FCC
RF Test Report

Product Name: HSDPA Module

Model Number: MU509-c

Report No: SYBHZ(R)E005112010EB-3
FCC ID: QISMU509C
IC ID: 6369A-MU509C

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice

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Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 24: Subpart E;
	RSS-Gen Issue 2 June 2007
	RSS-133 Issue 5 September 2005
START OF TEST	Nov.15, 2010
END OF TEST	Nov.18, 2010
Final Judgement:	Pass

Approved By Nov.18, 2010 (Date) **Liuchunlin** (Name) Liu Chunlin (Signature)

Reviewed By Nov.18, 2010 (Date) **Chenxiaohong** (Name) Chen Xiaohong (Signature)

Operator Nov.18, 2010 (Date) **Zhangting** (Name) Zhang Ting (Signature)

Contents

1 Summary

The table below summarizes the measurements and results for the HUAWEI MU509-c Module. Detailed results and descriptions are shown in the following pages.

Table 2 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	24.232	Effective Isotropic radiated power of Transmitterr 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
2.1055	24.235	Frequency Stability	PASS
2.1053	24.238	Radiated Spurious Emissions	See Note

Section in CFR 47	**Section in RSS-133**	**Description**	**Result**
24.232(b)	6.4	Effective Isotropic radiated power of Transmitter	PASS
2.1046(a)	6.4	Conducted RF output power	
2.1049(h)	6.5	Occupied Bandwidth	PASS
24.238(a)	6.5	Band Edges Compliance	PASS
24.238(a), 2.1051	6.5	Spurious Emission at Antenna Terminal	PASS
24.238(a), 2.1053	6.5	Radiated Spurious Emission	PASS
2.1055(a)	6.3	Frequency Stability	PASS

Note: The Radiated Spurious Emissions' test results are shown in the EMC report.

2 Product Description

2.1 Production Information

2.1.1 General Description

MU509-c Module is subscriber equipment in the GSM/UMTS system. The frequency band of this report is 1900M. The MU509-c implements such functions as RF signal receiving / Transmitting, HSDPA/WCDMA/EDGE/GPRS protocol processing and data service etc. Externally it provides LGA interface.. It has not internal antenna. MU509-c uses Qualcomm QSC6270 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The HUAWEI MU509-c Module support the function and service as follows:

Table 3 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Data	Modulation: GMSK	TM1	GPRS/GSM
Data	Modulation: 8PSK	TM2	EDGE
Data	Modulation: QPSK	TM3	WCDMA
Data	Modulation: QPSK	TM4	HSDPA

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0. The WCDMA test condition & settings are defined in 3GPP TS 34.121 V8.7.0:2009.

2.2 Modification Information

For original equipment, following table is not application.

Table 4 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

3.1 Testing Period

The test have been performed during the period of

Nov.15, 2010 – Nov.18, 2010

3.2 General Set up Description

HUAWEI MU509-cModule can support GSM/GPRS/EDGE/WCDMA/HSDPA mode and PCS Band in this report. During this measurement, the HUAWEI MU509-c Module just works in GSM/GPRS/EDGE/WCDMA/HSDPA mode and PCS Band.

TM1: GSM/GPRS Mode with GMSK Modulation
TM2: EDGE Mode with 8PSK Modulation
TM3: WCDMA Mode with QPSK Modulation
TM4: HSDPA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 5 Frequency Range

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

4.1.2 Channel Spacing / Separation

Table 6 Channel Spacing / Separation

	EDGE/GPRS/GSM	WCDMA/HSDPA
Channel raster	200k Hz	200k Hz
Channel spacing:	200k Hz	5MHz

4.1.3 Type of Emission

Table 7 Type of Emission

	EDGE/GPRS/GSM	WCDMA/HSDPA
Emission Designation:	300KG7W / 300KGXW	5M00F9W

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

4.1.4 Environmental Requirements

Table 8 Environmental Requirements

Minimum temperature:	- 20 °C
Maximum temperature:	+ 70 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

Table 9 Power Source

DC voltage nominal:	⎓ 3.8V; Supplied by LGA interface
DC voltage range	⎓ 3.3-4.2V
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 10 Applied RF Module 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 11 Board Information

HSDPA Module		
MU509-c		
Board and Module		
Model name	Serial Number	Remarks
MU509-c	4CA2A110A1900056	QSC6270

4.2.2 Adapter Technical Data

Not Applicable.

