



Report No: SYBH(R)80052007EB-2
FCC ID: QISE960

FCC TEST REPORT OF Huawei E960 Wireless Gateway

M/N: E960

JUL. 21, 2007

Reliability Laboratory of Huawei Technologies Co., Ltd.

All Right Reserved

Notice

| | |
|-----|--|
| 1. | The laboratory has obtained the accreditation of China National Accreditation Committee for Laboratories (CNAL), and accreditation number: L0310. |
| 2. | The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01. |
| 3. | 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. |
| 4. | The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is C1758, R1672, and T153. |
| 5. | The test report is invalid if not marked with "exclusive stamp for the test report". |
| 6. | Any copy of the test report is invalid if not re-marked with the "exclusive stamp for the test report". |
| 7. | 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. |
| 8. | The test report is invalid if there is any evidence of erasure and/or falsification. |
| 9. | 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. |
| 10. | Normally, the test report is only responsible for the samples that have undergone the test. |
| 11. | 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. |



REPORT ON **FCC Test of Huawei E960 Wireless Gateway**

M/N: E960

Report No:

REGULATION

FCC CFR47 Part 2: Subpart J;

FCC CFR47 Part 24: Subpart E;

FCC CFR47 Part 15: Subpart B;

CONCLUSION

There are 10 items need to be tested, 10 items have been tested. The sample of the model completely meets the requirements

Final Judgement: Pass

General Manager

2007.07.20

Date

Guo Xiaoqi

Name

signature

**Technical Responsibility
For Area of Testing**

2007.07.18

Date

Zhang Xinghai

Name

signature

Test Lab Engineer

2007.07.16

Date

Wang Wenjin

Name

signature

Contents

| | | |
|----------|---|-----------|
| 1 | <u>Summary</u> | 5 |
| 2 | <u>Product Description</u> | 6 |
| 2.1 | PRODUCTION INFORMATION | 6 |
| 2.2 | MODIFICATION INFORMATION..... | 6 |
| 3 | <u>Test Site Description</u> | 7 |
| 3.1 | TESTING PERIOD | 7 |
| 3.2 | GENERAL SET UP DESCRIPTION | 7 |
| 4 | <u>Product Description</u> | 8 |
| 4.1 | TECHNICAL CHARACTERISTICS | 8 |
| 4.2 | EUT IDENTIFICATION LIST | 10 |
| 5 | <u>Main Test Instruments</u> | 11 |
| 6 | <u>Transmitter Measurements</u> | 12 |
| 6.1 | EFFECTIVE RADIATED POWER OF TRANSMITTER (EIRP)..... | 12 |
| 6.2 | CONDUCTED POWER OF TRANSMITTER..... | 15 |
| 6.3 | MODULATION CHARACTERISTICS | 17 |
| 6.4 | OCCUPIED BANDWIDTH..... | 19 |
| 6.5 | BAND EDGES COMPLIANCE | 21 |
| 6.6 | SPURIOUS EMISSION AT ANTENNA TERMINAL | 23 |
| 6.7 | RADIATED SPURIOUS EMISSION | 25 |
| 6.8 | FREQUENCY STABILITY | 29 |
| 7 | <u>EMC Test</u> | 33 |
| 7.1 | CONDUCTED EMISSION AT POWER PORT | 33 |
| 7.2 | RADIATED EMISSION OF ENCLOSURE IN IDLE MODE..... | 35 |
| 8 | <u>System Measurement Uncertainty</u> | 37 |
| 9 | <u>Appendices</u> | 38 |

1 Summary

The table below summarizes the measurements and results for the Huawei GPRS/GSM/EDGE Wireless Gateway. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

| FCC Measurement Specification | FCC Limits Part(s) | Description | Result |
|--------------------------------------|---------------------------|---|---------------|
| 2.1046 | 24.232 | Effective Radiated Power of Transmitter | PASS |
| 2.1046 | 24.232 | Conducted Power of Transmitter | PASS |
| 2.1047 | | Modulation Characteristics | PASS |
| 2.1049 | | Occupied Bandwidth | PASS |
| 2.1051 | 24.238 | Band Edges Compliance | PASS |
| 2.1051 | 24.238 | Spurious Emission at Antenna Terminal | PASS |
| 2.1053 | 24.238 | Radiated Spurious Emission | PASS |
| 2.1055 | 24.235 | Frequency Stability | PASS |
| - | 15.107 | Conducted Emission at Power Port | PASS |
| - | 15.109 | Radiated Emission of Enclosure in Idle Mode | PASS |

2 Product Description

2.1 Production Information

2.1.1 General Description

HUAWEI E960 Wireless gateway is subscriber equipment in the UMTS/GSM system, also supports wireless Internet accessing function, routing function, and network address translation (NAT) function. The WCDMA frequency is Band 1. The GSM/GPRS/EDGE frequency band includes 850M, EGSM900, DCS1800 and PCS1900 , but only 900MHz & 1800MHz band and WCDMA Band 1's test data are included in this report, the wlan frequency is 2.4G . E960 implements such functions as RF signal receiving/transmitting, HSDPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service ,etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface , RJ11 interface(to connect to fixed telephone), RJ45 interface(to connect to pc). It has four internal antennas as default.

2.1.2 Support function and Service

The Wireless Gateway support the function and service as follows:

Table 2 Service and Test mode List

| Service Name | Characteristic | Corresponding Test Mode | Note |
|----------------|------------------|-------------------------|----------|
| Voice and data | Modulation: GMSK | TM1 | GPRS/GSM |
| Data | Modulation: 8PSK | TM2 | EDGE |

2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

| Model Number | Board/Module | Original Version | New Version | Modify Information |
|----------------|--------------|------------------|-------------|--------------------|
| Not applicable | | | | |
| | | | | |
| | | | | |
| | | | | |

3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China***

The test site description has been submitted to  and registration granted under the registration number **97456** on March 11, 2003. The test site has been accredited by



and the accredited number is **2174.01** in Jan of 2004.

3.1 Testing Period

The test have been performed during the period of

Jul. 14, 2007 to Jul. 21, 2007

3.2 General Set up Description

HUAWEI E960 Wireless gateway is subscriber equipment in the UMTS/GSM system, also supports wireless Internet accessing function, routing function, and network address translation (NAT) function. The WCDMA frequency is Band 1. The GSM/GPRS/EDGE frequency band includes 850M, EGSM900, DCS1800 and PCS1900 , but only 900MHz & 1800MHz band and WCDMA Band 1's test data are included in this report, the wlan frequency is 2.4G . E960 implements such functions as RF signal receiving/transmitting, HSDPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service ,etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface , RJ11 interface(to connect to fixed telephone), RJ45 interface(to connect to pc). It has four internal antennas as default.

