configurations

### <AC Conducted Emissions>



### Fundamental Emissions and Mask Measurement

For radiated emissions on frequency range 9kHz~30MHz and 30MHz~1GHz



## 2. TEST RESULT

### 2.1 AC Power Line Conducted Emissions Measurement

#### 2.1.1 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 (dB $\mu$ V) | AV Limit (dB $\mu$ V) |
|-----------------|-----------------------|-----------------------|
| 0.15~0.5        | 66~56                 | 56~46                 |
| 0.5~5           | 56                    | 46                    |
| 5~30            | 60                    | 50                    |

#### 2.1.2 Measuring Instruments and Setting

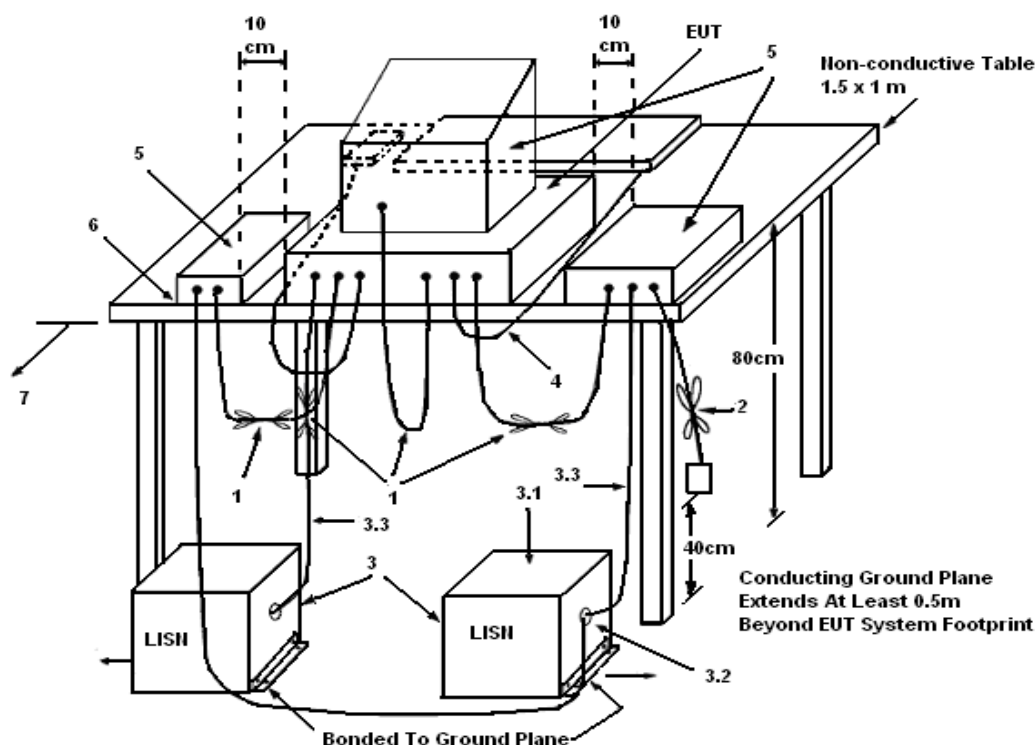
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

#### 2.1.3 Test Procedures

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

## 2.1.4 Test Setup Layout



### LEGEND:

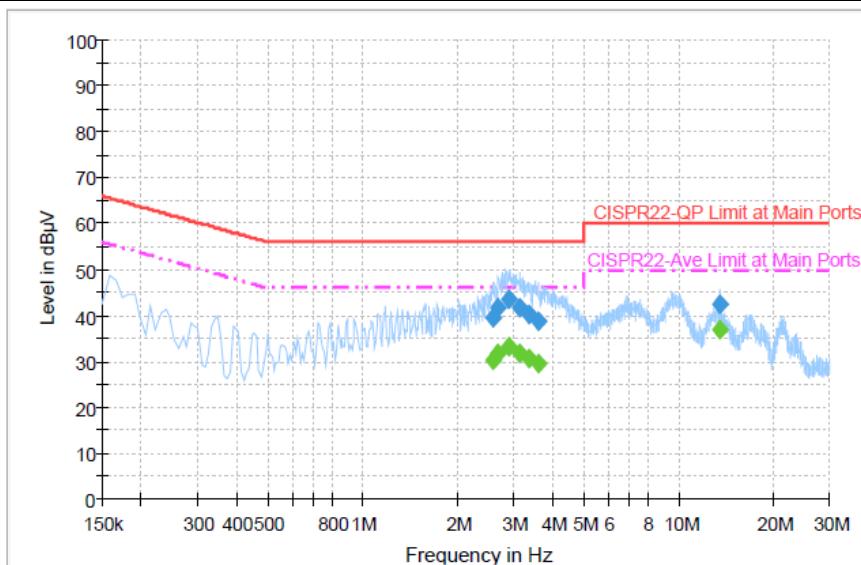
- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using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

## 2.1.5 Test Deviation

There is no deviation with the original standard.

**2.1.6 Results of AC Power Line Conducted Emissions Measurement**

|                        |                                                                                                  |                      |                              |
|------------------------|--------------------------------------------------------------------------------------------------|----------------------|------------------------------|
| <b>Final Test Date</b> | Apr. 12, 2014                                                                                    | <b>Test Site No.</b> | CO05-HY                      |
| <b>Temperature</b>     | 20~22°C                                                                                          | <b>Humidity</b>      | 46~48%                       |
| <b>Test Engineer</b>   | Cosmo Xu                                                                                         | <b>Configuration</b> | Transmitting Mode (13.56MHz) |
|                        |                                                                                                  | <b>Phase</b>         | Line                         |
| <b>Mode</b>            | GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + NFC Tx + USB Cable (Charging from Adapter) |                      |                              |

