



# EMC Test Report

**Product Name: cdma2000 Digital Mobile Phone**

**Model Number: HUAWEI M835/M835/HUAWEI C8500-3/C8500-3**

**Report No: SYBH(Z-EMC)047122010-2**  
**FCC ID: QISM835**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808 Fax: +86 755 89652518

---

## Notice 1

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
4. The test report is invalid if not marked with "exclusive stamp for the test report".
5. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
8. Normally, the test report is only responsible for the samples that have undergone the test.
9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.

## Notice 2

Modification Information:

### Modification Information

|                          |   |                        |
|--------------------------|---|------------------------|
| Modification Information | 1 |                        |
|                          | 2 |                        |
|                          | 3 | <i>Not Applicable!</i> |
|                          | 4 |                        |
|                          | 5 |                        |
|                          | 6 |                        |
|                          | 7 |                        |





---

## **REPORT BODY CONTENT**

|     |   |    |
|-----|---|----|
| 1   | Status .....                                  | 6  |
| 1.1 | Product Information .....                     | 6  |
| 1.2 | Test Site .....                               | 6  |
| 1.3 | Test environment condition .....              | 6  |
| 2   | Summary of Results .....                      | 7  |
| 3   | Equipment Specification .....                 | 8  |
| 3.1 | General Description .....                     | 8  |
| 4   | System Configuration during EMC Test .....    | 10 |
| 4.1 | Cables Used during Test .....                 | 10 |
| 4.2 | Associated Equipment Used during Test .....   | 10 |
| 4.3 | Test Configurations and Test Mode .....       | 10 |
| 4.4 | Test conditions and test Connections .....    | 11 |
| 5   | Electromagnetic Interference (EMI) .....      | 12 |
| 5.1 | Radiated Disturbance 30MHz to 18GHz .....     | 12 |
| 5.2 | Conducted Disturbance 0.15 MHz to 30MHz ..... | 13 |
| 5.3 | Radiated Spurious Emissions .....             | 14 |
| 6   | Main Test Instruments .....                   | 17 |
| 7   | System Measurement Uncertainty .....          | 18 |
| 8   | Graph and Data of Emission Test .....         | 19 |
| 8.1 | Radiated Disturbance .....                    | 19 |
| 8.2 | Conducted Disturbance .....                   | 21 |
| 8.3 | Radiated Spurious Emission .....              | 22 |

## 1 Status

### 1.1 Product Information

|                            |  |
|----------------------------|--|
| CLIENT:                    | Huawei Technologies Co., Ltd.                  |
| ADDRESS:                   | Bantian Longgang District Shenzhen, P.R. China |
| MANUFACTURING DESCRIPTION  | cdma2000 Digital Mobile Phone                  |
| MANUFACTURERS MODEL NUMBER | HUAWEI M835/M835/HUAWEI C8500-3/C8500-3        |

### 1.2 Test Site

Site 1:  
EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

### 1.3 Test environment condition

|                      |         |
|----------------------|---------|
| Ambient temperature  | 20~25°C |
| Relative humidity    | 40%~52% |
| Atmospheric pressure | 101kPa  |

## 2 Summary of Results

Table below shows a brief summary of the results obtained.

Summary of results

| <b>EUT Classification: Wireless Terminal</b>         |   |                                      |               |             |
|--|---|--------------------------------------|---------------|-------------|
| <b>Test Items</b>                                    | <b>Test Configuration &amp; Test Mode</b> | <b>Required Performance Criteria</b> | <b>Result</b> | <b>Site</b> |
| <u>Radiated Emissions</u><br>Enclosure Port          | TC1/TC2<br>(TM11-TM20)                    | N/A                                  | Pass          | Site1       |
| <u>Conducted Emissions</u>                           | TC1<br>(TM1-TM20)                         | N/A                                  | Pass          | Site1       |
| <u>Radiated Spurious Emissions</u><br>Enclosure Port | TC1<br>(TM1-TM9)                          | N/A                                  | Pass          | Site1       |

Note:  
1, Measurement taken is within the measurement uncertainty of measurement system.  
2, TC = Test configuration

### 3 Equipment Specification

#### 3.1 General Description

cdma2000 Digital Mobile Phone — HUAWEI M835/M835/HUAWEI C8500-3/C8500-3 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular and N.American PCS and AWS, Their band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1XEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) .

