



Report No: SYBH(R)54022007EB-2
FCC ID: QISE270

**FCC TEST REPORT OF
HUAWEI E270 HSPA USB Modem
M/N: E270**

Nov. 18, 2007

Reliability Laboratory of Huawei Technologies Co., Ltd.

All Right Reserved

Notice

1.	The laboratory has obtained the accreditation of China National Accreditation Committee for Laboratories (CNAL), and accreditation number: L0310.
2.	The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
3.	The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
4.	The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is C2583, R2364, and T256.
5.	The test report is invalid if not marked with "exclusive stamp for the test report".
6.	Any copy of the test report is invalid if not re-marked with the "exclusive stamp for the test report".
7.	The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
8.	The test report is invalid if there is any evidence of erasure and/or falsification.
9.	If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
10.	Normally, the test report is only responsible for the samples that have undergone the test.
11.	Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.



REPORT ON **FCC Test of HUAWEI E270 HSPA USB MODEM**

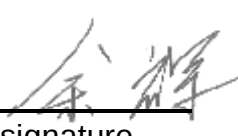
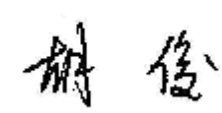
M/N: E270

Report No: SYBH(R) 18072007EB-2

REGULATION **FCC CFR47 Part 2: Subpart J;**
FCC CFR47 Part 24: Subpart E;

CONCLUSION There are 3 items need to be tested, 3 items have been tested. The sample of the model completely meets the requirements

Final Judgement: Pass

General Manager	<u>2007.11.02</u>	<u>张兴海</u>	
	Date	Name	
Technical Responsibility For Area of Testing	<u>2007.11.01</u>	<u>余 辉</u>	
	Date	Name	
Test Lab Engineer	<u>2007.10.30</u>	<u>胡 俊</u>	
	Date	Name	

-

Contents

1	<u>Summary</u>	5
2	<u>Product Description</u>	6
2.1	PRODUCTION INFORMATION.....	6
2.2	MODIFICATION INFORMATION	6
3	<u>Test Site Description</u>	7
3.1	TESTING PERIOD	7
3.2	GENERAL SET UP DESCRIPTION	7
4	<u>Product Description</u>	8
4.1	TECHNICAL CHARACTERISTICS.....	8
4.2	EUT IDENTIFICATION LIST	10
5	<u>Main Test Instruments</u>	11
6	<u>Transmitter Measurements</u>	12
6.1	EFFECTIVE RADIATED POWER OF TRANSMITTER (EIRP).....	12
6.2	CONDUCTED POWER OF TRANSMITTER.....	16
6.3	BAND EDGES COMPLIANCE.....	18
7	<u>System Measurement Uncertainty</u>	20
8	<u>Appendices</u>	21

1 Summary

The table below summarizes the measurements and results for the HUAWEI E270 HSPA USB MODEM. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	22.913	Effective Radiated Power of Transmitter	PASS
2.1046	22.913	Conducted Power of Transmitter	PASS
2.1051	22.917	Band Edges compliance	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

HUAWEI E270 HSPA USB Modem is subscriber equipment in the GSM system. The frequency band is 850M. The E270 implements such functions as RF signal receiving / Transmitting, HSPA/UMTS/EDGE/GPRS/GSM protocol processing and data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. It has two internal antennas. E270 uses Qualcomm MSM7200 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The HUAWEI E270 HSPA USB MODEM support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Data	Modulation: QPSK	TM2/TM1	HSUPA/WCDMA

2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

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

3 Test Site Description

The test site of:

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

The test site description has been submitted to  and registration granted under the registration number **97456** on Aug 20. 2006. The test site has been accredited by



and the accredited number is **2714.01** in Jan of 2006.

3.1 Testing Period

The test have been performed during the period of

Sept. 01, 2007 –Sept. 18, 2007

3.2 General Set up Description

HUAWEI E270 HSPA USB MODEM can support GPRS/EDGE mode and 850M Band. During this measurement, the HUAWEI E270 HSPA USB MODEM just works in WCDMA mode and 850M Band.

