



FCC Test Report

Product Name: HSPA Module

Model Number: EM770U

**Report No: SYBH(R) E054062009EB-2
FCC ID: QISEM770U**

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REPORT ON **FCC Test of HSPA Module**
M/N: EM770U
Report No: SYBH(R) E054062009EB-2

REGULATION **FCC CFR47 Part 2: Subpart J;**
FCC CFR47 Part 22: Subpart H;
FCC CFR47 Part 24: Subpart E;
FCC CFR47 Part 27: Subpart C&L;

CONCLUSION **Pass**

General Manager Aug. 21, 2009 张兴海 
Date Name signature

Technical Responsibility For Area of Testing Aug. 21, 2009 余辉 
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1 Summary

The table below summarizes the measurements and results for the HUAWEI EM770U Module. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
850M Band			
2.1046	22.913	Effective Radiated Power of Transmitter	PASS
2.1046	22.913	Conducted Power of Transmitter	PASS
1900M Band			
2.1046	24.232	Effective Radiated Power of Transmitter	PASS
2.1046	24.232	Conducted Power of Transmitter	PASS
1700M Band			
2.1046	27.50(d)(2)	Effective Radiated Power of Transmitter	PASS
2.1046	27.50(d)(2)	Conducted Power of Transmitter	PASS



2 Product Description

2.1 Production Information

2.1.1 General Description

HUAWEI EM770U Module is subscriber equipment in the GSM/UMTS system. The frequency band is 850M, 1900M and 1700M. The EM770U implements such functions as RF signal receiving / Transmitting, HSUPA/HSDPA/WCDMA/EDGE/GPRS/GSM protocol processing and data service etc. Externally it provides Mini PCI-E interface (to connect to the notebook etc.), USIM card interface. EM770U uses Qualcomm MSM6290 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The HUAWEI EM770U Module support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Data	Modulation: QPSK	TM1	HSUPA

Note: * The WCDMA test condition & settings are defined in 3GPP TS 34.121 V7.5.0:2007.

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				
Not applicable				
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***

3.1 Testing Period

The test have been performed during the period of

Aug. 10, 2009 – Aug. 19, 2009

3.2 General Set up Description

HUAWEI EM770U Module can support GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA mode and 850M Band, 1900M Band and 1700M Band. During this measurement, the HUAWEI EM770U Module just works in HSUPA mode and 850M Band, 1900M Band and 1700M Band.

TM1: HSUPA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

850M Band	
Uplink band:	824 to 849 MHz
Downlink band:	869 to 894 MHz
1900M Band	
Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz
1700M Band	
Uplink band:	1710 to 1755 MHz
Downlink band:	2110 to 2155 MHz

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

	HSUPA
Channel Raster	200kHz
Channel spacing:	5MHz

4.1.3 Type of Emission

Table 6 Type of Emission

	HSUPA
Emission Designation:	5M0F9W

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:	+ 55 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

Table 8 Power Source

DC voltage nominal:	≡ 3.3V; Supplied by Mini PCI-E port of notebook
DC voltage range	≡ 3.0-3.6V
DC current maximal:	1A

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 RF Module DC Voltages and Currents

Voltage:	≡ 2.85V (for the RF IC)
Current:	150mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)
Voltage:	≡ 3.6V (for the PA module)
Current:	350mA 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

HSPA Module		
EM770U		
Board and Module		
Model name	Serial Number	Remarks
EM770U	OP2AA10970100242	MD64TCPU

4.2.2 Adapter Technical Data

No Applicable.