##### 3.1.1 Main Equipment Technical Data

|                     |   |
|---------------------|---|
| Description:        | cdma2000 Digital Mobile Phone           |
| Models:             | HUAWEI M835/M835/HUAWEI C8500-3/C8500-3 |
| Input Rated Voltage | 3.7V                                    |
| Extreme Voltage     | 3.6V and 4.2V                           |
| Rated Power         | Normal 3W ,Max 8 W                      |
| Dimensions          | 105mm (L)×55.8mm (W)×13.6mm (H)         |
| Weight              | <110g (with battery)                    |

##### Sub-Assembly Identity

| Mode                    |                | Work Frequency            |                         |
|-------------------------|----------------|---------------------------|-------------------------|
|                         |                | Transmitt Frequency (MHz) | Receive Frequency (MHz) |
| CDMA2000 1x and 1XEV-DO | CDMA/EVDO800   | 824-849                   | 869-894                 |
|                         | CDMA/EVDO 1900 | 1850-1910                 | 1930-1990               |
|                         | AWS/EVDO 1700  | 1710-1755                 | 2110-2155               |
| Bluetooth               |                | 2400-2483.5               |                         |
| WIFI                    |                | 2400-2483.5               |                         |
| GPS                     |                | 1575.42                   |                         |

##### Sub-Assembly Identity

| Board      |      |                               |                            |  |
|------------|------|-------------------------------|----------------------------|--|
| Model Name | Qty. | Serial                        | Description                |  |
| HC1C815M   | 1    | 3R7NAA1082500441              | Main board of Mobile Phone |  |
| Accessory  |      |                               |                            |  |
| Name       | Qty. | Manufacture                   | Serials number             | Description  |
| Adapter    | 1    | Huawei Technologies Co., Ltd. | HKAA82473545               | Adapter Model: HW-050100U1W<br>Input Voltage : ~100-240V 50/60Hz 0.2A<br>Output Voltage:  5.0V 1A<br>Rated Power: 5W   |
| Adapter    | 1    | Huawei Technologies Co., Ltd. | HKAAB2405797               | Adapter Model: HW-050100E1W<br>Input Voltage : ~100-240V 50/60Hz 0.2A<br>Output Voltage:  5.0V 1.0A<br>Rated Power: 5W |
| Adapter    | 1    | Huawei Technologies Co., Ltd. | HKAAB2456231               | Adapter Model: HW-050100B1W<br>Input Voltage : ~100-240V 50/60Hz 0.2A<br>Output Voltage:                               |

|                        |   |                                     |                  |  |
|------------------------|---|-------------------------------------|------------------|--|
|                        |   |                                     |                  | === 5.0V 1.0A<br>Rated Power: 5W   |
| Rechargeable<br>Li-ion | 1 | Huawei<br>Technologies<br>Co., Ltd. | UNHA904XA3501564 | Battery Model: HB4J1<br>Rated capacity: 1050mAh<br>Nominal Voltage: === +3.7V<br>Charging Voltage: === +4.2V |

#### 4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

##### 4.1 Cables Used during Test

Cable Used during Test

| Cable    | Quantity | Type of Cable |
|----------|----------|---------------|
| USB      | 1        | shielded      |
| Earphone | 1        | Unshielded    |

##### 4.2 Associated Equipment Used during Test

Associated Equipment Used during Test

| Name                       | Model  | Manufacturer | S/N        | Cal Date  |
|----------------------------|--------|--------------|------------|-----------|
| Radio Communication Tester | CMU200 | R&S          | 3607111817 | 2010-7-23 |
| Notebook                   | T61    | IBM          | 3108052508 | N/A       |

##### 4.3 Test Configurations and Test Mode

###### 4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

TC1:EUT powered with an adapter and connected to the test system (Base Station Simulator).  
TC2:EUT connected to the notebook by USB port.

