



FCC RF Test Report

**Product Name: Vodafone 858 Smart ;
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with
Bluetooth; Vodafone 858;VF858**

Model Number: HUAWEI U8160/U8160

Report No: SYBH(Z-RF)021032011-2002

FCC ID: QISU8160

Reliability Laboratory of Technologies Co., Ltd.

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

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

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	



REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 24: Subpart E;
START OF TEST	Mar. 15, 2011
END OF TEST	Mar. 18, 2011
Final Judgement:	Pass

Approved By

Mar.25, 2011

Date

Chenxiaohong

Name

Chen Xiaohong

Signature

Reviewed By

Mar.25, 2011

Date

xuguangyi

Name

Xuguangyi

Signature

Operator

Mar.25, 2011

Date

Wuhua

Name

Wuhua

Signature



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1 Summary

The table below summarizes the measurements and results for the Mobile Phone. 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 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

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

HUAWEI U8160 /U8160 are subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band I. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only PCS1900MHz bands test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS, AGPS and Wi-Fi etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

HUAWEI U8160-U/U8160-U is a HSDPA/UMTS/GPRS/GSM/EDGE mobile phone with Bluetooth, which supports GSM850/900/1800/1900 and WCDMA900 /2100.

HUAWEI U8160/U8160 is a HSDPA/UMTS/GPRS/GSM/EDGE mobile phone with Bluetooth, which supports GSM850/900/1800/1900 and WCDMA2100

The PCB of them is the same.

The difference between HUAWEI U8160-U/U8160-U and HUAWEI U8160/U8160 is showed in the following table.

	HUAWEI U8160-U/ U8160-U	HUAWEI U8160/ U8160
GSM four bands	support	support
WCDMA 2100M	support	support
WCDMA 900M	support	No
FLASH	Same	Same
PCB	the same	the same
Appearance	the same	the same
Bluetooth mode	the same	the same
WLAN mode	the same	the same
BT/ WLAN antenna	the same	the same
GSM/ WCDMA antenna	the same	the same
External camera	the same	the same
Internal camera	No	No
Adapter	the same	the same
Battery	the same	the same

2.1.2 Support function and Service

The Mobile Phone 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

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.

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:

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

3.1 Testing Period

The test have been performed during the period of

Mar.15, 2011 –Mar.18, 2011

3.2 General Set up Description

The Mobile Phone can support GSM/GPRS/EDGE mode and PCS Band in this report.. During this measurement, the Mobile Phone just works in GSM/GPRS/EDGE mode and PCS Band.

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 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
Channel raster	200k Hz
Channel spacing:	200k Hz

4.1.3 Type of Emission

Table 7 Type of Emission

	EDGE/GPRS/GSM
Emission Designation:	300KG7W / 300KGXW

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:	- 10 °C
Maximum temperature:	+ 55 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

Table 9 Power Source

AC voltage nominal:	~ 120 V
AC voltage range	~ 100 V to ~ 240 V
AC current maximal:	400mA

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:	== 4.2V (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

Vodafone 858 Smart; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; Vodafone 858;VF858		
HUAWEI U8160/U8160		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
MAINBOARD	Z8D7NB1130200197	HD1U813M

4.2.2 Battery Technical Data

Name	Qty.	Manufacture	Serials number	Description
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	UNHA917XA37074 69	Battery Model: HB4J1H Rated capacity: 1200mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

4.2.3 FCC Identification

Grantee Code: QIS
Product Code: U8160
FCC Identification: QISU8160

5 Main Test Instruments

Table 12 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2011
Universal Radio Communication Tester	R&S	CMU200	105822	Oct.24.2011
Wireless Communication Test set	Agilent	N4010A	MY49081592	Dec.14.2011
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.04,2011
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr.24,2011
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2011
Temperature Chamber	WEISS	WKL64	24600294	Jan.03,2012
Signal generator	Agilent	E8257D	MY49281095	Jul.9.2011
Vector Signal Generator	R&S	SMU200A	104162	Sep.07,2011
Test receiver	R&S	ESIB26	100318	May.04.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec.13.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec.13.2011
Horn Antenna	R & S	HF906	359287/005	May.07, 2011
Horn Antenna	R & S	HF906	359287/006	April.27, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Sep.21, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	Jun.11, 2011
Horn Antenna	ETS-LINDGREN	3160	60008	Sep.20.2011
Horn Antenna	ETS-LINDGREN	3160	60006	Oct.27.2011

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°C
Relative humidity:	55%
Test Configurations:	TM1/TM2 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;

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.

