

RF Test Report

Product Name: Remote Radio Unit of Multi-Mode Distributed Base Station

Product Model: RRU3908

Report Number: SYBH(R)006122011EB-1

FCC ID: QISRRU3908

IC ID: 6369A-RRU3908

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Applicant: Huawei Technologies Co., Ltd.
Address: Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Product Name: Remote Radio Unit of Multi-Mode Distributed Base Station
Product Model: RRU3908
Version: V200R012

Date of Receipt Sample: 2011-12-01
Start Date of Test: 2011-12-01
End Date of Test: 2011-12-19

Test Result: Pass

Approved by Senior Engineer:	2011-12-19	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2011-12-19	Huang Yuanqiu	<i>Huang yuanqiu</i>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
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2 Test Summary

Test Case	FCC Part No.	Requirements	Result
Cellular Band			
Transmitter Output Power	2.1046 & 22.913	ERP not exceed 500 W	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 917	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 2.917	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/100 kHz, 30 MHz to 10 th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 22.917	Below -13 dBm/100 kHz	Pass
Frequency Stability	2.1055 & 22.355	Maintained within the tolerances of ± 1.5 ppm	Pass

Test Case	IC Standard No.	Requirements	Result
Cellular Band			
Transmitter Output Power	RSS-Gen, §4.8; RSS-132, §4.4	EIRP not exceed 820 W	Pass
Modulation Characteristics	RSS-132, §4.2	Digital modulation	Pass
Occupied Bandwidth	RSS-Gen, §4.6	(Not specified)	Pass
Band Edges Compliance	RSS-Gen, §4.9; RSS-132, §4.5	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	RSS-Gen, §4.9; RSS-132, §4.5	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/100 kHz (EBW \leq 4 MHz), 30 MHz to 5 th harmonics Below -13 dBm/1 MHz (EBW > 4 MHz), 30 MHz to 5 th harmonics	Pass
Field Strength of Spurious Radiation	RSS-Gen, §4.9; RSS-132, §4.5	Below -13 dBm/100 kHz (EBW \leq 4 MHz) Below -13 dBm/1 MHz (EBW > 4 MHz)	Pass
Frequency Stability	RSS-Gen, §4.7; RSS-132, §4.3	Maintained within the tolerances of ± 1.5 ppm	Pass
Receiver Spurious Emissions (Conducted)	RSS-Gen, §4.10; RSS-Gen, §6; RSS-132, §4.6	Below 2 nW/4 kHz (-57 dBm/4 kHz), for 30 MHz - 1000 MHz Below 5 nW/MHz (-53 dBm/MHz), for above 1 GHz	Pass



3 Description of the Equipment under Test (EUT)

3.1 General Description

The RRU3908 is an outdoor remote radio unit. It is the RF part of a distributed base station and can be located near the antenna. The RRU3908 performs modulation, demodulation, data processing, and combination and division of baseband signals and RF signals. With the Software Defined Radio (SDR) technology, the RRU3908 can support the dual-mode operation of either two modes of GSM/UMTS/LTE through software configuration modification.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Board		
Board Name	Hardware Version	Description
RRU3908	VER.E	DistributedNodeB Remote Radio Unit

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
WBBP	---	Huawei	NodeB baseband Unit
WMPT	---	Huawei	Main Processing Unit

3.3 Technical Description

3.3.1 Supported Frequency Range

Characteristics	Description
Downlink	869 – 894 MHz
Uplink	824 – 849 MHz

3.3.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	<input checked="" type="checkbox"/> GSM <input type="checkbox"/> CDMA <input checked="" type="checkbox"/> UMTS <input type="checkbox"/> WiMAX <input type="checkbox"/> LTE
TX and RX Antenna Ports	2 * TRX, 0 * RX-only, 0 * TX-only
Multiple Carrier Supported(per Antenna Port)	UMTS system: 2 GSM system: 4
TX Output Power (per Antenna Port)	UMTS system: 1 * 60 W 2 * 20W GSM system: 1*40W 2*20W 3*13W 4*10W
Channel Spacing(s) / Bandwidth(s)	GSM system: 200 kHz UMTS system: 5 MHz
Designation of Emissions	GSM system: 300KGXW (GMSK modulation), 300KG7W (8PSK modulation)) UMTS system: 4M16F9W