TM1: GPRS/GSM Mode with GMSK Modulation

TM2: EDGE Mode with 8PSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

| | |
|----------------|------------------|
| Uplink band: | 1850 to 1910 MHz |
| Downlink band: | 1930 to 1990 MHz |

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

| | |
|---------------------|---------------|
| | EDGE/GPRS/GSM |
| Channel spacing | 200k Hz |
| Channel separation: | 200k Hz |

4.1.3 Type of Emission

Table 6 Type of Emission

| | |
|-----------------------|---------------|
| | EDGE/GPRS/GSM |
| Emission Designation: | 300kGXW |

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Environmental Requirements

Table 7 Environmental Requirements

| | |
|----------------------|----------|
| Minimum temperature: | - 10 °C |
| Maximum temperature: | + 45 °C |
| Relative Humidity: | 5%-95%RH |

4.1.5 Power Source

Table 8 Power Source

| | |
|---------------------|------------|
| AC voltage nominal: | ~220V |
| AC voltage range | ~100V-240V |
| AC current maximal: | 0.5 A |

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.

4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Table 9 Applied DC Voltages and Currents

| | |
|----------|--|
| Voltage: |  5V |
| Current: | 2A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8) |

4.2 EUT Identification List

4.2.1 Board Information

Table 10 Board Information

| E960 Wireless Gateway | | | |
|-------------------------------------|----------------------------------|--------------------------------------|---------|
| E960 | | | |
| Board and Module | | | |
| Equipment Designation / Description | Hardware Version | Serial Number | Remarks |
| -Main board | WLA1GCPU Ver.C WLA1TIPU Ver.C | 020DYN1076000300 020DYN1076000303 | E960 |

4.2.2 Adapter Technical Data

| | |
|--------------------|---|
| AC/DCAdapter Model | UE15W1-050200SPAV |
| Manufacturer | Huawei Technologies CO.,LTD |
| Input Voltage | 100-240V ~50/60Hz 0.5 A |
| Output Voltage | 5V  2A |
| Rated Power | <9W |
| S/N | UEP7328002672 |

4.2.3 FCC Identification

Grantee Code: QIS
Product Code: E960
FCC Identification: QISE960

5 Main Test Instruments

Table 11 Main Test Equipments

| Equipment Description | Manufacturer | Model | Serial Number | Calibrated until (MM.DD.YYYY) |
|--------------------------------------|--------------|-------------------------|---------------|-------------------------------|
| 3m Semi Anechoic Chamber | S+M | N/A | N/A | 12.24.2007 |
| 3m Full Anechoic Chamber | S+M | N/A | N/A | 12.05.2007 |
| Signal Analyzer | R&S | FSQ 26 | 100266 | 12.18.2007 |
| Test Receiver Display Unit | R&S | ESMI 804.8932.52 | 829214/011 | 12.30.2007 |
| Test Receiver RF Unit | R&S | ESMI 1032.5640.53 | 829550/008 | 12.30.2007 |
| Receiver | R&S | ESIB 26 | 100318 | 12.17.2007 |
| Receiver | R&S | ESCS30 | 830245/018 | 12.30.2007 |
| Pre-Amplifier | Agilent | 8447D | 2944A10146 | 12.30.2007 |
| Pre-Amplifier | Agilent | 83017A | 3950M00246 | 12.03.2007 |
| Loop Antenna | Schwarzbeck | FMZB1516 | 1516115 | 12.08.2007 |
| BiLog Antenna | Schaffner | CBL 6112B | 2747 | 12.30.2007 |
| BiLog Antenna | Schaffner | CBL 6112B | 2536 | 12.30.2007 |
| Horn Antenna | R&S | HF906 4044.4507.02 | 359287/005 | 12.05.2007 |
| Horn Antenna | R&S | HF906 4044.4507.02 | 359287/006 | 12.05.2007 |
| Horn Antenna | ETS-Lindgren | 3117 | 00062533 | 09.14.2007 |
| Horn Antenna | ETS-Lindgren | 3117 | 00062549 | 09.14.2007 |
| Horn Antenna | ETS-Lindgren | 3116 | 00031541 | 12.15.2007 |
| Dipole | Schwarzbeck | D69250-UHAP/D69250-VHAP | 979/917 | 08.28.2007 |
| Signal Generator | R&S | SMT06 | 830264/009 | 09.29.2007 |
| Signal Generator | R&S | SMR 40 | 100325 | 12.09.2007 |
| Artificial Mains Network | Schwarzbeck | NNLK8121 | 8121416 | 09.29.2007 |
| Power Supply | Keithley | 2306 | 1045337 | 12.20.2007 |
| Climate Chamber | WEISS | ACS-1 | 3604040034 | 08.24.2007 |
| Universal Radio Communication Tester | R&S | CMU200 | 108035 | 12.04.2007 |
| Wireless communication test set | Agilent | 8960 | GB43461081 | 09.24.2007 |

6 Transmitter Measurements

6.1 Effective Radiated Power of Transmitter (EIRP)

6.1.1 Test Conditions

Table 12 Test Conditions

| | |
|----------------------|---------------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25 |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at frequency Bottom、 Mid、 Top |

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.
 $W(\text{dBm}) = 10 * \log (W_{\text{watts}})$.

Table 14 Limits

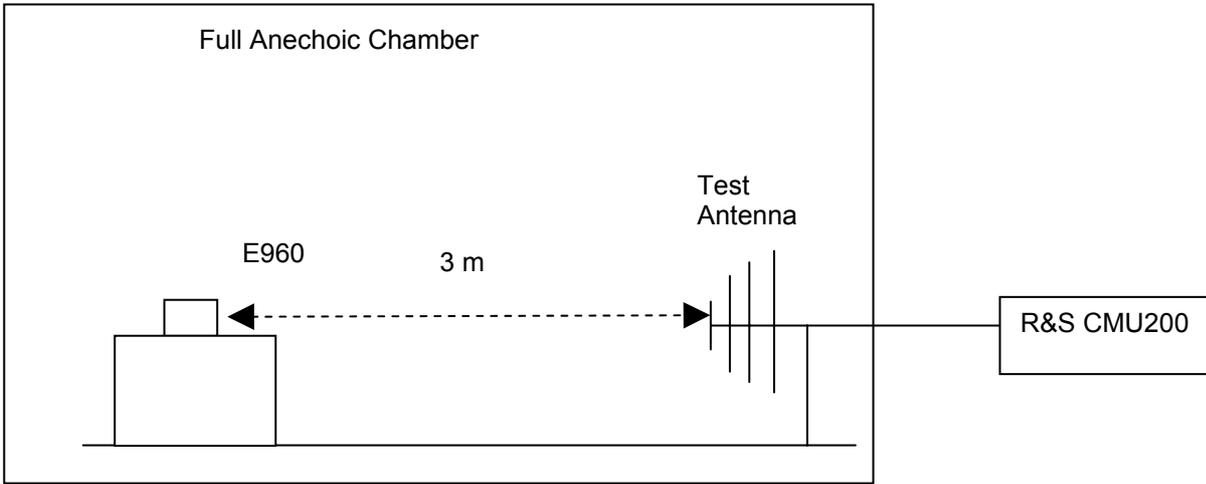
| | |
|------------------------------|-----------|
| Maximum Output Power (Watts) | < 2 Watts |
| Maximum Output Power (dBm) | < 33 dBm |

