



# FCC RF TEST REPORT

47 CFR FCC Part 15 Subpart C § 15.249

**APPLICANT** : SAMSUNG ELECTRONICS CO., LTD.  
**EQUIPMENT** : Mobile phone  
**BRAND NAME** : SAMSUNG  
**MODEL NAME** : SM-A7009  
**FCC ID** : A3LSMA7009

The product was received on Nov. 11, 2014 and testing was completed on Dec. 09, 2014. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL (SHENZHEN) INC.**

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## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FR4N1105E  | Rev. 01 | Initial issue of report | Dec. 04, 2014 |
|            |         |                         |               |
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|            |         |                         |               |

**1. SUMMARY OF THE TEST RESULT**

| Applied Standard: |              |                                         |          |                            |
|-------------------|--------------|-----------------------------------------|----------|----------------------------|
| Part              | FCC Rule     | Description of Test                     | Result   | Under Limit                |
| 3.1               | 15.207       | AC Power Line Conducted Emissions       | Complies | 14.98 dB at<br>0.260MHz    |
| 3.2               | 2.1049       | 20dB & 99% Occupied Bandwidth           | Complies | -                          |
| 3.3               | 15.249(a)    | Field Strength of Fundamental Emissions | Complies | 17.28 dB at<br>2441.000MHz |
| 3.3               | 15.249(a)(d) | Radiated Spurious Emissions             | Complies | 4.97 dB at<br>48.430MHz    |
| 3.4               | 15.203       | Antenna Requirements                    | Complies | -                          |

**Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)**

|                                                                            |        |
|----------------------------------------------------------------------------|--------|
| Measuring Uncertainty for a Level of<br>Confidence of 95% ( $U = 2Uc(y)$ ) | 2.3 dB |
|----------------------------------------------------------------------------|--------|

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

|                                                                            |        |
|----------------------------------------------------------------------------|--------|
| Measuring Uncertainty for a Level of<br>Confidence of 95% ( $U = 2Uc(y)$ ) | 3.9 dB |
|----------------------------------------------------------------------------|--------|



## 2. GENERAL INFORMATION

### 2.1 Applicant

**SAMSUNG ELECTRONICS CO., LTD.**

416 Maetan-3dong, Yeongtong-gu, Suwon-City, Gyeonggi-do, 443-742, Korea

### 2.2 Manufacturer

**SAMSUNG ELECTRONICS CO., LTD.**

416 Maetan-3dong, Yeongtong-gu, Suwon-City, Gyeonggi-do, 443-742, Korea

### 2.3 Product Details

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

| Product Feature            |                                                     |
|----------------------------|-----------------------------------------------------|
| Equipment                  | Mobile phone                                        |
| Brand Name                 | SAMSUNG                                             |
| Model Name                 | SM-A7009                                            |
| FCC ID                     | A3LSMA7009                                          |
| GSM Operating Band(s)      | GSM900/1800/1900MHz                                 |
| GPRS/EGPRS Multislot Class | GPRS Class 10, EGPRS Class 10                       |
| WCDMA Operating Band(s)    | FDD Band I/II/V                                     |
| LTE Operating Band(s)      | FDD Band 1/3<br>TDD Band 41                         |
| Wi-Fi Specification        | 2.4GHz 802.11b/g/n HT20<br>5GHz 802.11a/n HT20/HT40 |
| Bluetooth Version          | Bluetooth v3.0 + EDR/Bluetooth v4.0 LE              |
| NFC Specification          | Type A/B/F                                          |
| ANT+ Specification         | 2.4GHz                                              |
| HW Version                 | REV0.5                                              |
| SW Version                 | A7009.05                                            |
| EUT Stage                  | Production Unit                                     |



| Items                         | Description       |
|-------------------------------|-------------------|
| Modulation                    | GFSK              |
| Channel Bandwidth (99%)       | 0.876MHz          |
| Max. Field Strength (Peak)    | 96.72dB $\mu$ V/m |
| Max. Field Strength (Average) | 45.66dB $\mu$ V/m |
| ANT+ Channel Number           | 79                |
| ANT+ Frequency Range          | 2402-2480MHz      |

## 2.4 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 |
|-----------------------------------------|------|
| AC Power Line Conducted Emissions       | CTX  |
| Field Strength of Fundamental Emissions | CTX  |
| Bandwidth                               | CTX  |
| Radiated Emissions                      | CTX  |

Note:

1. CTX=continuously transmitting.
2. The programmed RF utility, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

**2.5 Table for Testing Locations**

|                           |                                                                                                                                                                                    |         |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL (SHENZHEN) INC.                                                                                                                                              |         |
| <b>Test Site Location</b> | 1F & 2F,Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China<br>TEL: +86-755-8637-9589<br>FAX: +86-755-8637-9595 |         |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                                            |         |
|                           | TH01-SZ                                                                                                                                                                            | CO01-SZ |

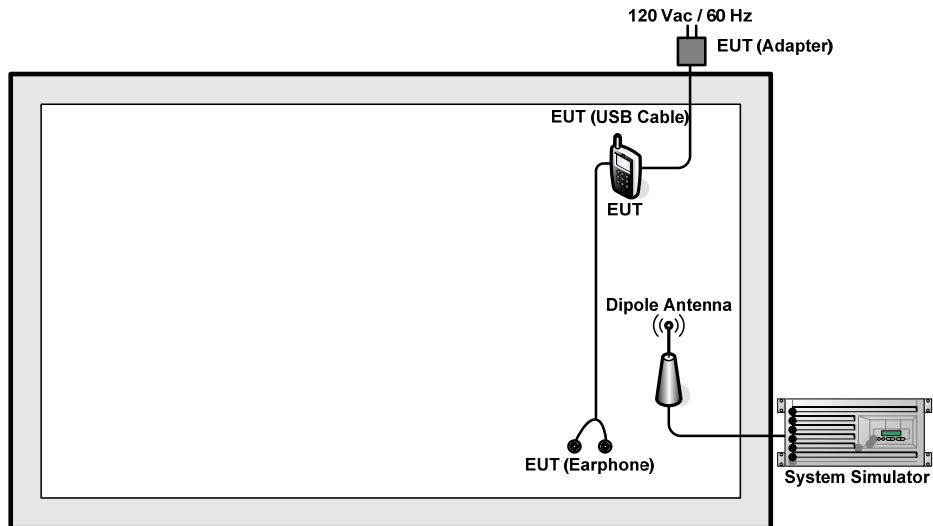
|                           |                                                                                                                                                                 |                             |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL (SHENZHEN) INC.                                                                                                                           |                             |
| <b>Test Site Location</b> | No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China<br>TEL: +86-755- 3320-2398 |                             |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                         | <b>FCC Registration No.</b> |
|                           | 03CH01-SZ                                                                                                                                                       | 831040                      |

**2.6 Table for Supporting Units**

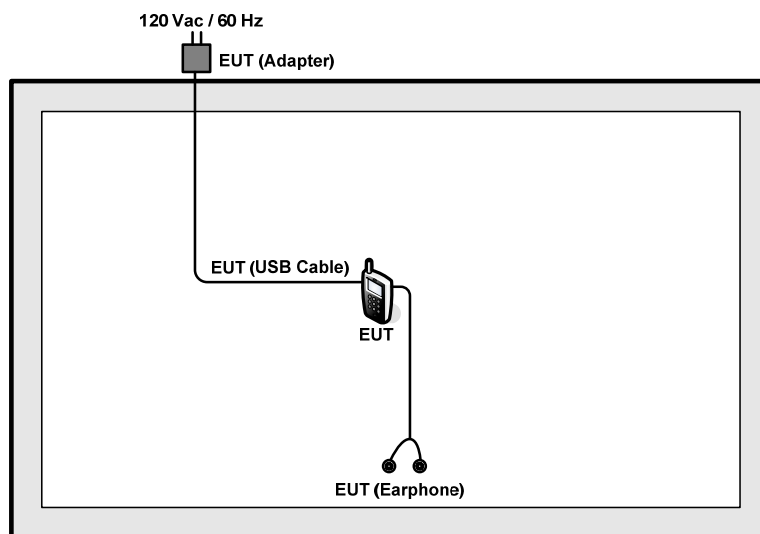
| <b>Support Unit</b> | <b>Manufacturer</b> | <b>Model</b> | <b>FCC ID</b> |
|---------------------|---------------------|--------------|---------------|
| System Simulator    | R&S                 | CMW 500      | N/A           |