Configuration table

|         |          |
|---------|----------|
| TC1/TC2 | TM1~TM20 |
|---------|----------|

###### 4.3.2 Test Mode

There were 20 test Modes. TM1 to TM20 were shown in the diagrams below:

|      |                                     |
|------|-------------------------------------|
| TM1  | operate in traffic mode CDMA800;    |
| TM2  | operate in traffic mode EVDO800.0;  |
| TM3  | operate in traffic mode EVDO800.A;  |
| TM4  | operate in traffic mode CDMA1900;   |
| TM5  | operate in traffic mode EVDO1900.0; |
| TM6  | operate in traffic mode EVDO1900.A; |
| TM7  | operate in traffic mode CDMA AWS;   |
| TM8  | operate in traffic mode EVDO AWS.0; |
| TM9  | operate in traffic mode EVDO AWS.A; |
| TM10 | operate in traffic mode GPS;        |
| TM11 | operate in idle mode CDMA800;       |
| TM12 | operate in idle mode EVDO800.0;     |
| TM13 | operate in idle mode EVDO800.A;     |
| TM14 | operate in idle mode CDMA1900;      |
| TM15 | operate in idle mode EVDO1900.0;    |
| TM16 | operate in idle mode EVDO1900.A;    |
| TM17 | operate in idle mode CDMA AWS;      |

|      |                                  |
|------|----------------------------------|
| TM18 | operate in idle mode EVDO AWS.0; |
| TM19 | operate in idle mode EVDO AWS.A; |
| TM20 | operate in idle mode GPS;        |

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

#### 4.4 Test conditions and test Connections

##### 4.4.1 Test Conditions

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

##### 4.4.2 Test connections

Traffic Mode:

The EUT is required to be in the traffic mode, a call is set up according to the generic call set up procedure and enter the EUT into loop back test mode.

For CDMA, the following conditions shall also be met:

- The EUT shall be commanded to operate at maximum transmit power;

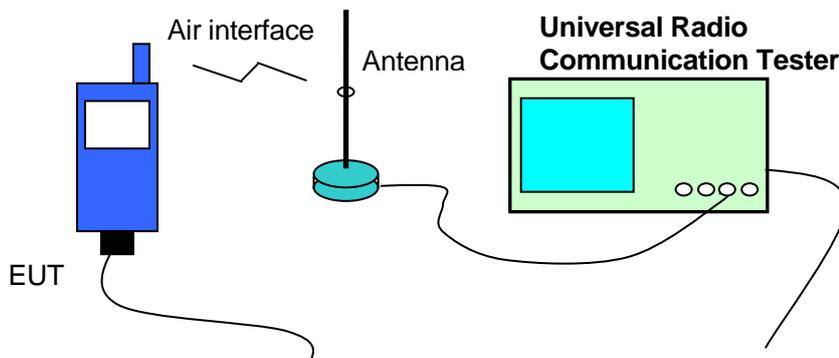


Figure 1.: Test Configuration

Idle Mode:

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

The EUT is required to be in the idle mode.

For CDMA, the following conditions shall be met:

- UE shall be camped on a cell;
- UE shall perform Location Registration (LR) before the test, but not during the test;
- UE's neighbour cell list shall be empty;

For Cellular, the following conditions shall be met:

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

## 5 Electromagnetic Interference (EMI)

### 5.1 Radiated Disturbance 30MHz to 18GHz

#### 5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance was 3m. The set-up and test methods were according to ANSI C63.4 .

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; the emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV detector (above 1GHz). The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

EUT was configured in idle mode and the test performed at worst emission state.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Measurement bandwidth: 1GHz – 18GHz: 1MHz

Test set up figure:

