



FCC & IC Test Report

Product Name: Distributed NodeB Remote Radio Unit

Model Number: RRU3804

Report No: SYBH (R) 033062008EB-1

FCC ID: QIS3804B2

IC: 6369A-3804B2

Reliability Laboratory of Huawei Technologies Co., Ltd.

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

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



Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), 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 has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
6. The test report is invalid if not marked with "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 & IC Test of Distributed NodeB Remote Radio Unit

Model Number: RRU3804

Report No: SYBH (R) 033062008EB-1

FCC ID: QIS3804B2

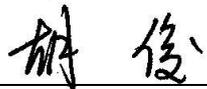
IC: 6369A-3804B2

REGULATION 47 CFR FCC Part 2, Subpart J
 47 CFR FCC Part 24, Subpart E

IC RSS-Gen (Issue 2, June 2007)
 IC RSS-133 (Issue 4, February 2008)

CONCLUSION PASSED

General Manager	2008-07-08	张兴海	
	Date (y-m-d)	Name	

Technical Responsibility For Area of Testing	2008-07-08	胡俊	
	Date (y-m-d)	Name	

Test Lab Engineer	2008-07-08	张卫民	
	Date (y-m-d)	Name	



Contents

1	<u>Summary</u>	5
2	<u>Product Description</u>	6
2.1	PRODUCTION INFORMATION OF EUT	6
2.2	MODIFICATION INFORMATION	6
3	<u>Test Site Description</u>	7
3.1	TESTING PERIOD	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 & Receiver Measurements</u>	12
6.1	MAXIMUM CHANNEL POWER.....	13
6.2	MODULATION CHARACTERISTICS.....	16
6.3	OCCUPIED BANDWIDTH	18
6.4	BAND EDGES COMPLIANCE.....	20
6.5	SPURIOUS EMISSION AT ANTENNA TERMINAL.....	23
6.6	RADIATED SPURIOUS EMISSION	26
6.7	FREQUENCY STABILITY.....	30
6.8	RECEIVER SPURIOUS EMISSIONS (CONDUCTED).....	34
7	<u>System Measurement Uncertainty</u>	37
8	<u>Appendices</u>	38



1 Summary

The table below summarizes the measurements and results for the equipment of RRU3804. Detailed results and descriptions are shown in the following pages.

Table 1. Summary of results for FCC requirements for PCS Band

47 CFR FCC Part(s) Requirements		Description	Result
Specification	Limits		
2.1046	24.232	Transmitter Output Power	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
2.1053	24.238	Radiated Spurious Emission	PASS
2.1055	24.235	Frequency Stability	PASS

Note: If no limits were applied, limits for product standards may be employed in this test report.

Table 2. Summary of results for IC requirements for PCS Band

IC RSS-133 Requirements	Description	Result
6.4	Transmitter Output Power	PASS
6.2	Modulation Characteristics	PASS
---	Occupied Bandwidth	PASS
6.5	Band Edges Compliance	PASS
6.5	Spurious Emission at Antenna Terminal	PASS
6.5	Radiated Spurious Emission	PASS
6.3	Frequency Stability	PASS
6.6	Receiver Spurious Emissions (Conducted)	PASS

Note: If no limits were applied, limits for product standards may be employed in this test report.



2 Product Description

2.1 Production Information of EUT

2.1.1 General Description

The RRU3804 can support 1900MHz frequency band. In general, the RRU3804 is connected to baseband processing module through a pair of fibres, and serves one cell or several logical sectors.

The RRU3804 implements radio transmission over the Uu interface, as well as the related control functions.

The RRU3804 has the following features:

- Compact size
- Easy installation
- Flexible coverage

It is ideal for the areas with medium or high traffic density.

2.1.2 Support function and Service

The EUT supports the function and service as follows:

Table 3. Service and Test Mode List

Service Name	Characteristic	Corresponding Test Mode	Remark
WCDMA voice and data	Modulation: QPSK	TM1	/
HSDPA	Modulation: 16QAM	TM5	/

Note: The test conditions and settings are defined in clause 6.1.1 of 3GPP 25.141.

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***

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



and the accredited number is **2174.01** in June of 2006.

3.1 Testing Period

The test has been performed during the period of

Date of Start: 25 June 2008

Date of End: 05 July 2008



4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 5. Frequency Range for PCS Band

	FCC	IC
Uplink band:	1850 to 1910 MHz	1850 to 1915 MHz
Downlink band:	1930 to 1990 MHz	1930 to 1995 MHz

Note: the operating frequency range of IC is wider than that of FCC; the EUT is designed to work under the range of FCC.

4.1.2 Channel Separation/Bandwidth

Table 6. Frequency Interval and Channel Separation

Channel raster:	200 kHz
Channel spacing:	5 MHz

4.1.3 Type of Emission

Refer to FCC part 2.201 and 2.202.
 Refer to IC TRC-43.

Table 7. Type of Emission

Emission Designation:	5M00F9W
-----------------------	---------

4.1.4 Environmental Requirements

Table 8. Environmental Requirements

Minimum temperature:	-40 °C
Maximum temperature:	+55 °C
Relative Humidity:	5% to 95% RH

4.1.5 Power Source

Table 9. DC Power Source

DC voltage nominal:	=== -48 V
DC voltage range:	=== -60 V to === -37 V
DC current maximal:	8 A

4.1.6 Tune-up Procedure

Refer to FCC 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.