$W(\text{dBm}) = 10 \cdot \log(W_{\text{in mWatts}})$.

Table 15 Limits

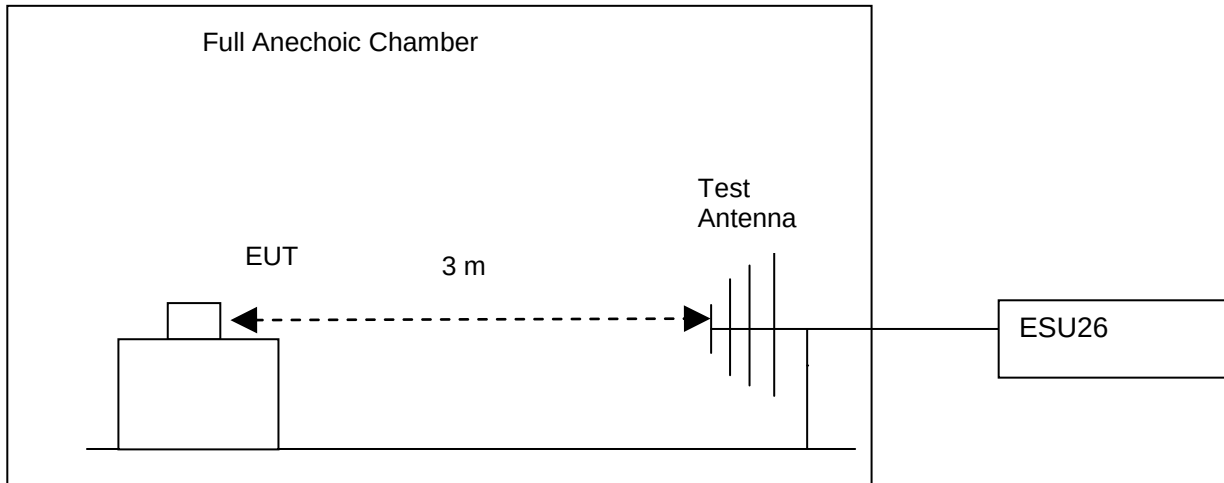
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

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 Mobile Phone to the wireless communication tester CMU200 via the air interface. The band 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 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