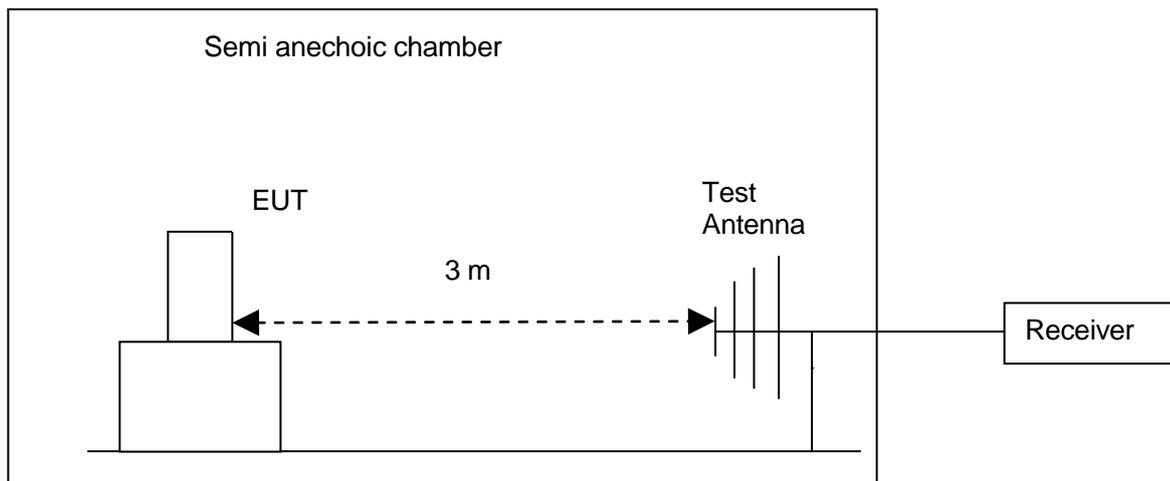


Figure 2. Test set-up

#### 5.1.2 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.

Test Limits

| Frequency of Emission (MHz) | Radiated Limit                 |   |
|-----------------------------|--------------------------------|---|
|                             | Unit( $\mu\text{V}/\text{m}$ ) | Unit( $\text{dB}\mu\text{V}/\text{m}$ ) |
| 30-88                       | 100                            | 40                                      |
| 88-216                      | 150                            | 43.5                                    |
| 216-960                     | 200                            | 46                                      |
| Above 960                   | 500                            | 54                                      |

## 5.2 Conducted Disturbance 0.15 MHz to 30MHz

### 5.2.1 Test Procedure

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

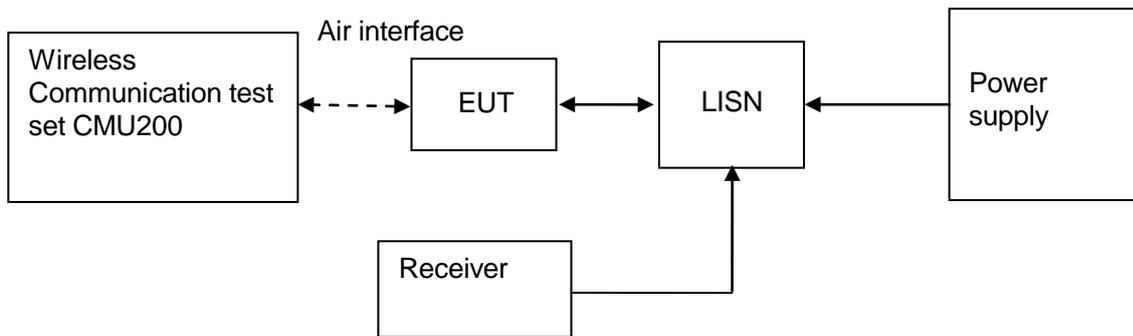


Figure 3. Test Set-up

### 5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

Test Limit of DC&AC Power Port

| Frequency range | 150kHz~ 30MHz    |                  |
|-----------------|------------------|------------------|
| Classification  | Class B          |                  |
| Limit(Class B)  | Voltage limits   |                  |
|                 | QP               | AV               |
| 0.15MHz~0.5MHz  | 66~56 dB $\mu$ V | 56~46 dB $\mu$ V |
| 0.5MHz~5MHz     | 56 dB $\mu$ V    | 46 dB $\mu$ V    |
| 5MHz~30MHz      | 60 dB $\mu$ V    | 50 dB $\mu$ V    |

### 5.3 Radiated Spurious Emissions

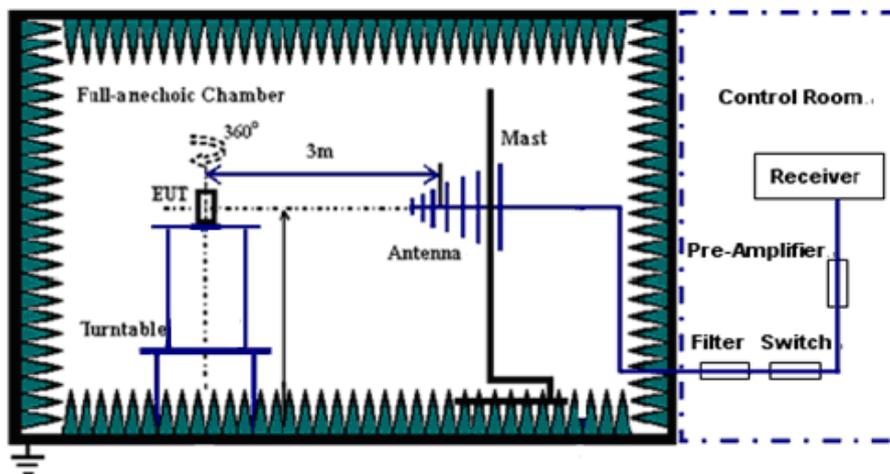
#### 5.3.1 Test Procedure

A test site fulfilling the requirements of ITU-R Recommendation SM329-10 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads.