## 2.7 Test Configurations

### <AC Conducted Emissions>



### <Radiated Spurious Emissions>



### 3. TEST RESULT

#### 3.1 AC Power Line Conducted Emissions Measurement

##### 3.1.1 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                    |

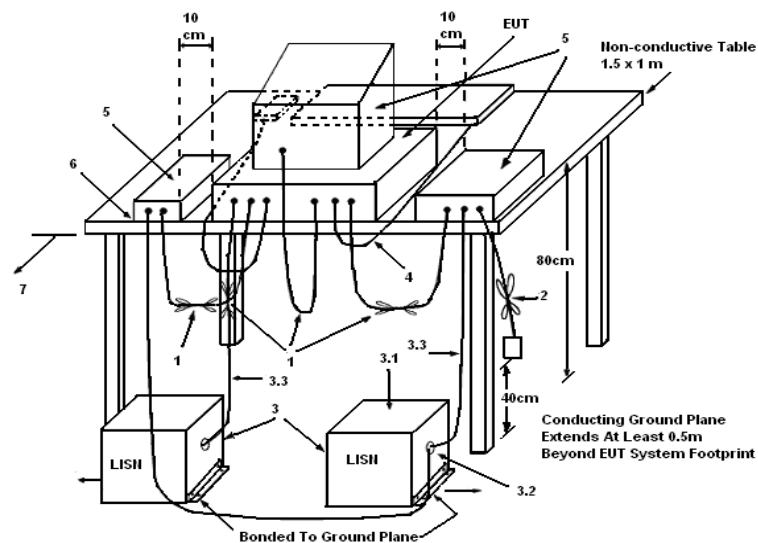
##### 3.1.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

##### 3.1.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

### 3.1.4 Test Setup Layout



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . 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.

### 3.1.5 Test Deviation

There is no deviation with the original standard.



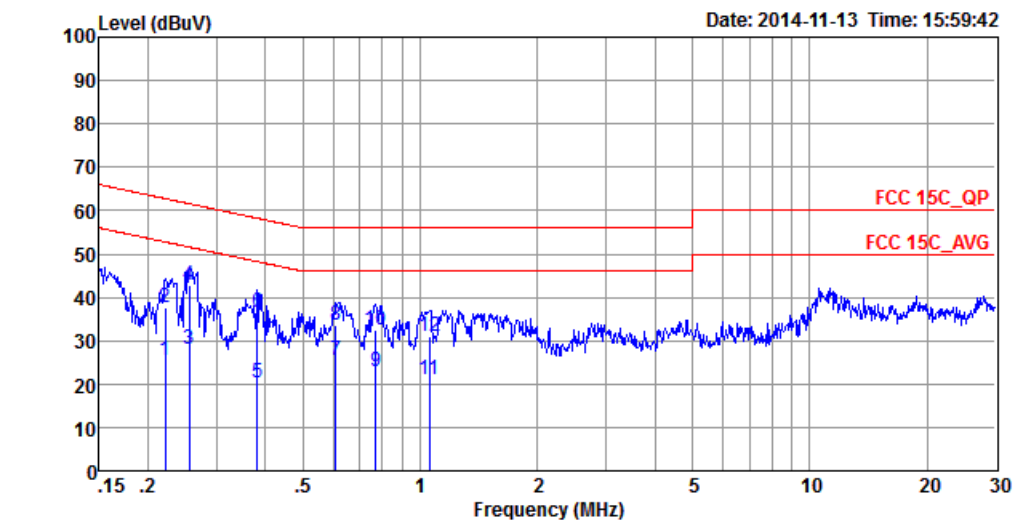
### 3.1.6 EUT Operation during Test

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

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

|               |                                                                      |               |                        |
|---------------|----------------------------------------------------------------------|---------------|------------------------|
| Test Date     | Nov. 13, 2014                                                        | Test Site No. | CO01-SZ                |
| Temperature   | 21~22℃                                                               | Humidity      | 41~42%                 |
| Test Engineer | Jack Tian                                                            | Configuration | ANT+ Transmitting Mode |
| Mode          | GSM1900 Idle + USB Cable (Charging from Adapter) + Earphone + ANT+TX |               |                        |

Line

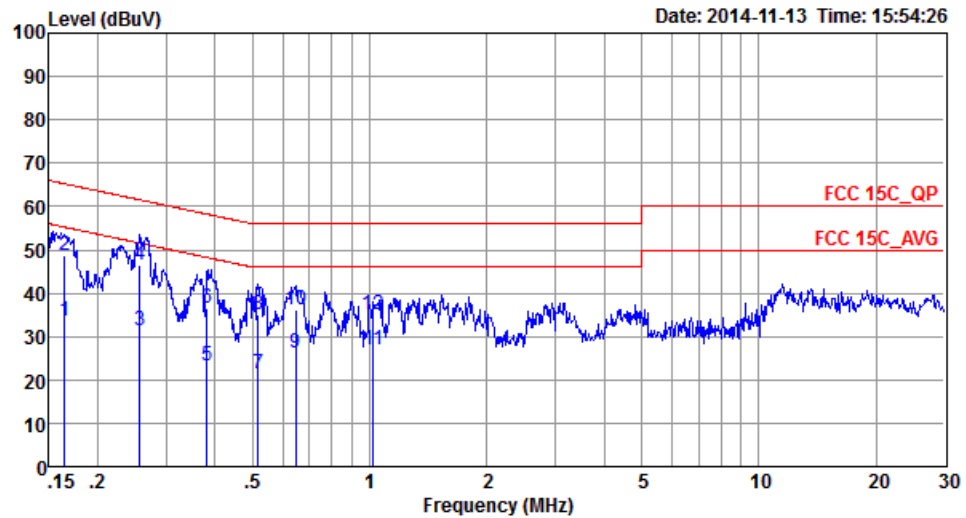


Site : CO01-SZ  
Condition: FCC 15C\_QP LISN\_L\_20140304 LINE

|     | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  |
|-----|------|-------|------------|------------|------------|-------------|------------|---------|
|     | MHz  | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |
| 1   | 0.22 | 25.40 | -27.34     | 52.74      | 14.90      | 0.23        | 10.27      | Average |
| 2   | 0.22 | 37.80 | -24.94     | 62.74      | 27.30      | 0.23        | 10.27      | QP      |
| 3   | 0.25 | 27.88 | -23.72     | 51.60      | 17.40      | 0.24        | 10.24      | Average |
| 4 * | 0.25 | 42.98 | -18.62     | 61.60      | 32.50      | 0.24        | 10.24      | QP      |
| 5   | 0.38 | 20.45 | -27.80     | 48.25      | 9.99       | 0.28        | 10.18      | Average |
| 6   | 0.38 | 36.45 | -21.80     | 58.25      | 25.99      | 0.28        | 10.18      | QP      |
| 7   | 0.61 | 25.38 | -20.62     | 46.00      | 15.00      | 0.23        | 10.15      | Average |
| 8   | 0.61 | 33.48 | -22.52     | 56.00      | 23.10      | 0.23        | 10.15      | QP      |
| 9   | 0.77 | 23.05 | -22.95     | 46.00      | 12.70      | 0.20        | 10.15      | Average |
| 10  | 0.77 | 32.55 | -23.45     | 56.00      | 22.20      | 0.20        | 10.15      | QP      |
| 11  | 1.05 | 21.01 | -24.99     | 46.00      | 10.60      | 0.26        | 10.15      | Average |
| 12  | 1.05 | 30.91 | -25.09     | 56.00      | 20.50      | 0.26        | 10.15      | QP      |