4.2.3 Battery Technical Data

No Applicable.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: EM770U
FCC Identification: QISEM770U



5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
EMI Test receiver	R&S	ESIB 26	100318	4.22, 2010
Broadband Antenna	Schaffner	CBL 6112B	2747	11.10, 2009
Horn Antenna	ETS-Lindgren	3117	00062553	9.27.2009
DC power supply	Schwarzbeck	D69250- UHAP/D69250-VHAP	979/917	11.20.2009
Signal Generator	R&S	SMR 40	100325	5.12, 2010
Vector Signal Generator	R&S	SMU200A	100699	01.15.2010
Power Supply	Agilent	66311B	MY43006371	04.26.2010
Climate Chamber	WEISS	WK11-600/70	5922602844001 0	10.08.2009
Universal Radio Communication Tester	R&S	CMU200	113164	06.17.2010
Spectrum Analyzer	R&S	FSU26	200002	04.29.2010



6 Transmitter Measurements

6.1 Part 850M Band

6.1.1 Effective Radiated Power of Transmitter (ERP)

6.1.1.1 Test Conditions

Table 12 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1 at Channel Bottom, Middle, Top

6.1.1.2 Test Specifications and Limits

6.1.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913.

6.1.1.2.2 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 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.1.1.2.3 Limits

Compliance with part 22.913, mobile/portable stations are limited to 7 watts ERP peak power.
 $W \text{ (dBm)} = 10 * \log(W_{\text{in mW}})$.

Table 14 Limits

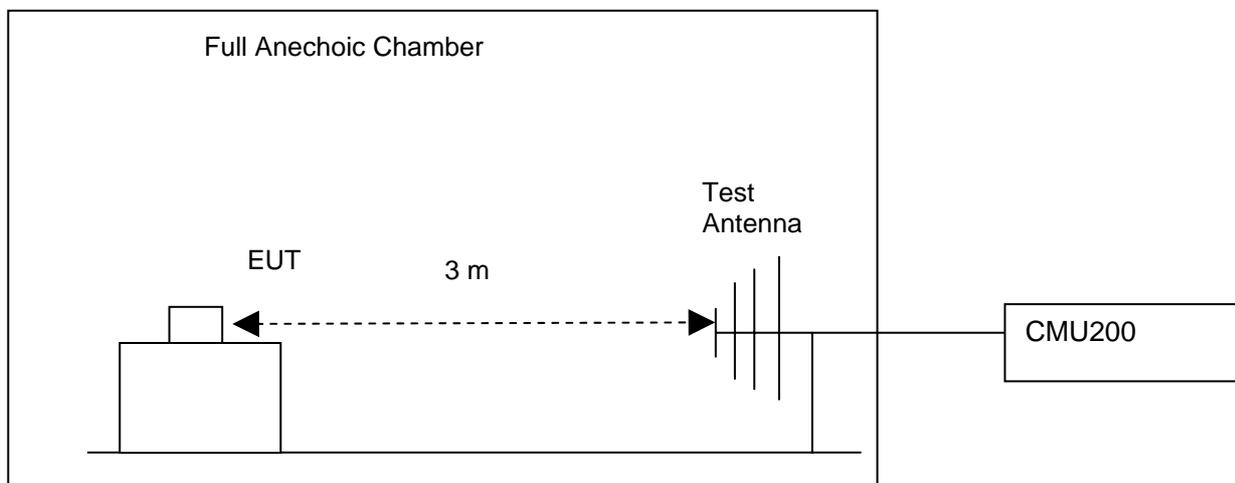
Maximum Output Power (Watts)	< 7 Watts
Maximum Output Power (dBm)	< 38.5 dBm

6.1.1.3 Test Method and Setup

- (a) 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 HUAWEI EM770U Module to the wireless communication tester CMU200 via the air interface. The band is set as 850M.
- (b) Test the Radiated maximum output power by the CMU200 received 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 R&S 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 ERP

