RF Test Report

Product Name: Distributed Base Station Remote Radio Unit

Product Model: RRU3808

Report Number: SYBH(R)013102011EB-1

FCC ID: QISRRU3808-AWS

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.

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3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.

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8. The test report is only valid for the test samples.

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Applicant:	Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Product Name:	Distributed Base Station Remote Radio Unit
Product Model:	RRU3808
Version:	V300R001

Date of Receipt Sample:	2011-10-11
Start Date of Test:	2011-10-11 (the present release), 2010-03-08 (last release)
End Date of Test:	2011-10-21 (the present release), 2010-03-11 (last release)

Test Result: Pass

Approved by Senior Engineer:	2011-11-08	Zhang Xinghai	Zhang Xing hai
	Date	Name	Signature

Prepared by:	2011-11-08	Zhang Weimin	Zhang Weimin
	Date	Name	Signature

Modification Record

No.	Last Report No.	Modification Description
1	---	Firstly release.
2	SYBH(R)004022010EB-1 (FCC ID: QISRRU3808), SYBH(R)058052009EB-1 (FCC ID: QISRRU3201-AWS)	The last report SYBH(R)004022010EB-1 (FCC ID: QISRRU3808) with the model RRU3808 was for UMTS work mode, and the last report SYBH(R)058052009EB-1 (FCC ID: QISRRU3201-AWS) with the model RRU3201 was for LTE work mode. The present report contains measurement results for both UMTS and LTE work modes: the results for UMTS work mode are directly derived from the last report SYBH(R)004022010EB-1 and has no modification; the measurements for LTE work mode were based on the last report SYBH(R)058052009EB-1 (covering partly channel bandwidths) and re-test all the conducted measurements. These two models now are combined into a single model RRU3808 as described in the present report, and contains both UMTS and LTE work modes. These two work modes share the radio unit.

CONTENT

1 General Information

1.1 Applied Standard

Applied Rules:	47 CFR FCC Part 2, Subpart J (10-1-10 Edition) 47 CFR FCC Part 27, Subpart C (10-1-10 Edition)

1.2 Test Location

Test Location 1:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

1.3 Test Environment Condition

Ambient Temperature:	20 to 23 °C (the present release), 22.5 to 25 °C (last release)
Ambient Relative Humidity:	52 to 74 % (the present release), 36 to 50 % (last release)
Atmospheric Pressure:	Not applicable

2 Test Summary

Test Case	FCC Part No.	Requirements	Result
AWS Band			
Transmitter Output Power	2.1046 & 27.50(d)	Peak EIRP not exceed 1640 W	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(h)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(h)	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/1 MHz, 30 MHz to 10th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(h)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

3 Description of the Equipment under Test (EUT)

3.1 General Description

HUAWEI Base Station DBS3900 UMTS/LTE is a distributed NodeB/eNodeB with the 3GPP UMTS/LTE FDD protocols. The DBS3900 UMTS/LTE supports CPRI interfaces and contains BBU and RRU two parts:

- Baseband unit (BBU): processes baseband signals.
- Radio remote unit (RRU): processes RF signals

RRU3808 (Band IV) is the outdoor radio remote unit. It can be mounted close to the antenna on a metal pole or a wall.

For RRU3808 (Band IV), the downlink frequency is 2110 MHz - 2155 MHz and the uplink frequency is 1710 MHz - 1755 MHz.

RRU3808 (Band IV) has a highly integrated structure. The components of RRU3808 are describes as follows:

1. Power supply: leads the external -48 VDC power to supply power for RRU3808.
2. Duplexer: multiplexes RX signals and TX signals, which enables the RX signals and TX signals to share the same antenna path. The duplexer also filters RX signals and TX signals.
3. Low noise amplifier: amplifies received signals to avoid loss of signals.
4. Power amplifier: amplifies transmission signals to reinforce the power of the signals. It has the power of 40 W per port.
5. TRX: includes two receive channels, two transmission channels and one feedback channel. Each channel supports only one carrier.