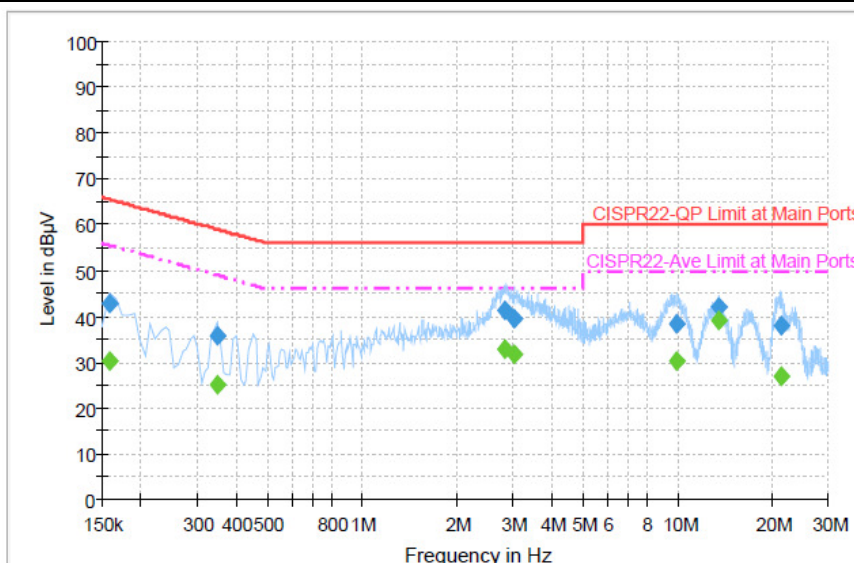

**Final Result : Quasi-Peak**

| Frequency (MHz) | Quasi-Peak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 2.582000        | 39.5              | Off    | L1   | 19.6       | 16.5        | 56.0         |
| 2.686000        | 41.5              | Off    | L1   | 19.5       | 14.5        | 56.0         |
| 2.910000        | 43.4              | Off    | L1   | 19.6       | 12.6        | 56.0         |
| 3.142000        | 41.7              | Off    | L1   | 19.6       | 14.3        | 56.0         |
| 3.358000        | 40.3              | Off    | L1   | 19.6       | 15.7        | 56.0         |
| 3.606000        | 38.7              | Off    | L1   | 19.6       | 17.3        | 56.0         |
| 13.558000       | 42.6              | Off    | L1   | 19.8       | 17.4        | 60.0         |

**Final Result : Average**

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 2.582000        | 30.3           | Off    | L1   | 19.6       | 15.7        | 46.0         |
| 2.686000        | 31.6           | Off    | L1   | 19.5       | 14.4        | 46.0         |
| 2.910000        | 33.3           | Off    | L1   | 19.6       | 12.7        | 46.0         |
| 3.142000        | 31.9           | Off    | L1   | 19.6       | 14.1        | 46.0         |
| 3.358000        | 30.8           | Off    | L1   | 19.6       | 15.2        | 46.0         |
| 3.606000        | 29.4           | Off    | L1   | 19.6       | 16.6        | 46.0         |
| 13.558000       | 37.0           | Off    | L1   | 19.8       | 13.0        | 50.0         |

|                        |                                                                                                  |                      |                              |
|------------------------|--------------------------------------------------------------------------------------------------|----------------------|------------------------------|
| <b>Final Test Date</b> | Apr. 12, 2014                                                                                    | <b>Test Site No.</b> | CO05-HY                      |
| <b>Temperature</b>     | 20~22°C                                                                                          | <b>Humidity</b>      | 46~48%                       |
| <b>Test Engineer</b>   | Cosmo Xu                                                                                         | <b>Configuration</b> | Transmitting Mode (13.56MHz) |
|                        |                                                                                                  | <b>Phase</b>         | Neutral                      |
| <b>Mode</b>            | GSM850 Idle + Bluetooth Link + WLAN Link + Earphone + NFC Tx + USB Cable (Charging from Adapter) |                      |                              |


**Final Result : Quasi-Peak**

| Frequency (MHz) | Quasi-Peak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|-------------------|--------|------|------------|-------------|--------------|
| 0.158000        | 42.7              | Off    | N    | 19.3       | 22.9        | 65.6         |
| 0.350000        | 35.9              | Off    | N    | 19.4       | 23.1        | 59.0         |
| 2.822000        | 41.3              | Off    | N    | 19.6       | 14.7        | 56.0         |
| 3.038000        | 39.6              | Off    | N    | 19.6       | 16.4        | 56.0         |
| 9.950000        | 38.5              | Off    | N    | 19.7       | 21.5        | 60.0         |
| 13.558000       | 42.2              | Off    | N    | 19.9       | 17.8        | 60.0         |
| 21.286000       | 38.1              | Off    | N    | 20.0       | 21.9        | 60.0         |

**Final Result : Average**

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.158000        | 30.2           | Off    | N    | 19.3       | 25.4        | 55.6         |
| 0.350000        | 25.2           | Off    | N    | 19.4       | 23.8        | 49.0         |
| 2.822000        | 32.8           | Off    | N    | 19.6       | 13.2        | 46.0         |
| 3.038000        | 31.8           | Off    | N    | 19.6       | 14.2        | 46.0         |
| 9.950000        | 30.3           | Off    | N    | 19.7       | 19.7        | 50.0         |
| 13.558000       | 39.2           | Off    | N    | 19.9       | 10.8        | 50.0         |
| 21.286000       | 27.0           | Off    | N    | 20.0       | 23.0        | 50.0         |

## 2.2 Field Strength of Fundamental Emissions and Mask Measurement

### 2.2.1 Limit

Field strength of fundamental emissions limit:

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters.

The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

| Frequencies<br>(MHz) | Field Strength<br>(microvolts/meter) | Field Strength<br>(dBμV/m) at 10m | Field Strength<br>(dBμV/m) at 3m |
|----------------------|--------------------------------------|-----------------------------------|----------------------------------|
| 13.553 ~ 13.567MHz   | 15848 at 30m                         | 103.08 (QP)                       | 124 (QP)                         |

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 RBW set to a 9kHz for the band 13.553~13.567MHz |                                    |                                      |                                      |                                     |
| Limit                    | Freq. of Emission<br>(MHz)                                                                                                 | Field Strength<br>(μV/m) at<br>30m | Field Strength<br>(dBμV/m) at<br>30m | Field Strength<br>(dBμV/m) at<br>10m | Field Strength<br>(dBμV/m) at<br>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                                |

### 2.2.2 Measuring Instruments and Setting

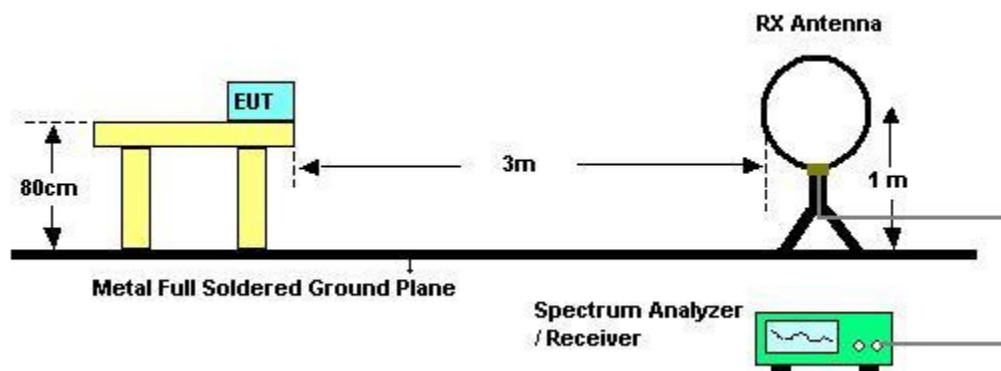
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