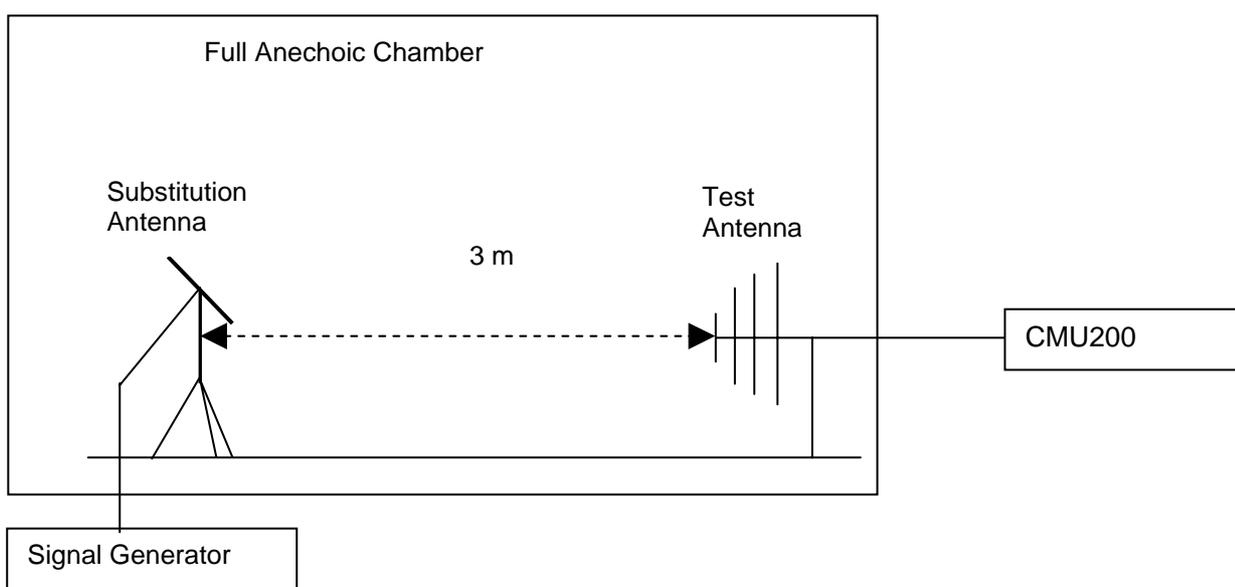


Figure 1. Test Set-up



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

ERP was measured using 1 host.

BenQ Joy book S72

6.1.1.4 Measurement Results

6.1.1.4.1 Pre-test Results

For HSUPA test mode, there are 5 sub-tests for different configuration. For the sub-test 1, the max power of EM770U is the maximum as followed table.
The channel is mid range.

HSUPA conducted max power pre-scan

Sub-test	bc	bd	bd (SF)	bc/bd	bHS	bec	bed	bed (SF)	bed (Codes)	CM (dB)	MPR (dB)	Test result
1	8/15	15/15	64	8/15	16/15	16/15	448/75	4	1	1	0	21.25
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3	2	18.86
3	15/15	5/15	64	5/15	30/15	30/15	bed1: 47/15 bed2: 47/15	4 4	2	2	1	19.99
4	1/15	15/15	64	1/15	2/15	2/15	56/75	4	1	3	2	19.41
5	12/15	15/15	64	12/15	24/15	24/15	224/25	4	1	1	0	21.20

For the following test, the TM1 was used for HSUPA.

Table 15 Pre-test Measurement Results

		RF Output Power (ERP)					
TEST CONDITIONS		Channel4132(B)		Channel4182(M)		Channel4233(T)	
		826.4MHz		836.4MHz		846.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.3V)	23.43	38.5	23.38	38.5	23.52	38.5

6.1.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBd]	Cable Loss [dB]	Substitution Level (ERP)	FCC limit [dBm]	Result



							[dBm]		
TM1	826.4	23.43	Dipole Ant.	26.73	-2.75	0.6	23.38	38.5	Pass
TM1	836.4	23.38	Dipole Ant.	26.62	-2.87	0.6	23.15	38.5	Pass
TM1	846.6	23.52	Dipole Ant.	26.72	-2.85	0.6	23.27	38.5	Pass

Note: a, For get the ERP (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

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 5M for TM1.