4.2 EUT Identification List

4.2.1 Component Parts Information

Table 10. Component Parts Information

Model Name	Qty.	Hardware Version	Software Version	Description	Serial Number
WD32TRX8A	1	VER.A	020KYH10818 00015	Multi-Carrier Transceiver Board	WD32TRX8A
WD3M2SDFU	1	VER.A	2199050ALVL 086000104	Duplex filter	WD3M2SDFU

4.2.2 Adapter Technical Data

Not Applicable for BTS.

4.2.3 Battery Technical Data

Not Applicable for BTS.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: 3804B2
FCC Identification: QIS3804B2

4.2.5 IC Identification

Company Number: 6369A
UPN Number: 3804B2
IC Identification: 6369A-3804B2



5 Main Test Instruments

Table 11. Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (y-m-d)
Radiated Cases				
EMI Test receiver	R&S	ESMI	829550/008	2009.04.21
Broadband Antenna	SCHAFFNER	CBL 6112B	2747	2008.10.17
Horn Antenna	R&S	HF906	359287/005	2008.12.13
Conducted Cases				
Signal Analyzer	R&S	FSQ 40	100266	2008.09.06
Power Supply	---	ONU4820	210213035320 5A000112	---
Attenuator	Aeroflex / Weinschel	49-40-33	NY604	---
Climate Chamber	ESPEC	EW2465	05175004	2008.08.10

6 Transmitter & Receiver Measurements

The EUT supports up to 4-carriers. The rated output power is 60W for all types of carrier configurations (i.e. 1-carrier, 2-carriers, 3-carriers and 4-carriers). Here in the present report, only 1-carrier and 4-carriers were considered.

For tests in this report, typical operating frequency points (channels) were used, which include bottom/lowest channel (B), middle channel (M) and top/highest channel (T) of each frequency block as the table below.

Table 12. Frequency points (channels) selected to perform transmitter tests

Transmitter Operating Band	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
PCS band:	1	No.9662 1932.4MHz	No.9800 1960MHz	No.9938 1987.6MHz
	4	No.9662/9687/9712/ 9737 1932.4/1937.4/1942. 4/1947.4MHz	No.9750/9775/9800/ 9825 1950/1955/1960/196 5MHz	No.9863/9888/9913/ 9938 1972.6/1977.6/1982. 6/1987.6MHz

Table 13. Frequency points (channels) selected to perform receiver tests

Receiver Operating Band	Multi-Carriers	Channels No.		
		Channel B	Channel M	Channel T
PCS band:	1	---	No.9400 1880MHz	---

6.1 Maximum Channel Power

6.1.1 Test Conditions

Table 14. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	22.5 °C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel B, M, T for Multi Carrier 1, 4
Rated maximum transmitter output power (P_{max}):	Single carrier: total 47.8dBm(60W); Four carriers: each 41.8dBm, total 47.8dBm(60W)

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

FCC part 2.1046 and part 24.232
 IC RSS-133 clause 6.4 and SRSP-510 clause 5.1

6.1.2.2 Supporting Standards

Table 15. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
IC SRSP-510 (Issue 4 February 2008)	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.1.2.3 Limits

Compliance with FCC part 2.1046 and part 24.232, base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP), and in no any case may the peak power of a base station transmitter exceeds 100 watts.

Table 16. FCC Limits for PCS Band

Maximum EIRP:	< 1640 Watts (= 62 dBm)
Maximum Output Power:	< 100 Watts (= 50 dBm)

Compliance with IC RSS-133 clause 6.4 and SRSP-510 clause 5.1, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceed 100 watts, and base

stations are limited to 1640 watts maximum equivalent isotropically radiated power (EIRP).

Table 17. IC Limits for PCS Band

Maximum EIRP:	< 1640 Watts (= 62 dBm)
Maximum Output Power:	< 100 Watts (= 50 dBm)

6.1.3 Test Method and Setup

The EUT was connected to the Wireless Signal Analyzer or equivalent via one RF connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Maximum Channel Power of the EUT by the Wireless Signal Analyzer or equivalent.

Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an RMS equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Test setup

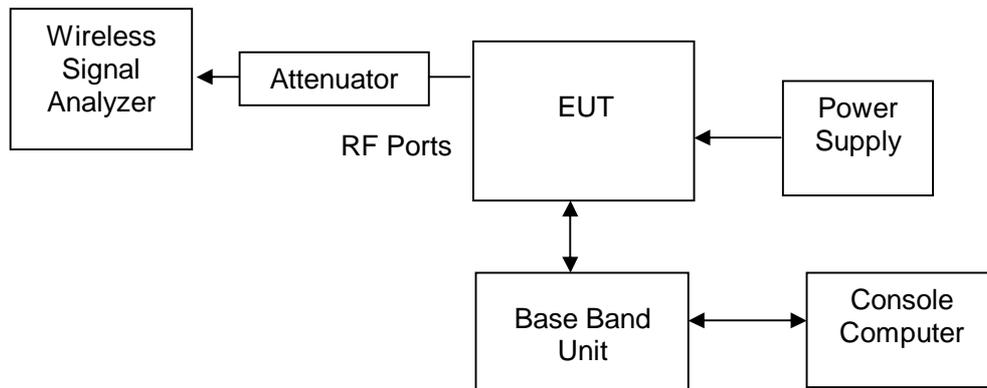


Figure 1. TEST SETUP

6.1.4 Measurement Results

TM1: QPSK

Table 18. Measurement Results for Maximum Output Power

Multi Carriers	Maximum Output Power			Limit (dBm)
	No.9662 1932.4MHz	No.9800 1960MHz	No.9938 1987.6MHz	
	dBm	dBm	dBm	
Single carrier	47.75	47.99	47.77	< 50