## Neutral



Site : CO01-SZ

Condition: FCC 15C\_QP LISN\_N\_20140304 NEUTRAL

|     | Freq | Level | Over<br>Limit | Limit<br>Line | Read<br>Level | LISN<br>Factor | Cable<br>Loss | Remark  |
|-----|------|-------|---------------|---------------|---------------|----------------|---------------|---------|
|     | MHz  | dBuV  | dB            | dBuV          | dBuV          | dB             | dB            |         |
| 1   | 0.16 | 33.57 | -21.68        | 55.25         | 22.90         | 0.33           | 10.34         | Average |
| 2   | 0.16 | 48.67 | -16.58        | 65.25         | 38.00         | 0.33           | 10.34         | QP      |
| 3   | 0.26 | 31.38 | -20.18        | 51.56         | 20.80         | 0.34           | 10.24         | Average |
| 4 * | 0.26 | 46.58 | -14.98        | 61.56         | 36.00         | 0.34           | 10.24         | QP      |
| 5   | 0.38 | 23.16 | -25.09        | 48.25         | 12.60         | 0.38           | 10.18         | Average |
| 6   | 0.38 | 36.56 | -21.69        | 58.25         | 26.00         | 0.38           | 10.18         | QP      |
| 7   | 0.52 | 21.45 | -24.55        | 46.00         | 10.90         | 0.39           | 10.16         | Average |
| 8   | 0.52 | 35.05 | -20.95        | 56.00         | 24.50         | 0.39           | 10.16         | QP      |
| 9   | 0.64 | 26.14 | -19.86        | 46.00         | 15.70         | 0.29           | 10.15         | Average |
| 10  | 0.64 | 36.04 | -19.96        | 56.00         | 25.60         | 0.29           | 10.15         | QP      |
| 11  | 1.02 | 26.78 | -19.22        | 46.00         | 16.30         | 0.33           | 10.15         | Average |
| 12  | 1.02 | 35.08 | -20.92        | 56.00         | 24.60         | 0.33           | 10.15         | QP      |

### 3.2 20dB and & 99% Occupied Bandwidth

#### 3.2.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band.

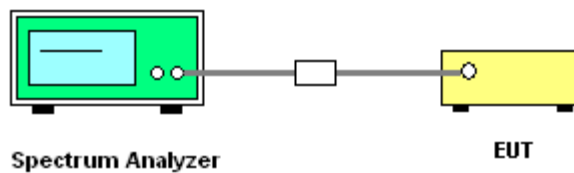
#### 3.2.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

#### 3.2.3 Test Procedures

1. The transmitter output port was connected to the spectrum analyzer.
2. Measured the spectrum width with highest power setting.

#### 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.

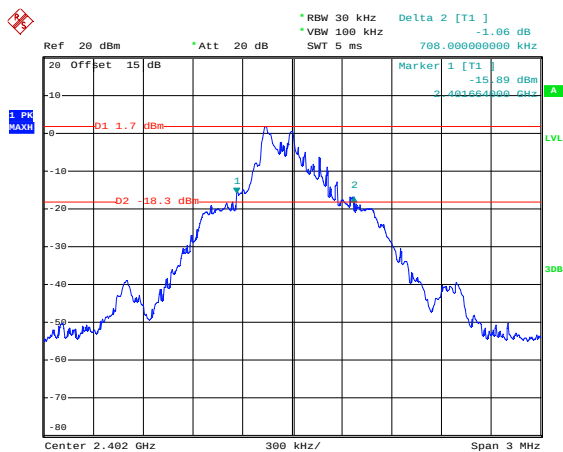


## 3.2.7 Test Result of 20dB Spectrum Bandwidth

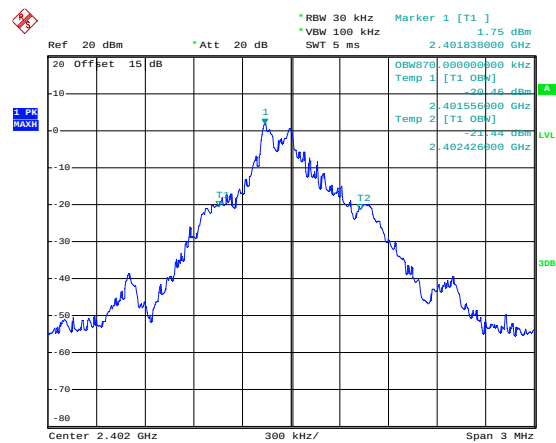
|               |               |               |         |
|---------------|---------------|---------------|---------|
| Test Date     | Nov. 22, 2014 | Test Site No. | TH01-SZ |
| Temperature   | 24~26°C       | Humidity      | 50~53%  |
| Test Engineer | Fly Liang     |               |         |

| Frequency | 20dB BW<br>(MHz) | 99% OBW<br>(MHz) |
|-----------|------------------|------------------|
| 2402MHz   | 0.708            | 0.870            |
| 2441MHz   | 0.750            | 0.876            |
| 2480MHz   | 0.702            | 0.858            |