6.1.1.5 Conclusion

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



6.1.2 Conducted Power of Transmitter

6.1.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at Channel Bottom, Middle, Top

6.1.2.2 Test Specifications and Limits

6.1.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H

6.1.2.2.2 Supporting Standards

Table 18 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.1.2.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. The calculated longitude ERP by following formula:

$$ERP(\text{dBm}) = 10 * \log(ERP_{\text{in watts}}).$$

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

$$P_{\text{cod}}(\text{dBm}) = ERP(\text{dBm}) - \text{Gain}(\text{dBd}).$$

and $\text{Gain}(\text{dBd}) = \text{Gain}(\text{dBi}) - 2.15\text{dB}$

Table 19 Limits

Maximum Output Power (Watts)	< 7 Watts(38.5dBm)
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Antenna Gain(dBi):	4.28
Antenna Gain(dBd):	2.13
Maximum Conducted Output Power (dBm)	< 36.37

6.1.2.3 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 HUAWEI EM770U Module to the wireless communication tester CMU200 via the antenna connector. The band class is set as US Cellular.

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

Test setup

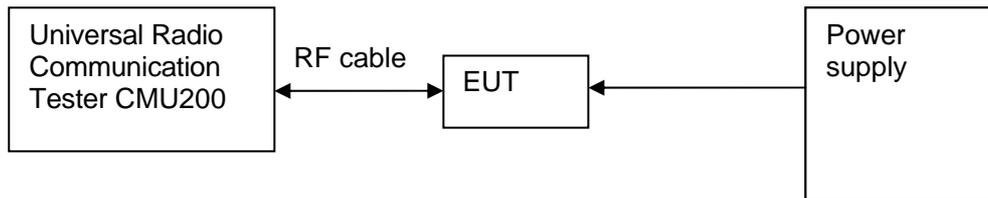


Figure 2. Test Set-up

6.1.2.4 Measurement Results

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel4132(B) 826.4MHz		Channel4182(M) 836.4MHz		Channel4233(T) 846.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.3V)	21.30	36.37	21.25	36.37	21.39	36.37

6.1.2.5 Conclusion

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



6.2 Part 1900M Band

6.2.1 Effective Radiated Power of Transmitter (EIRP)

6.2.1.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.2.1.2 Test Specifications and Limits

6.2.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

6.2.1.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.2.1.2.3 Limits

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

Limits

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

6.2.1.3 Test Method and Setup

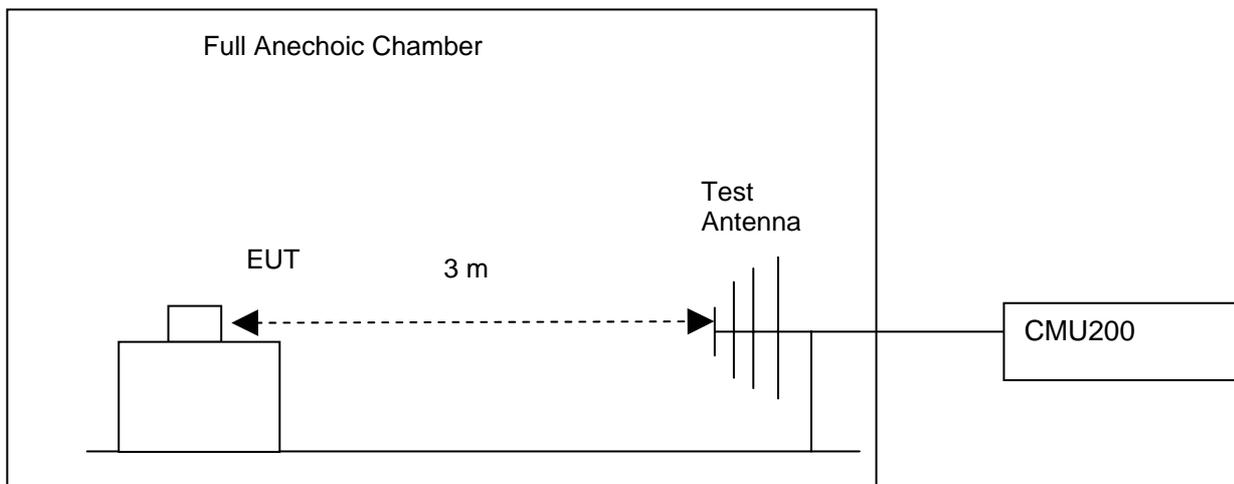
(d) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the

tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the HUAWEI EM770U Module to the wireless communication tester CMU200 via the air interface. The band is set as PCS.

- (e) Test the Radiated maximum output power by the CMU200 received from test antenna.
- (f) 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

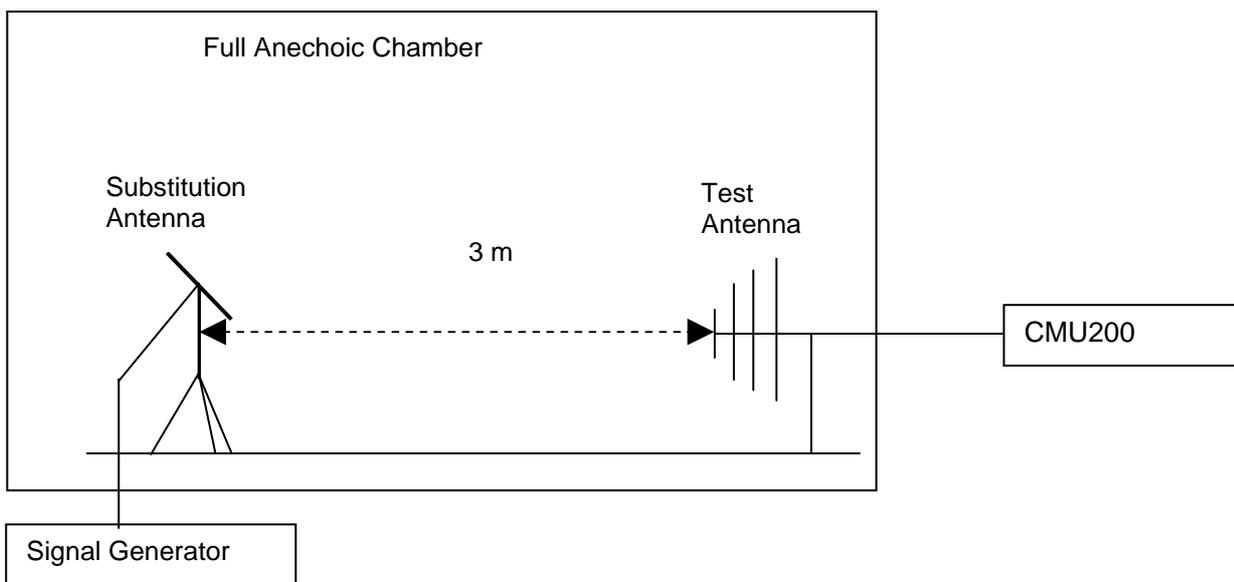


Figure 3. Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) 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.

$EIRP (dBm) = ERP (dBm) + 2.15$ (ITU-R Recommendation SM.329-10).



EIRP was measured using 1 host.
BenQ Joy book S72

6.2.1.4 Measurement Results

6.2.1.4.1 Pre-test Results

For HSUPA test mode, there are 5 sub-tests for different configuration. For the sub-test 1, the max power of EM770U is the maximum as followed table.
The channel is mid range.

