



FCC&IC RF Test Report

Product Name: Wireless Modem

Model Number: E583C

Report No: SYBHZ(R)E008092010EB-4

FCC ID: QISE583C-52

IC:6369A-E583C

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Notice

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Notice 2

Modification Information:

Table 1 Modification Information

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



REPORT ON	FCC 47CFR Part27 subpart C&L / IC RSS-139 Issue 2 test of Wireless Modem
	M/N: E583C
REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part27;
	RSS-Gen Issue 2
	RSS-139 Issue 2
START OF TEST	Sep.01, 2010
END OF TEST	Sep.08, 2010
Final Judgement:	Pass

Approved By 2010-09-08 Chenxiaohong Chen Xiaohong
 Date Name Signature

Reviewed By 2010-09-08 Xuguangyi Xuguangyi
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1 Summary

The table below summarizes the measurements and results for the E583C Wireless Modem. 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	27.50(d)	Effective Radiated Power of Transmitter	PASS
2.1046	27.50(d)	Conducted Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	27.53(g)	Band Edges Compliance	PASS
2.1051	27.53(g)	Spurious Emission at Antenna Terminal	PASS
2.1055	27.54	Frequency Stability	PASS
2.1053	22.917	Radiated Spurious Emissions	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

E583C is a UMTS/GSM Wireless Modem It can be used as a WiFi Access Point, Max to 5 WiFi stations can be associating with E583C simultaneity. It also can be used as a USB modem by connecting with PC via USB cable. It supports wireless internet accessing function. The data service rate is HSUPA 5.75Mbps, and HSDPA 7.2Mbps. The WCDMA frequency is BAND I and BAND IV. The GPRS/EDGE frequency is 850/900/1800/1900 MHz, but only WCDMA BAND IV、GSM850 and AWS1900 test data included in this report. The WiFi frequency is 2.4G.

2.1.2 Support function and Service

The E583C Wireless Modem support the function and service as follows:

Table 3 Service and Test mode List

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

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



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

Sep. 01, 2010 – Sep. 8, 2010



4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	1710 to 1755 MHz
Downlink band:	2110 to 2155 MHz

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

	WCDMA
Channel spacing	200 kHz
Channel separation:	5 MHz

4.1.3 Type of Emission

Table 6 Type of Emission

	WCDMA
Emission Designation:	5M00F9W

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202
 RSS-139 Issue 2

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:	~120V
AC voltage range	~100V-240V
AC current maximal:	0.2A

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).
According to RSS-139 Issue 2

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).
According to RSS-139 Issue 2

The voltage and current of RF IC in the final stage is:

Table 9 Applied RF module DC Voltages and Currents

Voltage:	 2.85V
Current:	2A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)
	2A According to RSS-139 Issue 2

4.2 EUT Identification List

4.2.1 Board Information

Table 10 Board Information

E583C Wireless Modem		
E583C		
Board and Module		
Equipment Designation / Description	Hardware Version	Remarks
MAINBOARD	WL1E583CT	E583C

4.2.2 Adapter Technical Data

AC/DCAdapter Model	HW-050100U1W
Manufacturer	Shen Zhen Huntkey Power Technology Co.,Ltd
Input Voltage	100-240V ~50/60Hz 0.2 A
Output Voltage	5V 1A
Rated Power	<3.5W
S/N	HKAA51085276

AC/DCAdapter Model	HW-050100U1W
Manufacturer	TECH-POWER INTERNATIONAL CO.,LTD
Input Voltage	100-240V ~50/60Hz 0.2 A
Output Voltage	5V 1A
Rated Power	<3.5W
S/N	TPAA62900079

4.2.3

Type:	Rechargeable Li-ion
Manufacturer:	Huawei Technologies Co., Ltd.
Battery Model:	HB7A1H
Rated capacity:	1400mAh
Nominal Voltage:	+3.7V
Charging Voltage:	+4.2V

4.2.4 FCC/IC Identification

Grantee Code: QIS
 Product Code: E583C-52
 FCC Identification: QISE583C-52
 IC Identification: 6369A-E583C