Table 19. Measurement Results for Maximum Output Power

Multi Carriers	Maximum Output Power			Limit (dBm)
	No.9662/9687/9712 /9737 1932.4/1937.4/1942 .4/1947.4MHz	No.9750/9775/9800 /9825 1950/1955/1960/19 65MHz	No.9863/9888/9913 /9938 1972.6/1977.6/1982 .6/1987.6MHz	
	dBm	dBm	dBm	
Four carriers	CH#1: 41.78 CH#2: 41.87 CH#3: 41.45 CH#4: 41.51 Total: 47.68	CH#1: 41.86 CH#2: 41.72 CH#3: 41.78 CH#4: 41.59 Total: 47.76	CH#1: 41.60 CH#2: 41.48 CH#3: 41.67 CH#4: 41.24 Total: 47.52	< 50

TM5: 16QAM

Table 20. Measurement Results for Maximum Output Power

Multi Carriers	Maximum Output Power			Limit (dBm)
	No.9662 1932.4MHz	No.9800 1960MHz	No.9938 1987.6MHz	
	dBm	dBm	dBm	
Single carrier	48.00	48.02	47.86	< 50

Table 21. Measurement Results for Maximum Output Power

Multi Carriers	Maximum Output Power			Limit (dBm)
	No.9662/9687/9712 /9737 1932.4/1937.4/1942 .4/1947.4MHz	No.9750/9775/9800 /9825 1950/1955/1960/19 65MHz	No.9863/9888/9913 /9938 1972.6/1977.6/1982 .6/1987.6MHz	
	dBm	dBm	dBm	
Four carriers	CH#1: 41.63 CH#2: 41.75 CH#3: 42.00 CH#4: 41.59 Total: 47.77	CH#1: 41.88 CH#2: 41.95 CH#3: 41.39 CH#4: 41.43 Total: 47.69	CH#1: 41.59 CH#2: 41.58 CH#3: 41.61 CH#4: 41.23 Total: 47.53	< 50

6.1.5 Conclusion

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

6.2 Modulation Characteristics

6.2.1 Test Conditions

Table 22. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	22.5 °C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel M

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

FCC part 2.1047 and part 24 subpart E
 IC RSS-133 clause 6.2

6.2.2.2 Supporting Standards

Table 23. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.2.2.3 Limits

No specific modulation characteristics requirement limits in FCC part 2.1047 and part 24 subpart E for PCS Band.

No specific modulation characteristics requirement limits in IC RSS-133 clause 6.2 for PCS Band.

In addition, limits according to the technical requirements of the EUT can be adopted as showed in the following table.

Table 24. Limits According to EUT technical requirements

Limits for UMTS equipments:	QPSK modulation: EVM < 17.5% 16QAM modulation: EVM < 12.5%
-----------------------------	---

6.2.3 Test Method and Setup

The EUT was connected to the Wireless Signal Analyzer or equivalent via one RF connector, and

other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Modulation Characteristics of the EUT by the Wireless Signal Analyzer or equivalent.

Test setup

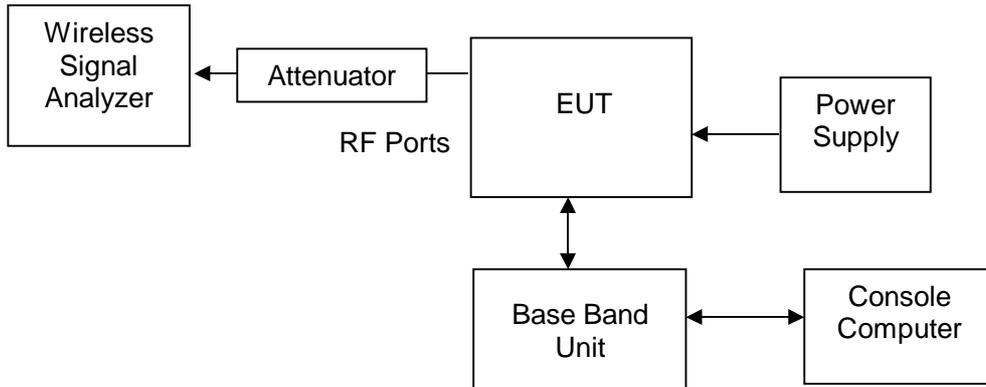


Figure 2. TEST SETUP

6.2.4 Measurement Results

Table 25. Measurement Results for Modulation Characteristics

Test Mode	Modulation Characteristics			
	No.9800 1960MHz			
	Type/Mode	Parameters	Measured	Limit
TM1	QPSK	EVM	6.46%	< 17.5%
TM5	16QAM	EVM	6.26%	< 12.5%

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to Appendix A.



6.3 Occupied Bandwidth

6.3.1 Test Conditions

Table 26. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	22.5 °C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel B, M, T

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

FCC part 2.1049 and part 24 subpart E
 IC RSS-Gen clause 4.6.1

6.3.2.2 Supporting Standards

Table 27. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.3.2.3 Limits

No specific occupied bandwidth requirement in FCC part 2.1049 and part 24 subpart E for PCS Band.

No occupied bandwidth requirement in IC radio specifications. The definition of occupied bandwidth is specified in IC RSS-Gen clause 4.6.1.

6.3.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer or equivalent via one RF connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Occupied Bandwidth of the EUT by the Spectrum Analyzer or equivalent.

The occupied bandwidth, 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 (as 99% bandwidth).