TM1: WCDMA test mode

TM2: HSUPA test mode

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

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

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

	UMTS/HSUPA
Channel spacing	200k Hz
Channel separation:	5M Hz

4.1.3 Type of Emission

Table 6 Type of Emission

	UMTS/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:	--- +5.0V; Supplied by EXPRESSCARD port of notebook
DC voltage range	--- +4.5-5.5V
DC current maximal:	750mA

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
Current:	150mA 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

1900MHz HUAWEI E270 HSPA USB Modem		
E270		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-MAINBOARD	EF1AB10770200086	TCPU VER.B

4.2.2 Adapter Technical Data

Not Applicable.

4.2.3 Battery Technical Data

Not Applicable.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: E270
FCC Identification: QISE270

5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
Signal Analyzer	R&S	FSQ 26	100266	07.18.2008
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	04.22.2008
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	04.22.2008
Receiver	R&S	ESIB 26	100318	05.29.2008
Receiver	R&S	ESCS30	830245/018	05.29.2008
Pre-Amplifier	Agilent	8447D	2944A10146	07.30.2008
Pre-Amplifier	Agilent	83017A	3950M00246	08.03.2008
Loop Antenna	Schwarzbeck	FMZB1516	1516115	02.15.2008
BiLog Antenna	Schaffner	CBL 6112B	2747	06.07.2008
BiLog Antenna	Schaffner	CBL 6112B	2536	05.19.2008
Horn Antenna	ETS-Lindgren	3117	006006	05.19.2008
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	05.19.2008
Signal Generator	R&S	SMT06	830264/009	09.28.2008
Signal Generator	R&S	SMR 40	100325	07.15.2008
Power Supply	Keithley	2306	1045337	08.28.2008
Climate Chamber	WEISS	ACS-1	105025	07.20.2008
Universal Radio Communication Tester	R&S	CMU200	108035	07.19.2008
Wireless communication test set	Agilent	8960	GB43461081	08.23.2008

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/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 24.232

6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

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

6.1.2.3 Limits

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

Table 14 Limits

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

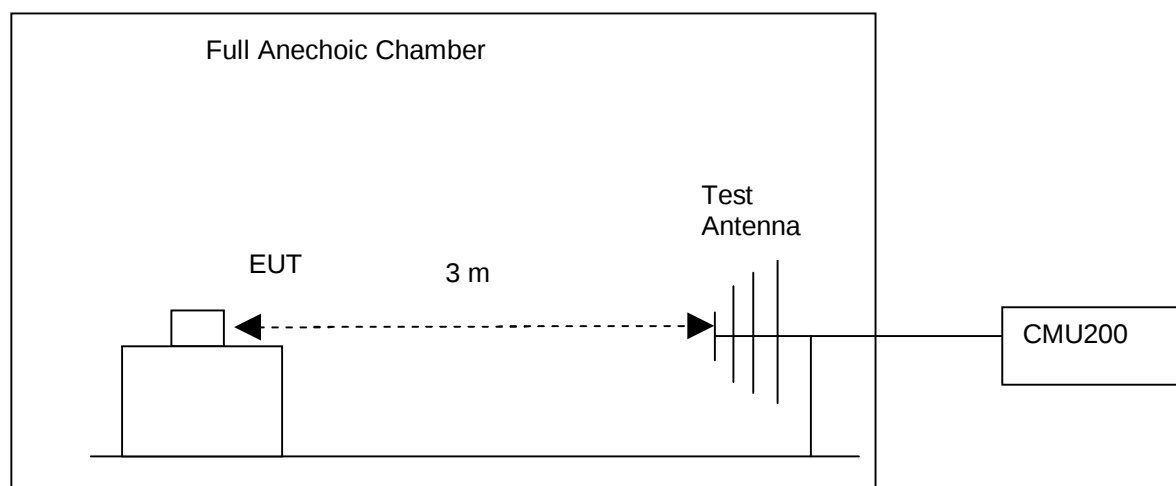
6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, 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 E270 HSPA USB Modem 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 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 Agilent 8960, 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