5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	08.23.2011
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	08.23.2011
Receiver	R&S	ESIB 26	100318	05.29.2011
Receiver	R&S	ESCS30	830245/018	05.29.2011
Pre-Amplifier	Agilent	8447D	2944A10146	05.21.2011
Pre-Amplifier	Agilent	83017A	3950M00246	06.04.2011
Loop Antenna	Schwarzbeck	FMZB1516	1516115	06.20.2011
BiLog Antenna	Schaffner	CBL 6112B	2536	10.25.2010
Horn Antenna	ETS-Lindgren	3117	00062533	06.05.2011
Horn Antenna	ETS-Lindgren	3116	00031541	06.20.2011
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	11.27.2010
Signal Generator	R&S	SMT06	830264/009	09.29.2010
Signal Generator	R&S	SMU200A	3605062516	10.08.2010
Signal Generator	R&S	SMR 40	100325	12.09.2010
Power Supply	Keithley	2306	1045337	07.20.2011
Climate Chamber	WEISS	ACS-1	3604040034	08.14.2011
Universal Radio Communication Tester	R&S	CMU200	108035	07.04.2011
Wireless communication test set	Agilent	8960	GB43461081	06.15.2011
Power Splitter	Agilent	11667B	3586M000159	07.20.2011
Spectrum Analyzer	Agilent	E4440A	N/A	10.26.2010

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°C
Relative humidity:	55%
Test Configurations:	TM1 at frequency B、 M、 T

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part27.50(d)
 RSS-139 Issue 2

6.1.2.2 Supporting Standards

Table 13 Supporting 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);
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6.1.2.3 Limits

Compliance with part27.50(d), mobile/portable stations are limited to 2 watts EIRP peak power.
 $W(\text{dBm}) = 10 * \log(W_{\text{In mwatts}})$.

Table 14 Limits

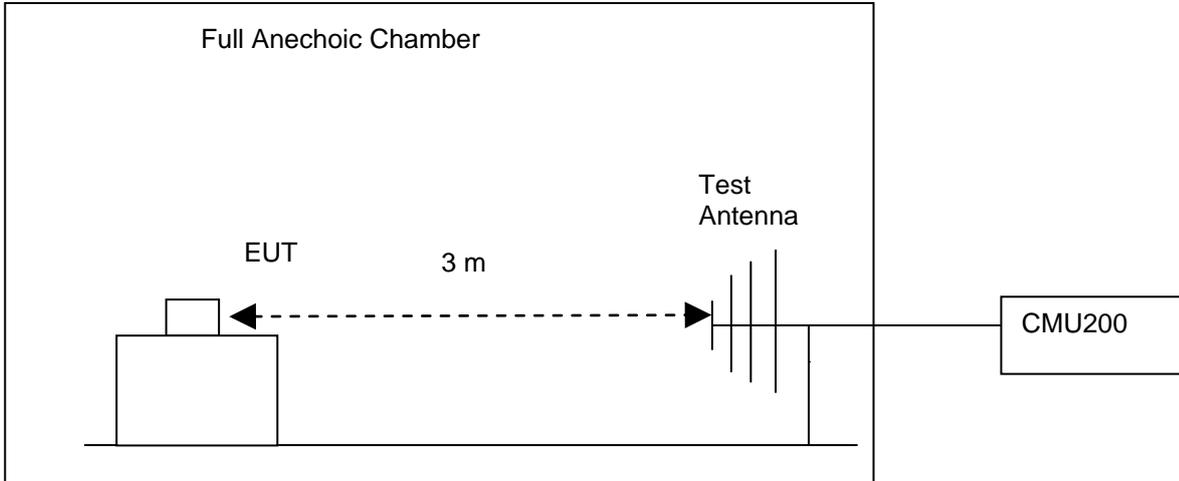
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, 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 Modem to the wireless communication tester R&S CMU200 via the air interface. The band class is set as AWS.
- 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