Measurement bandwidth (RBW) of Spectrum Analyzer or equivalent:

for UMTS equipments:	30 kHz
----------------------	--------

Test setup

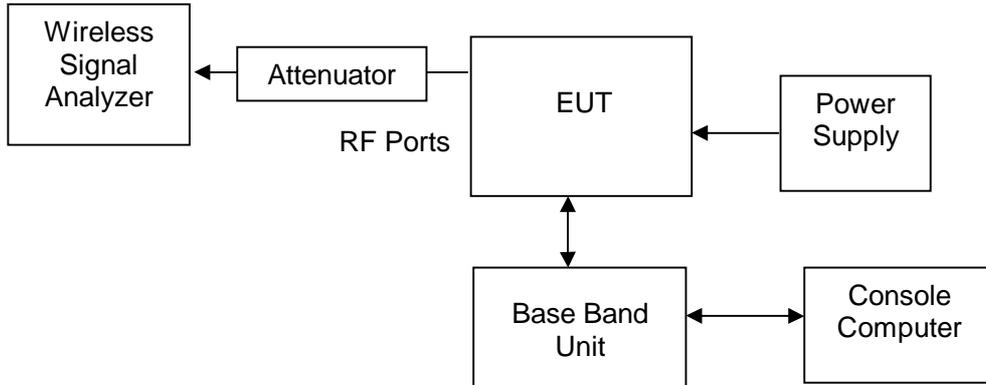


Figure 3. TEST SETUP

6.3.4 Measurement Results

Table 28. Measurement Results for Occupied Bandwidth

Test Mode	Occupied Bandwidth			Limit
	No.9662 1932.4MHz	No.9800 1960MHz	No.9938 1987.6MHz	
	MHz	MHz	MHz	
TM1	4.15	4.17	4.15	---
TM5	4.15	4.15	4.15	

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to Appendix B.



6.4 Band Edges Compliance

6.4.1 Test Conditions

Table 29. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	22.5°C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel B, T for Multi Carrier 1, 4
Rated maximum transmitter output power (P_{max}):	Single carrier: total 47.8dBm(60W); Four carriers: each 41.8dBm, total 47.8dBm(60W)

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

FCC part 2.1051 and part 24.238
 IC RSS-133 clause 6.5

6.4.2.2 Supporting Standards

Table 30. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
IC SRSP-510 (Issue 4 February 2008)	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.4.2.3 Limits

Compliance with FCC part 2.1051 and part 24.238, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, and the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

Table 31. FCC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

Compliance with IC RSS-133 clause 6.5, in the first 1.0 MHz bands immediately outside and adjacent

to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log(P)$, dB.

Table 32. IC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

6.4.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer or equivalent via one RF connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Band Edge Spurious Emissions of the EUT by the Spectrum Analyzer or equivalent.

Set the Spectrum Analyzer or equivalent in power averaging mode and resolution bandwidth (RBW) as close to 1.0% of the emission bandwidth as possible. Set the sweep span to cover at least $\pm 250\%$ of the emission bandwidth or 2 MHz, which is larger.

Measurement bandwidth (RBW) of Spectrum Analyzer or equivalent:

for UMTS equipments:	50 kHz (close to 1% of 5 MHz)
----------------------	-------------------------------

Test setup

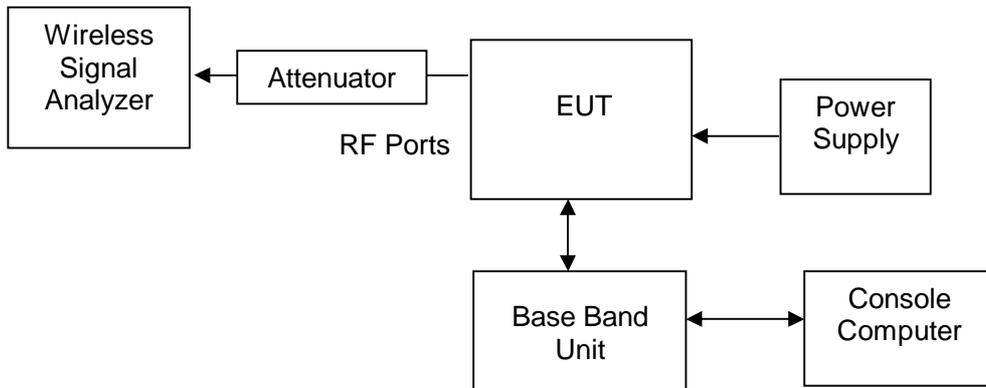


Figure 4. TEST SETUP

6.4.4 Measurement Results

TM1: QPSK

Table 33. Measurement Results for Band Edge Characteristics

Channel Number	Multi Carriers	Test Frequency Range (MHz)	Maximum Spurious Level measured (dBm)	Limit
No.9662/9687/9712/9737 1932.4/1937.4/1942.4/1947.4MHz	1	1929 – 1930	-15.84	< - 13dBm
	4	1929 – 1930	-19.48	



Channel Number	Multi Carriers	Test Frequency Range (MHz)	Maximum Spurious Level measured (dBm)	Limit
No.9863/9888/9913/9938 1972.6/1977.6/1982.6/1987.6MHz	1	1990 – 1991	-16.56	
	4	1990 – 1991	-23.06	

Note: refer to 3GPP TS 25.141, the offset of measurement filter -3dB point was considered for this test.

TM5: 16QAM

Table 34. Measurement Results for Band Edge Characteristics

Channel Number	Multi Carriers	Test Frequency Range (MHz)	Maximum Spurious Level measured (dBm)	Limit
No.9662/9687/9712/9737 1932.4/1937.4/1942.4/1947.4MHz	1	1929 – 1930	-15.96	< - 13dBm
	4	1929 – 1930	-19.42	
No.9863/9888/9913/9938 1972.6/1977.6/1982.6/1987.6MHz	1	1990 – 1991	-16.17	
	4	1990 – 1991	-20.92	

Note: refer to 3GPP TS 25.141, the offset of measurement filter -3dB point was considered for this test.