4.2.3 Battery Technical Data

Not Applicable.

4.2.4 FCC Identification

FCC Identification: **QISMU509C**
IC Identification: **6369A-MU509C**

5 Main Test Instruments

Table 12 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
EMI Test receiver	R&S	ESIB 26	100318	05.04.2011
Broadband Antenna	Schaffner	CBL 6112B	2941	04.17, 2011
Horn Antenna	R & S	HF906	359287/006	06.15.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	11.20.2010
Signal Generator	R&S	SMR 40	100325	05.12, 2011
Vector Signal Generator	R&S	SMU200A	3605064030	05.20.2011
Power Supply	Agilent	66311B	MY43006371	03.26.2011
Climate Chamber	WEISS	WK11-600/70	5922602844001 0	09.26.2011
Universal Radio Communication Tester	R&S	CMU200	113164	05.21.2011
Spectrum Analyzer	R&S	FSU26	200002	03.07.2011

6 Transmitter Measurements

6.1 Effective Isotropic radiated power of Transmitter (EIRP)

6.1.1 Test Conditions

Table 13 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25℃
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3/TM4 at frequency Bottom, Middle, Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24 subpart E

6.1.2.2 Supporting Standards

Table 14 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.1.2.3 Limits

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

Table 15 Limits

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

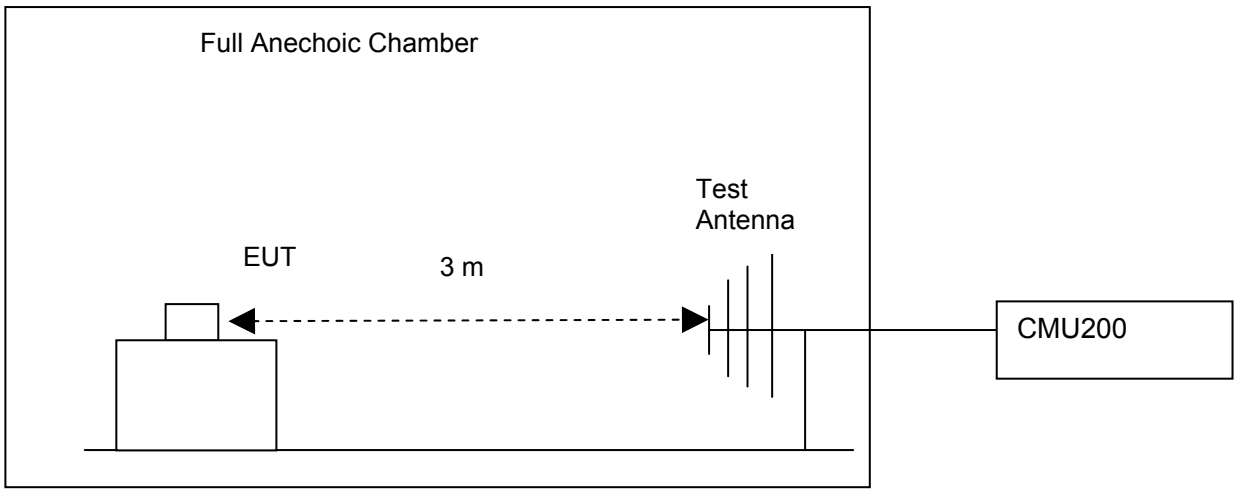
6.1.3 Test Method and Setup

(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 HUAWEI MU509-c Moduleto the wireless communication tester CMU200 via the air interface. The band is set as PCS.
(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 horn antenna. The horn 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