### 2.2.3 Test Procedures

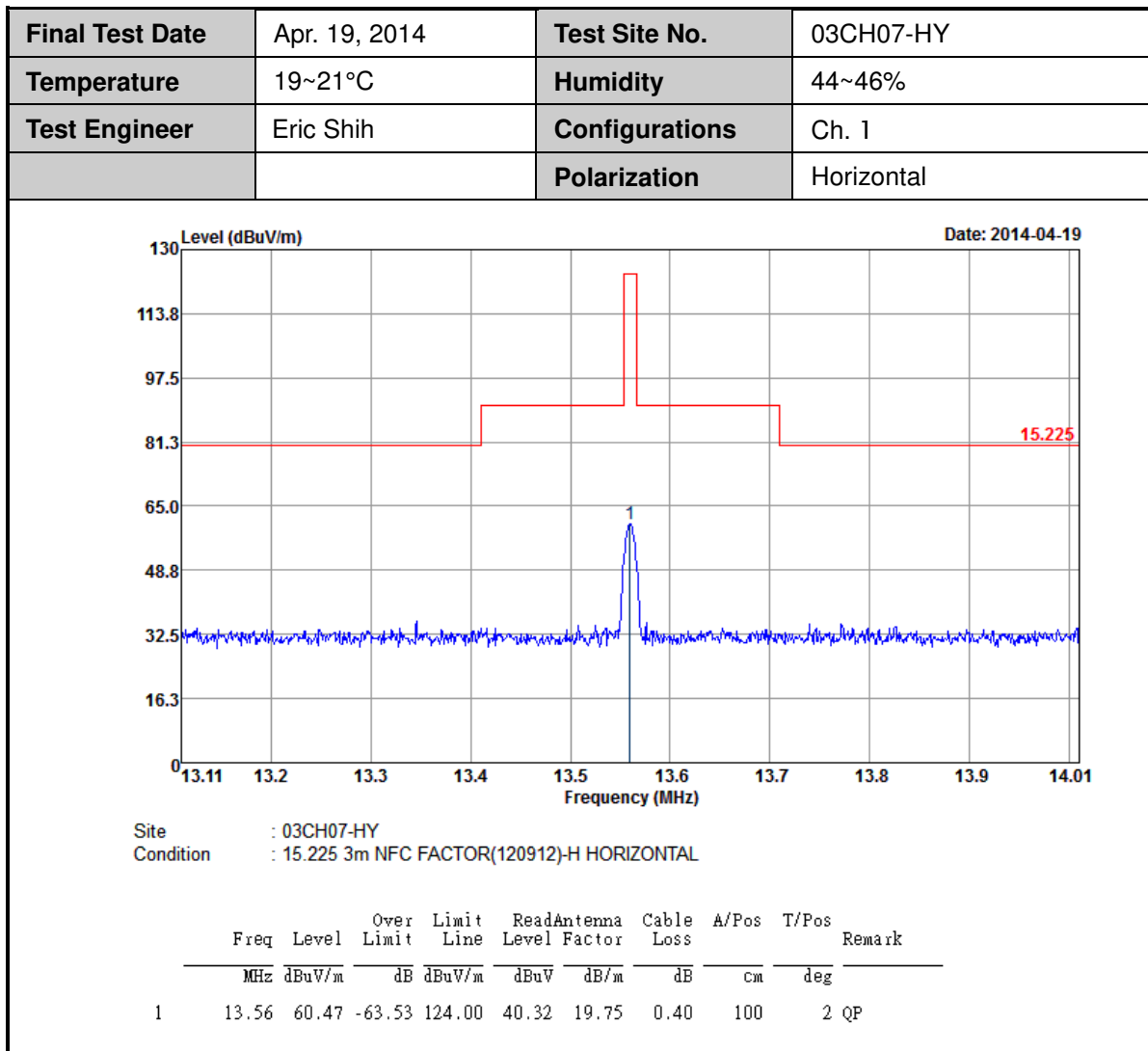
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was 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 RBW set to a 9kHz for the band 13.553~13.567MHz.

## 2.2.4 Test Setup Layout

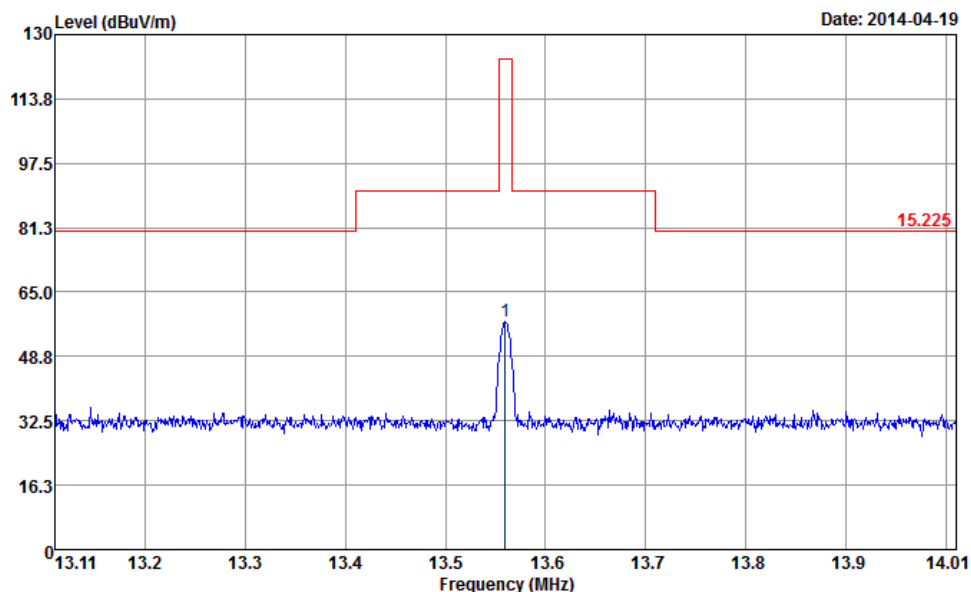


## 2.2.5 Test Deviation

There is no deviation with the original standard.