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
RRU3808	VER.B	Distributed Base Station Remote Radio Unit

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
WMPT	---	HUAWEI	UMTS Main Processing Unit of Base Band Unit
WBBP	---	HUAWEI	UMTS Base Band Unit

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
LMPT	---	HUAWEI	LTE Main Processing & Transmission Unit
LBBP	---	HUAWEI	LET baseband Processing Unit

3.3 Technical Description

3.3.1 Supported Frequency Range

Characteristics	Description
Downlink	2110 to 2155 MHz
Uplink	1710 to 1755 MHz

3.3.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	☐ GSM ☐ CDMA ☒ UMTS ☐ WiMAX ☒ LTE
TX and RX Antenna Ports	2 * TRX, 0 * RX-only, 0 * TX-only
Multiple Carrier Supported	UMTS system: 4 LTE system: 1
TX Output Power (per Antenna Port)	40 W max.
Channel Spacing(s) / Bandwidth(s)	UMTS system: 5 MHz LTE system: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
Designation of Emissions	UMTS system: 5M00F9W LTE system: 1M40D9W, 3M00D9W, 5M00D9W, 10M0D9W, 15M0D9W, 20M0D9W

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

NOTE: The test modes are derived from relevant product technical specifications/standards.

Test Mode	Test Modes Description
TM 1	3GPP TS 25.141 (UMTS system), clause 6.1.1, Test Model 1 (for measurements of wanted emissions, unwanted emissions (out-of-band emissions and spurious emissions))
E-TM 1.1	3GPP TS 36.141 (LTE system), clause 6.1.1, E-TM1.1 (for measurements of wanted emissions, unwanted emissions (out-of-band emissions and spurious emissions))
E-TM 1.2	3GPP TS 36.141 (LTE system), clause 6.1.1, E-TM1.2 (for measurements of out-of-band emissions)

4.2 RF Channels under Test

TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX (UMTS system)	MC 1	2112.4 MHz	2132.4 MHz	2152.6 MHz
	MC 2	2112.4/2117.4 MHz	2132.4/2137.4 MHz	2147.6/2152.6 MHz
	MC 3	2112.4/2117.4/2122.4 MHz	2127.4/2132.4/2137.4 MHz	2142.6/2147.6/2152.6 MHz
	MC 4	2112.4/2117.4/2122.4/2127.4 MHz	2127.4/2132.4/2137.4/2142.4 MHz	2137.6/2142.6/2147.6/2152.6 MHz
TX (LTE system)	1.4M	2110.7 MHz	2132.5 MHz	2154.3 MHz
	3M	2111.5 MHz	2132.5 MHz	2153.5 MHz
	5M	2112.5 MHz	2132.5 MHz	2152.5 MHz
	10M	2115 MHz	2132.5 MHz	2150 MHz
	15M	2117.5 MHz	2132.5 MHz	2147.5 MHz
	20M	2120 MHz	2132.5 MHz	2145 MHz
NOTE: The “MC” denotes multiple carriers, the channel bandwidths of which is fixed and defined by the relevant radio system; The “xxxM”, “xxxM+yyyM”, “xxxM+yyyM+zzzM” (or similar) denotes multiple carriers with different channel bandwidths for each carrier.				

4.3 Test Environments

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

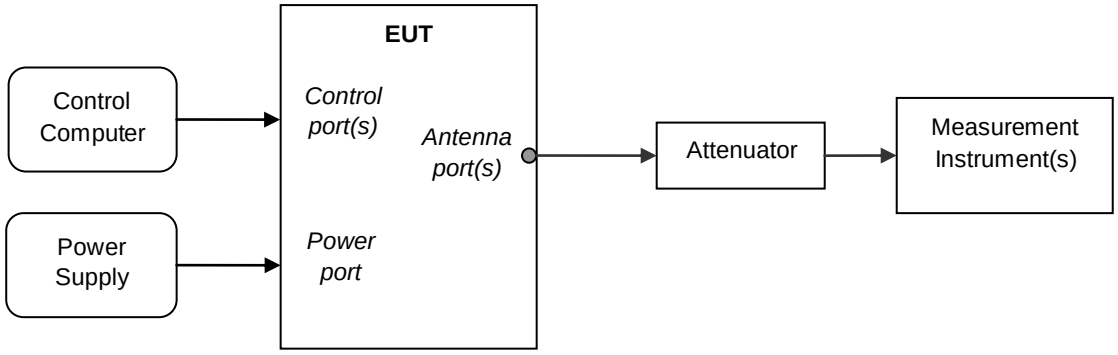
4.4 Test Setups

NOTE: See Appendix I for practical Test Setup Photos.