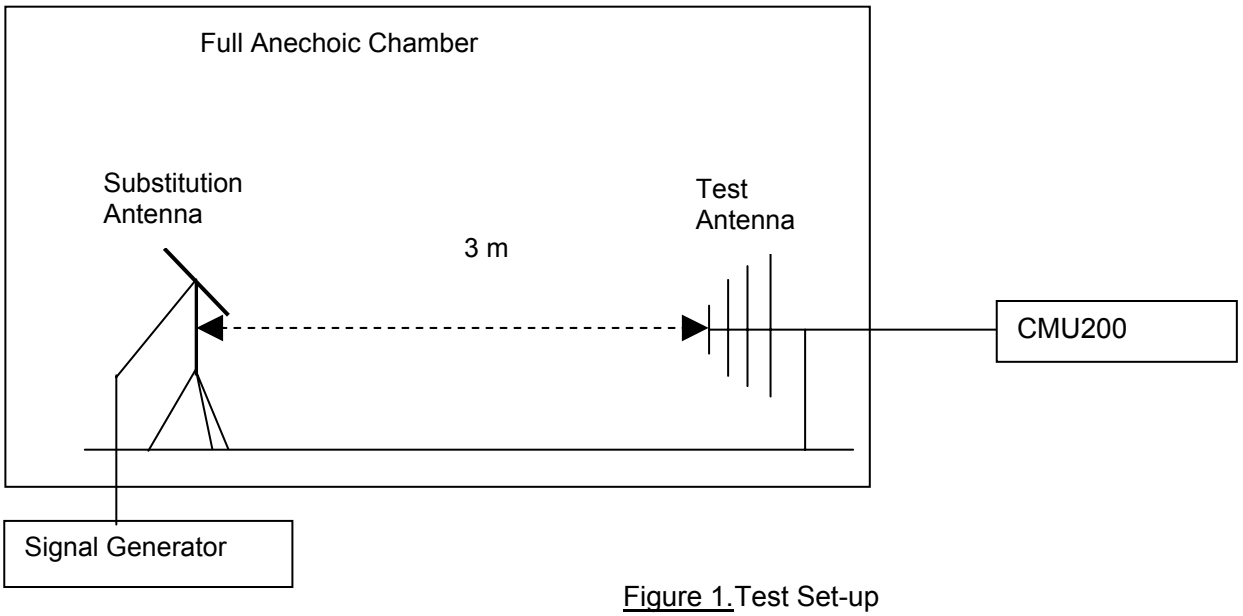


Figure 1.Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave horn 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 using1 host.
BenQ Joy book S72

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

Table 16 Measurement Results

	RF Output Power (EIRP)					
TEST CONDITIONS	Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
	dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (3.8V)	Measured	Limit	Measured	Limit	Measured	Limit
TM1	32.69	33	32.48	33	32.06	33
TM2	29.26	33	29.16	33	28.77	33
TEST CONDITIONS	Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
	dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (3.8V)	Measured	Limit	Measured	Limit	Measured	Limit
TM3	25.07	33	25.01	33	24.74	33

6.1.4.2 Substitution Results

Table 17 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]
TM1	1850.2	32.69	Horn Ant.	28.95	4.5	1.0	32.45	33
TM1	1880.0	32.48	Horn Ant.	28.75	4.5	1.0	32.25	33
TM1	1909.8	32.06	Horn Ant.	28.02	4.8	1.0	31.82	33
TM2	1850.2	29.26	Horn Ant.	25.59	4.5	1.0	29.09	33
TM2	1880.0	29.16	Horn Ant.	25.49	4.5	1.0	28.99	33
TM2	1909.8	28.77	Horn Ant.	24.74	4.8	1.0	28.54	33
TM3	1852.4	25.07	Horn Ant.	21.47	4.5	1.0	24.97	33
TM3	1880.0	25.01	Horn Ant.	21.29	4.5	1.0	24.79	33
TM3	1907.6	24.74	Horn Ant.	20.70	4.8	1.0	24.50	33

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

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2 and 5M for TM3 and TM4.

6.1.5 Conclusion

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

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 18 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3/TM4 at frequency Bottom, Middle, Top

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

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

6.2.2.2 Supporting Standards

Table 19 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

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 ($EIRP_{in\ mW}$).

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

Table 20 Limits

Maximum Output Power (Watts)	< 2 Watts (33 dBm)
Antenna Gain(dBi):	2.7

Maximum Conducted Output Power (dBm)	< 30.30

For HSDPA test mode, there are 4 sub-tests for different configuration.

Table 21 HSDPA conducted max power pre-scan

Sub-test	c	d	d (SF)	c/d	HS (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0	0
2	12/15	15/15	64	12/15	24/15	1	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

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 HUAWEI MU509-c 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

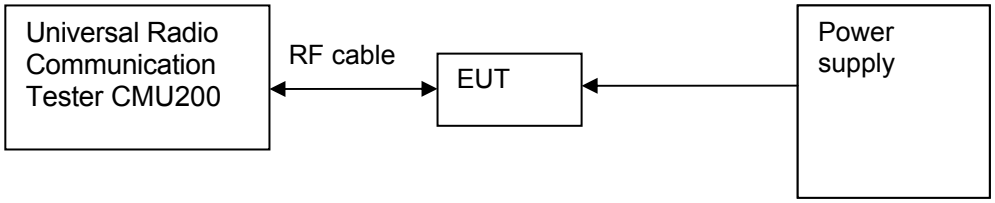


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 22 Measurement Results

	RF Output Power (Conducted)					
TEST CONDITIONS	Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
	dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (3.8V)	Measured	Limit	Measured	Limit	Measured	Limit