**2.2.6 Test Result of Field Strength of Fundamental Emissions**

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | 03CH07-HY |
| <b>Temperature</b>     | 19~21°C       | <b>Humidity</b>       | 44~46%    |
| <b>Test Engineer</b>   | Eric Shih     | <b>Configurations</b> | Ch. 1     |
|                        |               | <b>Polarization</b>   | Vertical  |



Site : 03CH07-HY  
Condition : 15.225 3m NFC FACTOR(120912)-V VERTICAL

|   | Freq  | Level  | Over   | Limit  | Read  | Antenna | Cable | A/Pos | T/Pos | Remark |
|---|-------|--------|--------|--------|-------|---------|-------|-------|-------|--------|
|   | MHz   | dBuV/m | dB     | dBuV/m | dBuV  | dB/m    | dB    | cm    | deg   |        |
| 1 | 13.56 | 57.68  | -66.32 | 124.00 | 37.53 | 19.75   | 0.40  | 100   | 92    | QP     |

**Note:**

1. Emission level (dBuV/m) = 20 log Emission level (uV/m).
2. Measured distance is 3m.

## 2.3 20dB Spectrum Bandwidth Measurement

### 2.3.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 ~ 13.567MHz).

### 2.3.2 Measuring Instruments and Setting

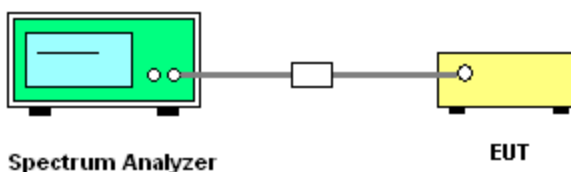
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameters | Setting          |
|---------------------|------------------|
| Attenuation         | Auto             |
| Span Frequency      | > 20dB Bandwidth |
| RBW                 | 1 kHz            |
| VBW                 | 3 kHz            |
| Detector            | Peak             |
| Trace               | Max Hold         |
| Sweep Time          | Auto             |

### 2.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

### 2.3.4 Test Setup Layout



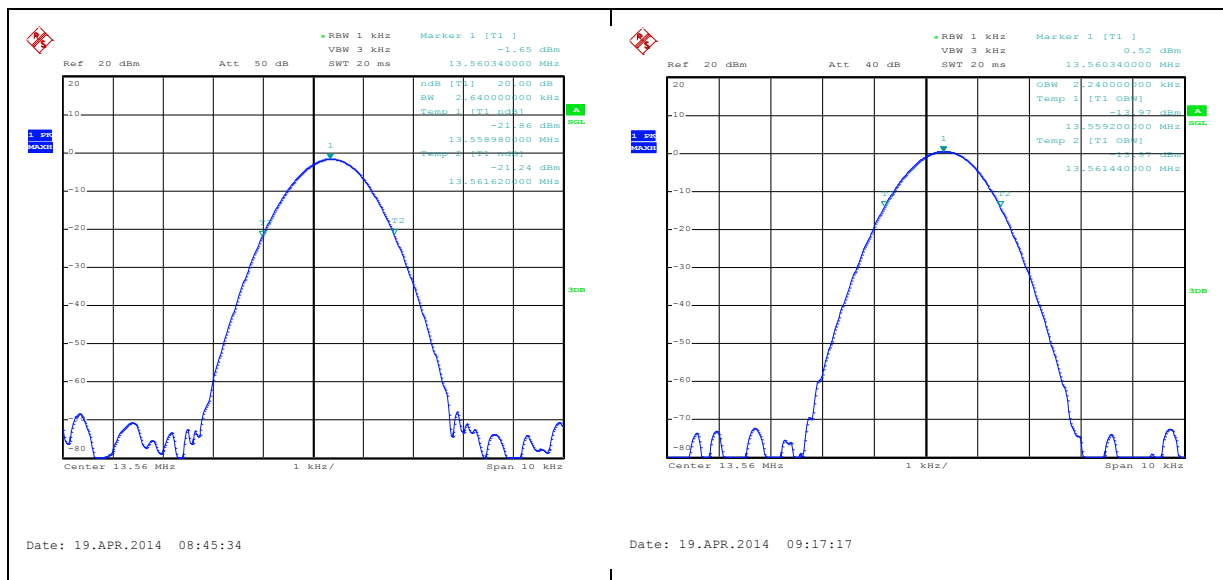
### 2.3.5 Test Deviation

There is no deviation with the original standard.

**2.3.6 Test Result of 20dB Spectrum Bandwidth**

|                        |               |                       |         |
|------------------------|---------------|-----------------------|---------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | TH02-HY |
| <b>Temperature</b>     | 22~24°C       | <b>Humidity</b>       | 53~55%  |
| <b>Test Engineer</b>   | Tommy Lee     | <b>Configurations</b> | 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 | 2.640         | 2.240         | 13.55898                                          | 13.56162                                          | <b>Complies</b> |

**20 dB / 99% Bandwidth Plot on 13.56 MHz**


## 2.4 Radiated Emissions Measurement

### 2.4.1 Limit

The field strength of any emissions which appear outside of 13.553 ~ 13.567MHz band shall not exceed the general radiated emissions limits.

| Frequencies<br>(MHz) | Field Strength<br>( $\mu$ V/m) | Measurement Distance<br>(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                                |

### 2.4.2 Measuring Instruments and Setting

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

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

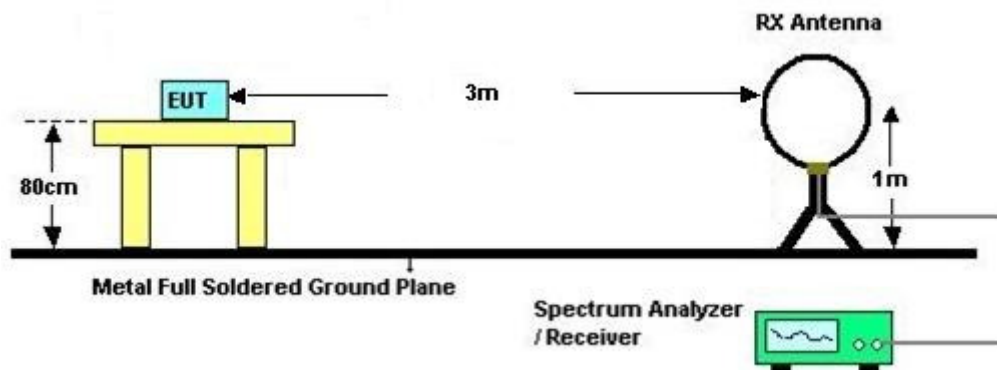
**Note:** The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