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to Appendix C.



6.5 Spurious Emission at Antenna Terminal

6.5.1 Test Conditions

Table 35. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	22.5 °C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel B, M, T for Multi Carrier 1, 4
Rated maximum transmitter output power (P_{max}):	Single carrier: total 47.8dBm(60W); Four carriers: each 41.8dBm, total 47.8dBm(60W)

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

FCC part 2.1051 and part 24.238
 IC RSS-Gen clause 4.9, RSS-133 clause 6.5

6.5.2.2 Supporting Standards

Table 36. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
IC SRSP-510 (Issue 4 February 2008)	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.5.2.3 Limits

Compliance with FCC part 2.1051 and part 24.238, based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

Table 37. FCC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

Compliance with IC RSS-133 clause 6.5, after the first 1.0 MHz bands immediately outside and adjacent to the licensee's frequency block, the power of emissions shall be attenuated below the

transmitter output power by at least $43 + 10 \log(P)$, dB, per any 1 MHz of bandwidth.

Table 38. IC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

6.5.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer or equivalent via one RF connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Out-band Spurious Emissions of the EUT by the Spectrum Analyzer or equivalent.

According to FCC part 2.1057, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

According to IC RSS-Gen clause 4.9, the search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated or used, without exceeding 40 GHz.

Measurement bandwidth (RBW) of Spectrum Analyzer or equivalent for test frequency range of 9 kHz to 10th harmonic:

PCS Band:	1 MHz
-----------	-------

Alternatively, according to ITU SM.329, measurement bandwidth (RBW) of Spectrum Analyzer or equivalent can be set as following for test frequency range of 9 kHz to 30 MHz:

9 kHz – 150 KHz:	1 kHz
150 kHz – 30 MHz:	10 kHz

Test setup

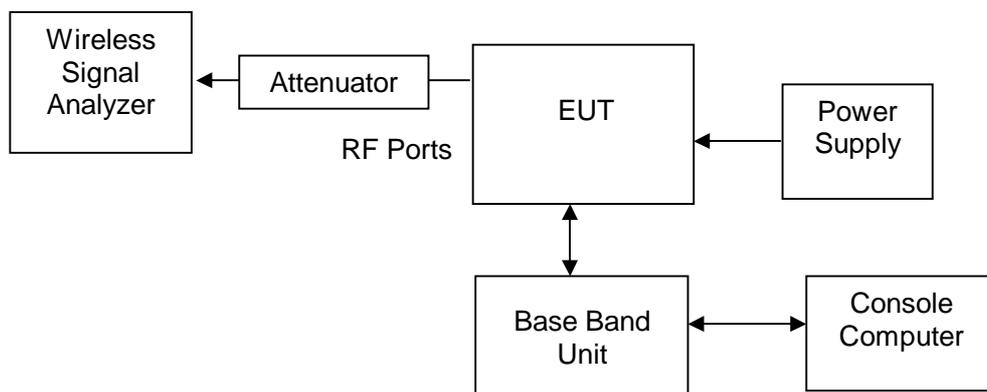


Figure 5. TEST SETUP

6.5.4 Measurement Results

TM1: QPSK

Table 39. Measurement Results for Spurious Emissions

Channel Number	Multi Carriers	Test Frequency Range (Hz)	Maximum Spurious Level measured (dBm)	Limit
No.9662/9687/9712/9737 1932.4/1937.4/1942.4/1947.4MHz	1	9k – 20G	-22.40	< - 13dBm
	4	9k – 20G	-22.18	
No.9750/9775/9800/9825 1950/1955/1960/1965MHz	1	9k – 20G	-22.60	
	4	9k – 20G	-22.51	
No.9863/9888/9913/9938 1972.6/1977.6/1982.6/1987.6MHz	1	9k – 20G	-22.68	
	4	9k – 20G	-22.64	

TM5: 16QAM

Table 40. Measurement Results for Spurious Emissions

Channel Number	Multi Carriers	Test Frequency Range (Hz)	Maximum Spurious Level measured (dBm)	Limit
No.9662/9687/9712/9737 1932.4/1937.4/1942.4/1947.4MHz	1	9k – 20G	-21.80	< - 13dBm
	4	9k – 20G	-22.11	
No.9750/9775/9800/9825 1950/1955/1960/1965MHz	1	9k – 20G	-22.55	
	4	9k – 20G	-22.47	
No.9863/9888/9913/9938 1972.6/1977.6/1982.6/1987.6MHz	1	9k – 20G	-22.49	
	4	9k – 20G	-22.42	

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to Appendix D.



6.6 Radiated Spurious Emission

6.6.1 Test Conditions

Table 41. Test Conditions

Preconditioning:	1 hour
Measured at:	Enclosure
Ambient temperature:	23°C
Relative humidity:	50 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1 at Channel M for Multi Carrier 4
Rated maximum transmitter output power (P_{max}):	Single carrier: total 47.8dBm(60W); Four carriers: each 41.8dBm, total 47.8dBm(60W)

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

FCC part 2.1053 and part 24.238
 IC RSS-Gen clause 4.9, RSS-133 clause 6.5

6.6.2.2 Supporting Standards

Table 42. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
IC SRSP-510 (Issue 4 February 2008)	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.6.2.3 Limits

Compliance with FCC part 2.1053 and part 24.238, based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

Table 43. FCC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

Compliance with IC RSS-133 clause 6.5, after the first 1.0 MHz bands immediately outside and adjacent to the licensee's frequency block, the power of emissions shall be attenuated below the



transmitter output power by at least $43 + 10 \log(P)$, dB, per any 1 MHz of bandwidth.