20 dB Bandwidth Plot on 2402MHz



99% Bandwidth Plot on 2402MHz

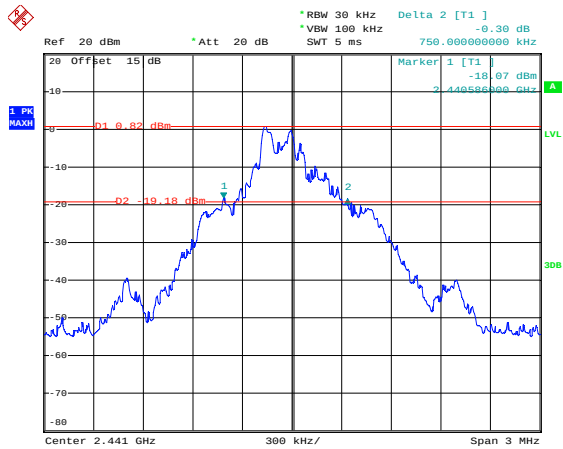


Date: 22.NOV.2014 13:17:09

Date: 22.NOV.2014 13:58:11

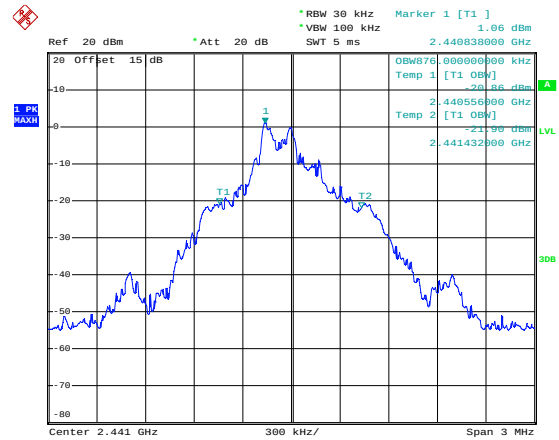


20 dB Bandwidth Plot on 2441MHz



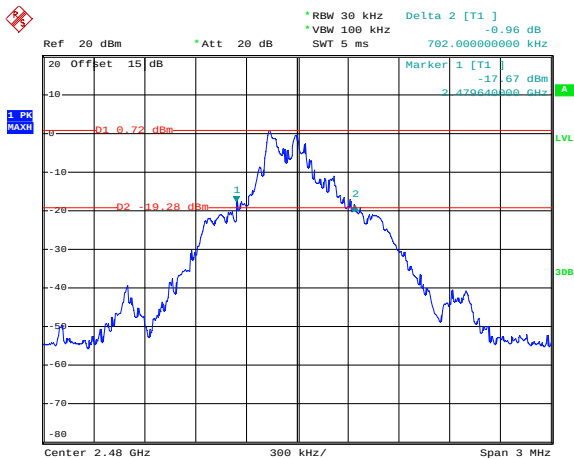
Date: 22.NOV.2014 13:23:45

99% Bandwidth Plot on 2441MHz



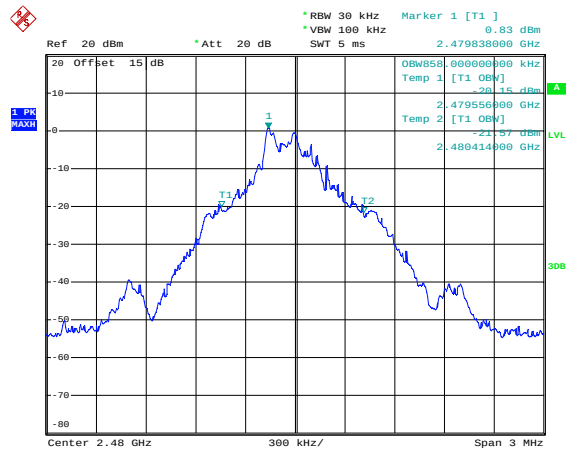
Date: 22.NOV.2014 13:52:11

20 dB Bandwidth Plot on 2480MHz



Date: 22.NOV.2014 13:29:38

99% Bandwidth Plot on 2480MHz



Date: 22.NOV.2014 13:47:13

### 3.3 Field Strength of Fundamental Emissions and Radiated Spurious Emissions

#### 3.3.1 Limit

The field strength measured at 3 meters shall not exceed the limits in the following table:

| Fundamental<br>Frequencies(MHz) | Field Strength(millivolts/m) |           |
|---------------------------------|------------------------------|-----------|
|                                 | Fundamental                  | Harmonics |
| 902~928                         | 50                           | 0.5       |
| 2400~2483.5                     | 50                           | 0.5       |
| 5725~5875                       | 50                           | 0.5       |

**Note:** The limits shown in the above table are based on measurements using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using a CISPR quasi-peak detector.

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in 15.209 as below, whichever is less stringent.

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | 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                                |



### 3.3.2 Measuring Instruments

Please refer to section 4 of equipment list in this report.

### 3.3.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.

**Remark:**

1. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
2. For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds

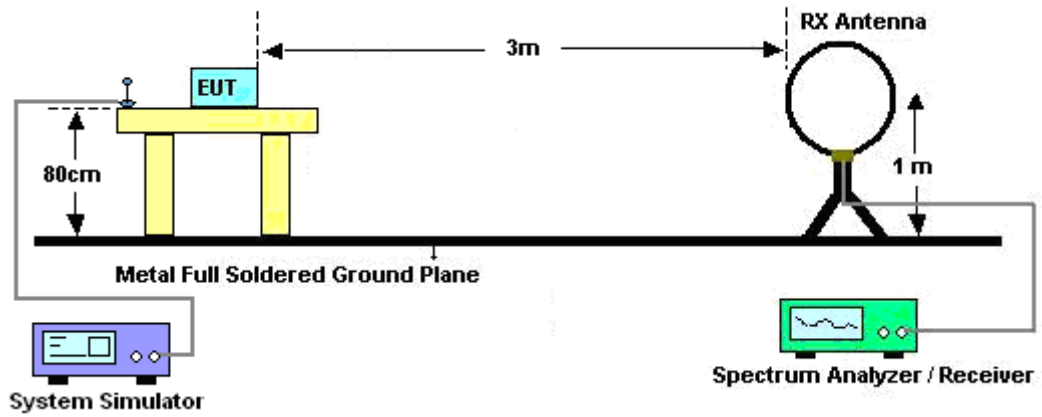
On time =  $N1 \cdot L1 + N2 \cdot L2 + \dots + Nn-1 \cdot L_{Nn-1} + Nn \cdot Ln$

Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

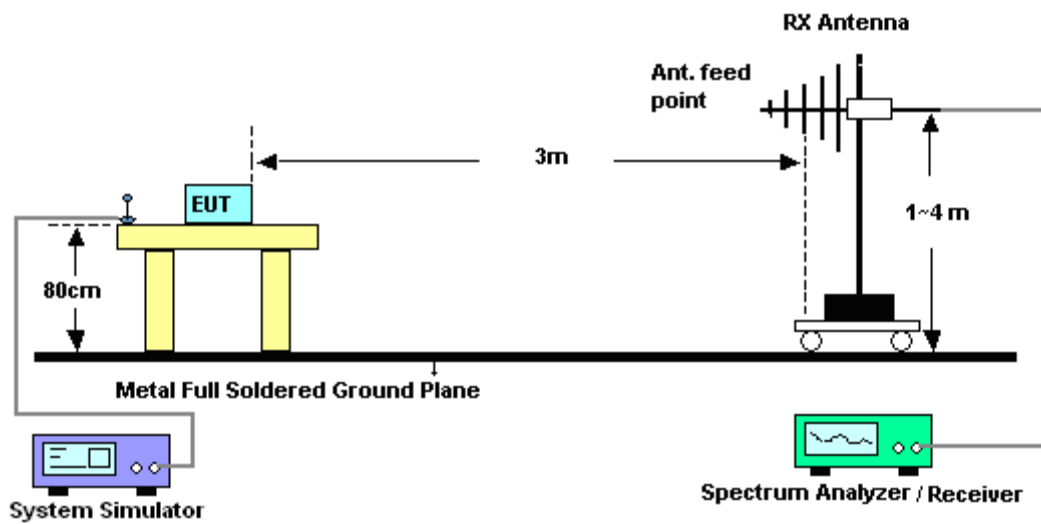
Average Emission Level = Peak Emission Level +  $20 \cdot \log(\text{Duty cycle})$

### 3.3.4 Test Setup Layout

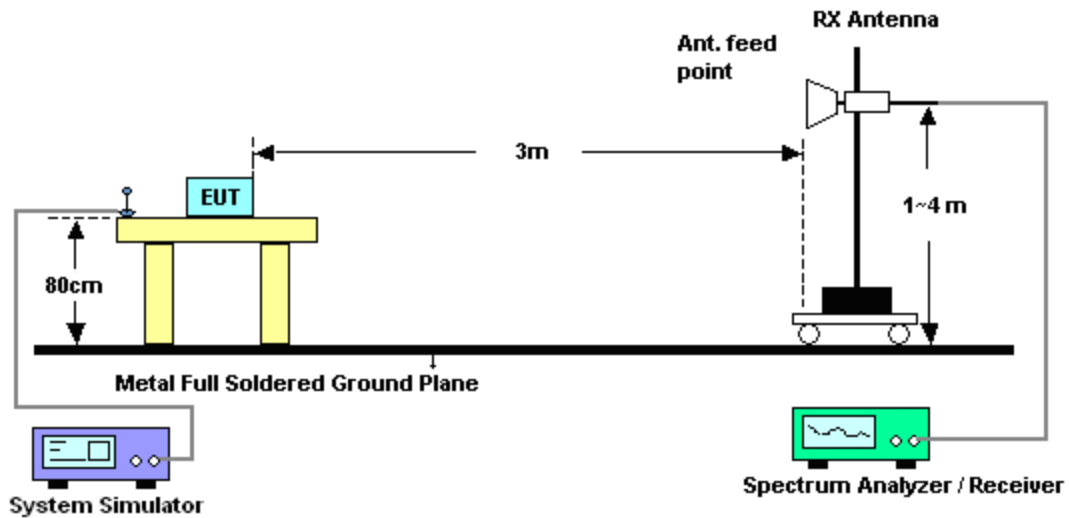
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.3.5 Test Deviation

There is no deviation with the original standard.