### 2.4.3 Test Procedures

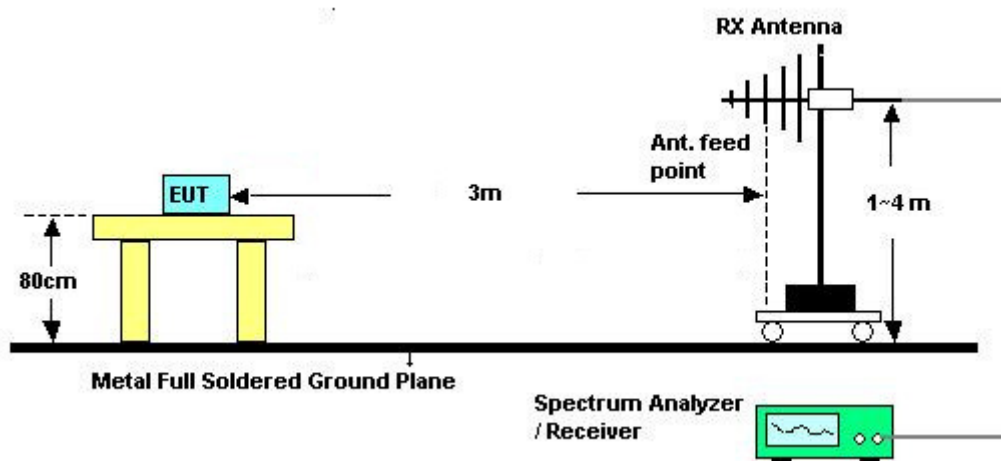
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

## 2.4.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz

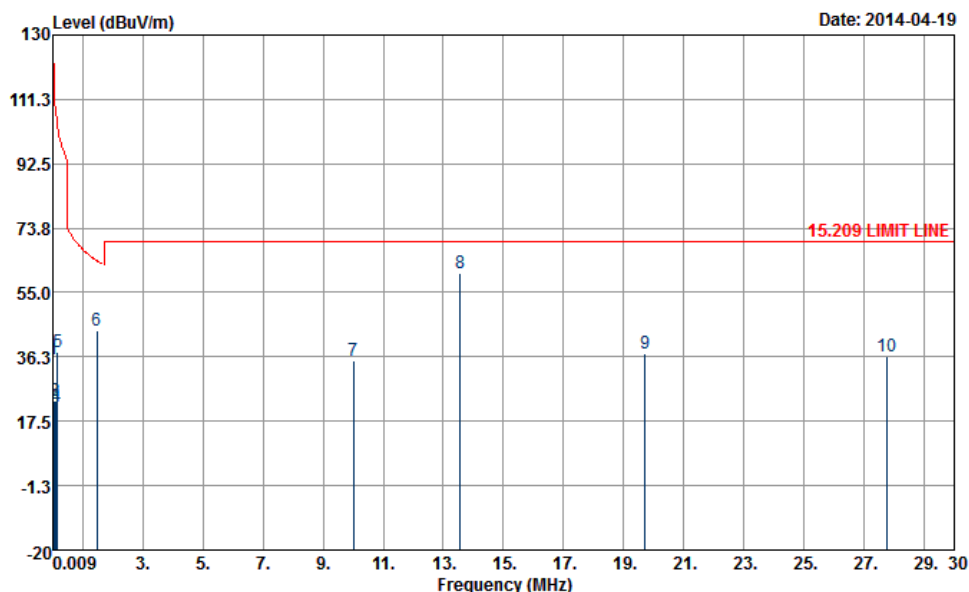


## 2.4.5 Test Deviation

There is no deviation with the original standard.

**2.4.6 Results of Radiated Emissions (9 kHz~30MHz)**

|                        |               |                       |            |
|------------------------|---------------|-----------------------|------------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | 03CH07-HY  |
| <b>Temperature</b>     | 19~21°C       | <b>Humidity</b>       | 44~46%     |
| <b>Test Engineer</b>   | Eric Shih     | <b>Configurations</b> | Ch. 1      |
|                        |               | <b>Polarization</b>   | Horizontal |



Site : 03CH07-HY  
Condition : 15.209 LIMIT LINE 3m NFC FACTOR(120912)-H HORIZONTAL

|    | Freq  | Level  | Over   | Limit  | ReadAntenna | Cable | A/Pos | T/Pos | Remark  |
|----|-------|--------|--------|--------|-------------|-------|-------|-------|---------|
|    | MHz   | dBuV/m | dB     | dBuV/m | dBuV        | dB/m  | dB    | cm    | deg     |
| 1  | 0.02  | 35.46  | -87.03 | 122.49 | 14.91       | 20.26 | 0.29  | ---   | Average |
| 2  | 0.07  | 23.39  | -87.66 | 111.05 | 2.99        | 20.11 | 0.29  | ---   | Average |
| 3  | 0.10  | 23.39  | -84.55 | 107.94 | 3.03        | 20.07 | 0.29  | ---   | QP      |
| 4  | 0.14  | 21.83  | -82.65 | 104.48 | 1.48        | 20.06 | 0.29  | ---   | Average |
| 5  | 0.16  | 37.84  | -65.47 | 103.31 | 17.51       | 20.04 | 0.29  | ---   | Average |
| 6  | 1.48  | 44.08  | -20.11 | 64.19  | 23.76       | 20.01 | 0.31  | 100   | 13 QP   |
| 7  | 10.01 | 35.02  | -34.98 | 70.00  | 14.88       | 19.75 | 0.39  | ---   | QP      |
| 8  | 13.56 | 60.53  |        |        | 40.38       | 19.75 | 0.40  | ---   | QP      |
| 9  | 19.71 | 37.42  | -32.58 | 70.00  | 16.88       | 20.11 | 0.43  | ---   | QP      |
| 10 | 27.76 | 36.33  | -33.67 | 70.00  | 15.48       | 20.35 | 0.50  | ---   | QP      |