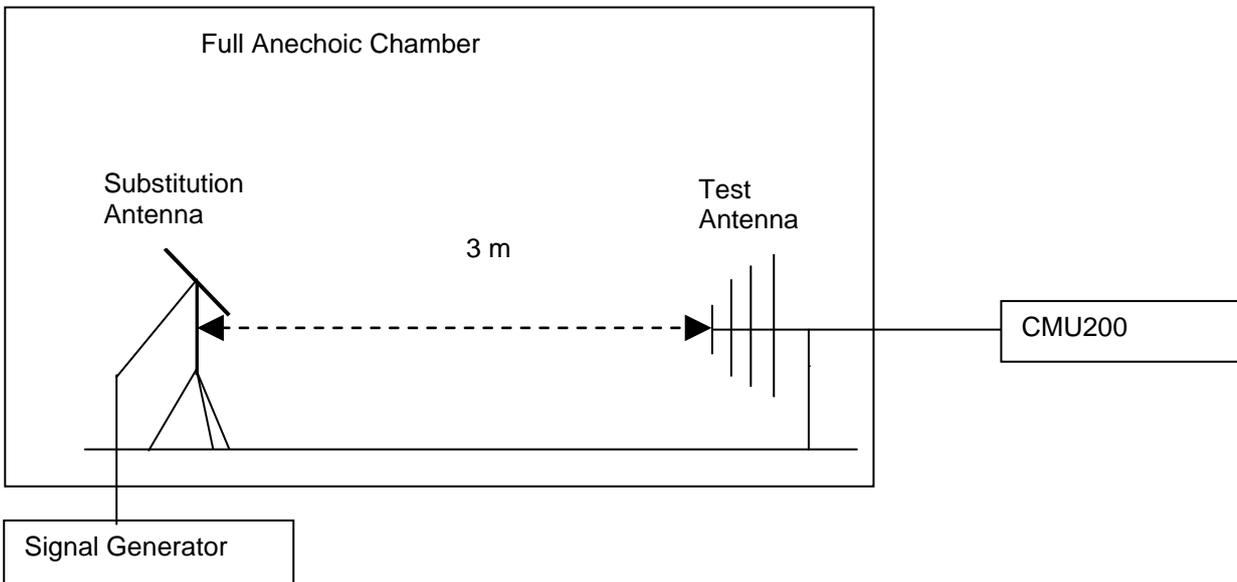


Figure 1. Test Set-up

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.

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

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power (EIRP)					
		Channe1312(B) 1712.5MHz		Channel1413(M) 1732MHz		Channel1513(T) 1752.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.7V)	22.08	33	22.04	33	22.05	33

6.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution on Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Limit [dBm]	Result
TM1	1712.5	22.08	Dipole Ant.	19.19	4.6	1.0	22.79	33	Pass
TM1	1732.0	22.04	Dipole Ant.	19.01	4.6	1.0	22.61	33	Pass
TM1	1752.6	22.05	Dipole Ant.	18.87	4.8	1.0	22.67	33	Pass

Note: a, For get the EIRP (Efficient Isotropically 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, A WCDMA signal with bandwidth of 5MHz of 200kHz are created by the vector generator R&S SMU200A.

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

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:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1 at frequency B、M、T

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part27.50(d)
 RSS-139 Issue 2

6.2.2.2 Supporting Standards

Table 18 Supporting 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);
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6.2.2.3 Limits

Compliance with part part27.50(d), 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 19 Limits

Maximum Output Power (Watts)	< 2 Watts (33dBm)
Antenna Gain(dBi):	1.6
Maximum Conducted Output Power (dBm)	< 33dBm

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 Modem 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

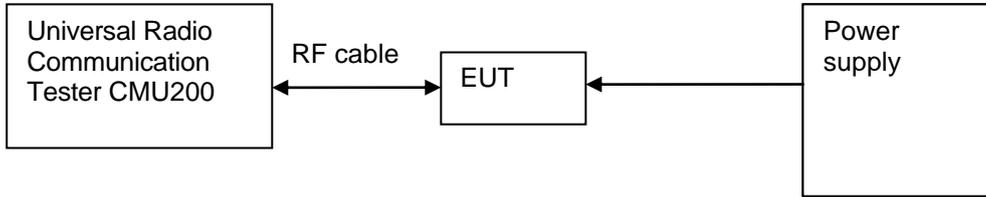


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power(Conducted)					
		Channe1312(B) 1712.5MHz		Channel1413(M) 1732MHz		Channel1513(T) 1752.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.7V)	22.49	31.4	22.41	31.4	22.47	31.4

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:	52 %
Test Configurations:	TM1 at frequency M

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 27 subpart C&L
 RSS-139 Issue 2

6.3.2.2 Supporting Standards

Table 22 Supporting 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);
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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
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6.3.3 Test Method and Setup