HSUPA conducted max power pre-scan

Sub-test	bc	bd	bd (SF)	bc/bd	bHS	bec	bed	bed (SF)	bed (Codes)	CM (dB)	MPR (dB)	Test result
1	8/15	15/15	64	8/15	16/15	16/15	448/75	4	1	1	0	21.66
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3	2	19.38
3	15/15	5/15	64	5/15	30/15	30/15	bed1: 47/15 bed2: 47/15	4 4	2	2	1	20.67
4	1/15	15/15	64	1/15	2/15	2/15	56/75	4	1	3	2	19.56
5	12/15	15/15	64	12/15	24/15	24/15	224/25	4	1	1	0	21.57

For the following test, the TM1 was used for HSUPA.

Measurement Results

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.3V)	25.22	33	25.26	33	25.37	33

6.2.1.4.2 Substitution Results

Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	FCC limit [dBm]	Result
TM1	1852.4	25.22	Horn Ant.	21.55	4.5	1.0	25.05	33	Pass
TM1	1880.0	25.26	Horn Ant.	21.59	4.5	1.0	25.09	33	Pass



TM1	1907.6	25.37	Horn Ant.	21.32	4.8	1.0	25.12	33	Pass
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Note: a, For get the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

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

NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 5M for TM1.

6.2.1.5 Conclusion

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



6.2.2 Conducted Power of Transmitter

6.2.2.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.2.2.2 Test Specifications and Limits

6.2.2.2.1 Specification

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

6.2.2.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.2.2.2.3 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:

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

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

Limits

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

Antenna Gain(dBi):	3.6
Maximum Conducted Output Power (dBm)	< 29.40

6.2.2.3 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 HUAWEI EM770U Module 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 CMU200.

Test setup

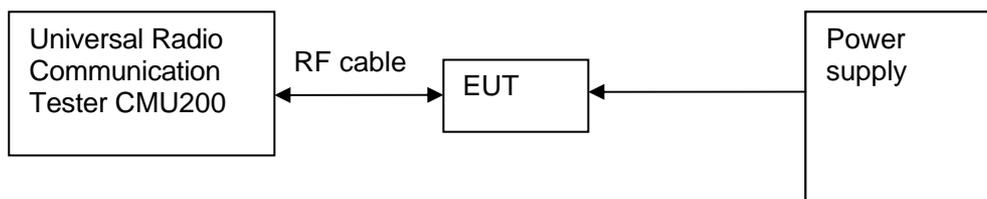


Figure 4. Test Set-up

6.2.2.4 Measurement Results

Measurement Results

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.3V)	21.62	29.40	21.66	29.40	21.77	29.40

6.2.2.5 Conclusion

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



6.3 Part AWS Band

6.3.1 Effective Radiated Power of Transmitter (EIRP)

6.3.1.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.3.1.2 Test Specifications and Limits

6.3.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and Part 27.50(d)2

6.3.1.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.3.1.2.3 Limits

Compliance with Part 27.232, mobile/portable stations are limited to 1 watts EIRP peak power.
 $W(\text{dBm}) = 10 * \log(W_{\text{in mW}})$.