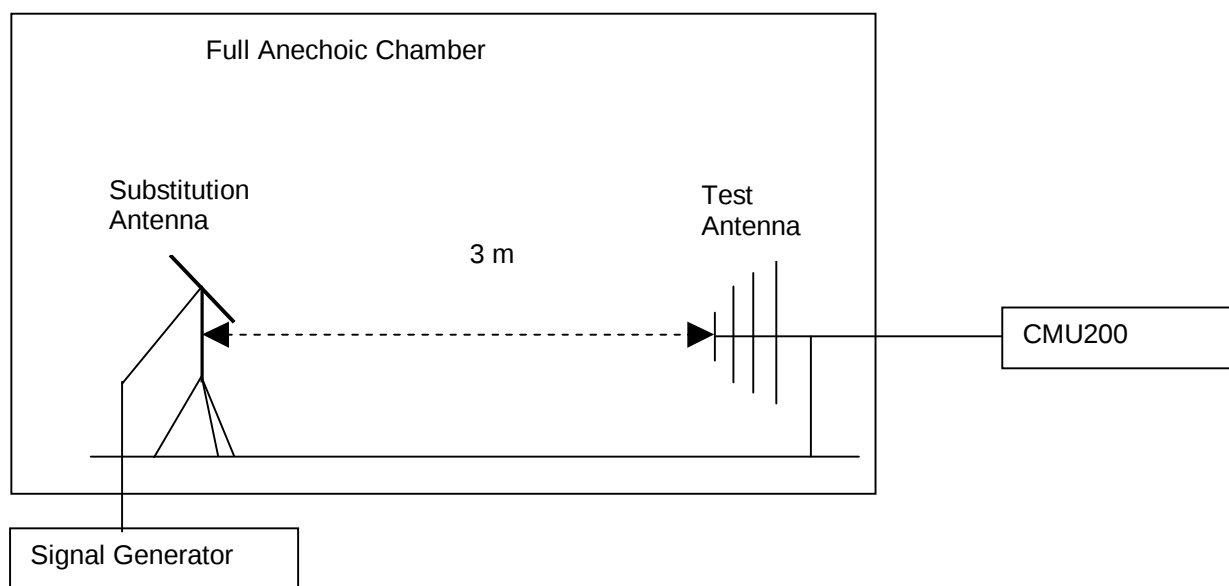


Figure 1. Test Set-up

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

For HSUPA test mode, there are 5 sub-test for different configuration. For the sub-test 1, the max power of E270 is the maximum as followed table..

The channel is mid range.

Table 15HSUPA conducted max power pre-scan

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (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	0.0	22.56
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	22.17
3	15/15	5/15	64	15/5	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	21.35
4	1/15	15/15	64	1/15	2/15	2/15	56/75	4	1	3.0	2.0	20.55
5	12/15	15/15	64	12/15	24/15	24/15	224/25	4	1	1.0	0.0	22.39

For the following test, the sub-test 1 was used for HSUPA.

Table 16 Measurement Results

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (5.0V)	26.12	33	26.01	33	25.99	33
TM2(sub-test1)	T_{nom} (25 °C) V_{nom} (5.0V)	25.46	33	25.25	33	25.11	33

6.1.4.2 Substitution Results

Table 17Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	Limit [dBm]	Result
TM1	1852.4	26.12	Dipole Ant.	22.28	4.6	1.0	25.88	33	Pass
TM1	1880	26.01	Dipole Ant.	22.09	4.7	1.0	25.79	33	Pass
TM1	1907.6	25.99	Dipole Ant.	21.95	4.8	1.0	25.75	33	Pass
TM2	1852.4	25.46	Dipole Ant.	21.62	4.6	1.0	25.22	33	Pass
TM2	1880	25.25	Dipole Ant.	21.21	4.7	1.0	24.91	33	Pass
TM2	1907.6	25.11	Dipole Ant.	20.70	4.8	1.0	24.50	33	Pass