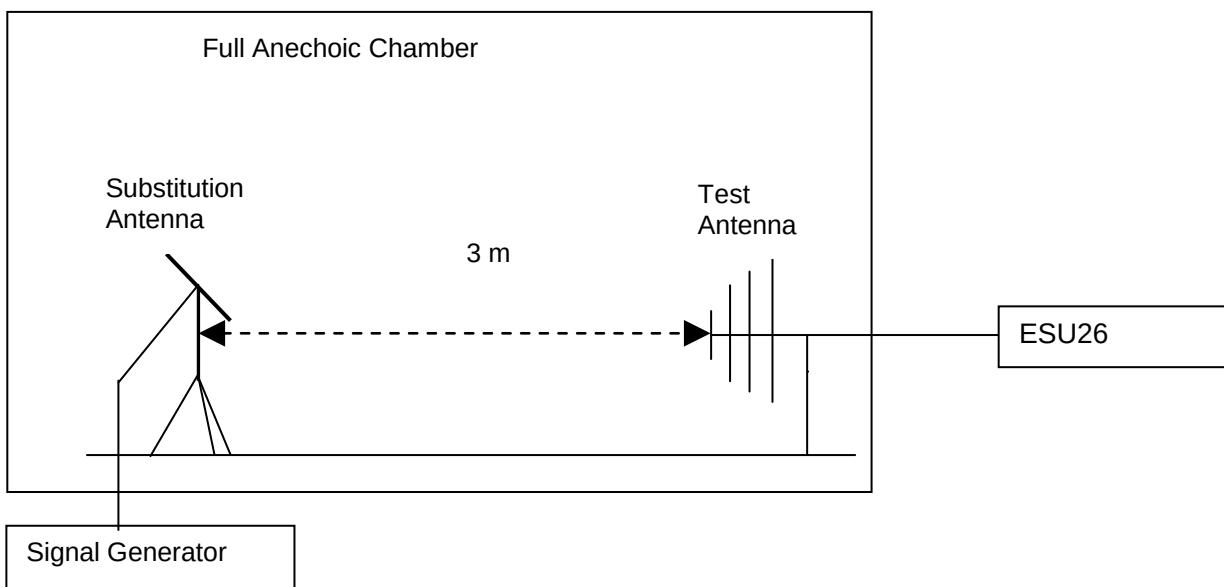


Figure 1. Test Set-up

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 using 1 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	
		Measure d	Limit	Measure d	Limit	Measure d	Limit
TM1	T _{nom} (25 °C) V _{nom} (5.0V)	27.73	33	27.85	33	27.64	33
TM2	T _{nom} (25 °C) V _{nom} (5.0V)	25.19	33	25.26	33	25.11	33

6.1.4.2 Substitution Results

Table 17 Substitution Results

Test Mod e	Freq. [MHz]	Meas . Level [dBm]	Substitutio n Antenna Type	SGP [dBm]	Substitutio n Gain [dBi]	Cabl e Loss [dB]	Substitutio n Level (EIRP) [dBm]	FCC limit [dBm]	Resul t
TM1	1850. 2	27.73	Horn Ant.	24.03	4.5	1.0	27.53	33	Pass
TM1	1880. 0	27.85	Horn Ant.	24.11	4.5	1.0	27.61	33	Pass
TM1	1909. 8	27.64	Horn Ant.	23.62	4.8	1.0	27.42	33	Pass
TM2	1850. 2	25.19	Horn Ant.	21.73	4.5	1.0	25.23	33	Pass
TM2	1880. 0	25.26	Horn Ant.	22.17	4.5	1.0	25.67	33	Pass
TM2	1909. 8	25.11	Horn Ant.	21.34	4.8	1.0	25.14	33	Pass

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 200kHz for TM1 and TM2..

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 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;

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:

$$\text{EIRP(dBm)} = 10 \cdot \log (\text{EIRP}_{\text{in mW}}).$$

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

$$\text{P}_{\text{cod.}}(\text{dBm}) = \text{EIRP}(\text{dBm}) - \text{Gain}(\text{dBi}).$$

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

Table 20 Limits

Maximum Output Power (Watts)	< 2 Watts (33 dBm)
Antenna Gain(dBi):	-0.68
Maximum Conducted Output Power (dBm)	< 33.68

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 U8160/U8160/Vodafone 858/V858 Mobile Phone 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

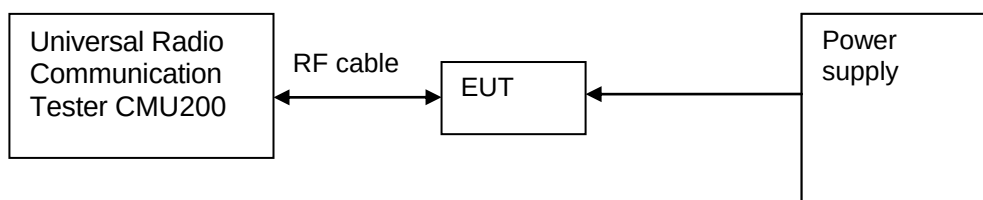


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 21 Measurement Results

		RF Output Power(Conducted)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel661(M) 1880.0MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measure d	Limit	Measure d	Limit	Measure d	Limit
TM1	T _{nom} (25 °C) V _{nom} (5.0V)	28.41	33.68	28.53	33.68	28.32	33.68
TM2	T _{nom} (25 °C) V _{nom} (5.0V)	25.87	33.68	25.94	33.68	25.79	33.68

6.2.5 Conclusion

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

6.3 Modulation Characteristics

6.3.1 Test Conditions

Table 22 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
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 23 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;

6.3.2.3 Limits

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

Table 24 Limits

Limits	Not applicable
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6.3.3 Test Method and Setup