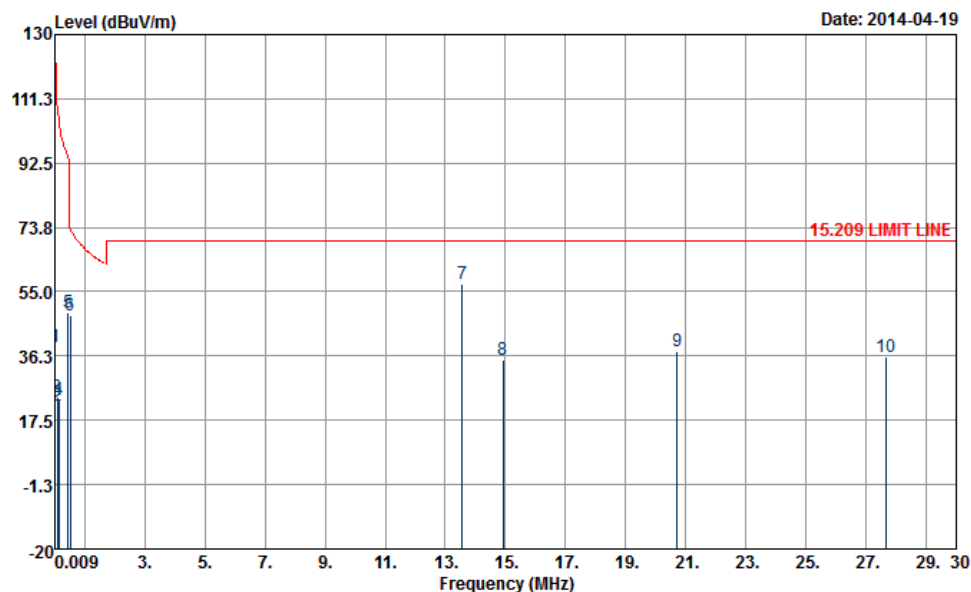
**Note:**

- Remark 8 is transmitter's fundamental signal which is higher than any other spurious emissions.
- The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | 03CH07-HY |
| <b>Temperature</b>     | 19~21°C       | <b>Humidity</b>       | 44~46%    |
| <b>Test Engineer</b>   | Eric Shih     | <b>Configurations</b> | Ch. 1     |
|                        |               | <b>Polarization</b>   | Vertical  |



Site : 03CH07-HY  
Condition : 15.209 LIMIT LINE 3m NFC FACTOR(120912)-V VERTICAL

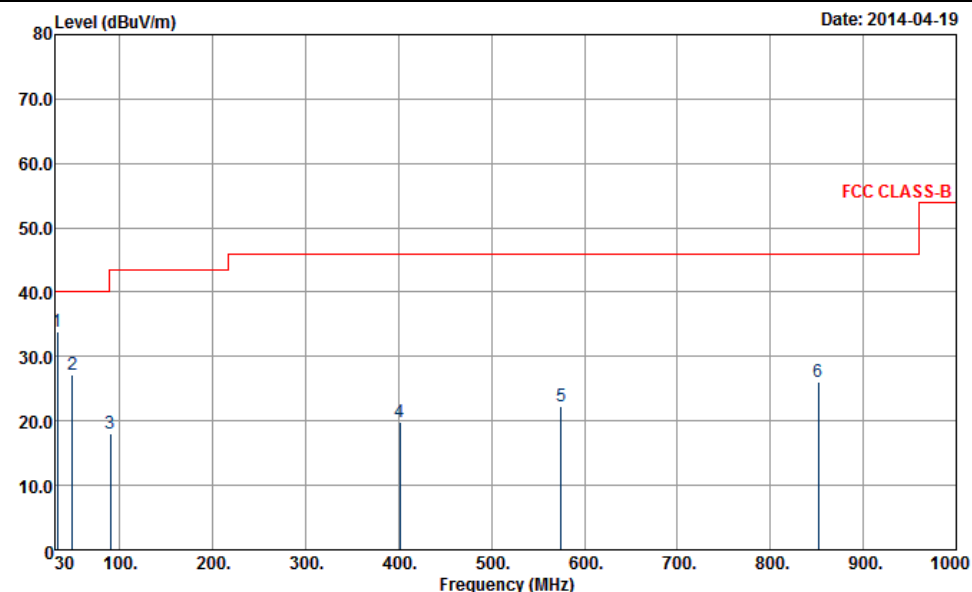
|    | Freq  | Level  | Over   | Limit  | ReadAntenna | Cable  | A/Pos | T/Pos | Remark |
|----|-------|--------|--------|--------|-------------|--------|-------|-------|--------|
|    | MHz   | dBuV/m | dB     | dBuV/m | Level       | Factor | Loss  | cm    | deg    |
| 1  | 0.01  | 39.06  | -86.21 | 125.27 | 18.51       | 20.26  | 0.29  | ---   | ---    |
| 2  | 0.08  | 21.65  | -87.81 | 109.46 | 1.25        | 20.11  | 0.29  | ---   | ---    |
| 3  | 0.10  | 24.34  | -83.31 | 107.65 | 3.98        | 20.07  | 0.29  | ---   | ---    |
| 4  | 0.13  | 23.26  | -82.15 | 105.41 | 2.91        | 20.06  | 0.29  | ---   | ---    |
| 5  | 0.45  | 49.13  | -45.49 | 94.62  | 28.84       | 20.00  | 0.29  | ---   | ---    |
| 6  | 0.51  | 48.06  | -25.35 | 73.41  | 27.75       | 20.00  | 0.31  | 100   | 309    |
| 7  | 13.56 | 57.31  |        |        | 37.16       | 19.75  | 0.40  | ---   | ---    |
| 8  | 14.92 | 35.24  | -34.76 | 70.00  | 15.07       | 19.76  | 0.41  | ---   | ---    |
| 9  | 20.73 | 37.53  | -32.47 | 70.00  | 16.89       | 20.21  | 0.43  | ---   | ---    |
| 10 | 27.67 | 35.86  | -34.14 | 70.00  | 15.00       | 20.36  | 0.50  | ---   | ---    |

**Note:**

- Remark 7 is transmitter's fundamental signal which is higher than any other spurious emissions.
- The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
  - Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);
  - Limit line = specific limits (dBuV) + distance extrapolation factor.