Note: a, For get the EIRP (Efficient 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 are created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 5MHz 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 V6.1.0:2005	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:

$$EIRP(dBm) = 10 \cdot \log(EIRP_{in\ mWts}).$$

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 (33dBm)
Antenna Gain(dBi):	2.7
Maximum Conducted Output Power (dBm)	< 30.3dBm

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 E270 HSPA USB 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

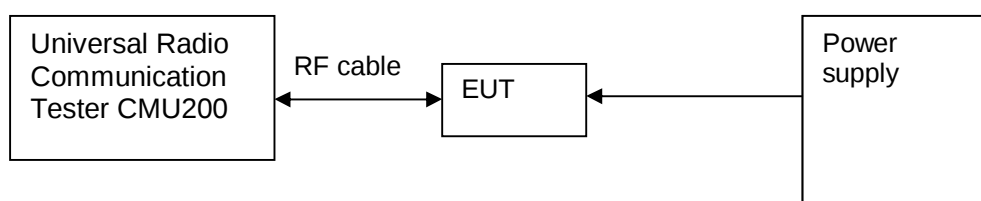


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 21 Measurement Results

		RF Output Power(Conducted)					
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (5.0V)	23.54	30.3	23.42	30.3	23.22	30.3
TM2(sub-test1)	T _{nom} (25 °C) V _{nom} (5.0V)	22.87	30.3	22.77	30.3	22.42	30.3

6.2.5 Conclusion

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

6.3 Band Edges Compliance

6.3.1 Test Conditions

Table 22 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

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

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 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.3.2.3 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 24 Limits for GPRS

	TM1	TM2
Rated Power:	24 dBm	24 dBm
Required attenuation:	$43 + 10 \log (0.25) = 37$, 24 dBm - 37 dB	$43 + 10 \log (0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm

6.3.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record band edges compliance of the EUT by the R&S FSQ26.

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

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 100 kHz (Resolution bandwidth)

Video bandwidth (VBW): 300 kHz

Test Set-up

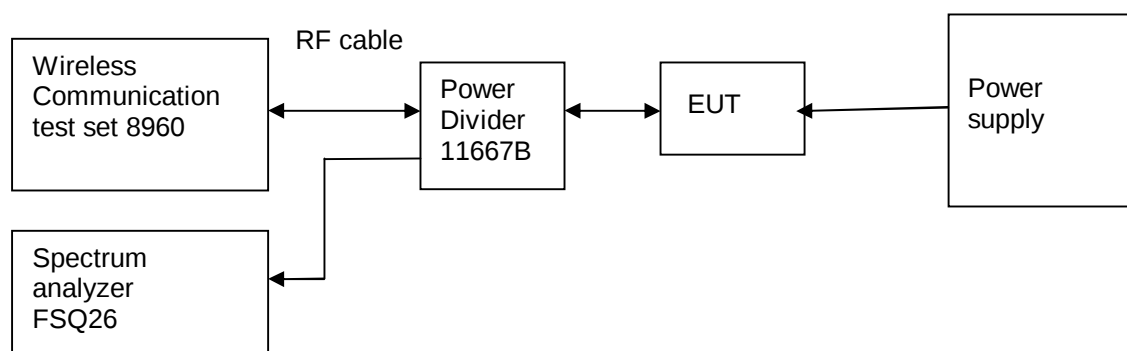


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 25 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)					
	1852.4	9262	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1907.6	9538	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1852.4	9262	TM2	<-13(See appendix C)	- 13 dBm	Pass
	1907.6	9538	TM2	<-13(See appendix C)	- 13 dBm	Pass

6.3.5 Conclusion

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

For the measurement results refer to appendix C.