Limits

Maximum Output Power (Watts)	< 1 Watts
Maximum Output Power (dBm)	< 30 dBm

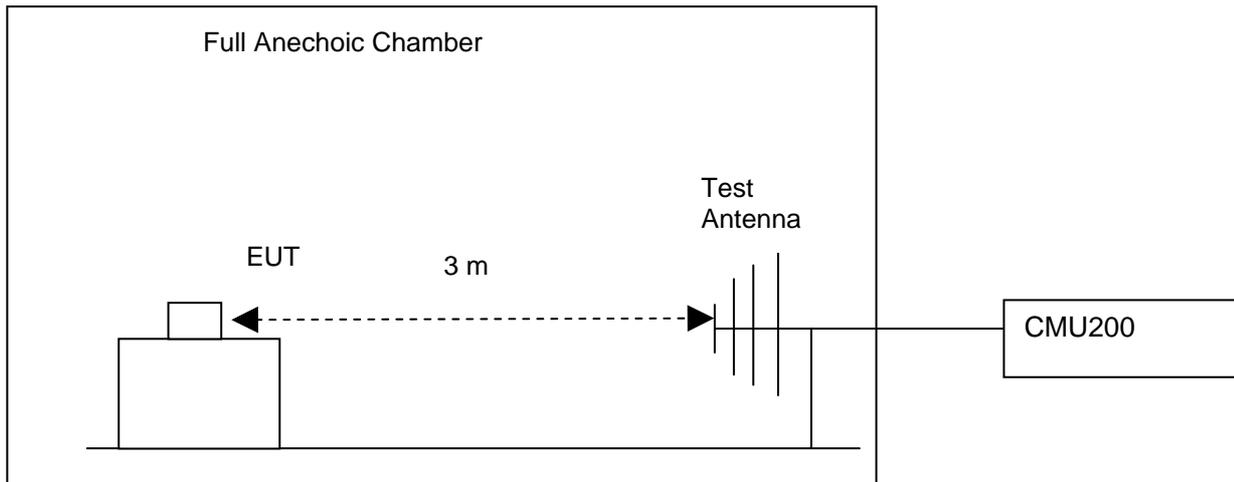
6.3.1.3 Test Method and Setup

(g) 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 HUAWEI EM770U Module to the wireless communication tester CMU200 via the air interface. The band is set as AWS.

- (h) Test the Radiated maximum output power by the CMU200 received from test antenna.
- (i) 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

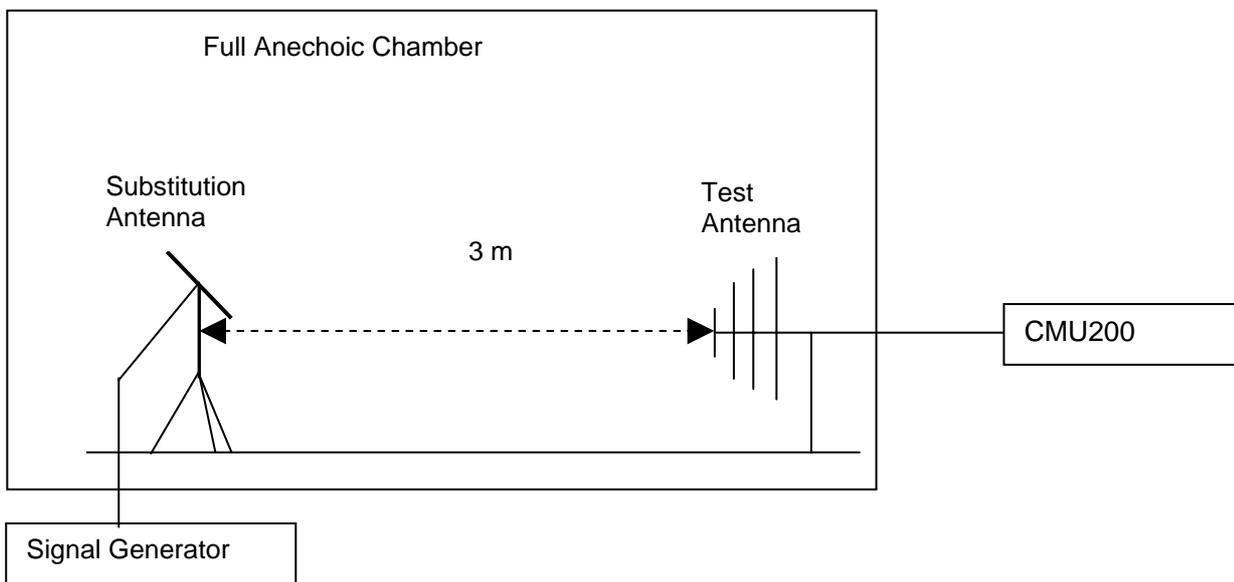


Figure 5. Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) 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 ERP and EIRP.