**2.4.7 Results for Radiated Emissions (30MHz~1GHz)**

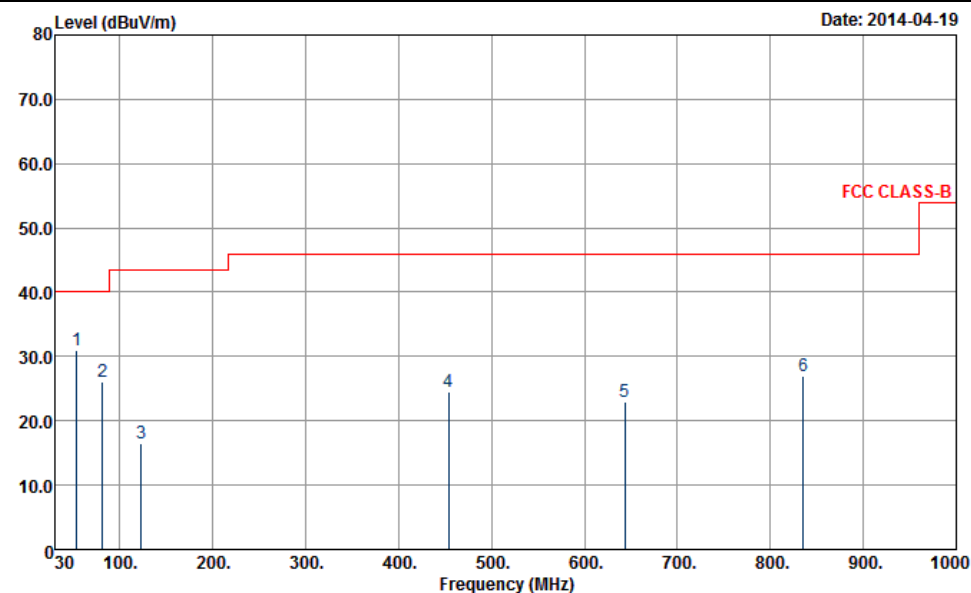
|                        |               |                       |            |
|------------------------|---------------|-----------------------|------------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | 03CH07-HY  |
| <b>Temperature</b>     | 19~21°C       | <b>Humidity</b>       | 44~46%     |
| <b>Test Engineer</b>   | Eric Shih     | <b>Configurations</b> | Ch. 1      |
|                        |               | <b>Polarization</b>   | Horizontal |



Site : 03CH07-HY  
Condition : FCC CLASS-B 3m LF-ANT(131102) HORIZONTAL

|   | Freq   | Level  | Over   | Limit  | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark  |
|---|--------|--------|--------|--------|-------------|-------|--------|-------|-------|---------|
|   | MHz    | dBuV/m | dB     | dBuV/m | dBuV        | dB/m  | dB     | dB    | cm    | deg     |
| 1 | 32.43  | 33.98  | -6.02  | 40.00  | 47.56       | 17.24 | 0.56   | 31.38 | 138   | 37 Peak |
| 2 | 48.63  | 27.13  | -12.87 | 40.00  | 48.55       | 9.10  | 0.68   | 31.20 | ---   | ---     |
| 3 | 89.94  | 17.97  | -25.53 | 43.50  | 39.43       | 8.70  | 0.94   | 31.10 | ---   | ---     |
| 4 | 401.50 | 19.94  | -26.06 | 46.00  | 32.74       | 15.95 | 2.15   | 30.90 | ---   | ---     |
| 5 | 575.10 | 22.38  | -23.62 | 46.00  | 30.81       | 19.65 | 2.62   | 30.70 | ---   | ---     |
| 6 | 851.60 | 26.17  | -19.83 | 46.00  | 30.02       | 23.28 | 3.27   | 30.40 | ---   | ---     |

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | 03CH07-HY |
| <b>Temperature</b>     | 19~21°C       | <b>Humidity</b>       | 44~46%    |
| <b>Test Engineer</b>   | Eric Shih     | <b>Configurations</b> | Ch. 1     |
|                        |               | <b>Polarization</b>   | Vertical  |



Site : 03CH07-HY  
Condition : FCC CLASS-B 3m LF-ANT(131102) VERTICAL

|   | Freq   | Level  | Over   | Limit  | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark   |
|---|--------|--------|--------|--------|-------------|-------|--------|-------|-------|----------|
|   | MHz    | dBuV/m | dB     | dBuV/m | dBuV        | dB/m  | dB     | dB    | cm    | deg      |
| 1 | 53.49  | 31.04  | -8.96  | 40.00  | 54.32       | 7.20  | 0.72   | 31.20 | 105   | 143 Peak |
| 2 | 81.30  | 26.12  | -13.88 | 40.00  | 49.18       | 7.22  | 0.89   | 31.17 | ---   | ---      |
| 3 | 122.88 | 16.55  | -26.95 | 43.50  | 35.01       | 11.52 | 1.12   | 31.10 | ---   | ---      |
| 4 | 454.00 | 24.41  | -21.59 | 46.00  | 35.53       | 17.34 | 2.31   | 30.77 | ---   | ---      |
| 5 | 643.70 | 23.06  | -22.94 | 46.00  | 30.35       | 20.40 | 2.82   | 30.51 | ---   | ---      |
| 6 | 835.50 | 27.03  | -18.97 | 46.00  | 31.17       | 23.00 | 3.23   | 30.37 | ---   | ---      |

**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

## 2.5 Frequency Stability Measurement

### 2.5.1 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.

### 2.5.2 Measuring Instruments and Setting

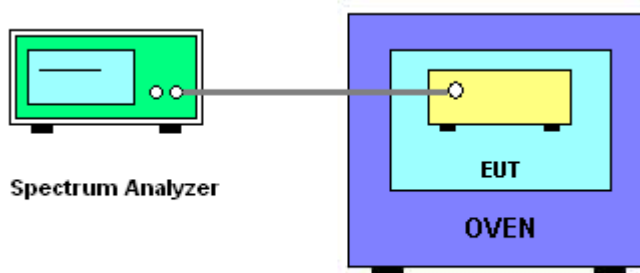
Please refer to section 4 of equipment list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting |
|--------------------|---------|
| Attenuation        | Auto    |
| RBW                | 1 kHz   |
| VBW                | 3 kHz   |
| Sweep Time         | Auto    |

### 2.5.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted signal and fixed channelize
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The  $f_c$  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. Extreme temperature rule is -20°C~50°C.

#### 2.5.4 Test Setup Layout



#### 2.5.5 Test Deviation

There is no deviation with the original standard.