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 26 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

8 Appendices

Appendix A Measurement Results Band Edges Compliance

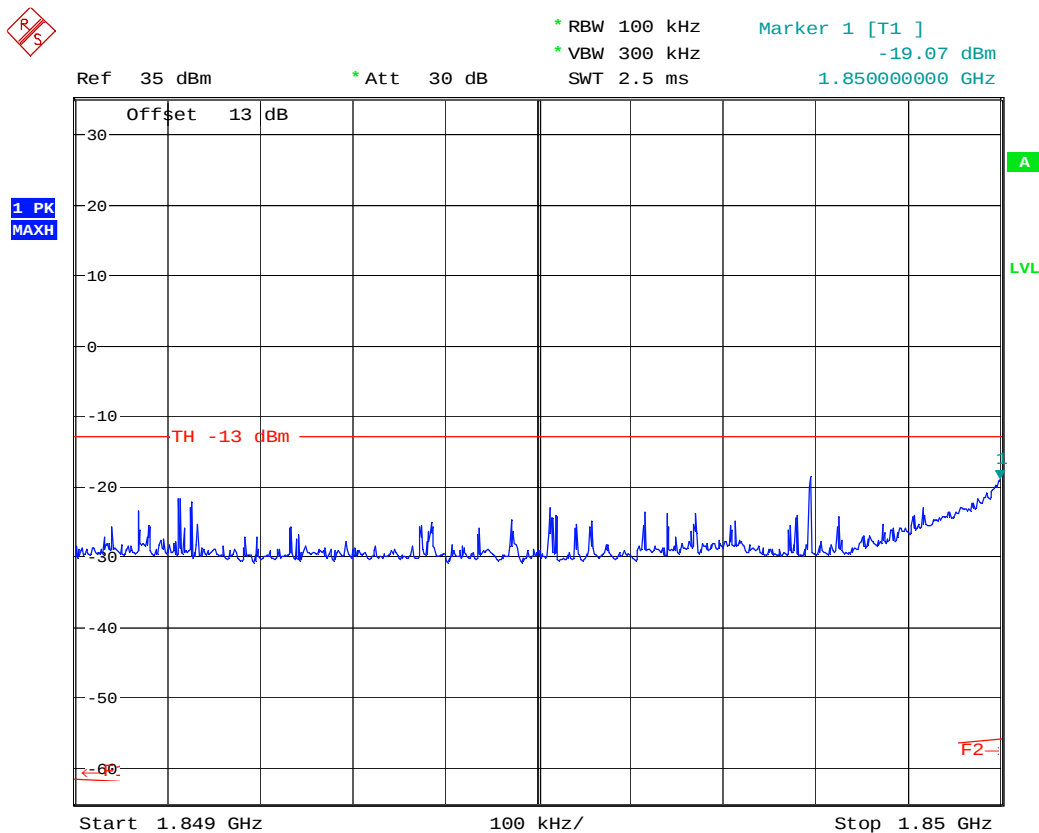