Step 1:

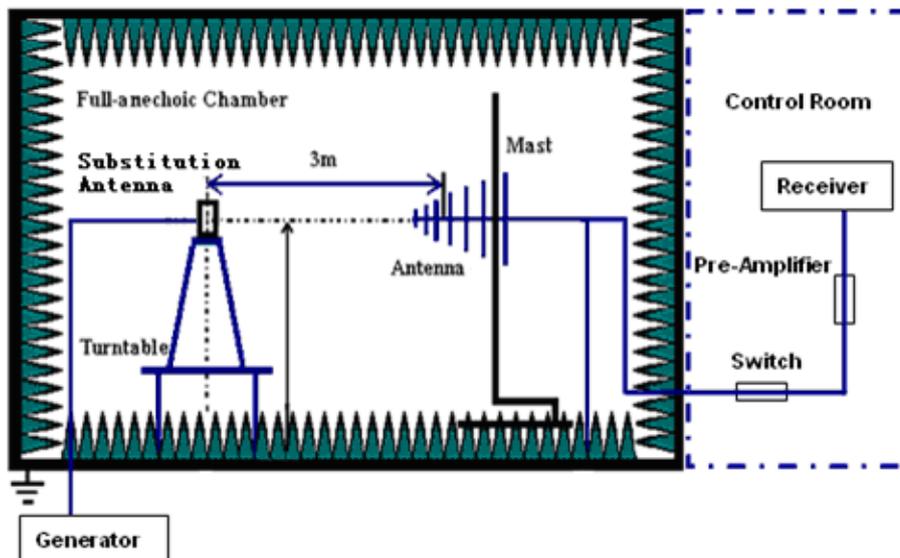
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Test Receiver from test antenna.



Step 2:

Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step1 on Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;  
Measurement bandwidth (RBW) for 30MHz up to 1 GHz: 100 kHz;  
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

Radiated Spurious Emissions Limits

| Frequency band | Minimum requirement (E.R.P) traffic mode |
|----------------|--|
| 9KHz~18GHz     | -13dBm                                   |

According to part 24.238, the defined measurement bandwidth as following:

24.238(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;  
Measurement bandwidth (RBW) for 30MHz up to 26.5GHz: 1MHz;

Radiated Spurious Emissions Limits

| Frequency band | Minimum requirement (E.R.P) traffic mode |
|----------------|--|
| 9KHz~26.5GHz   | -13dBm                                   |

According to part 27.53, the defined measurement bandwidth as following:

27.53(h) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;  
Measurement bandwidth (RBW) for 30MHz up to 18GHz: 1MHz;

Radiated Spurious Emissions Limits

| Frequency band | Minimum requirement (E.R.P) traffic mode |
|----------------|--|
| 9KHz~18GHz     | -13dBm                                   |

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method isn't used.

Calculation Sample:

Substitution Results

| Freq. [MHz] | Measure ment Value | Substitution Antenna Type | Gain [dBd] | Cable Loss [dB] | Signal Generator Level [dBm] | Substitution Level [dBm] | FCC limit [dBm] | Result |
|-------------|--------------------|---------------------------|------------|-----------------|------------------------------|--------------------------|-----------------|--------|
|-------------|--------------------|---------------------------|------------|-----------------|------------------------------|--------------------------|-----------------|--------|

---

---

|  |       |  |  |  |  |  |  |  |
|--|-------|--|--|--|--|--|--|--|
|  | [dBm] |  |  |  |  |  |  |  |
|  |       |  |  |  |  |  |  |  |

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{E.R.P. [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

### 5.3.2 Test Results

The EUT has met the requirements of FCC Part22/24/27.