### 3.3.6 EUT Operation during Test

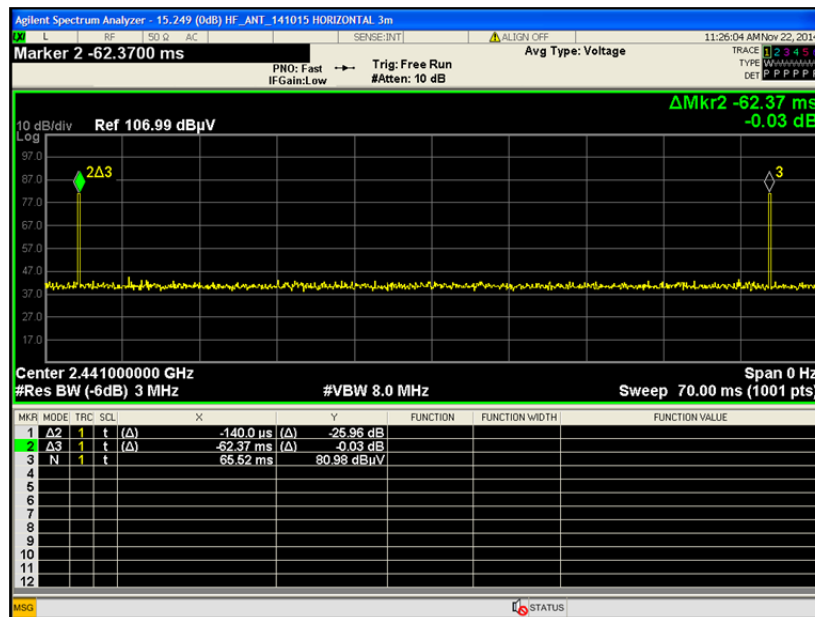
The EUT was programmed to be in continuously transmitting mode.

### 3.3.7 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

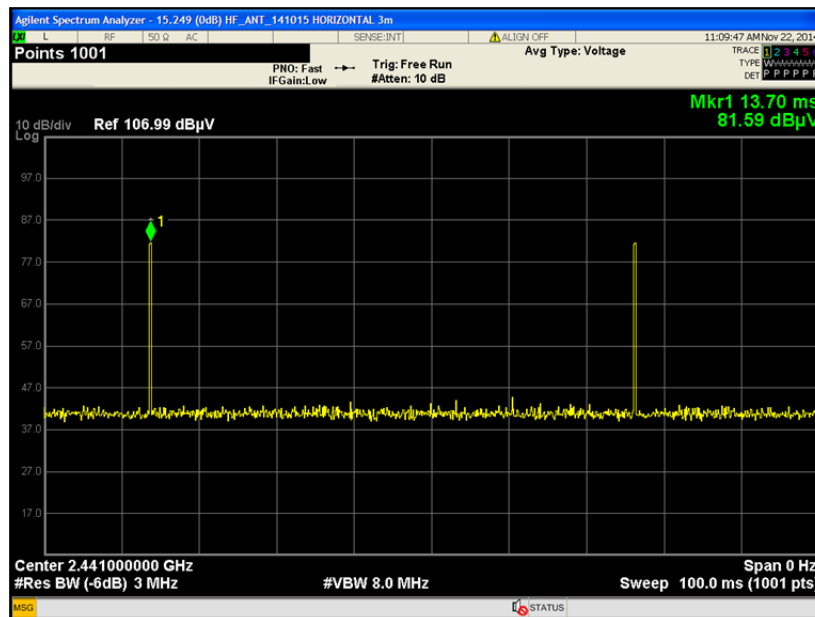
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.3.8 Duty cycle correction factor for average measurement

#### On time (One Pulse) Plot on 2441MHz



#### On time (Count Pulses) Plot on 2441MHz



#### Note:

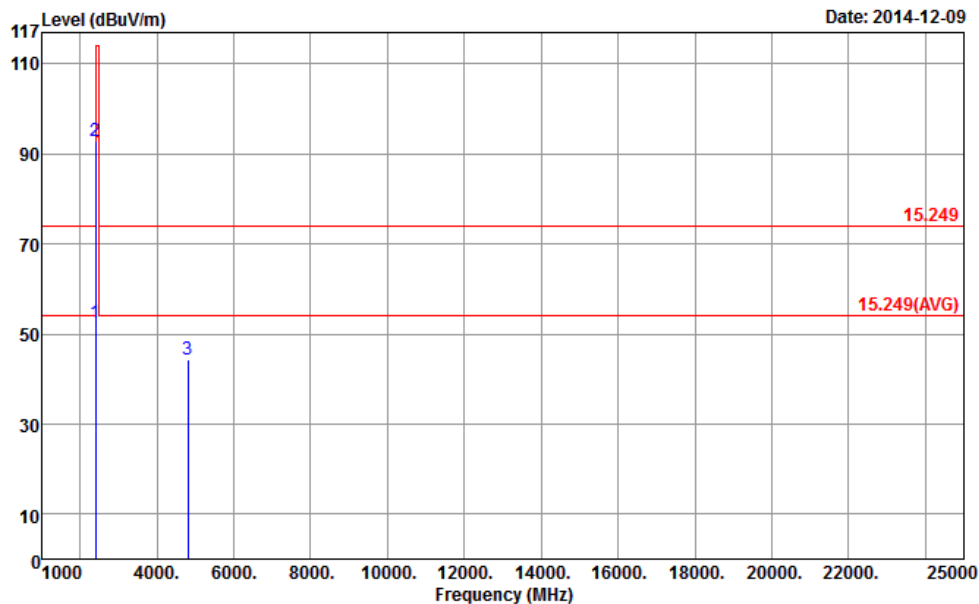
1. Worst case Duty cycle = on time/100 milliseconds =  $2 * 0.14 / 100 = 0.28 \%$
2. Worst case Duty cycle correction factor =  $20 * \log(\text{Duty cycle}) = -51.06 \text{ dB}$



## 3.3.9 Test Result of Field Strength of Fundamental Emissions and Spurious Emissions

**Note:** Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

|             |                               |               |             |
|-------------|-------------------------------|---------------|-------------|
| Test Date   | Nov. 22, 2014 ~ Dec. 09, 2014 | Test Engineer | Gavin Zhang |
| Temperature | 23~25°C                       | Humidity      | 48~52%      |

**2402MHz**

Site : 03CH01-SZ  
Condition : 15.249 3m HF ANT 141015 HORIZONTAL

Plane : Y

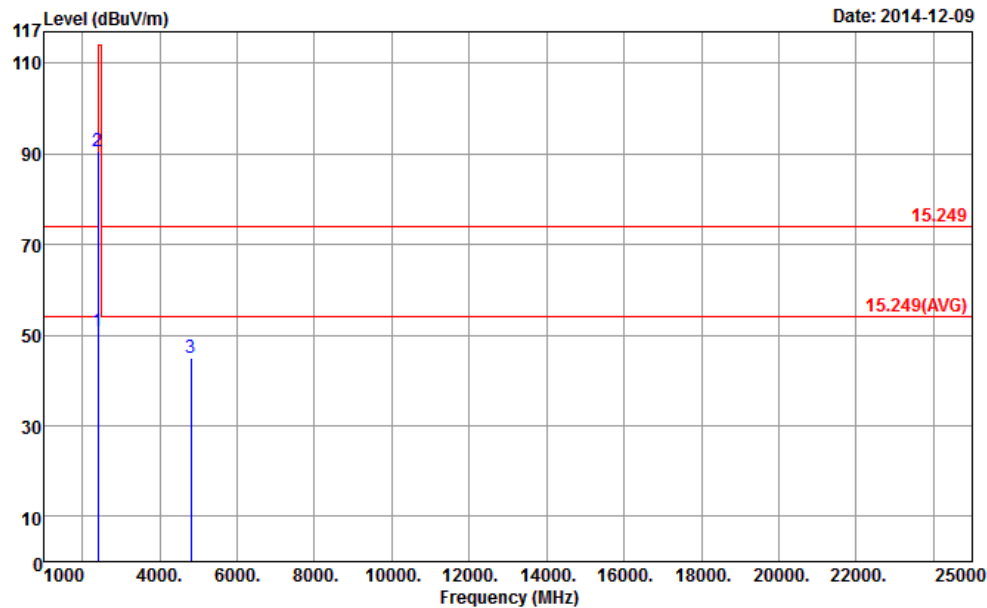
|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|-------|-------|--------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            | cm    | deg   |        |
| 1 | 2400.00 | 52.45  | -21.55     | 74.00      | 40.51             | 32.60          | 8.60       | 29.26         | 121   | 51    | Peak   |
| 2 | 2402.00 | 92.94  | -21.06     | 114.00     | 81.00             | 32.60          | 8.60       | 29.26         | 121   | 51    | Peak   |
| 3 | 4804.00 | 44.29  | -29.71     | 74.00      | 43.50             | 34.39          | 12.86      | 46.46         | 151   | 219   | Peak   |

| Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark  |
|-------------------|------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2402              | 92.94            | -21.06            | 114                   | 81                | 32.6                  | 8.6               | 29.26                | 121            | 51                | Peak    |
| 2402              | 41.88            | -52.12            | 94                    | -                 | -                     | -                 | -                    | 121            | 51                | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.