TM1		29.99	30.30	29.78	30.30	29.36	30.30
TM2		26.56	30.30	26.46	30.30	26.07	30.30
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (3.8V)		Measured	Limit	Measured	Limit	Measured	Limit
TM3		22.37	30.30	22.31	30.30	22.04	30.30
TM4	Case1	21.12	30.30	21.14	30.30	20.89	30.30
	Case2	21.10	30.30	21.01	30.30	20.77	30.30
	Case3	21.10	30.30	20.93	30.30	20.78	30.30
	Case4	19.82	30.30	19.87	30.30	19.57	30.30

6.2.5 Conclusion

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

6.3 Modulation Characteristics

6.3.1 Test Conditions

Table 23 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 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 24 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.3.2.3 Limits

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

Table 25 Limits

Limits	Not applicable

6.3.3 Test Method and Setup

Connect the HUAWEI MU509-c Module to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the HUAWEI MU509-c Module's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. The waveform quality and constellation of the HUAWEI MU509-c Module was tested.

Test setup

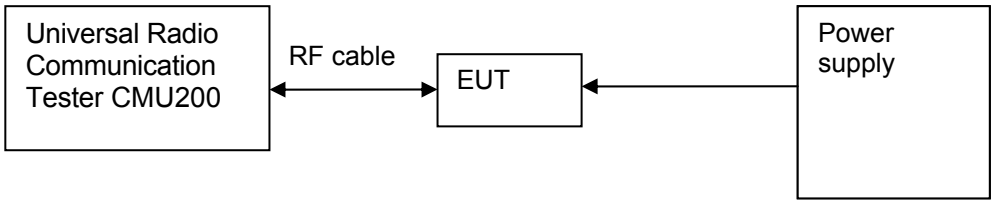


Figure 3.Test Set-up

6.3.4 Measurement Results

Table 26Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel661(M) 192MHz	
		Measured	
		TM1	TM2
T_{nom} (25 °C)	V_{nom} (3.8V)	Refer to Appendix A	Refer to Appendix A
TEST CONDITIONS		Channel9400(M) 192MHz	
		Measured	
		TM3	
T_{nom} (25 °C)	V_{nom} (3.8V)	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 27 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Middle, 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 28 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

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 29 Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

HUAWEI MU509-c Module was connected to the wireless signal analyzer R&S FSU26 via the one RF connector. The band class is set as PCS; HUAWEI MU509-c Module was controlled to transmit maximum power. Measure and record the occupied bandwidth of the HUAWEI MU509-c Module 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 following RBW and VBW are employed:
Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)
Video bandwidth (VBW): 500 kHz

Test Set-up

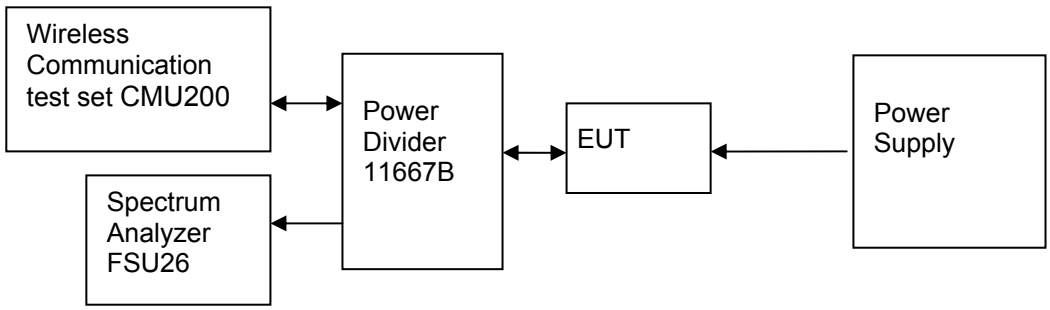


Figure 4.Test Set-up

6.4.4 Measurement Results

Table 30 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
Center Frequency		Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
		Measured (kHz)		Measured (kHz)		Measured (kHz)	
		TM1	TM2	TM1	TM2	TM1	TM2
Tnom (25 °C) Vnom (3.8V)	99%	245.19	246.79	243.59	243.59	246.79	248.40
Center Frequency		Channel9262(B) 1852.4MHz		Channel9400(M) 1880.0MHz		Channel9538(T) 1907.6MHz	
		Measured		Measured		Measured	