5 pages

Appendix A

Band Edges Compliance According to FCC Part 2.1051 & 24.238



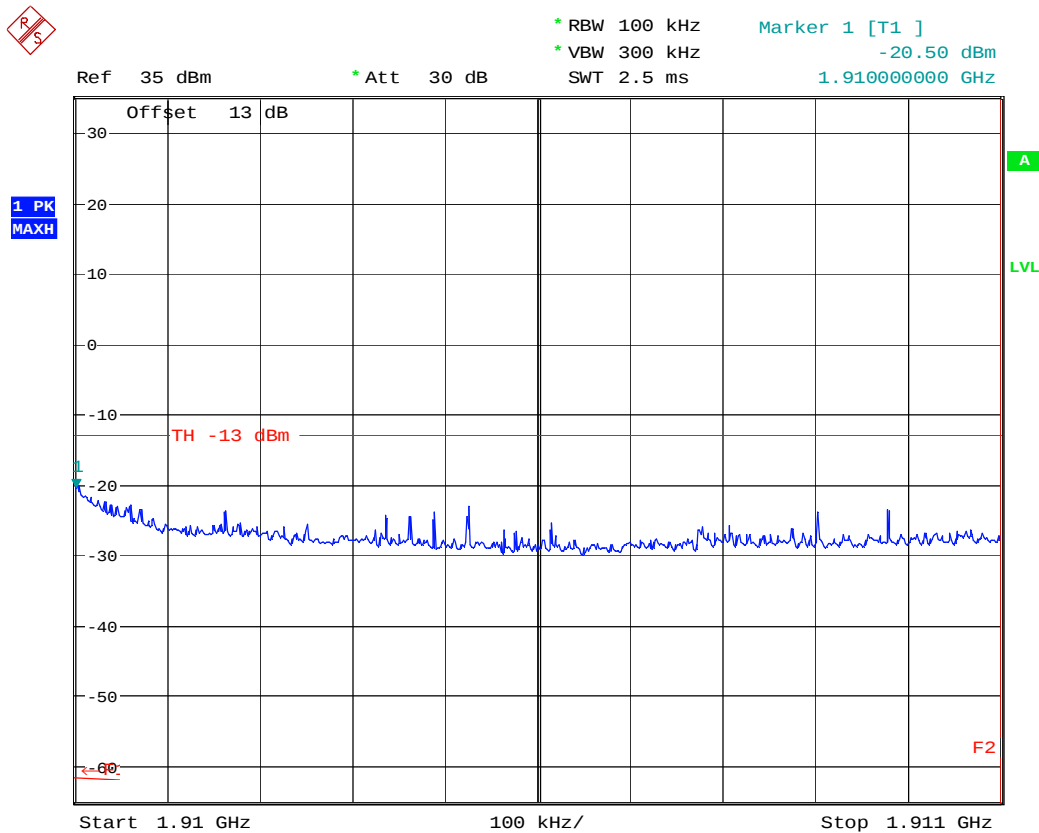
TM1:WCDMA
Left Edge
Channel 9262



Date: 10.SEP.2007 19:36:17



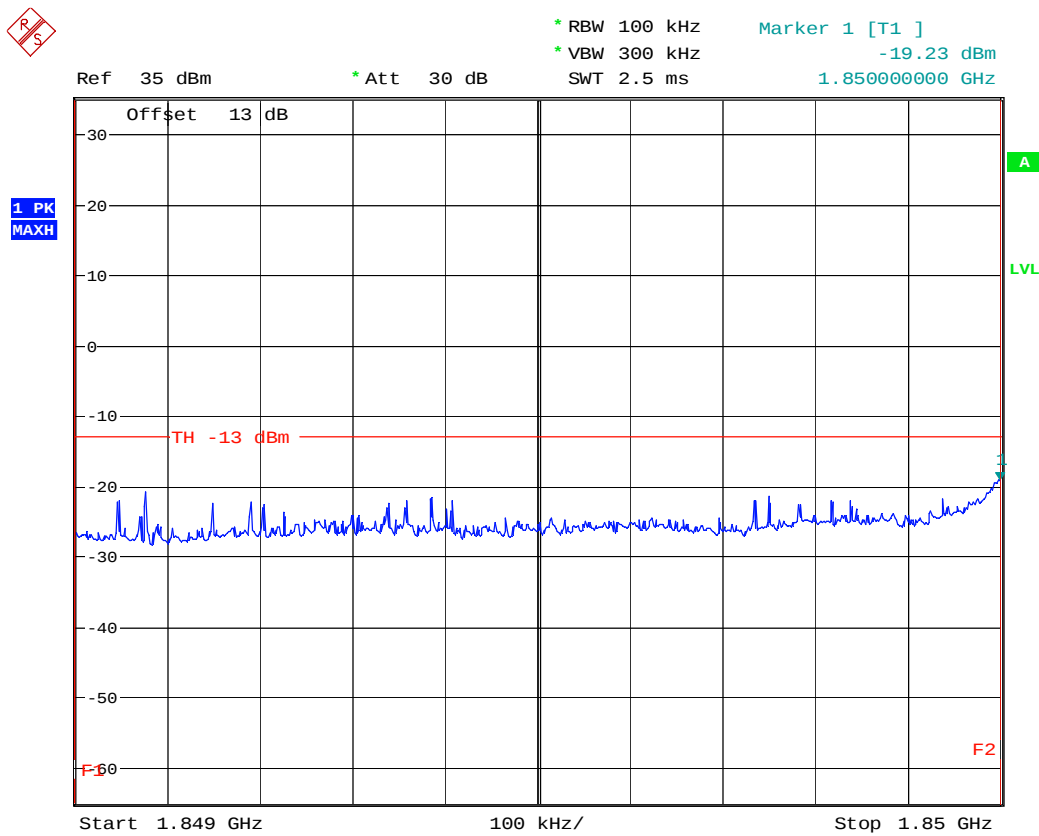