6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP 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 Wireless Gateway to the wireless communication tester R&S CMU200 via the air interface. The band class is set as PCS.
- Test the Radiated maximum output power by the CMU200 received from test antenna.
- 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 step (b) on CMU200, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum EIRP

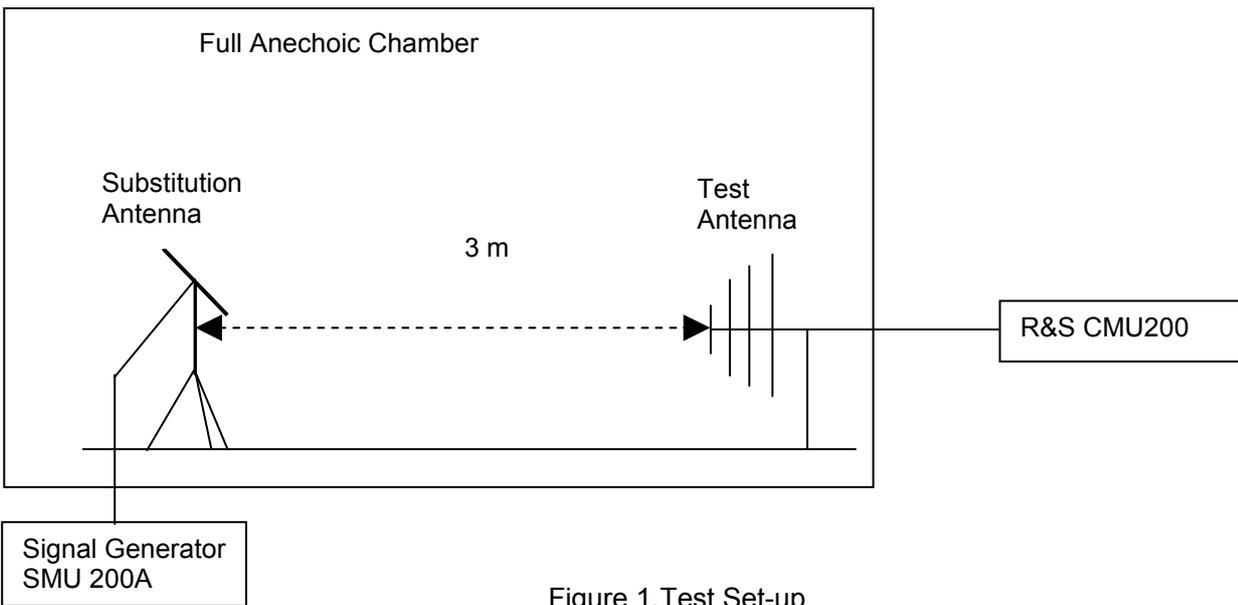


Figure 1. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.
 There is a constant difference of 2.15 dB between EIRP and ERP.
 $ERP (dBm) = EIRP (dBm) - 2.15$ (ITU-R Recommendation SM.329-10).

6.1.4 Measurement Results

Table 15 Measurement Results

| TEST CONDITIONS | RF Output Power (EIRP) | | |
|-----------------|------------------------|---------------|---------------|
| | Channel512(B) | Channel661(M) | Channel810(T) |
| | | | |

| | | 1850.2MHz | | 1880.0MHz | | 1909.8MHz | |
|-----|--------------------------|-----------|-------|-----------|-------|-----------|-------|
| | | dBm | | dBm | | dBm | |
| | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | T _{nom} (25 °C) | 27.61 | 33 | 27.49 | 33 | 27.34 | 33 |
| | V _{nom} (5 V) | | | | | | |
| TM2 | T _{nom} (25 °C) | 25.94 | 33 | 25.81 | 33 | 26.42 | 33 |
| | V _{nom} (5 V) | | | | | | |

6.1.4.1 Substitution Results

Table 16 Substitution Results

| Test Mode | Freq. [MHz] | Meas. Level [dBm] | Substitution Antenna Type | Substitution Gain [dBi] | Cable Loss [dB] | Substitution Level (EIRP) [dBm] | FCC limit [dBm] | Result |
|-----------|-------------|-------------------|---------------------------|-------------------------|-----------------|---------------------------------|-----------------|--------|
| TM1 | 1850.2 | 27.61 | Dipole Ant. | 4.6 | 1.0 | 27.70 | 33 | Pass |
| TM1 | 1880.0 | 27.49 | Dipole Ant. | 4.6 | 1.0 | 27.58 | 33 | Pass |
| TM1 | 1909.8 | 27.34 | Dipole Ant. | 4.7 | 1.0 | 27.43 | 33 | Pass |
| TM2 | 1850.2 | 25.94 | Dipole Ant. | 4.6 | 1.0 | 25.82 | 33 | Pass |
| TM2 | 1880.0 | 25.81 | Dipole Ant. | 4.6 | 1.0 | 25.68 | 33 | Pass |
| TM2 | 1909.8 | 26.42 | Dipole Ant. | 4.7 | 1.0 | 26.3 | 33 | Pass |

Note: a, For get the ERP (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

b, A WCDMA signal with bandwidth of 5.0MHz and a GSM signal with bandwidth of 200 kHz are created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2 and 5MHz for TM3.

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 17 Test Conditions

| | |
|----------------------|---------------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 23.5 |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2 at frequency Bottom、 Mid、 Top |

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

| | |
|---------------------|---|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|---------------------|---|

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

$$EIRP(dBm) = 10 * \log(EIRP_{in\ watts}).$$

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

$$P_{cod.}(dBm) = EIRP(dBm) - Gain(dBi).$$

and $Gain(dBi) = Gain(dBd) + 2.15dB$

Table 19 Limits

| | |
|--------------------------------------|------------------|
| Maximum Output Power (Watts) | < 2 Watts=33 dBm |
| Antenna Gain(dBi): | 2.5dBi |
| Maximum Conducted Output Power (dBm) | < 30.5dBm |

6.2.3 Test Method and Setup

(a)For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power 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 Wireless Gateway to the wireless communication tester CMU200 via the antenna connector. The band class is set as PCS.

(b)Test the Conducted maximum output power by the R&S CMU200.