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

Test setup

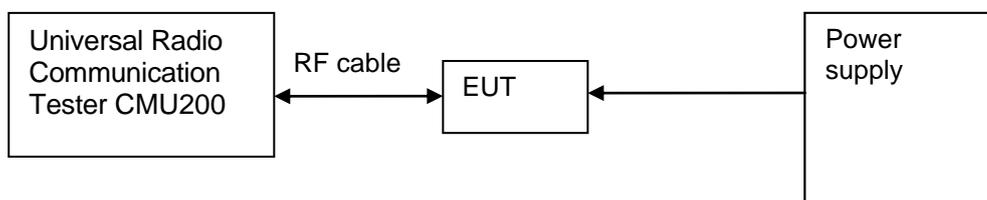


Figure 3. Test Set-up



6.3.4 Measurement Results

Table 24 Measurement Results

		Modulation Characteristic
TEST CONDITIONS		Channel1413(M) 1732MHz
		Measured
		TM1
T _{nom} (25 °C)	V _{nom} (3.7V)	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 at frequency B, M, T

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 27 subpart C&L
 RSS-139 Issue 2

6.4.2.2 Supporting Standards

Table 26 Supporting 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);
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6.4.2.3 Limits

No specific occupied bandwidth requirement in part 27 subpart C&L, 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
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6.4.3 Test Method and Setup

Wireless Modem was connected to the Spectrum Analyzer AGILENT E4440A via the one RF connector. The band class is set as AWS; The EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT by the AGILENT E4440A.

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 system following RBW and VBW are employed:
 Measurement bandwidth (RBW): 51 kHz (Resolution bandwidth)
 Video bandwidth (VBW): 510 kHz

Test Set-up

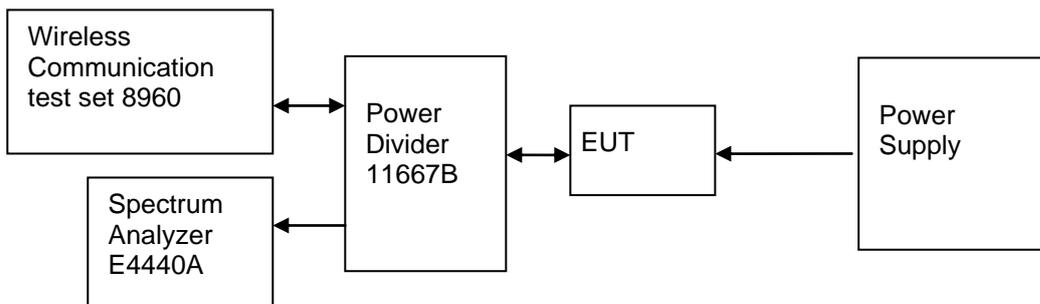


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 28 Measurement Results

TEST CONDITIONS		Occupied Bandwidth		
		Channel1312(B) 1712.5MHz	Channel1413(M) 1732MHz	Channel1513 (T) 1752.6MHz
		Measured (MHz)	Measured (MHz)	Measured (MHz)
		TM1	TM1	TM1
T _{nom} (25 °C) V _{nom} (3.7V)	99%	4.1905	4.1569	4.1594

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 at frequency B、 T

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 27.53(g)
 RSS-139 Issue 2

6.5.2.2 Supporting Standards

Table 30 Supporting 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);
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6.5.2.3 Limits

Compliance with part 27.53(g), 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 31 Limits

	TM1
Rated Power:	24 dBm
Required attenuation:	$43 + 10 \log (0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer AGILENT E4440A via the one RF connector, the band class is set as AWS. The EUT was controlled to transmit maximum power. Measure and record band edges compliance of the EUT by the AGILENT E4440A.

The limit is -13dBm.

For TM1 system following RBW and VBW are employed:
 Measurement bandwidth (RBW): 51 kHz (Resolution bandwidth)
 Video bandwidth (VBW): 200 kHz