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

Test setup

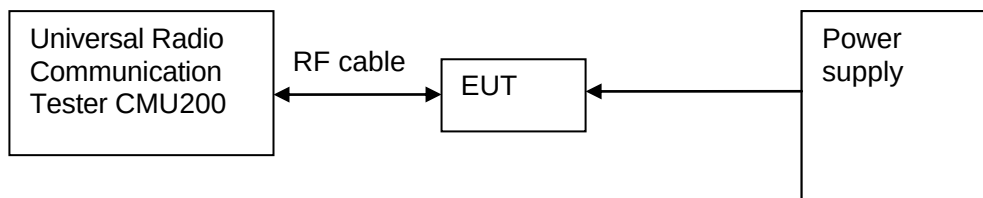


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 25 Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel 661(M) 1880.0MHz	
		Measured	
		TM1	TM2
T_{nom} (25 °C)	V_{nom} (5.0V)	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 26 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1/TM2 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 27 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;

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 28 Limits

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

6.4.3 Test Method and Setup

U8160/U8160/Vodafone 858/V858 Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector. The band class is set as PCS; U8160/U8160/Vodafone 858/V858 Mobile Phone was controlled to transmit maximum power. Measure and record the occupied bandwidth of the U8160/U8160/Vodafone 858/V858 Mobile Phone by the R&S FSQ31.

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

Test Set-up

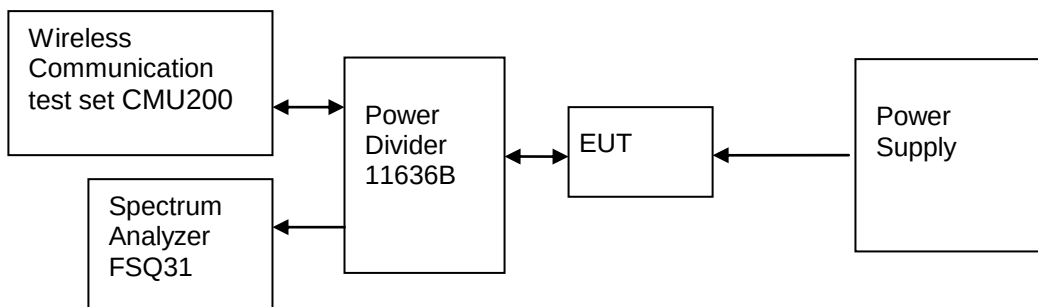


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 29 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 (5.0V)	99%	243.59	243.59	248.40	243.59	243.59	240.38

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 30 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 31 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;

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 32 Limits for GPRS

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

6.5.3 Test Method and Setup

U8160/U8160/Vodafone 858/V858 Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the band class is set as PCS. U8160/U8160/Vodafone 858/V858 Mobile Phone was controlled to transmit maximum power. Measure and record band edges compliance of the U8160/U8160/Vodafone 858/V858 Mobile Phone by the R&S FSQ31.

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

Test Set-up

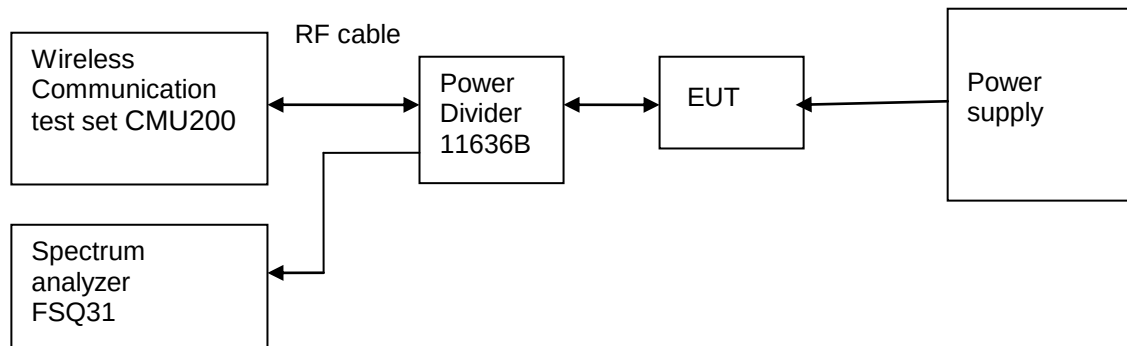


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 33 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} (5.0V)					
	128	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	251	810	TM1	<-13(See appendix C)	- 13 dBm	Pass
	128	512	TM2	<-13(See appendix C)	- 13 dBm	Pass
	251	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 34 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1/TM2at frequency Bottom, Middle ,Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.6.2.2 Supporting Standards

Table 35 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;

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 36 Limits for GPRS Mode

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

6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ31 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 FSQ31.