## 6 Main Test Instruments

Main Test Equipments

| Test item            | Test Instrument   | Model        | Manufacturer | Cal-Date     | Cal Interval (month) |
|----------------------|-------------------|--------------|--------------|--------------|----------------------|
| RE&CE                | EMI Test receiver | ESU26        | R&S          | Jun.25, 2010 | 12                   |
|                      | Broadband Antenna | VULB 9163    | SCHWARZBECK  | May.15, 2010 | 12                   |
|                      | Horn Antenna      | HF906        | R&S          | May.15, 2010 | 12                   |
|                      | LISN              | ENV216       | R&S          | Jun.25.2010  | 12                   |
| RSE                  | EMI Test receiver | FSU43        | R&S          | Jun.24, 2010 | 12                   |
|                      | Broadband Antenna | VULB 9163    | SCHAFFNER    | May.15.2010  | 12                   |
|                      | Horn Antenna      | HF906        | R&S          | Jun.26, 2010 | 12                   |
| Software Information |                   |              |              |              |                      |
| Test Item            | Software Name     | Manufacturer |              | Version      |                      |
| RE/CE                | ES-K1             | R&S          |              | 1.7.1        |                      |
| RSE                  | EMC32             | R&S          |              | V8.10.10     |                      |

## 7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

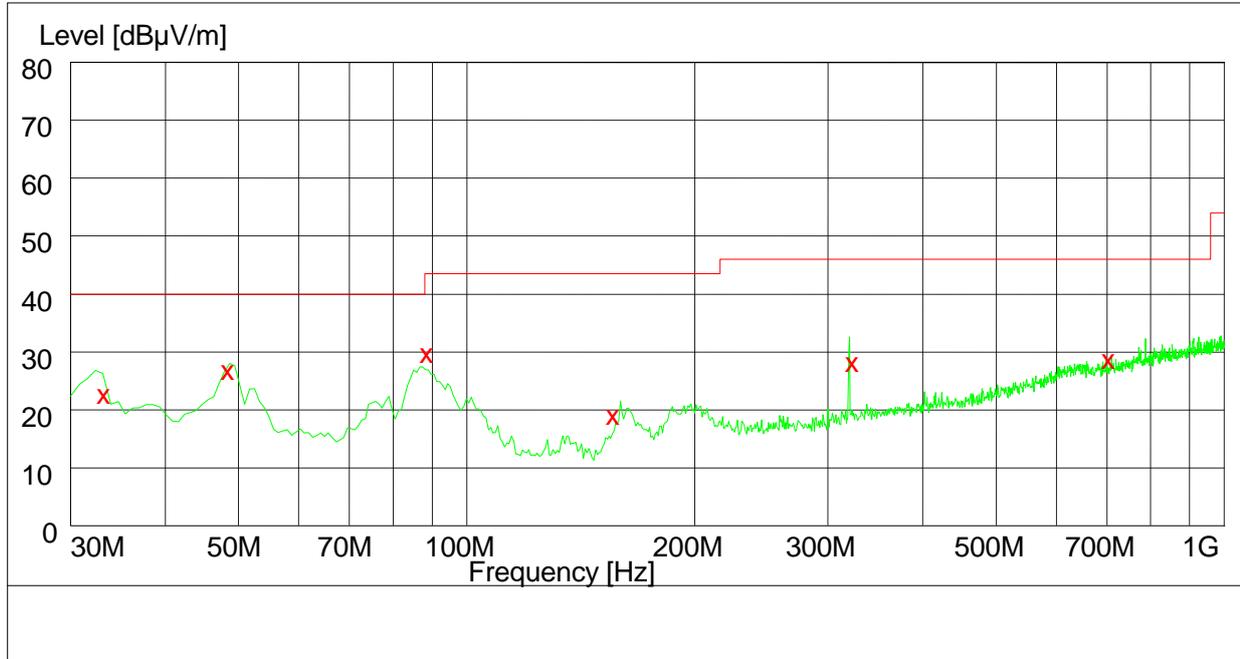
| Items |                                  | Extended Uncertainty     |
|-------|----------------------------------|--------------------------|
| RE    | Field strength (dB $\mu$ V/m)    | U=4.1dB; k=2(30MHz-1GHz) |
| RE    | Field strength (dB $\mu$ V/m)    | U=4.1dB; k=2(1GHz-18GHz) |
| RSE   | ERP (dBm)                        | U=2.8dB; k=2             |
| CE    | Disturbance Voltage (dB $\mu$ V) | U=3.4dB; k=2             |

## 8 Graph and Data of Emission Test

### 8.1 Radiated Disturbance

This test was carried out in all the test modes, here only the worst test result was shown.