Table 44. IC Limits for PCS Band

Limit:	$< P - (43 + 10\log_{10}P) = 10\log_{10}(1000 * P) - (43 + 10\log_{10}P) = 30 - 43 = -13\text{dBm}$
--------	---

6.6.3 Test Method and Setup

(a) Measurements were made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.1049(c) as appropriate. For equipment operating on frequencies below 890 MHz, an Open Field Test is normally required with the measuring instrument antenna located in the far field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

- (b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:
- (1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
 - (2) All equipment operating on frequencies higher than 25 MHz
 - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
 - (4) Other types of equipment as required, when deemed necessary by the Commission.

The EUT was equipped with non-integral antenna. And it should test according to part (b). The EUT was connected to match loads. The Console Computer controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on a typical channel.

The test procedure

(1) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, E.R.P. 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. The EUT was connected to ancillary in order to simulate normal operating conditions with reference to the guidance given in the standard for this type of equipment.

(2) Test the radiated maximum output power by the test Receiver received from test antenna.

(3) 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 (2) on the test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

According to FCC part 2.1057, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

According to IC RSS-Gen clause 4.9, the search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lowest frequency, to the 5th harmonic of the highest frequency generated or used, without exceeding 40 GHz.

Measurement bandwidth (RBW) of Spectrum Analyzer or equivalent for test frequency range of 9 kHz to 10th harmonic:

PCS Band:	1 MHz
-----------	-------

Alternatively, according to ITU SM.329, measurement bandwidth (RBW) of Spectrum Analyzer or equivalent can be set as following for test frequency range of 9 kHz to 30 MHz:

9 kHz – 150 KHz:	1 kHz
150 kHz – 30 MHz:	10 kHz

Test setup

Step 1: Pre-test

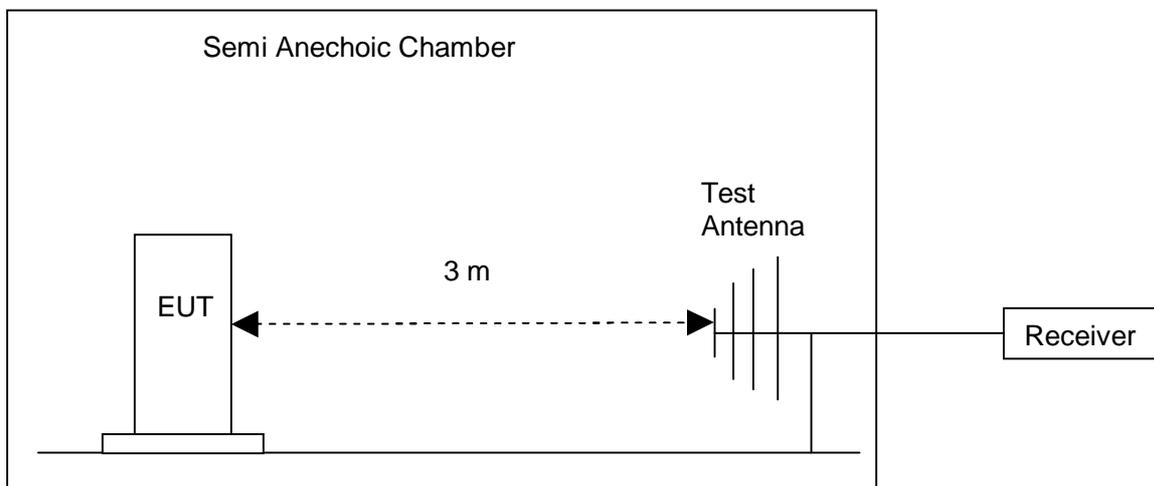


Figure 6. Test Set-up for Pre-test

Step 2: Substitution method to verify the maximum ERP

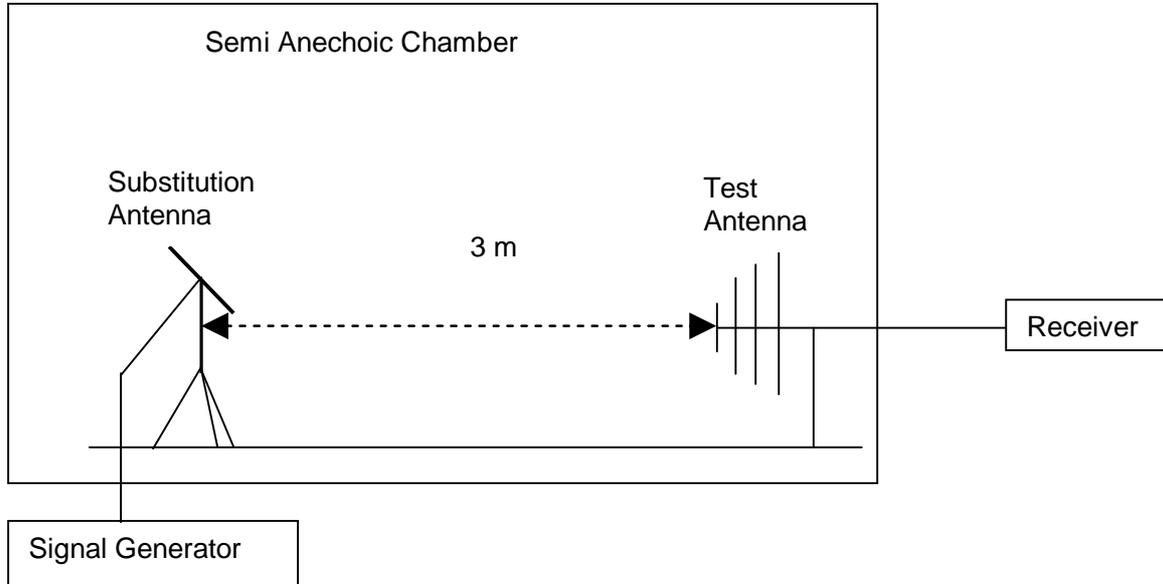


Figure 7. Test Set-up for Substitution

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

6.6.4 Measurement Results

Table 45. Measurement Results for Spurious Emissions

Channel Number	Test Frequency Range (Hz)	Maximum Spurious Level measured (dBm)	Limit
No.9750/9775/9800/9825 1950/1955/1960/1965MHz	30M – 20G	< -13	< - 13dBm

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to Appendix E.



6.7 Frequency Stability

6.7.1 Test Conditions

Table 46. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	See Measurement Results
Relative humidity:	70 %
Power supply:	See Measurement Results
Test Configuration/Mode:	TM1 at Channel M

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

FCC part 2.1055 and part 24.235
 IC RSS-Gen clause 4.7, RSS-133 clause 6.3

6.7.2.2 Supporting Standards

Table 47. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.7.2.3 Limits

Compliance with FCC part 2.1055 and part 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Table 48. FCC Limits for PCS Band

Limit:	(not defended)
--------	----------------

Compliance with IC RSS-133 clause 6.3, the carrier frequency shall not depart from the reference frequency in excess of ± 1.0 ppm for base stations.

Table 49. IC Limits for PCS Band

Limit:	$< \pm 1.0$ ppm
--------	-----------------

Specially, limits according to the technical requirements of the EUT can be adopted as showed in the following table:

Table 50. Limits According to EUT technical requirements for all operating bands

for UMTS equipments:	< ± (0.05 ppm+12 Hz)
----------------------	----------------------

6.7.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature from -30 °C to 50 °C.

Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10 °C 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.

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.

The test procedure

The EUT was placed inside an environmental temperature chamber. The EUT was connected to the Signal Analyzer or equivalent via one RF connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power by Console Computer. Measure and record the Frequency Tolerance of the EUT by the Signal Analyzer or equivalent.

According to ANSI C63.4 clause 13.1.6, no modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

According to IC RSS-Gen clause 4.7, with the transmitter installed in an environment test chamber, the unmodulated carrier frequency shall be measured under the conditions specified below.

The operating end points are: -48 VDC (normal point), -37 VDC (lowest point) and -60 VDC (highest point).

Test Set up

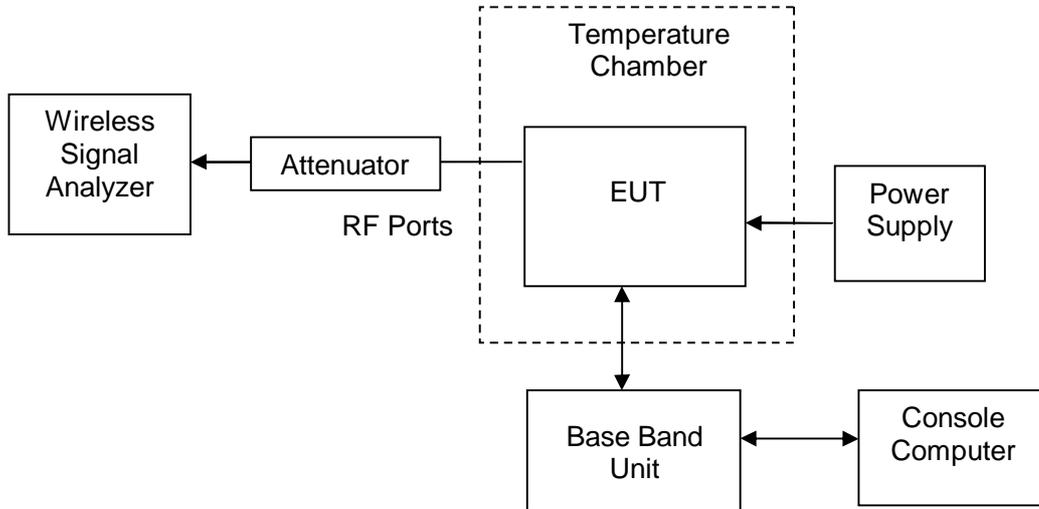


Figure 8. Test Set up

6.7.4 Measurement Results

6.7.4.1 Frequency Error vs. Temperature

Table 51. Measurement Results for Frequency Error vs. Temperature

Measured Maximum Frequency Error					
Test Environment		No.9800 1960MHz			
Voltage	Temperature	Hz	ppm		Limit
			Refer to nominal frequency	Refer to (+20°C, rated voltage)	
-48 VDC (100% rated / normal)	-30 °C	-67.83	-0.035	-0.010	< ±0.05ppm (UMTS) or < ±1.0ppm (IC)
	-20 °C	-52.94	-0.027	-0.002	
	-10 °C	-75.21	-0.038	-0.013	
	0 °C	-58.89	-0.030	-0.005	
	+10 °C	-66.74	-0.034	-0.009	
	+20 °C	-48.95	-0.025	---	
	+30 °C	-48.55	-0.025	0.000	
	+40 °C	-43.04	-0.022	0.003	
+50 °C	-51.35	-0.026	-0.001		