Test setup

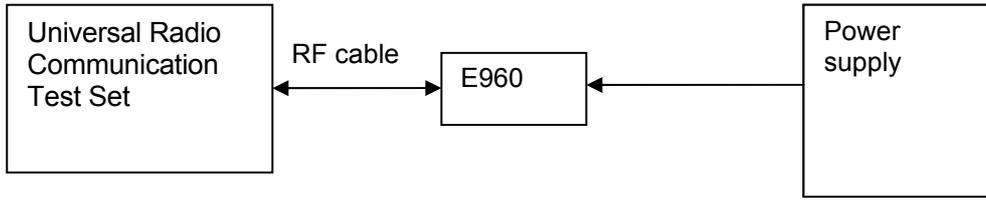


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

| TEST CONDITIONS | | RF Output Power | | | | | |
|-----------------|--|-----------------------------|-------|---------------------------|-------|-----------------------------|-------|
| | | Channel 512(B) 1850.2MHz | | Channel 661(M) 1880MHz | | Channel 810(T) 1909.8MHz | |
| | | dBm | | dBm | | dBm | |
| | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | T _{nom} (25 °C) V _{nom} (5 V) | 26.11 | 30.5 | 25.99 | 30.5 | 25.84 | 30.5 |
| TEST CONDITIONS | | Channel 512(B) 1850.2MHz | | Channel 661(M) 1880MHz | | Channel 810(T) 1909.8MHz | |
| | | dBm | | dBm | | dBm | |
| | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM2 | T _{nom} (25 °C) V _{nom} (5 V) | 26.17 | 30.5 | 25.99 | 30.5 | 25.85 | 30.5 |

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.3 Modulation Characteristics

6.3.1 Test Conditions

Table 21 Test Conditions

| | |
|----------------------|-----------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at frequency Middle |

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |

6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Table 23 Limits

| | |
|--------|----------------|
| Limits | Not applicable |
|--------|----------------|

6.3.3 Test Method and Setup

Connect the Wireless Gateway to Wireless Communication Test Set R&S CMU200 via the antenna connector. The band class is set as PCS1900; the Wireless Gateway’s output is matched with 50 Ω loads, test method was according to 3GPP TS 51.010 and TS 34.121. The waveform quality and constellation of the Wireless Gateway was tested.

Test setup

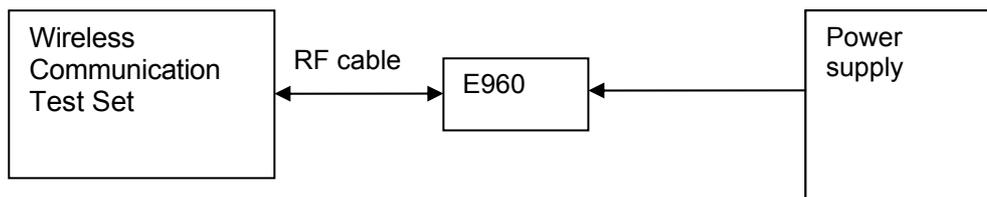


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 24 Measurement Results

| | | Modulation Characteristic | |
|-------------------|-----------------|---------------------------|---------------------|
| TEST CONDITIONS | | Channel661(M) 1880MHz | |
| | | Measured | |
| | | TM1 | TM2 |
| T_{nom} (25 °C) | V_{nom} (5 V) | Refer to Appendix A | Refer to Appendix A |

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix A.

6.4 Occupied Bandwidth

6.4.1 Test Conditions

Table 25 Test Conditions

| | |
|----------------------|--|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1, TM2 at frequency Bottom、 Mid、 Top |

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 subpart E

6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 subpart E, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Table 27 Limits

| | |
|-------------------------------|------------------------|
| Upper /lower frequency limits | 0.5% of the mean power |
|-------------------------------|------------------------|

6.4.3 Test Method and Setup

Wireless Gateway was connected to the Spectrum Analyzer R&S FSU26 via the one RF connector. The band class is set as PCS1900; Wireless Gateway was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Wireless Gateway by the R&S FSU26.

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Refer to 47CFR part2.1049 section (g)&(h).

(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules,

the tests should provide the manufacturer’s maximum rated condition.

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)

Video bandwidth (VBW): 10 kHz

For TM3 system following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 500 kHz

Test Set-up

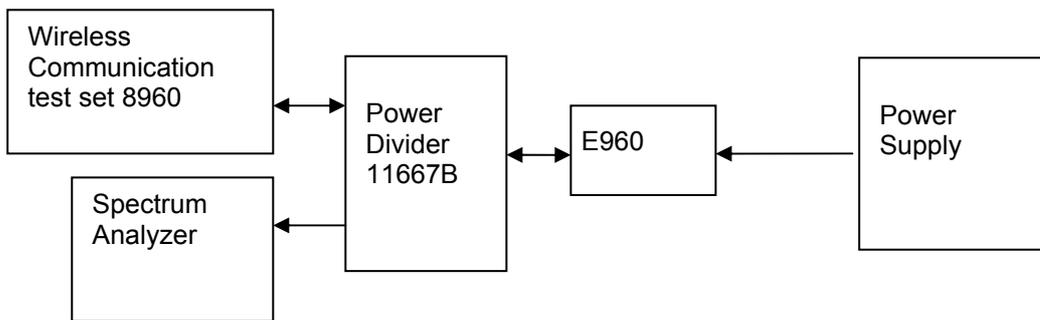


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 28 Measurement Results

| TEST CONDITIONS | | Occupied Bandwidth | | | | | |
|--------------------------|-----|-----------------------------|--------|---------------------------|--------|-----------------------------|--------|
| | | Channel512 (B) 1850.2MHz | | Channel661 (M) 1880MHz | | Channel810 (T) 1909.8MHz | |
| | | Measured (kHz) | | Measured (kHz) | | Measured (kHz) | |
| | | TM1 | TM2 | TM1 | TM2 | TM1 | TM2 |
| T _{nom} (25 °C) | 99% | 241.99 | 245.19 | 241.99 | 246.79 | 243.59 | 245.19 |
| V _{nom} (5 V) | | | | | | | |

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

6.5 Band Edges Compliance

6.5.1 Test Conditions

Table 29 Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at frequency Bottom、 Top |

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |

6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 31 Limits

| | TM1 | TM2 | TM3 |
|-----------------------|--|--|---|
| Rated Power: | 33 dBm | 27 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(2) = 46$, 33 dBm - 46 dB | $43 + 10 \log(0.5) = 40$, 27 dBm - 40 dB | $43 + 10 \log(0.25) = 37$; 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.5.3 Test Method and Setup

Wireless Gateway was connected to the Spectrum Analyzer E4445A via the one RF connector, the band class is set as PCS. Wireless Gateway was controlled to transmit maximum power. Measure and record band edges compliance of the Spectrum Analyzer E4445A.

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. According to FCC part 24.238. The FCC rules define the fundamental emission as -26dBc bandwidth. The limit is -13dBm.