Site : 03CH01-SZ  
Condition : 15.249 3m HF ANT 141015 VERTICAL

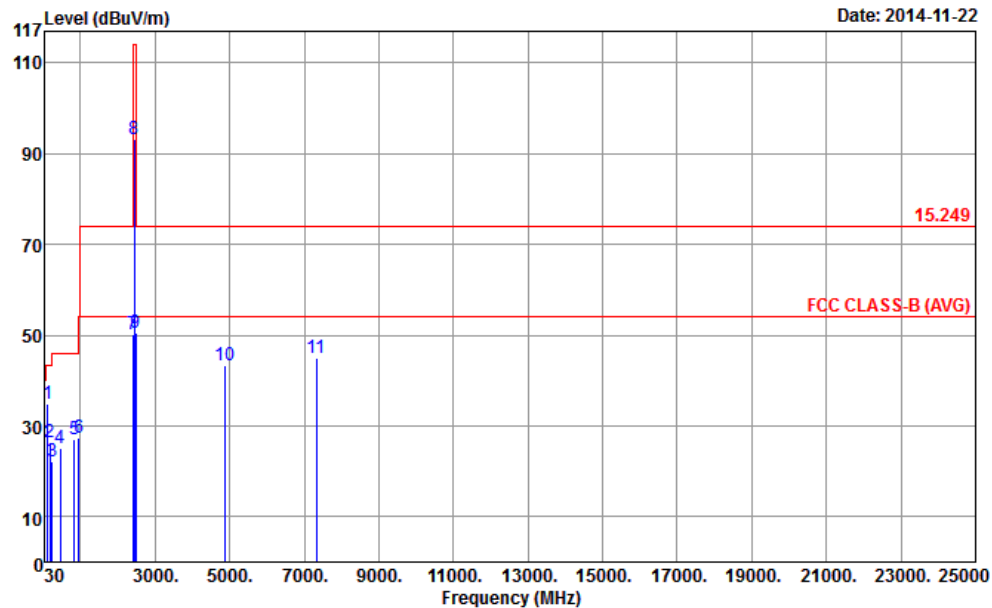
| Plane | Y       |       |        |             |        |        |        |       |        |     |      |
|-------|---------|-------|--------|-------------|--------|--------|--------|-------|--------|-----|------|
| Freq  | Level   | Over  | Limit  | ReadAntenna | Cable  | Preamp | A/Pos  | T/Pos | Remark |     |      |
| MHz   | dBuV/m  | Limit | Line   | Level       | Factor | Loss   | Factor | cm    | deg    |     |      |
| 1     | 2397.54 | 50.83 | -23.17 | 74.00       | 38.89  | 32.60  | 8.60   | 29.26 | 154    | 75  | Peak |
| 2     | 2402.00 | 90.56 | -23.44 | 114.00      | 78.62  | 32.60  | 8.60   | 29.26 | 154    | 75  | Peak |
| 3     | 4804.00 | 44.90 | -29.10 | 74.00       | 44.11  | 34.39  | 12.86  | 46.46 | 151    | 219 | Peak |

| Frequency ( MHz ) | Level ( dBuV/m ) | Over Limit ( dB ) | Limit Line ( dBuV/m ) | Read Level ( dBuV ) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark  |
|-------------------|------------------|-------------------|-----------------------|---------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2402              | 90.56            | -23.44            | 114                   | 78.62               | 32.6                  | 8.6               | 29.26                | 154            | 75                | Peak    |
| 2402              | 39.5             | -54.5             | 94                    | -                   | -                     | -                 | -                    | 154            | 75                | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.

**2441MHz**

Site : 03CH01-SZ  
 Condition : 15.249 3m LF ANT 131026 HORIZONTAL

Plane : Y

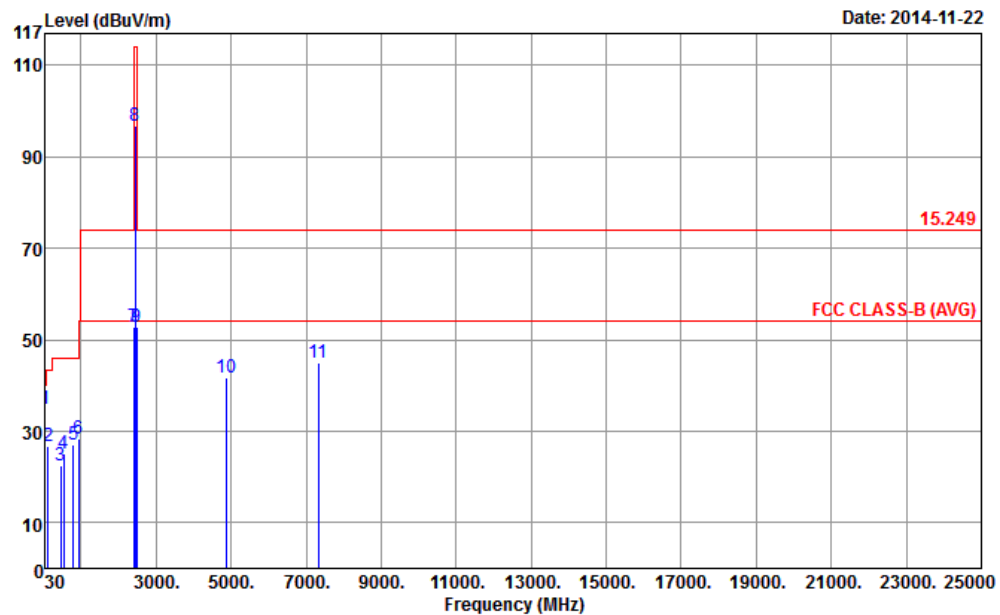
|    | Freq    | Level  | Over   | Limit  | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark   |
|----|---------|--------|--------|--------|-------------|-------|--------|-------|-------|----------|
|    | MHz     | dBuV/m | Limit  | Line   | Level       | Loss  | Factor | cm    | deg   |          |
| 1  | 117.30  | 34.74  | -8.76  | 43.50  | 51.88       | 11.93 | 1.67   | 30.74 | 100   | 360 Peak |
| 2  | 184.23  | 26.34  | -17.16 | 43.50  | 46.77       | 8.16  | 2.10   | 30.69 | ---   | Peak     |
| 3  | 246.31  | 22.23  | -23.77 | 46.00  | 38.72       | 11.62 | 2.46   | 30.57 | ---   | Peak     |
| 4  | 449.04  | 25.08  | -20.92 | 46.00  | 35.93       | 15.98 | 3.40   | 30.23 | ---   | Peak     |
| 5  | 825.40  | 27.05  | -18.95 | 46.00  | 31.01       | 20.51 | 4.75   | 29.22 | ---   | Peak     |
| 6  | 945.68  | 27.45  | -18.55 | 46.00  | 30.03       | 21.16 | 5.01   | 28.75 | ---   | Peak     |
| 7  | 2400.00 | 50.33  | -23.67 | 74.00  | 38.39       | 32.60 | 8.60   | 29.26 | 199   | 358 Peak |
| 8  | 2441.00 | 93.05  | -20.95 | 114.00 | 80.91       | 32.65 | 8.69   | 29.20 | 199   | 358 Peak |
| 9  | 2483.50 | 50.55  | -23.45 | 74.00  | 38.25       | 32.68 | 8.78   | 29.16 | 199   | 358 Peak |
| 10 | 4882.00 | 43.35  | -30.65 | 74.00  | 42.28       | 34.43 | 12.98  | 46.34 | 115   | 258 Peak |
| 11 | 7323.00 | 45.13  | -28.87 | 74.00  | 41.53       | 36.23 | 14.71  | 47.34 | 152   | 309 Peak |

| Frequency<br>( MHz ) | Level<br>( dBμV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBμV/m ) | Read<br>Level<br>( dBμV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2441                 | 93.05               | -20.95                  | 114                         | 80.91                     | 32.65                       | 8.69                    | 29.2                       | 199                  | 358                     | Peak    |
| 2441                 | 41.99               | -52.01                  | 94                          | -                         | -                           | -                       | -                          | 199                  | 358                     | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.