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

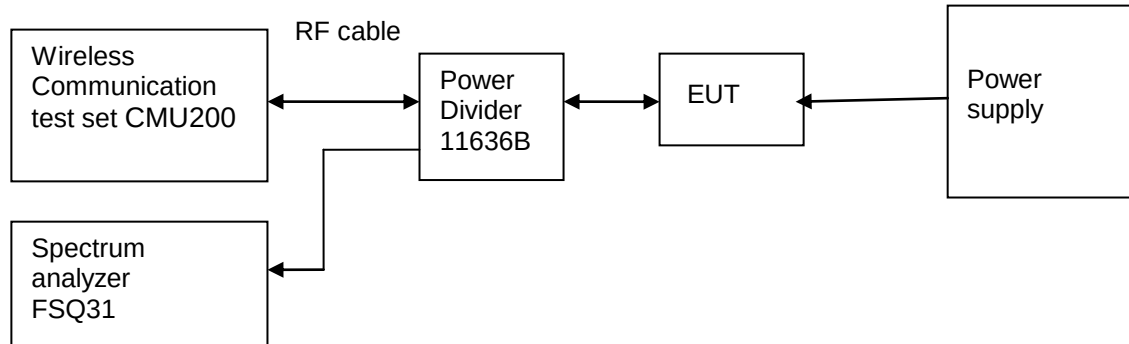


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 37 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 698(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 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

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 38 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1/TM2at frequency Middle

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.7.2.2 Supporting Standards

Table 39 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;

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 +50 ° 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° 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 4.75V and 5.25V, so here the EUT is tested in the 4.75V and 5.25V.

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.

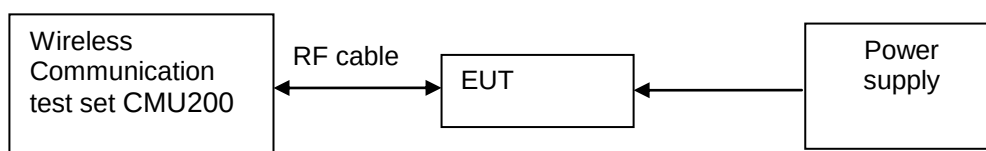


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 5.0V DC Channel No.661(192.0MHz)**

Table 40 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	-25	Pass
-10 °C	1880.0	-19	Pass
0 °C	1880.0	-13	Pass
+10 °C	1880.0	-9	Pass
+20 °C	1880.0	-7	Pass
+30 °C	1880.0	-10	Pass
+40 °C	1880.0	-13	Pass
+50 °C	1880.0	-16	Pass

- **TM2, 5.0V DC Channel No.661(192.0MHz)**

Table 41 Measurement Results vs. Variation of Temperature—TM2

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	1880.0	-34	Pass
-20 °C	1880.0	-25	Pass
-10 °C	1880.0	-18	Pass
0 °C	1880.0	-13	Pass
+10 °C	1880.0	-9	Pass
+20 °C	1880.0	-7	Pass
+30 °C	1880.0	-11	Pass
+40 °C	1880.0	-13	Pass
+50 °C	1880.0	-19	Pass

6.7.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 661(192.0MHz)**

Table 42 Measurement Results vs. Variation of Voltage— TM1

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25 V	1880.0	-15	Pass
5.0 V	1880.0	-4	Pass
4.75 V	1880.0	-6	Pass

- **TM2, 25 °C ,Channel No. 661(192.0MHz)**

Table 43 Measurement Results vs. Variation of Voltage— TM2

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25 V	1880.0	42	Pass
5.0 V	1880.0	49	Pass
4.75 V	1880.0	29	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 44 System Measurement Uncertainty

Items		Extended Uncertainty
Effective 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	3 Pages
Appendix B	Measurement Results Occupied Bandwidth	7 Pages
Appendix C	Measurement Results Band Edges	5 Pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	19 Pages