**2.5.6 Test Result of Frequency Stability**

|                        |               |                       |         |
|------------------------|---------------|-----------------------|---------|
| <b>Final Test Date</b> | Apr. 19, 2014 | <b>Test Site No.</b>  | TH02-HY |
| <b>Temperature</b>     | 22~24°C       | <b>Humidity</b>       | 53~55%  |
| <b>Test Engineer</b>   | Tommy Lee     | <b>Configurations</b> | Ch. 1   |

**Voltage vs. Frequency Stability**

| <b>Voltage(V)</b>    | <b>Measurement Frequency (MHz)</b> |
|----------------------|------------------------------------|
| 120                  | 13.560310                          |
| 102                  | 13.560320                          |
| 138                  | 13.560300                          |
| Max. Deviation (MHz) | 0.000320                           |
| Max. Deviation (ppm) | 23.5988                            |

**Temperature vs. Frequency Stability**

| <b>Temperature (°C)</b> | <b>Measurement Frequency (MHz)</b> |
|-------------------------|------------------------------------|
| -20                     | 13.560380                          |
| -10                     | 13.560360                          |
| 0                       | 13.560350                          |
| 10                      | 13.560360                          |
| 20                      | 13.560330                          |
| 30                      | 13.560300                          |
| 40                      | 13.560280                          |
| 50                      | 13.560290                          |
| Max. Deviation (MHz)    | 0.000380                           |
| Max. Deviation (ppm)    | 28.0236                            |



## **2.6 Antenna Requirements**

### **2.6.1 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.

### **2.6.2 Antenna Connector Construction**

Embedded in Antenna.



## 3. LIST OF MEASURING EQUIPMENT

| Instrument                     | Manufacturer          | Model No.                | Serial No.           | Characteristics  | Calibration Date | Test Date     | Due Date      | Remark                |
|--------------------------------|-----------------------|--------------------------|----------------------|------------------|------------------|---------------|---------------|-----------------------|
| Spectrum Analyzer              | Rohde & Schwarz       | FSP40                    | 100055               | 9kHz~40GHz       | Jun. 07, 2013    | Apr. 19, 2014 | Jun. 06, 2014 | Conducted (TH02-HY)   |
| Thermal Chamber                | Ten Billion           | TTH-D3SP                 | TBN-930701           | N/A              | Jul. 19, 2013    | Apr. 19, 2014 | Jul. 18, 2014 | Conducted (TH02-HY)   |
| Hygrometer                     | Testo                 | 608-H1                   | 34897199             | N/A              | May 07, 2013     | Apr. 19, 2014 | May 06, 2014  | Conducted (TH02-HY)   |
| RF cable                       | WOKEN                 | SMA(M)-SM A(M) for SS405 | S05-130703-32        | N/A              | Jul. 09, 2013    | Apr. 19, 2014 | Jul. 08, 2014 | Conducted (TH02-HY)   |
| EMI Test Receiver              | Rohde & Schwarz       | ESCS 30                  | 100356               | 9kHz ~ 2.75GHz   | Nov. 15, 2013    | Apr. 12, 2014 | Nov. 14, 2014 | Conduction (CO05-HY)  |
| LISN (for auxiliary equipment) | Rohde & Schwarz       | ENV216                   | 100081               | 9kHz ~ 30MHz     | Dec. 12, 2013    | Apr. 12, 2014 | Dec. 11, 2014 | Conduction (CO05-HY)  |
| LISN                           | Rohde & Schwarz       | ENV216                   | 100080               | 9kHz ~ 30MHz     | Dec. 04, 2013    | Apr. 12, 2014 | Dec. 03, 2014 | Conduction (CO05-HY)  |
| AC Power Source                | ChainTek              | APC-1000W                | N/A                  | N/A              | N/A              | Apr. 12, 2014 | N/A           | Conduction (CO05-HY)  |
| Thermometer                    | Testo                 | 608-H1                   | 34913912             | N/A              | Apr. 26, 2013    | Apr. 12, 2014 | Apr. 25, 2014 | Conduction (CO05-HY)  |
| Test Software                  | N/A                   | EMC32                    | 8.40.0               | N/A              | N/A              | Apr. 12, 2014 | N/A           | Conduction (CO05-HY)  |
| LF Cable                       | Shuner                | RG-402                   | N/A                  | N/A              | Oct. 17, 2013    | Apr. 12, 2014 | Oct. 16, 2014 | Conduction (CO05-HY)  |
| EMI Test Receiver              | Rohde & Schwarz       | ESCI 7                   | 100724               | 9kHz~7GHz        | Sep. 06, 2013    | Apr. 19, 2014 | Sep. 05, 2014 | Radiation (03CH07-HY) |
| Spectrum Analyzer              | Rohde & Schwarz       | FSV30                    | 101749               | 10Hz ~ 30GHz     | Feb. 10, 2014    | Apr. 19, 2014 | Feb. 09, 2015 | Radiation (03CH07-HY) |
| Loop Antenna                   | Rohde & Schwarz       | HFH2-Z2                  | 860004/0001          | 9 kHz~30 MHz     | Jul. 03, 2012    | Apr. 19, 2014 | Jul. 02, 2014 | Radiation (03CH07-HY) |
| Bilog Antenna                  | Schaffner             | CBL6111C                 | 2726                 | 30MHz ~ 1GHz     | Oct. 10, 2013    | Apr. 19, 2014 | Oct. 09, 2014 | Radiation (03CH07-HY) |
| Preamplifier                   | COM-POWER             | PA-103A                  | 161241               | 10 MHz ~ 1000MHz | Mar. 17, 2014    | Apr. 19, 2014 | Mar. 16, 2015 | Radiation (03CH07-HY) |
| Turn Table                     | ChainTek              | ChainTek 3000            | N/A                  | 0 ~ 360 degree   | N/A              | Apr. 19, 2014 | N/A           | Radiation (03CH07-HY) |
| Antenna Mast                   | ChainTek              | ChainTek 3000            | N/A                  | N/A              | N/A              | Apr. 19, 2014 | N/A           | Radiation (03CH07-HY) |
| LF RF Cable                    | Warison+HUB ER SUHNER | WCBA-WC0 4NM.NM2         | N/A                  | 30MHz ~ 1GHz     | Nov. 28, 2013    | Apr. 19, 2014 | Nov. 27, 2014 | Radiation (03CH07-HY) |
| Test Software                  | Audix                 | E3                       | Version 6.2009-08-24 | N/A              | N/A              | Apr. 19, 2014 | N/A           | Radiation (03CH07-HY) |
| Hygrometer                     | Testo                 | 608-H1                   | 34897197             | N/A              | May 07, 2013     | Apr. 19, 2014 | May 06, 2014  | Radiation (03CH07-HY) |

**Note:** Test equipment calibration is traceable to the procedure of ISO17025.



#### 4. TEST LOCATION

|        |     |                                                                            |
|--------|-----|----------------------------------------------------------------------------|
| 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                                                           |