3.3.3 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC Power Supply
Input to EUT (DC power)	DC Voltage Nominal:  -48 V DC Voltage Range:  -36 V to -57 V

4 General Test Conditions / Configurations

4.1 Test Modes

Test Mode	Test Modes Description
uTM 1	UMTS system: 3GPP TS 25.141, clause 6.1.1, Test Model 1, QPSK modulation
gTM 1	GSM system: GSM/GPRS, GMSK modulation
gTM 2	GSM system: EDGE, 8PSK modulation

4.2 RF Channels under Test

UMTS system:

TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX	MC 1	871.4 MHz	881.4 MHz	891.6 MHz
	MC 2	871.4/ 876.4MHz	881.4/ 886.4MHz	891.6/ 886.6MHz
RX	MC 1	826.4 MHz	836.4 MHz	846.6 MHz

NOTE: The "MC" denotes multiple carriers with identical channel bandwidths; The "xxxM+yyyM" (or similar) denotes multiple carriers with a xxx MHz channel bandwidth carrier and a yyy MHz channel bandwidth carrier.

GSM system:

TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX	MC 1	869.4 MHz	882 MHz	893.6MHz
	MC 2	869.4/870MHz	882/882.6MHz	893/893.6MHz
	MC 3	869.4/870/870.6MHz	881.4/882/882.6MHz	892.4/893/893.6MHz
	MC 4	869.4/870/870.6/871.2 MHz	881.4/882/882.6/883.2 MHz	891.8/892.4/893/893.6 MHz
RX	MC 1	824.4 MHz	837 MHz	848.6 MHz

NOTE: The "MC" denotes multiple carriers with identical channel bandwidths; The "xxxM+yyyM" (or similar) denotes multiple carriers with a xxx MHz channel bandwidth carrier and a yyy MHz channel bandwidth carrier.

4.3 Test Environments

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

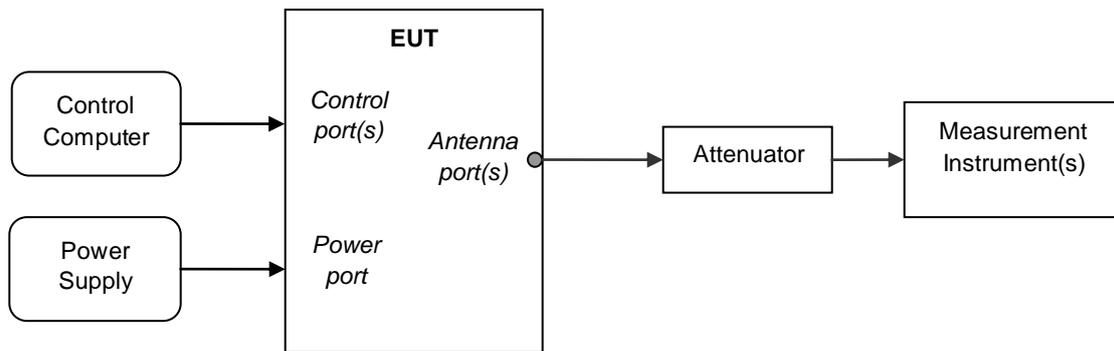
4.4 Test Setups

NOTE: See Appendix I for practical Test Setup Photos.