		(MHz)	(MHz)	(MHz)
		TM3	TM3	TM3
Tnom (25 °C) Vnom (3.8V)	99%	4.15	4.15	4.17

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 31 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 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 subpart E

6.5.2.2 Supporting Standards

Table 32 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

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(W). (Whereas P is the rated power of the EUT).

Table 33 Limits for GPRS

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB	43+10log (0.4) = 39 , 26 dBm - 39 dB	43+10log (0.25) = 37 , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.5.3 Test Method and Setup

HUAWEI MU509-c Module was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as PCS. HUAWEI MU509-c Module was controlled to transmit maximum power. Measure and record band edges compliance of the HUAWEI MU509-c Module by the R&S FSU26.

For TM1/TM2 following RBW and VBW are employed:
Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz
For TM3 following RBW and VBW are employed:
Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)
Video bandwidth (VBW): 200 kHz

Test Set-up

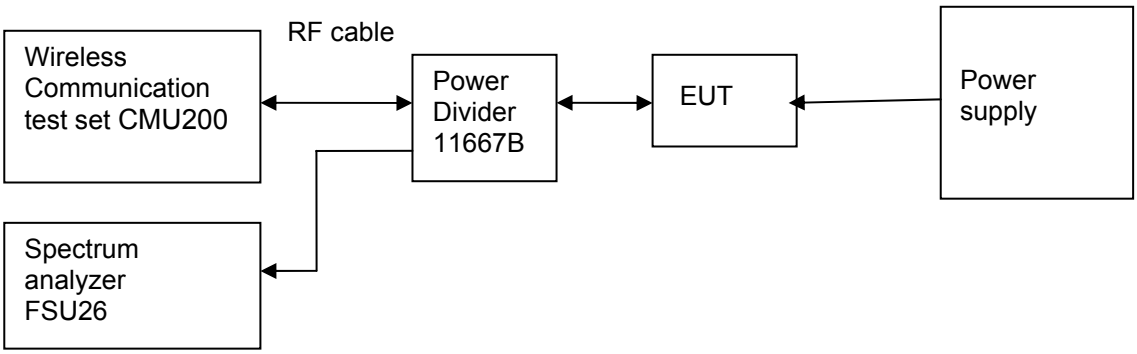


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 34 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
PCS	T_{nom} (25 °C), V_{nom} (3.8V)					
	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
	1852.4	9262	TM3	<-13(See appendix C)	- 13 dBm	Pass
	1907.6	9538	TM3	<-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 35 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Middle ,Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24 subpart E

6.6.2.2 Supporting Standards

Table 36 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

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 37 Limits for GPRS Mode

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm - 43 dB	43+10log (0.4) = 39 , 26 dBm - 39 dB	43+10log (0.25) = 37 , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the R&S FSU26.

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 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

Test Set-up

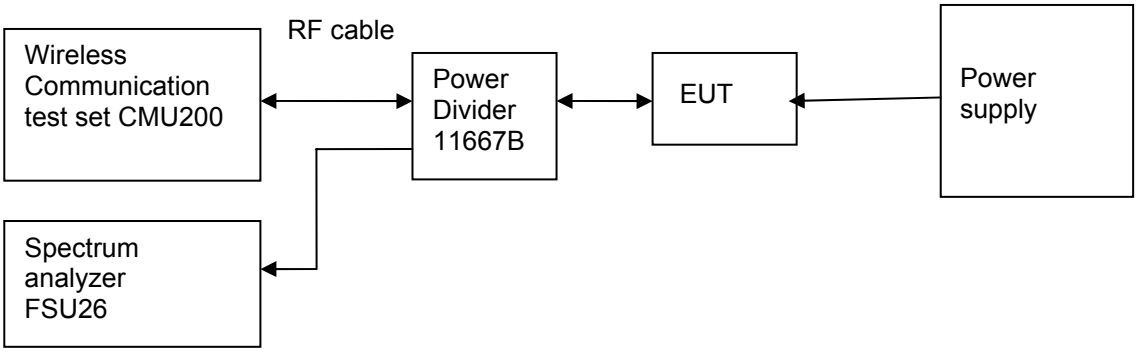


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 38 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	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9262(B)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 661(M)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9400(M)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass

	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9538(T)	TM3	9 kHz~20GHz	24	<- 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 Frequency Stability

6.7.1 Test Conditions

Table 39 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1/TM2/TM3 at frequency Middle

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24 subpart E

6.7.2.2 Supporting Standards

Table 40 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 V8.7.0:2009	Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.7.2.3 Limits

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

6.7.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From -30 ° to +70 ° centigrade for all equipment except that specified in subparagraphs
(2) and (3) of paragraph 2.1055

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10^{o} 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.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 95 to 105 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.
(c) 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) 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.)

The EUT can only work in such extreme voltage 3.3V and 4.2V, so here the EUT is tested in the 3.3V and 4.2V.

Test Set up

Connect the EUT to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50 Ω load.

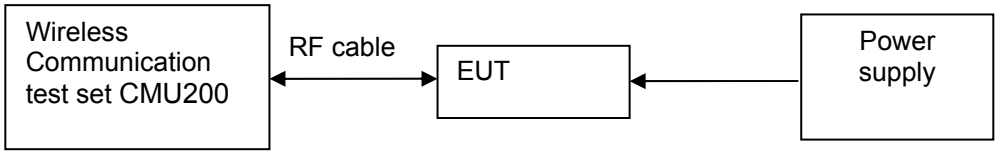


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.8V DC Channel No.661(1880.0MHz)**

Table 41 Measurement Results vs. Variation of Temperature—TM1

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	34	Pass
-20 °C	1880.0	-23	Pass
-10 °C	1880.0	-13	Pass
0 °C	1880.0	12	Pass
+10 °C	1880.0	-5	Pass
+20 °C	1880.0	-9	Pass
+30 °C	1880.0	-11	Pass
+40 °C	1880.0	-7	Pass
+50 °C	1880.0	19	Pass
+60°C	1880.0	5	Pass
+70°C	1880.0	-7	Pass

- **TM2, 3.8V DC Channel No.661(1880.0MHz)**

Table 42 Measurement Results vs. Variation of Temperature—TM2

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	31	Pass
-20 °C	1880.0	-26	Pass
-10 °C	1880.0	-10	Pass
0 °C	1880.0	6	Pass
+10 °C	1880.0	10	Pass
+20 °C	1880.0	1	Pass
+30 °C	1880.0	6	Pass
+40 °C	1880.0	-13	Pass
+50 °C	1880.0	14	Pass
+60°C	1880.0	9	Pass
+70°C	1880.0	-8	Pass

- **TM3, 3.8V DC Channel No.9400(1880.0MHz)**

Table 43 Measurement Results vs. Variation of Temperature—TM3

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	28	Pass
-20 °C	1880.0	-23	Pass
-10 °C	1880.0	-14	Pass
0 °C	1880.0	-8	Pass
+10 °C	1880.0	4	Pass
+20 °C	1880.0	7	Pass
+30 °C	1880.0	-7	Pass
+40 °C	1880.0	-8	Pass
+50 °C	1880.0	14	Pass
+60°C	1880.0	3	Pass
+70°C	1880.0	-8	Pass

6.7.4.2 Measurement Results vs. Variation of Voltage

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

Table 44 Measurement Results vs. Variation of Voltage—TM1

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.2 V	1880.0	-66	Pass
3.8 V	1880.0	-64	Pass
3.3 V	1880.0	-54	Pass

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

Table 45 Measurement Results vs. Variation of Voltage－TM2

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.2 V	1880.0	-48	Pass
3.8 V	1880.0	-53	Pass
3.3 V	1880.0	-62	Pass

- **TM3, 25 °C ,Channel No. 9400(1880.0MHz)**

Table 46 Measurement Results vs. Variation of Voltage－TM3

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.2 V	1880.0	-2	Pass
3.8 V	1880.0	-41	Pass
3.3 V	1880.0	-44	Pass

6.7.5 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 47 System Measurement Uncertainty

Items		Extended Uncertainty
Efficient Isotropic 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

8 Appendices

Appendix A	Measurement Results Modulation Characteristics	4 Pages
Appendix B	Measurement Results Occupied Bandwidth	10 Pages
Appendix C	Measurement Results Band Edges	7 Pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	28 Pages