Right Edge
Channel 9538



Date: 10.SEP.2007 19:37:52



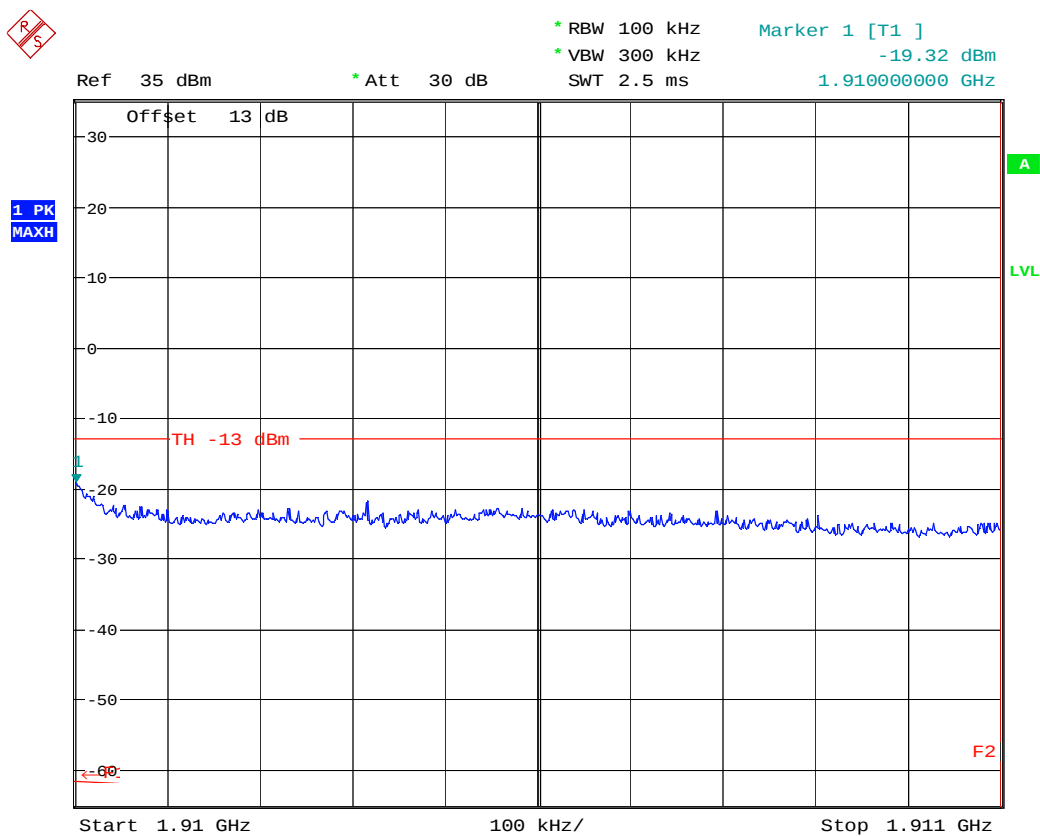
HSUPA
Left Edge
Channel 9262



Date: 10.SEP.2007 15:21:25



Right Edge
Channel 9538



Date: 10.SEP.2007 15:23:09