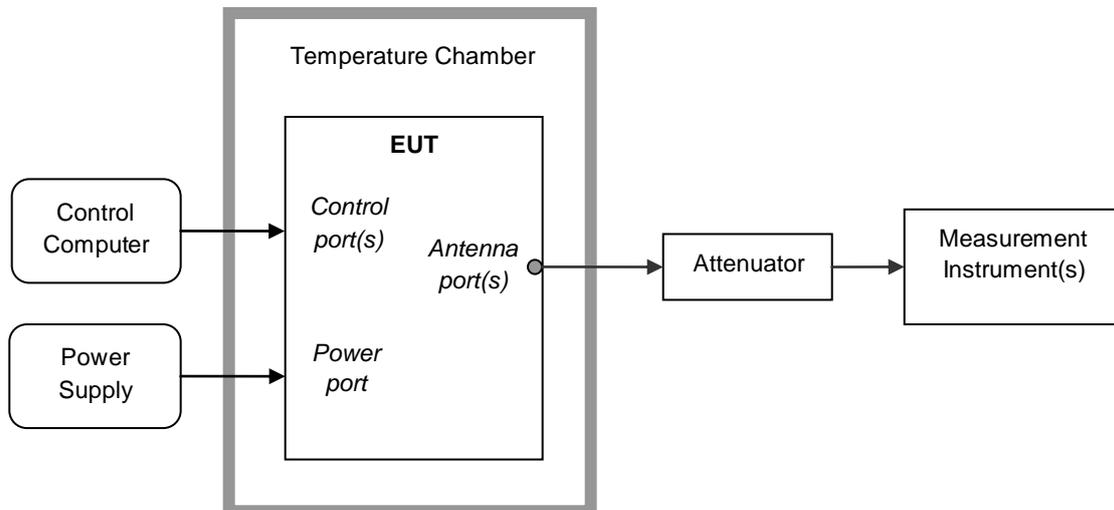
4.4.1 General Test Setup Configurations

Configuration	Description
Test Antenna Ports	Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