Test Set-up

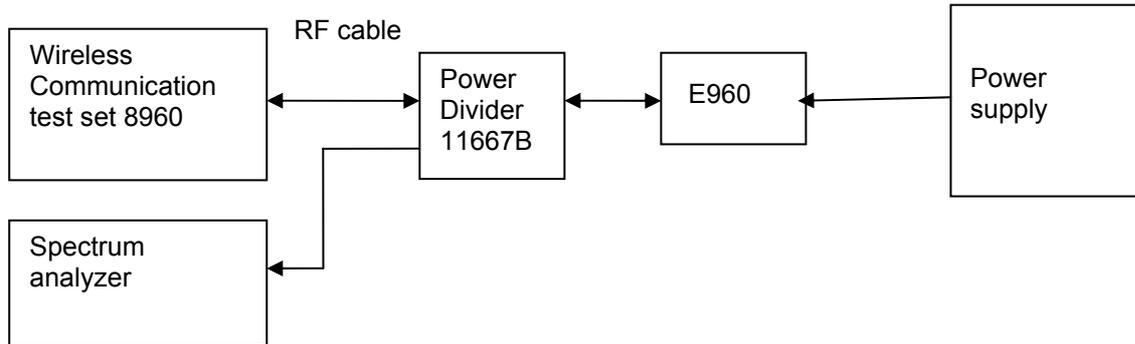


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 32 Measurement Results outside Band Edges-- Single Carrier

| Band | Frequency of Band edges [MHz] | Channel Number | Test Mode | Spurious Level measured [dBm] | FCC limit | Result |
|--|-------------------------------|----------------|-----------|-------------------------------|-----------|--------|
| $T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (5\text{ V})$ | | | | | | |
| PCS | 1850.2 | 512 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1909.8 | 810 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1850.2 | 512 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1909.8 | 810 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to appendix C.

6.6 Spurious Emission at Antenna Terminal

6.6.1 Test Conditions

Table 33 Test Conditions

| | |
|----------------------|------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at frequency B、 M、 T |

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Recommended GSM/EDGE MS conformance specification |

6.6.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 35 Limits

| | TM1 | TM2 | TM3 |
|-----------------------|--|--|---|
| Rated Power: | 33dBm | 27 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(2) = 46$, 33 dBm - 46 dB | $43 + 10 \log(0.5) = 40$, 27 dBm - 40 dB | $43 + 10 \log(0.25) = 37$; 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.6.3 Test Method and Setup

Wireless Gateway was connected to the Spectrum Analyzer R&S FSU26 via the one RF connector, the band class is set as PCS. Wireless Gateway was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the Wireless Gateway by the R&S FSU26.

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

24.238 Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 1 GHz: 1MHz;

Measurement bandwidth (RBW) for 1 GHz up to 12.75 GHz: 1 MHz;

Measurement bandwidth (RBW) for 12.75 GHz up to 20 GHz: 1 MHz;

Test Set-up

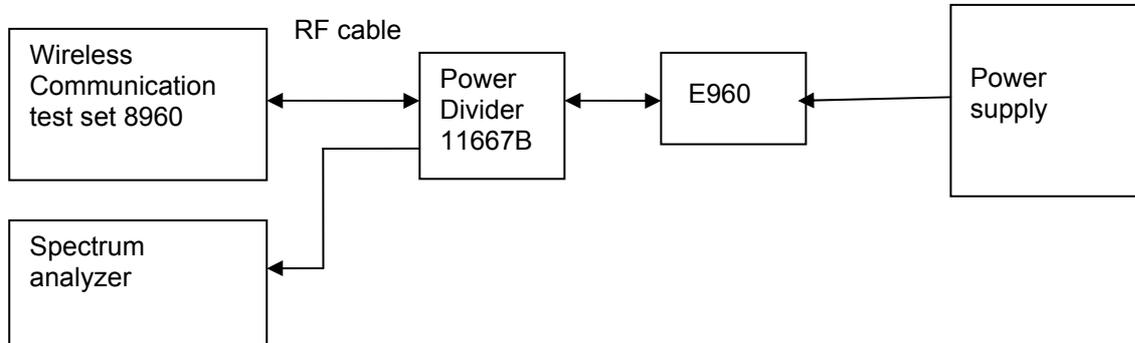


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 36 Measurement Results

| Channel Number | Test Mode | Test Range (Frequency) | Output Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|----------------|-----------|------------------------|--------------------|-------------------------------|-----------|--------|
| Channel 512(B) | TM1 | 9 kHz~20GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 661(M) | TM1 | 9 kHz~20GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 810(T) | TM1 | 9 kHz~20GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.

6.7 Radiated Spurious Emission

6.7.1 Test Conditions

Table 37 Test Conditions

| | |
|----------------------|------------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25 °C |
| Relative humidity: | 53 % |
| Test Configurations: | TM1, TM2 and TM3 at middle channel |

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 24.238

6.7.2.2 Supporting Standards

Table 38 Supporting Standards:

| | |
|----------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
|----------------------|---|

6.7.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 39 Limits

| | TM1 | TM2 | TM3 |
|-----------------------|--|--|---|
| Rated Power: | 33dBm | 27 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(2) = 46$, 30 dBm - 46 dB | $43 + 10 \log(0.5) = 40$, 26 dBm - 40 dB | $43 + 10 \log(0.25) = 37$; 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.7.3 Test Method and Setup

(a) Measurements were made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.1049(c) as appropriate. For equipment operating on frequencies below 890 MHz, an Open Field Test is normally required with the measuring instrument antenna located in the far field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of

any possible source of reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

Huawei Wireless Gateway is equipment with non-integral antenna. And it should test according to part (b) of above section.

BTS simulator is connected to a communication antenna, by which communicate with the Wireless Gateway inside the test site. The BTS simulator controls the Wireless Gateway to transmit at maximum power which defined in specification of product when in traffic mode, field strength of spurious emission in idle mode were also tested. The Wireless Gateway operates on a typical channel.

The test procedure:

- (a) 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 Wireless Gateway to the BTS simulator via the air interface. The band class is set as PCS.
- (b) Test the Radiated maximum output power by the Rohde and Schwarz ESMI Test Receiver from test antenna.
- (c) 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 step (b) on ESMI Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

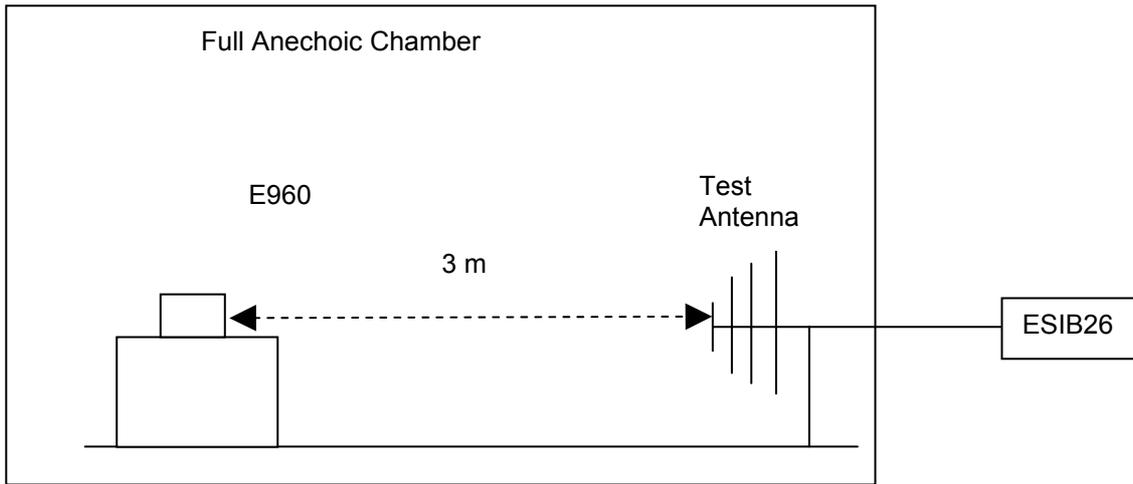
According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 30MHz up to 1GHz: 1 MHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;
Measurement bandwidth (RBW) for 12.75GHz up to 20GHz: 1MHz;