Site : 03CH01-SZ  
Condition : 15.249 3m LF\_ANT\_131026 VERTICAL

Plane : Y

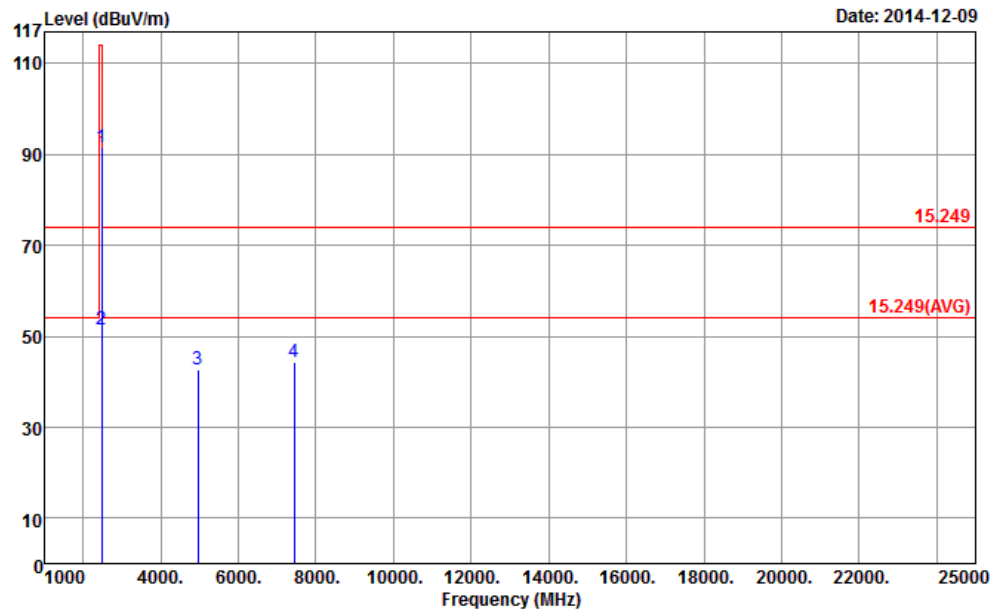
|    | Freq    | Level  | Over   | Limit  | ReadAntenna | Cable | Preamp | A/Pos | T/Pos | Remark   |
|----|---------|--------|--------|--------|-------------|-------|--------|-------|-------|----------|
|    | MHz     | dBuV/m | dB     | dBuV/m | dBuV        | dB/m  | dB     | dB    | cm    | deg      |
| 1  | 48.43   | 35.03  | -4.97  | 40.00  | 56.94       | 7.80  | 1.06   | 30.77 | 100   | 200 Peak |
| 2  | 119.24  | 26.85  | -16.65 | 43.50  | 44.00       | 11.91 | 1.68   | 30.74 | ---   | ---      |
| 3  | 449.04  | 22.53  | -23.47 | 46.00  | 33.38       | 15.98 | 3.40   | 30.23 | ---   | ---      |
| 4  | 533.43  | 25.18  | -20.82 | 46.00  | 33.71       | 17.67 | 3.72   | 29.92 | ---   | ---      |
| 5  | 800.18  | 26.99  | -19.01 | 46.00  | 31.79       | 20.00 | 4.59   | 29.39 | ---   | ---      |
| 6  | 934.04  | 28.22  | -17.78 | 46.00  | 31.03       | 21.04 | 4.98   | 28.83 | ---   | ---      |
| 7  | 2396.42 | 52.75  | -21.25 | 74.00  | 40.81       | 32.60 | 8.60   | 29.26 | 100   | 105 Peak |
| 8  | 2441.00 | 96.72  | -17.28 | 114.00 | 84.58       | 32.65 | 8.69   | 29.20 | 100   | 105 Peak |
| 9  | 2484.81 | 52.64  | -21.36 | 74.00  | 40.34       | 32.68 | 8.78   | 29.16 | 100   | 105 Peak |
| 10 | 4882.00 | 41.86  | -32.14 | 74.00  | 40.79       | 34.43 | 12.98  | 46.34 | 115   | 258 Peak |
| 11 | 7323.00 | 44.86  | -29.14 | 74.00  | 41.26       | 36.23 | 14.71  | 47.34 | 152   | 309 Peak |

| Frequency ( MHz ) | Level ( dBuV/m ) | Over Limit ( dB ) | Limit Line ( dBuV/m ) | Read Level (dBuV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark  |
|-------------------|------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2441              | 96.72            | -17.28            | 114                   | 84.58             | 32.65                 | 8.69              | 29.2                 | 100            | 105               | Peak    |
| 2441              | 45.66            | -48.34            | 94                    | -                 | -                     | -                 | -                    | 100            | 105               | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.

**2480MHz**

Site : 03CH01-SZ  
Condition : 15.249 3m HF ANT 141015 HORIZONTAL

Plane : Y

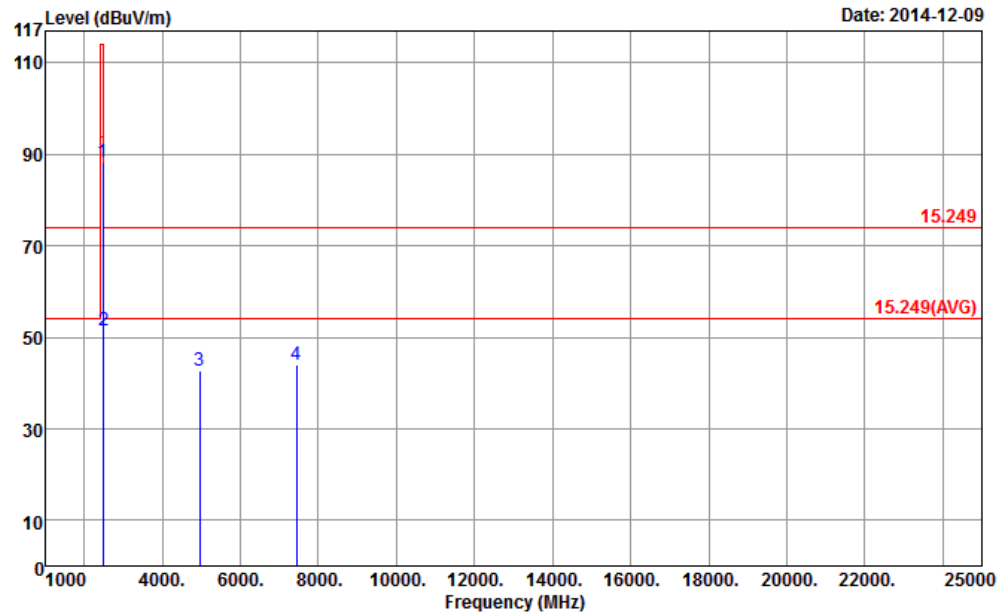
|   | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level Factor | Cable Loss | Preamp Factor | A/Pos | T/Pos | Remark   |
|---|---------|--------|------------|------------|--------------------------|------------|---------------|-------|-------|----------|
|   | MHz     | dBuV/m | dB         | dBuV/m     | dBuV                     | dB/m       | dB            | dB    | cm    | deg      |
| 1 | 2480.00 | 91.55  | -22.45     | 114.00     | 79.25                    | 32.68      | 8.78          | 29.16 | 200   | 25 Peak  |
| 2 | 2483.50 | 51.37  | -22.63     | 74.00      | 39.07                    | 32.68      | 8.78          | 29.16 | 200   | 25 Peak  |
| 3 | 4960.00 | 42.69  | -31.31     | 74.00      | 41.30                    | 34.48      | 13.10         | 46.19 | 118   | 289 Peak |
| 4 | 7440.00 | 44.33  | -29.67     | 74.00      | 40.73                    | 36.28      | 14.77         | 47.45 | 158   | 273 Peak |

| Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark  |
|-------------------|------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2480              | 91.55            | -22.45            | 114                   | 79.25             | 32.68                 | 8.78              | 29.16                | 200            | 25                | Peak    |
| 2480              | 40.49            | -53.51            | 94                    | -                 | -                     | -                 | -                    | 200            | 25                | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.



Site : 03CH01-SZ  
Condition : 15.249 3m HF ANT 141015 VERTICAL

| Plane : Y |        | Over Limit |        | Limit Line |        | ReadAntenna |        | Cable Preamp |     | A/Pos T/Pos |  | Remark |
|-----------|--------|------------|--------|------------|--------|-------------|--------|--------------|-----|-------------|--|--------|
| Freq      | Level  | Limit      | Line   | Level      | Factor | Loss        | Factor |              |     |             |  |        |
| MHz       | dBuV/m | dB         | dBuV/m | dBuV       | dB/m   | dB          | dB     | cm           | deg |             |  |        |
| 1 2480.00 | 88.37  | -25.63     | 114.00 | 76.07      | 32.68  | 8.78        | 29.16  | 100          | 86  | Peak        |  |        |
| 2 2490.68 | 51.54  | -22.46     | 74.00  | 39.20      | 32.70  | 8.78        | 29.14  | 100          | 86  | Peak        |  |        |
| 3 4960.00 | 42.71  | -31.29     | 74.00  | 41.32      | 34.48  | 13.10       | 46.19  | 118          | 289 | Peak        |  |        |
| 4 7440.00 | 44.03  | -29.97     | 74.00  | 40.43      | 36.28  | 14.77       | 47.45  | 158          | 273 | Peak        |  |        |

| Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark  |
|-------------------|------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2480              | 88.37            | -25.63            | 114                   | 76.07             | 32.68                 | 8.78              | 29.16                | 100            | 86                | Peak    |
| 2480              | 37.31            | -56.69            | 94                    | -                 | -                     | -                 | -                    | 100            | 86                | Average |

Note: For average measurement: use duty cycle correction factor method per 15.35(c).

Average measurement was not performed if peak level went lower than the average limit.

Test result of emissions which are 20 dB lower than the limit is not reported per 15.31.



### **3.4 Antenna Requirements**

#### **3.4.1 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.

#### **3.4.2 Antenna Connector Construction**

Embedded in Antenna.

**4. LIST OF MEASURING EQUIPMENT**

| Instrument                        | Manufacturer         | Model No. | Serial No.   | Characteristics | Calibration Date | Test Date                       | Due Date      | Remark                |
|-----------------------------------|----------------------|-----------|--------------|-----------------|------------------|---------------------------------|---------------|-----------------------|
| Spectrum Analyzer                 | R&S                  | FSP30     | 101400       | 9kHz~30GHz      | Mar. 03, 2014    | Nov. 22, 2014                   | Mar. 02, 2015 | Conducted (TH01-SZ)   |
| Power Meter                       | Anritsu              | ML2495A   | 1218010      | 0.3GHz~6GHz     | Mar. 03, 2014    | Nov. 22, 2014                   | Mar. 02, 2015 | Conducted (TH01-SZ)   |
| Power Sensor                      | Dare                 | RPR3006W  | TH01SZ00019  | 0.3GHz~6GHz     | Mar. 14, 2014    | Nov. 22, 2014                   | Mar. 13, 2015 | Conducted (TH01-SZ)   |
| ESCIO TEST Receiver               | R&S                  | ESCI      | 100724       | 9kHz~3GHz       | Feb. 21, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Feb. 20, 2015 | Radiation (03CH01-SZ) |
| Spectrum Analyzer                 | Agilent Technologies | N9038A    | MY52260185   | 20Hz~26.5GHz    | May 26, 2014     | Nov. 22, 2014~<br>Dec. 09, 2014 | May 25, 2015  | Radiation (03CH01-SZ) |
| Loop Antenna                      | R&S                  | HFH2-Z2   | 100354       | 9kHz~30MHz      | May 09, 2014     | Nov. 22, 2014~<br>Dec. 09, 2014 | May 08, 2015  | Radiation (03CH01-SZ) |
| Bilog Antenna                     | TESEQ                | CBL 6112D | 37877        | 30MHz~2GHz      | Oct. 15, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Oct. 14, 2015 | Radiation (03CH01-SZ) |
| Double Ridge Horn Antenna         | ETS Lindgren         | 3117      | 00119436     | 1GHz~18GHz      | Oct. 15, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Oct. 14, 2015 | Radiation (03CH01-SZ) |
| Double Ridged Horn Antenna        | COM-POWER            | AH-840    | 101073       | 18GHz~40GHz     | Jun. 09, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Jun. 08, 2015 | Radiation (03CH01-SZ) |
| Amplifier                         | ADVANTEST            | BB525C    | E9007003     | 9kHz~3000MHz    | Feb. 21, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Feb. 20, 2015 | Radiation (03CH01-SZ) |
| Amplifier                         | Yiai                 | AV3860B   | 04030        | 2GHz~26.5GHz    | May 08, 2014     | Nov. 22, 2014~<br>Dec. 09, 2014 | May 07, 2015  | Radiation (03CH01-SZ) |
| AC Source(AVR)                    | Chroma               | 61601     | 616010001985 | 100Vac~250Vac   | Mar. 25, 2014    | Nov. 22, 2014~<br>Dec. 09, 2014 | Mar. 24, 2015 | Radiation (03CH01-SZ) |
| Turn Table                        | EM Electronics       | EM 1000   | N/A          | 0~360 degree    | NCR              | Nov. 22, 2014~<br>Dec. 09, 2014 | NCR           | Radiation (03CH01-SZ) |
| Antenna Mast                      | EM Electronics       | EM 1000   | N/A          | 1 m~4 m         | NCR              | Nov. 22, 2014~<br>Dec. 09, 2014 | NCR           | Radiation (03CH01-SZ) |
| ESCIO TEST Receiver               | R&S                  | ESCI      | 100724       | 9kHz~3GHz       | Feb. 21, 2014    | Nov. 13, 2014                   | Feb. 20, 2015 | Conduction (CO01-SZ)  |
| AC LISN                           | EMCO                 | 3816/2SH  | 00103912     | 9kHz~30MHz      | Mar. 04, 2014    | Nov. 13, 2014                   | Mar. 03, 2015 | Conduction (CO01-SZ)  |
| AC LISN (for auxiliary equipment) | EMCO                 | 3816/2SH  | 00103892     | 9kHz~30MHz      | Mar. 04, 2014    | Nov. 13, 2014                   | Mar. 03, 2015 | Conduction (CO01-SZ)  |
| AC Power Source                   | Chroma               | 61602     | 616020000891 | 100Vac~250Vac   | Dec. 17, 2013    | Nov. 13, 2014                   | Dec. 16, 2014 | Conduction (CO01-SZ)  |

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