4.4.2 Test Setup 1



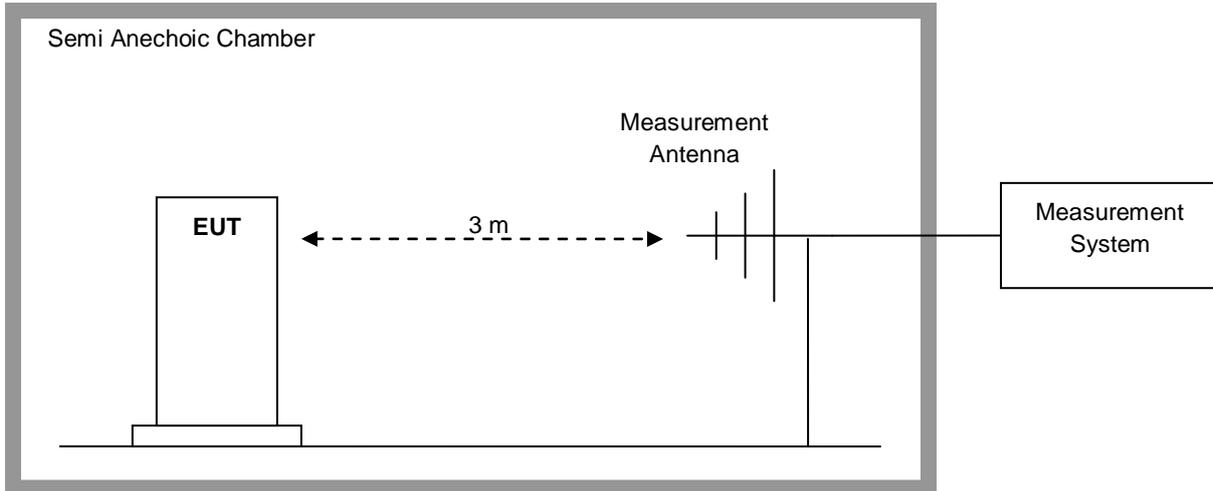
4.4.3 Test Setup 2



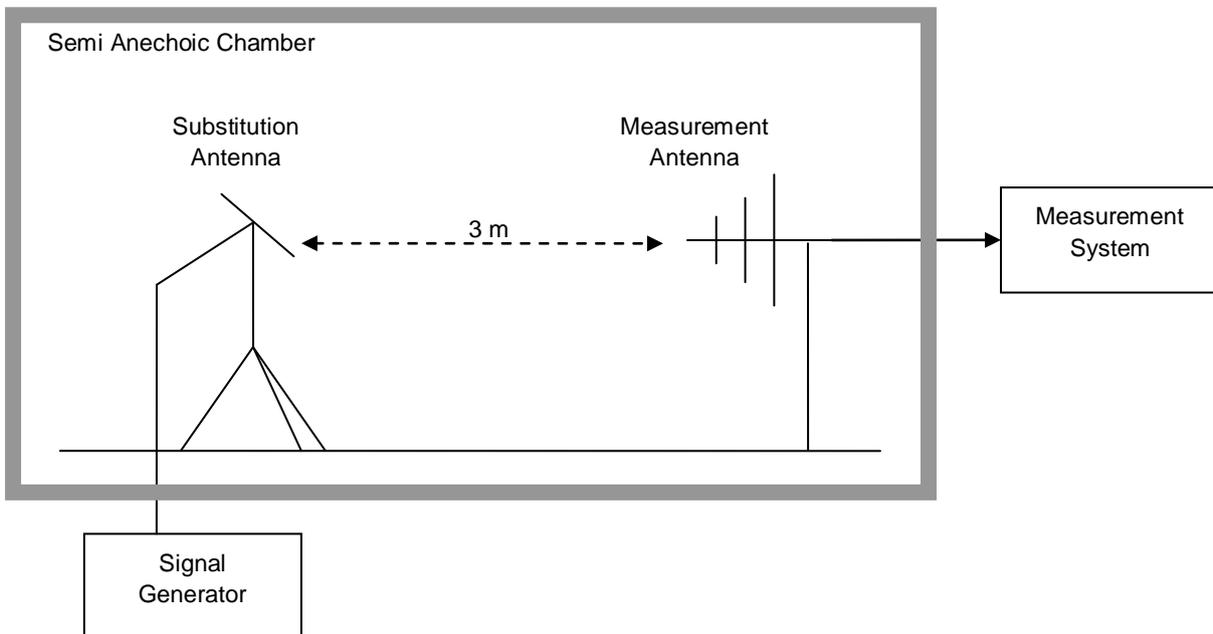
4.4.4 Test Setup 3

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

4.4.4.1 Step 1: Pre-test



4.4.4.2 Step 2: Substitution method to verify the maximum ERP



4.5 Test Conditions

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1 to MC 2 GSM system: MC 1 to MC 4
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1 GSM system: MC 1
	RF Channels (TX)	M
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1 GSM system: MC 1
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1, MC 2 GSM system: MC 1, MC 4
	RF Channels (TX)	B, T
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1, MC 2 GSM system: MC 1, MC 4
	RF Channels (TX)	B, T
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	UMTS system: MC 1

Test Case	Test Conditions	
		NOTE: The test mode having maximum power level is selected as the worst case.
	RF Channels (TX)	M
	Test Mode	UMTS system: uTM 1
Frequency Stability	Test Configuration	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
	Test Setup	Test Seup 2
	Carrier Conf.	UMTS system: MC 1
	RF Channels (TX)	M
	Test Mode	UMTS system: uTM 1 NOTE: An arbitrary test mode is selected as a representative since the un-modulation carrier configuration is required by the standards/rules.
Receiver Spurious Emissions (Conducted) (Only for IC requirement)	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1 GSM system: MC 1
	RF Channels (TX/RX)	M
	Test Mode	UMTS system: uTM 1 GSM system: gTM 1, gTM 2



5 Test Results

No.	Test Item	Test Result
1	Transmitter Output Power	Appendix A
2	Modulation Characteristics	Appendix B
3	Occupied Bandwidth	Appendix C
4	Band Edges Compliance	Appendix D
5	Spurious Emission at Antenna Terminals	Appendix E
6	Field Strength of Spurious Radiation	Appendix F
7	Frequency Stability	Appendix G
8	Receiver Spurious Emissions (Conducted) (Only for IC requirement)	Appendix H



6 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2012-11-20
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-05-13
Vector Signal Generator	SMU200A	R&S	100699	2012-03-21
Temperature Chamber	WEISS	WK11-1000	5922609060010	2012-08-24
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	---
EMI Test receiver	R&S	ESU40	100144	2012-05-13
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	2012-08-08
Horn Antenna	R&S	HF906	359287/006	2012-05-20



7 Measurement Uncertainty

For a 95% confidence level ($k=2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmitter Output Power	Power (dBm)	U =0.39 dB
Occupied Bandwidth	Magnitude (%)	U=0.2%
Band Edge Compliance	Disturbance Power (dBm)	U=2.0 dB
Conducted Spurious Emissions	Disturbance Power (dBm)	U=2.0 dB
Field Strength of Spurious Radiation	ERP (dBm)	U=4.6 dB (30 MHz – 1GHz) U=3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy (ppm)	U=0.21 ppm

END