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP

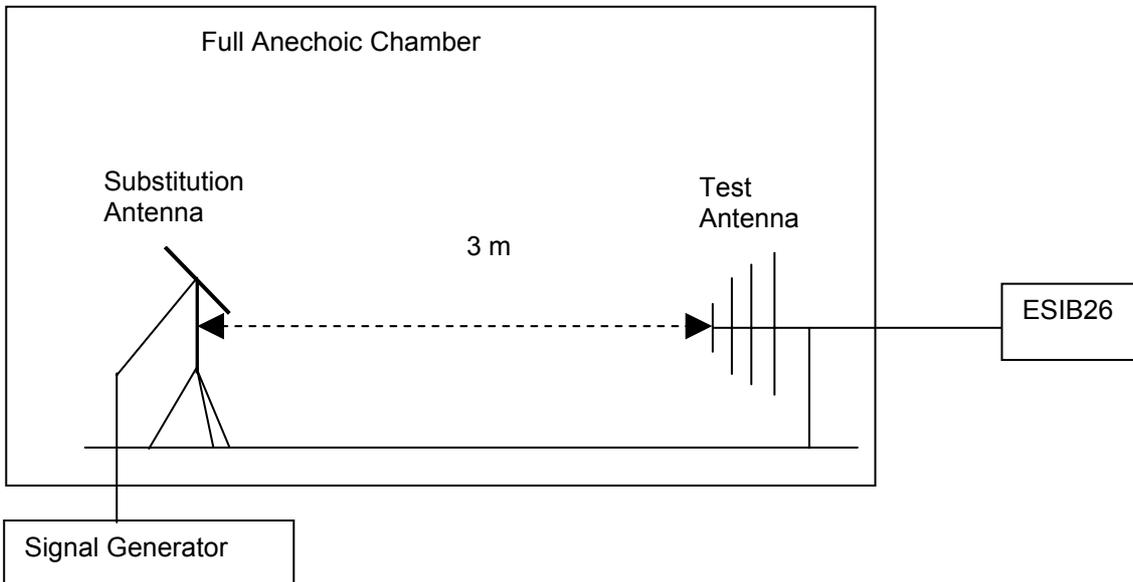


Figure 7. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

6.7.4 Measurement Results

6.7.4.1 Pre-test Measurement Results

Table 40 Measurement Results

| Channel Number | Mode | Test Range (Frequency) | Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|----------------|------|------------------------|-------------|-------------------------------|-----------|--------|
| 661 | TM1 | 30MHz ~20GHz | 33 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |
| 661 | TM2 | 30MHz ~20GHz | 27 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |
| 9400 | TM3 | 30MHz ~20GHz | 24 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |

6.7.4.2 Substitution Results

No peak found in pre- test.

Calculation Sample:

Table 41 Substitution Results

| Test Mode | Freq. [MHz] | Meas. Level [dBm] | Substitution Antenna Type | Gain [dBd] | Cable Loss [dB] | Substitution Level [dBm] | FCC limit [dBm] | Result |
|-----------|-------------|-------------------|---------------------------|------------|-----------------|--------------------------|-----------------|--------|
| | | | | | | | | |

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

$$ERP [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]$$

NOTE: SGP- Signal Generator Level

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix E.

6.8 Frequency Stability

6.8.1 Test Conditions

Table 42 Test Conditions

| | |
|----------------------|------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2 at frequency M |

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.8.2.2 Supporting Standards

Table 43 Supporting Standards:

| | |
|---------------------------|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V6.1.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |

6.8.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.8.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30 ° to +50 ° centigrade for all equipment except that specified in subparagraphs (2) and (3) of paragraph 2.1055

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example,

measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

Test Set up

Connect the Wireless Gateway to the Wireless Communication test set Agilent 8960 via the connector. Then measure the frequency error by the Wireless Communication test set Agilent 8960. The Wireless Gateway’s output is matched with a 50 Ω load.

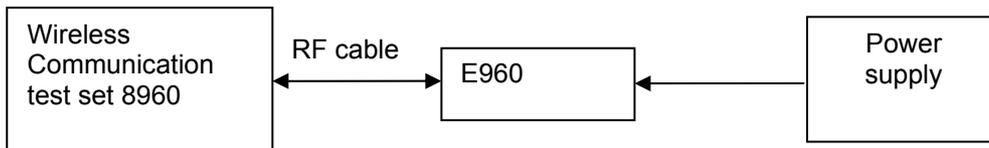


Figure 8. Test Set up

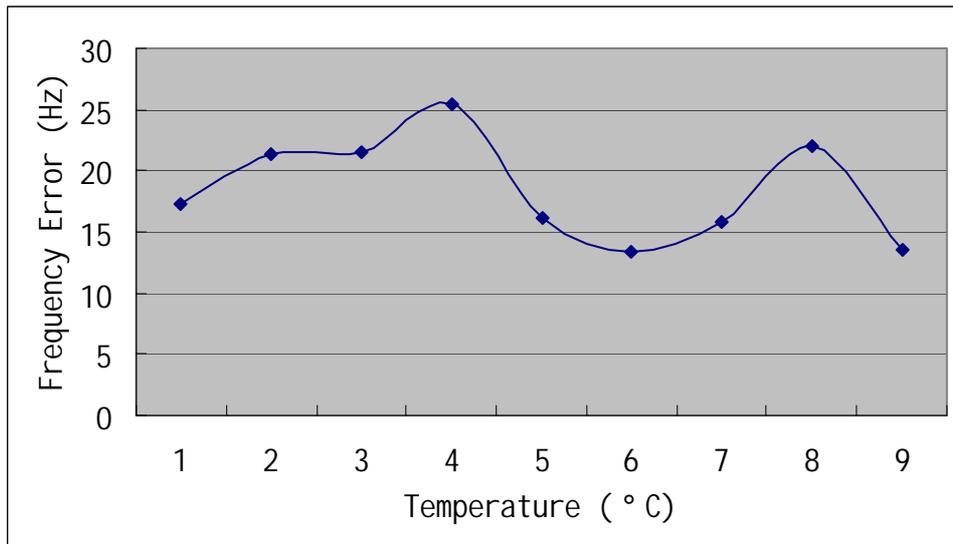
6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 5 V DC Channel No. 661(1880.0MHz)**