Test Set-up

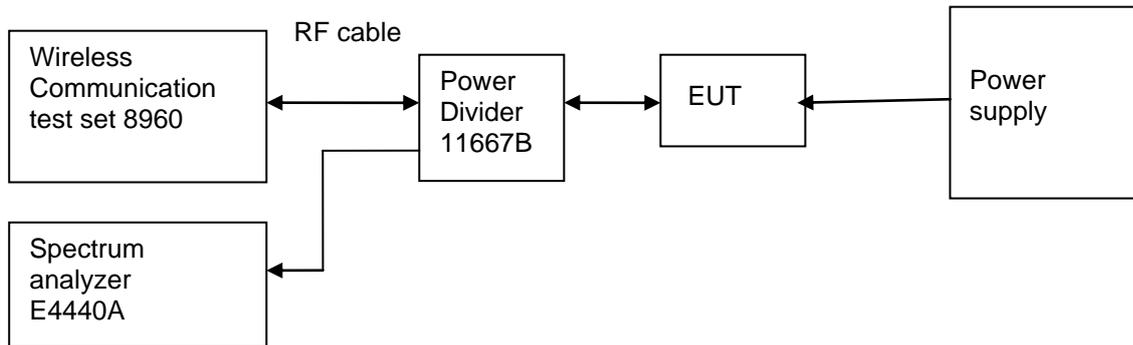


Figure 5. Test Set-up

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
$T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (3.7\text{V})$						
AWS	1712.5	1312	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1752.6	1513	TM1	<-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:	50 %
Test Configurations:	TM1 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 27.53(g)
 RSS-139 Issue 2

6.6.2.2 Supporting Standards

Table 34 Supporting 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);
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6.6.2.3 Limits

Compliance with part 27.53(g), 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
Rated Power:	24 dBm
Required attenuation:	$43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

The EUT was connected to the Spectrum analyzer AGILENT E4440A via the one RF connector, the band class is set as AWS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the AGILENT E4440A.

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

27.53(g) 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

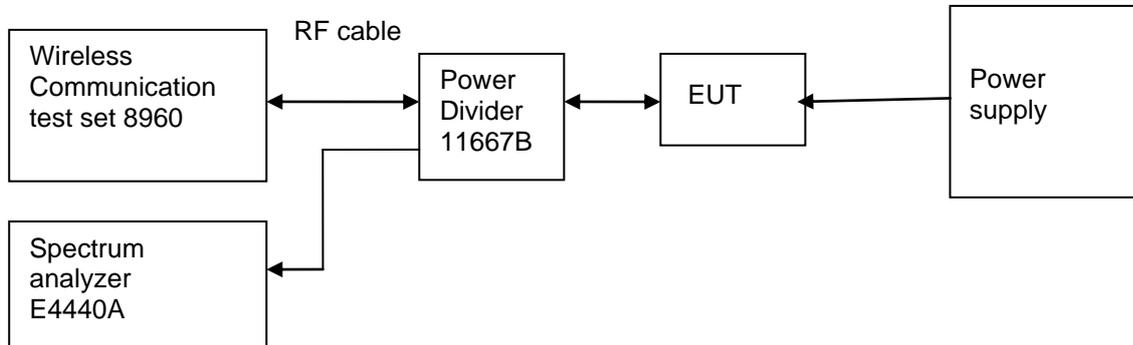


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 36 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 1312(B)	TM1	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 1413(M)	TM1	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 1513(T)	TM1	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 37 Test Conditions

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

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 27.54
 RSS-139 Issue 2

6.7.2.2 Supporting Standards

Table 38 Supporting 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);
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6.7.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 27.54.

6.7.3 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.)

The EUT can only work in such extreme voltage 3.6V and 4.2V, so here the EUT is tested in the 3.6V and 4.2V

Test Set up

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

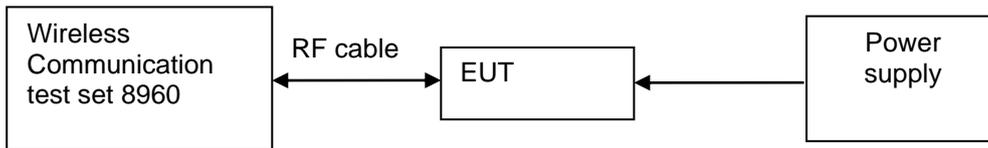


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.7 DC Channel No.1413(1732.0MHz)**

Table 39 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	1732.0	14	Pass
-20 °C	24	1732.0	9	Pass
-10 °C	24	1732.0	15	Pass
0 °C	24	1732.0	9	Pass
+10 °C	24	1732.0	13	Pass
+20 °C	24	1732.0	15	Pass
+30 °C	24	1732.0	15	Pass
+40 °C	24	1732.0	9	Pass
+50 °C	24	1732.0	10	Pass



6.7.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 1413(1732.0MHz)**

Table 40 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	24	1732.0	11	Pass
3.7	24	1732.0	13	Pass
4.2	24	1732.0	13	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 41 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Isotropically 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	4 pages
Appendix C	Measurement Results Band Edges Compliance	4 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	13 pages