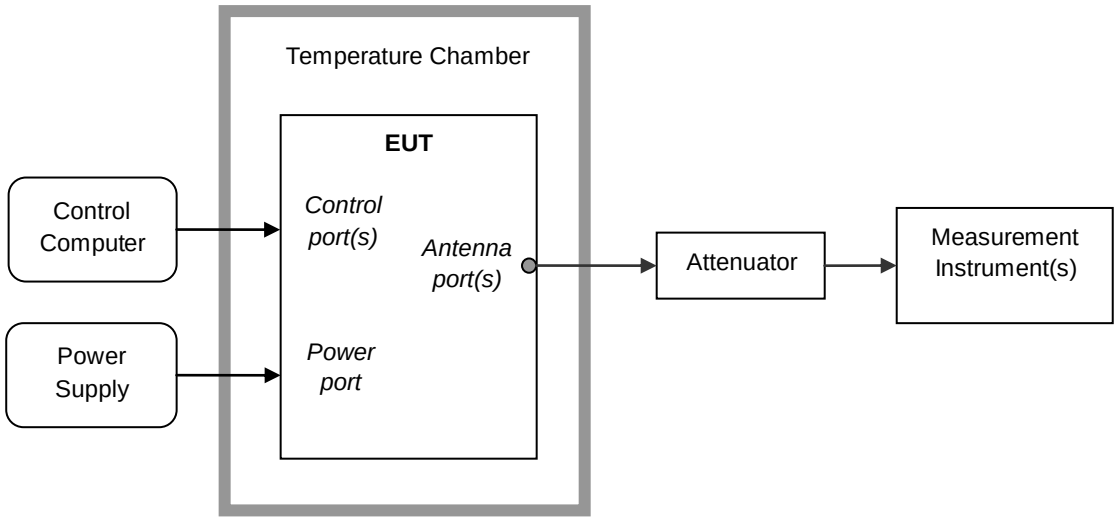
4.4.1 General Test Setup Configurations

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



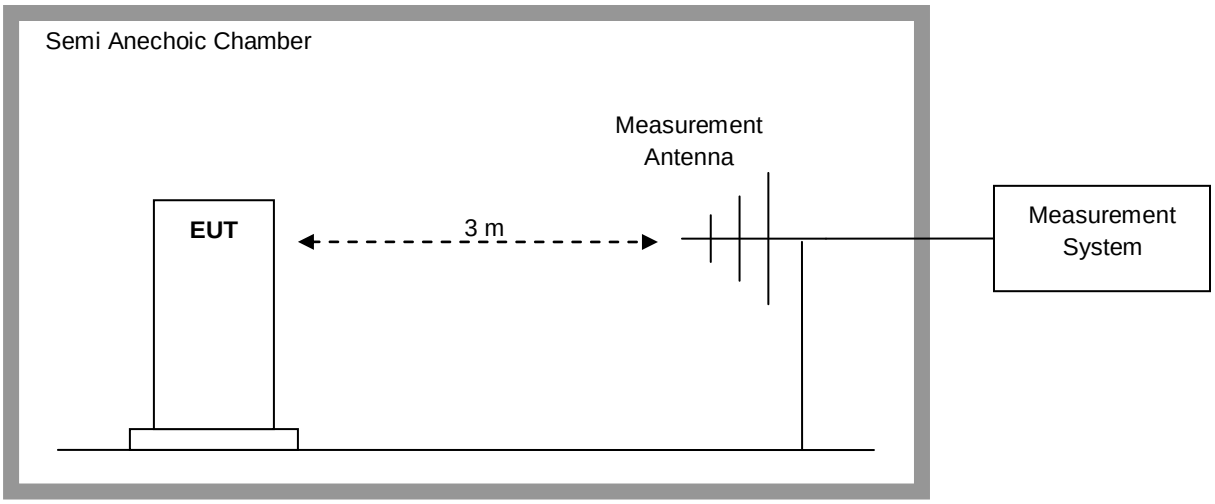
4.4.3 Test Setup 2



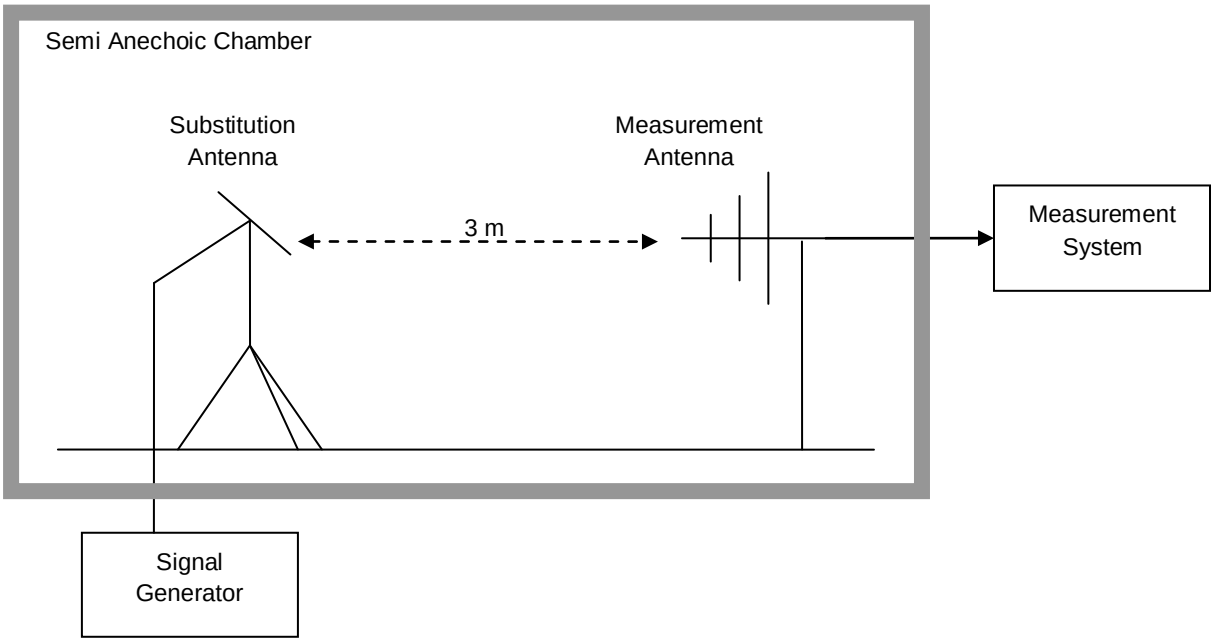
4.4.4 Test Setup 3

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, MC 2, MC 3, MC 4 LTE system: 1.4M, 3M, 5M, 10M, 15M, 20M
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1 LTE system: 1.4M
	RF Channels (TX)	M
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS: MC 1 LTE: 1.4M, 3M, 5M, 10M, 15M, 20M
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1, MC 4 LTE system: 1.4M, 3M, 5M, 10M, 15M, 20M
	RF Channels (TX)	B, T
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1, E-TM 1.2
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	UMTS system: MC 1, MC 4 LTE system: 1.4M, 3M, 5M, 10M, 15M, 20M
	RF Channels (TX)	B, M, T
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	UMTS system: MC 4 LTE system: 20M

Test Case	Test Conditions	
	RF Channels (TX)	M
	Test Mode	UMTS system: TM 1 LTE system: E-TM 1.1
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: TM 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	Not applicable
	Test Setup	Not applicable
	Carrier Conf.	Not applicable
	RF Channels (TX/RX)	Not applicable
	Test Mode	Not applicable

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

Test Period for the present measurements:

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2012-10-19

Test Period for last measurements:

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	R&S	FSQ40	100025	2010-10-09
Temperature Chamber	ESPEC	EW2465	05175004	2010-08-11
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	---
EMI Test receiver	R&S	ESU40	100144	2010-04-21
Broadband Antenna	SCHAFFNER	CBL 6112B	2747	2010-11-29
Horn Antenna	R&S	HF906	359287/005	2010-03-26
Horn Antenna	ETS	3160-9	00060006	2010-10-27

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