Table 44 Measurement Results vs. Variation of Temperature

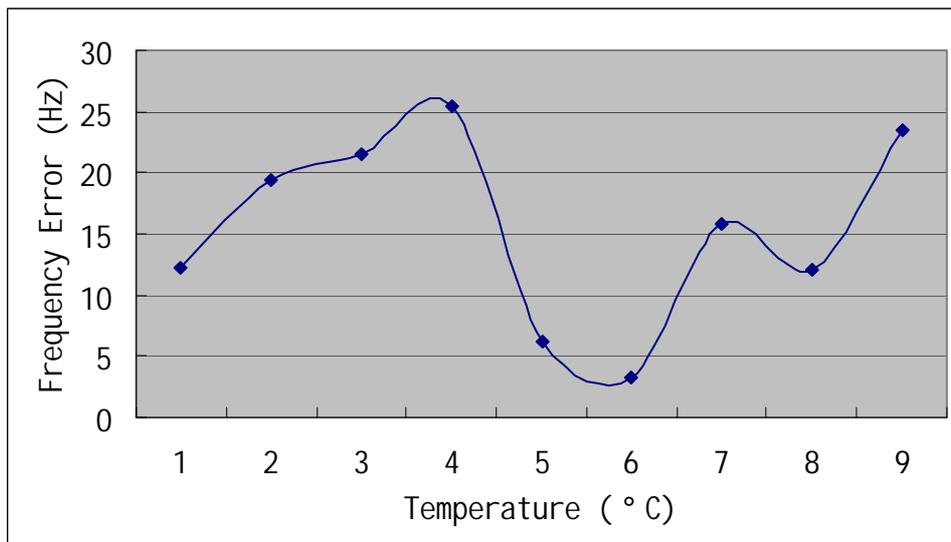
| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C | 33 | 1880.0 | 17.23 | Pass |
| -20 °C | 33 | 1880.0 | 21.36 | Pass |
| -10 °C | 33 | 1880.0 | 21.45 | Pass |
| 0 °C | 33 | 1880.0 | 25.48 | Pass |
| +10 °C | 33 | 1880.0 | 16.2 | Pass |
| +20 °C | 33 | 1880.0 | 13.34 | Pass |
| +30 °C | 33 | 1880.0 | 15.81 | Pass |
| +40 °C | 33 | 1880.0 | 22.06 | Pass |
| +50 °C | 33 | 1880.0 | 13.49 | Pass |



● **TM2, 5 V DC Channel No. 661(1880.0MHz)**

Table 45 Measurement Results vs. Variation of Temperature

| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C | 27 | 1880.0 | 12.23 | Pass |
| -20 °C | 27 | 1880.0 | 19.36 | Pass |
| -10 °C | 27 | 1880.0 | 21.45 | Pass |
| 0 °C | 27 | 1880.0 | 25.48 | Pass |
| +10 °C | 27 | 1880.0 | 6.2 | Pass |
| +20 °C | 27 | 1880.0 | 3.34 | Pass |
| +30 °C | 27 | 1880.0 | 15.81 | Pass |
| +40 °C | 27 | 1880.0 | 12.06 | Pass |
| +50 °C | 27 | 1880.0 | 23.49 | Pass |



6.8.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 661(1880.0MHz)**

Table 46 Measurement Results vs. Variation of Voltage

| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| 3.6 | 33 | 1880.0 | 27.31 | Pass |
| 3.7 | 33 | 1880.0 | 20.14 | Pass |
| 4.2 | 33 | 1880.0 | -5.32 | Pass |

- **TM2, 25 °C ,Channel No. 661(1880.0MHz)**

Table 47 Measurement Results vs. Variation of Voltage

| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| 3.6 | 27 | 1880.0 | -17.89 | Pass |
| 3.7 | 27 | 1880.0 | 23.50 | Pass |
| 4.2 | 27 | 1880.0 | 9.25 | Pass |

6.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.

7 EMC Test

7.1 Conducted Emission at Power Port

7.1.1 Test Conditions

Table 48 Test Conditions

| | |
|----------------------|--------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Power port |
| Ambient temperature: | 23.5°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1 at frequency M |

7.1.2 Test Specifications and Limits

7.1.2.1 Specification

CFR 47 (FCC) part 15.107

7.1.2.2 Supporting Standards

Table 49 Supporting Standards:

| | |
|------------------|--|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
|------------------|--|

7.1.2.3 Limits

Compliance with part15.107, conducted emission must meet the requirement of following table.

Table 50 Limits

| Frequency of Emission (MHz) | Conducted Limit (dB μ V) | |
|-----------------------------|------------------------------|------------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note: * Decreases with the logarithm of the frequency.

7.1.3 Test Method and Setup

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: 2003.

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

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

Test Set-up

The Wireless Gateway was setup in the screened chamber and operated under nominal conditions.

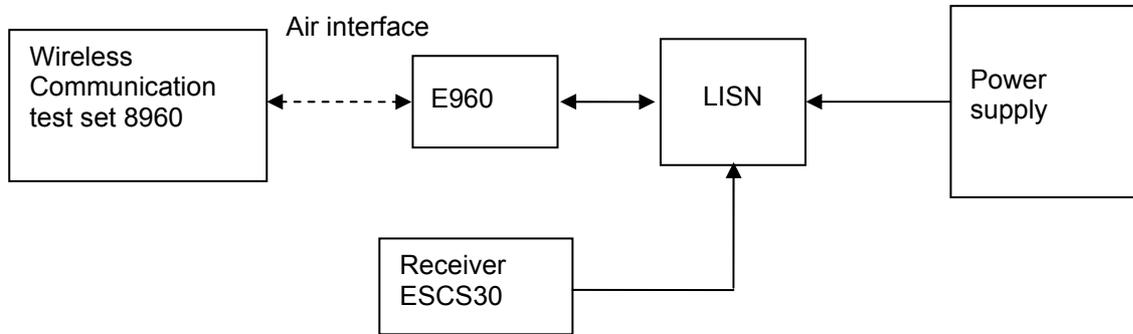


Figure 9. Test Set-up

7.1.4 Measurement Results

Table 51 MEASUREMENT RESULT:QP DETECTOR

| Frequency (MHz) | Level (dBμV) | Transd (dB) | Limit (dBμV) | Margin (dB) | Line | PE |
|-------------------|----------------|---------------|----------------|---------------|------|-----|
| 0.195000 | 48.00 | 10.5 | 64 | 15.8 | N | FLO |
| 0.847500 | 40.10 | 9.9 | 56 | 15.9 | L3 | FLO |
| 1.846500 | 40.40 | 10.1 | 56 | 15.6 | L3 | FLO |
| 2.449500 | 42.30 | 10.1 | 56 | 13.7 | L3 | FLO |
| 6.252000 | 40.70 | 10.2 | 60 | 19.3 | L3 | FLO |
| 24.675000 | 40.30 | 14.9 | 60 | 19.7 | N | FLO |