6.7.4.2 Frequency Error vs. Voltage

Table 52. Measurement Results for Frequency Error vs. Voltage

Measured Maximum Frequency Error



Test Environment		No.9800 1960MHz			
Voltage	Temperature	Hz	ppm		Limit
			Refer to nominal frequency	Refer to (+20°C, rated voltage)	
-37 VDC (85% rated / lowest)	+25 °C	56.26	0.029	0.054	< ±0.05ppm (UMTS) or < ±1.0ppm (IC)
-48 VDC (100% rated / normal)	+25 °C	50.84	0.026	0.051	
-60 VDC (115% rated / highest)	+25 °C	-49.40	-0.025	0.000	

6.7.5 Conclusion

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

6.8 Receiver Spurious Emissions (Conducted)

6.8.1 Test Conditions

Table 53. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector (RX diversity only)
Ambient temperature:	22.5 °C
Relative humidity:	76 %
Power supply:	-48 VDC
Test Configuration/Mode:	TM1, TM5 at Channel M

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

IC RSS-Gen clause 4.10 and clause 6, RSS-133 clause 6.6

6.8.2.2 Supporting Standards

Table 54. Supporting Standards

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
IC RSS-Gen (Issue 2 June 2007)	General Requirements and Information for the Certification of Radiocommunication Equipment
3GPP TS 25.141 version 7.9.0 Release 7)	Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD)

6.8.2.3 Limits

Compliance with IC RSS-Gen clause 4.10 and clause 6 and RSS-133 clause 6.6, when a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz in the band 30 - 1000 MHz, or 5 nanowatts per any 1 MHz above 1 GHz.

Table 55. IC Limits for PCS Band

Limit:	< 2 nW/4 kHz (-57 dBm/4 kHz), for 30 MHz - 1000 MHz; < 5 nW/MHz (-53 dBm/MHz), for above 1 GHz
--------	---

6.8.3 Test Method and Setup

The EUT was connected to the Spectrum Analyzer or equivalent via one RF RX diversity connector, and other RF connectors were connected to match loads. The EUT was controlled to transmit maximum power and to be operated in the normal receive mode by Console Computer. Measure and record the Receiver Out-band Spurious Emissions of the EUT by the Spectrum Analyzer or equivalent.

According to IC RSS-Gen clause 4.10, the search for spurious emissions shall be from the lowest

frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

Measurement bandwidth (RBW) and Detector of Spectrum Analyzer or equivalent:

4 kHz RBW with Peak Detector, for below 1 GHz;
1 MHz RBW with Average Detector, for above 1 GHz

Test setup

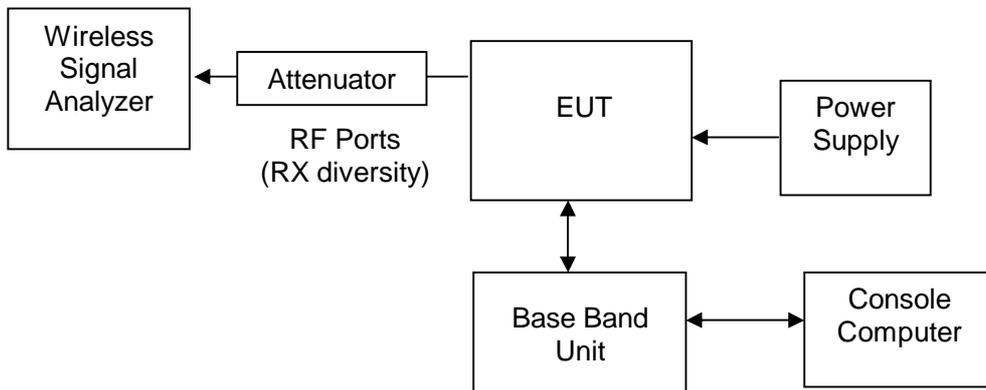


Figure 9. TEST SETUP

6.8.4 Measurement Results

TM1: QPSK

Table 56. Measurement Results for Receiver Spurious Emissions (Conducted)

Channel Number	Test Frequency Range (Hz)	Detector	Maximum Spurious Level measured (dBm)	Limit
No.9400 1880MHz	30 MHz to 1 GHz	Peak	-75.27	< -57 dBm/4kHz
	1 GHz to 6 GHz	Average	-61.96	< -53 dBm/1MHz

TM5: 16QAM

Table 57. Measurement Results for Receiver Spurious Emissions (Conducted)

Channel Number	Test Frequency Range (Hz)	Detector	Maximum Spurious Level measured (dBm)	Limit
No.9400	30 MHz to 1 GHz	Peak	-77.25	< -57 dBm/4kHz



Channel Number	Test Frequency Range (Hz)	Detector	Maximum Spurious Level measured (dBm)	Limit
1880MHz	1 GHz to 6 GHz	Average	-62.27	< -53 dBm/1MHz

6.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to Appendix F.

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 58. System Measurement Uncertainty

Items		Extended Uncertainty
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
Field Strength of Spurious Radiation	ERP (dBm)(30MHz~1G)	U=4.6dB; k=2
	ERP (dBm) (>1G)	U=3dB; k=2
Conducted Output Power	Power (dBm)	U=0.39dB; 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	9 Pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	49 Pages
Appendix E	Measurement Results Radiated Spurious Emission	4 Pages
Appendix F	Measurement Results Receiver Spurious Emissions (Conducted)	5 Pages
Appendix G	Photos of Test Setup	3 Pages

----- END OF REPORT -----