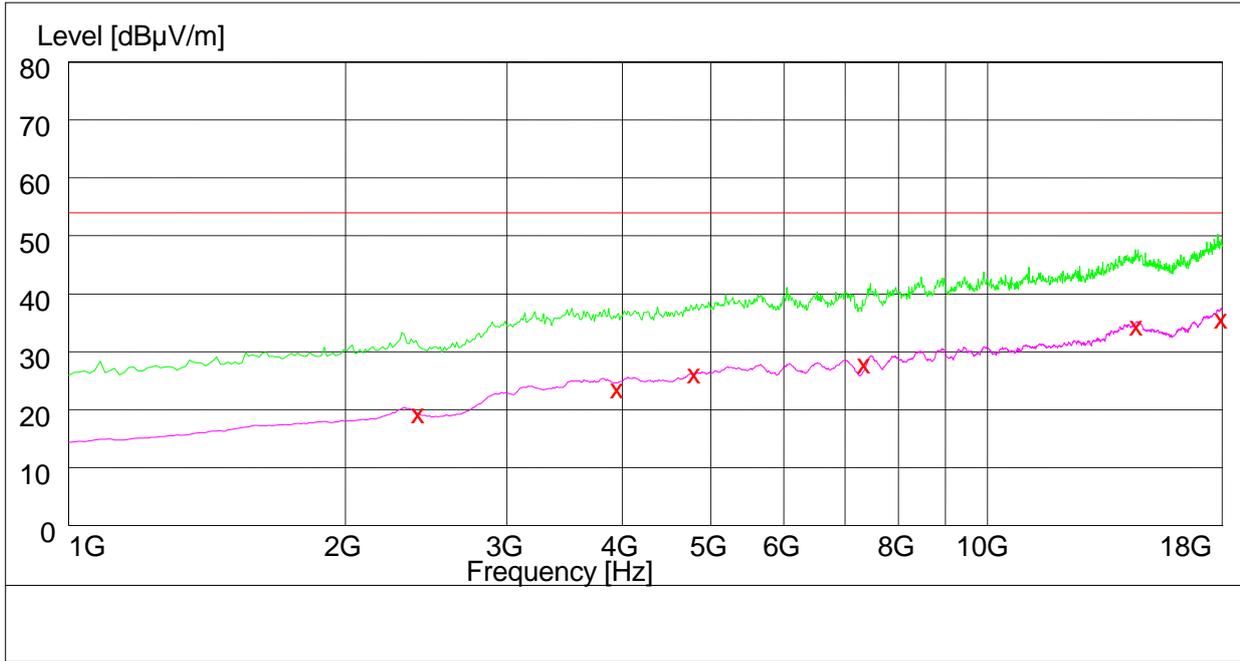
#### 30MHz-1GHz



#### MEASUREMENT RESULT: QP Detector

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 33.228000     | 23.90        | 11.7      | 40.0         | 16.1      | 100.0     | 55.00       | HORIZONTAL   |
| 48.472000     | 28.10        | 12.9      | 40.0         | 11.9      | 200.0     | 138.00      | VERTICAL     |
| 88.636000     | 30.90        | 11.5      | 43.5         | 12.6      | 100.0     | 342.00      | HORIZONTAL   |
| 156.204000    | 20.30        | 9.3       | 43.5         | 23.2      | 124.0     | 254.00      | VERTICAL     |
| 323.148000    | 29.40        | 16.0      | 46.0         | 16.6      | 111.0     | 189.00      | HORIZONTAL   |
| 705.228000    | 30.00        | 23.3      | 46.0         | 16.0      | 124.0     | 218.00      | HORIZONTAL   |

**1GHz-18GHz**



**MEASUREMENT RESULT: AV Detector**

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Height cm | Azimuth deg | Polarisation |
|---------------|--------------|-----------|--------------|-----------|-----------|-------------|--------------|
| 2402.000000   | 20.50        | -11.5     | 54.0         | 33.5      | 158.0     | 268.00      | HORIZONTAL   |
| 3960.500000   | 24.80        | -6.0      | 54.0         | 29.2      | 112.0     | 346.00      | VERTICAL     |
| 4800.000000   | 27.30        | -4.1      | 54.0         | 26.7      | 169.0     | 265.00      | VERTICAL     |
| 7340.000000   | 29.10        | 0.8       | 54.0         | 24.9      | 136.0     | 168.00      | HORIZONTAL   |
| 14524.500000  | 35.70        | 12.3      | 54.0         | 18.3      | 141.0     | 365.00      | VERTICAL     |
| 17974.600000  | 36.80        | 17.1      | 54.0         | 17.2      | 139.0     | 328.00      | HORIZONTAL   |