Table 52 MEASUREMENT RESULT:AV DETECTOR

| Frequency (MHz) | Level (dBμV) | Transd (dB) | Limit (dBμV) | Margin (dB) | Line | PE |
|-------------------|----------------|---------------|----------------|---------------|------|-----|
| 0.262500 | 32.80 | 10.3 | 51 | 18.6 | L3 | FLO |
| 0.820500 | 29.60 | 9.9 | 46 | 16.4 | L3 | FLO |
| 0.888000 | 30.20 | 9.9 | 46 | 15.8 | L3 | FLO |
| 2.539500 | 32.50 | 10.1 | 46 | 13.5 | L3 | FLO |
| 5.280000 | 32.90 | 10.2 | 50 | 17.1 | L3 | FLO |
| 24.877500 | 26.00 | 14.8 | 50 | 24.0 | L3 | FLO |

7.1.5 Conclusion

The equipment **PASSED** the requirement of this clause. For the measurement results refer to appendix F.

7.2 Radiated Emission of Enclosure in Idle Mode

7.2.1 Test Conditions

Table 53 Test Conditions

| | |
|----------------------|--------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25 °C |
| Relative humidity: | 45 % |
| Test Configurations: | TM1 at frequency M |

7.2.2 Test Specifications and Limits

7.2.2.1 Specification

CFR 47 (FCC) part 15.109

7.2.2.2 Supporting Standards

Table 54 Supporting Standards:

| | |
|------------------|--|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
|------------------|--|

7.2.2.3 Limits

The Radiated Emission of enclosure of EUT should compliance with the requirement of part 15.109. The limit showed in following table.

Table 55 Limits

| Frequency of Emission (MHz) | Radiated Limit | |
|-----------------------------|------------------|--------------------|
| | Unit(μ v/m) | Unit(dB μ V/m) |
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| 960-1000 | 500 | 54 |

7.2.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector. 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.

Huawei Wireless Gateway was communicated with the BTS simulator through Air interface. The Wireless Gateway operated on the typical channel and the Wireless Gateway worked in idle mode, transmitter was not work in this test.

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

Test set up

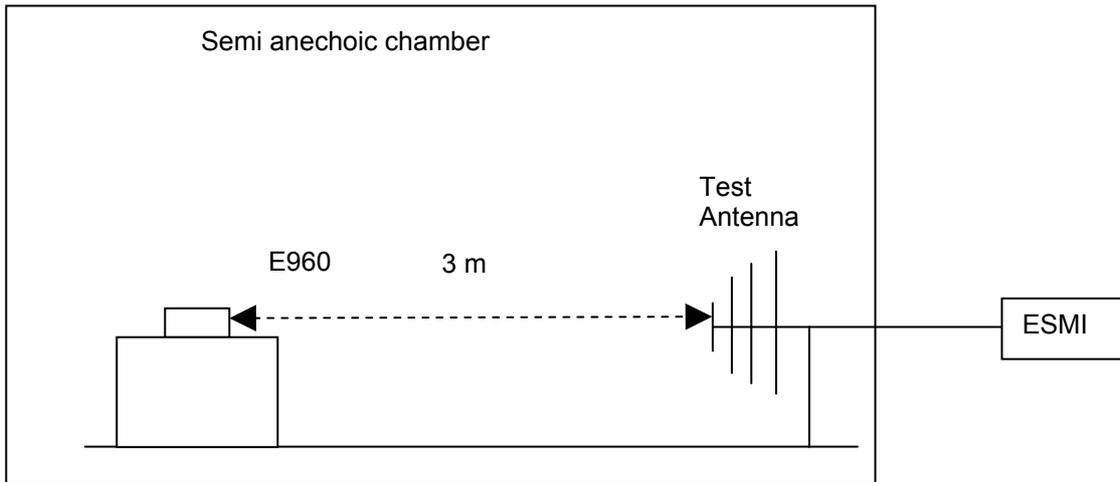


Figure 10. Test set up

7.2.4 Measurement Results

Table 56 MEASUREMENT RESULT: QP DETECTOR

| Frequency (MHz) | Level (dBμV/m) | Transd (dB) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Azimuth (deg) | Polarisation |
|-------------------|------------------|---------------|------------------|---------------|---------------|-----------------|--------------|
| 56.280000 | 34.90 | -15.8 | 40.0 | 5.1 | 120.0 | 343.00 | VERTICAL |
| 96.780000 | 32.80 | -11.3 | 43.5 | 10.7 | 100.0 | 11.00 | VERTICAL |
| 204.000000 | 34.00 | -11.5 | 43.5 | 9.5 | 133.0 | 0.00 | HORIZONTAL |
| 208.680000 | 33.10 | -11.7 | 43.5 | 10.4 | 126.0 | 0.00 | HORIZONTAL |
| 336.000000 | 34.70 | -5.9 | 46.0 | 11.3 | 100.0 | 178.00 | HORIZONTAL |
| 900.000000 | 36.60 | 1.4 | 46.0 | 9.4 | 120.0 | 171.00 | VERTICAL |

7.2.5 Conclusion

The equipment **PASSED** the requirement of this clause. For the measurement results refer to appendix G.

8 System Measurement Uncertainty

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

Table 57 System Measurement Uncertainty

| Items | | Extended Uncertainty |
|---|------------------------------------|----------------------|
| Effective Radiated Power of Transmitter | EIRP (dBm) | U=2.2dB; k=2 |
| Band Width | Magnitude (%) | U = 0.2%; k=2 |
| Band Edge Compliance | Disturbance Power (dBm) | U = 2.0dB; k=2 |
| Conducted Spurious Emission at Antenna Terminal | Disturbance Power (dBm) | U = 2.0dB; k=2 |
| Frequency Stability | Frequency Accuracy(ppm) | U = 0.21ppm; k=2 |
| Field Strength of Spurious Radiation | ERP(dBm) | U=2.2dB; k=2 |
| Conducted Output Power | Power(dBm) | U=0.39dB; k=2 |
| Conducted Emission at Power Port | Disturbance Voltage (dB μ V) | U=4dB; k=2 |
| Radiated Emission of enclosure at ideal mode | Field strength (dB μ V/m) | U=5dB; k=2 |

9 Appendices

| | | |
|------------|--|----------|
| Appendix A | Modulation Characteristics | 3 pages |
| Appendix B | Occupied Bandwidth | 7 pages |
| Appendix C | Band Edges | 5 pages |
| Appendix D | Spurious Emission at Antenna Terminal | 19 pages |
| Appendix E | Measurement Results Radiated Spurious Emission | 16 pages |
| Appendix F | Measurement Results Conducted Emission at Power Port | 2 pages |
| Appendix G | Measurement Results Radiated Emission of Enclosure at Ideal Mode | 2 pages |
| Appendix H | Photos of Test Setup | 6 pages |