$EIRP (dBm) = ERP (dBm) + 2.15$ (ITU-R Recommendation SM.329-10).

EIRP was measured using 1 host.

BenQ Joy book S72



6.3.1.4 Measurement Results

6.3.1.4.1 Pre-test Results

For HSUPA test mode, there are 5 sub-tests for different configuration. For the sub-test 1, the max power of EM770U is the maximum as followed table.
The channel is mid range.

HSUPA conducted max power pre-scan

Sub-test	bc	bd	bd (SF)	bc/bd	bHS	bec	bed	bed (SF)	bed (Codes)	CM (dB)	MPR (dB)	Test result
1	8/15	15/15	64	8/15	16/15	16/15	448/75	4	1	1	0	21.46
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3	2	19.40
3	15/15	5/15	64	5/15	30/15	30/15	bed1: 47/15 bed2: 47/15	4 4	2	2	1	20.86
4	1/15	15/15	64	1/15	2/15	2/15	56/75	4	1	3	2	20.22
5	12/15	15/15	64	12/15	24/15	24/15	224/25	4	1	1	0	21.51

For the following test, the TM1 was used for HSUPA.

Measurement Results

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel1312(B) 1712.4MHz		Channel1412(M) 1732.4MHz		Channel1513(T) 1752.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C)	24.50	30	24.06	30	23.70	30
	V _{nom} (3.3V)						

6.3.1.4.2 substitution Results

Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	FCC limit [dBm]	Result
TM1	1712.4	24.50	Horn Ant.	20.85	4.5	1.0	24.35	30	Pass
TM1	1732.4	24.06	Horn Ant.	20.35	4.5	1.0	23.85	30	Pass
TM1	1752.6	23.70	Horn Ant.	19.73	4.8	1.0	23.53	30	Pass



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

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

NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 5M for TM1.

6.3.1.5 Conclusion

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



6.3.2 Conducted Power of Transmitter

6.3.2.1 Test Conditions

Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at frequency Bottom, Middle, Top

6.3.2.2 Test Specifications and Limits

6.3.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and Part 27.50(d)(2)

6.3.2.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS 34.121 V7.5.0:2007	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.3.2.2.3 Limits

Compliance with Part 27.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

$$EIRP(dBm) = 10 * \log(EIRP_{mW})$$

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

Limits

Maximum Output Power (Watts)	< 1 Watts (30 dBm)
Antenna Gain(dBi):	2.6

Maximum Conducted Output Power (dBm)	< 27.4
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6.3.2.3 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 HUAWEI EM770U Module to the wireless communication tester CMU200 via the antenna connector. The band class is set as AWS.

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

Test setup

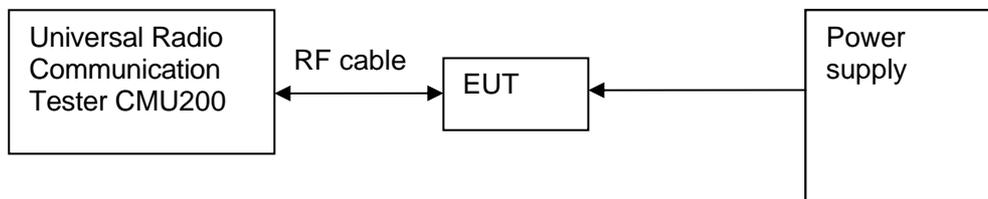


Figure 6. Test Set-up

6.3.2.4 Measurement Results

Measurement Results

TEST CONDITIONS		RF Output Power(Conducted)					
		Channel1312(B) 1712.4MHz		Channel1412(M) 1732.4MHz		Channel1513(T) 1752.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.3V)	21.90	27.4	21.46	27.4	21.10	27.4

6.3.2.5 Conclusion

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

7 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 21 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	EIRP (dBm)	U=3dB; 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