RF Test Report

Product Name: **Remote Radio Unit of Distributed Base Station**

Product Model: **RRU3232**

Report Number: **SYBH(R)01324917EB-1**

FCC ID: **QISRRU3232-3650**

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

2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.

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

4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The site recognition number is 6369A-1.

5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers are R2364, C2583, and T256.

6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

7. The test report is invalid if there is any evidence of erasure and/or falsification.

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

9. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

Applicant:	Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Product Name:	Remote Radio Unit of Distributed Base Station
Product Model:	RRU3232
Version:	V100R006

Date of Receipt Sample:	2014-04-30
Start Date of Test:	2014-05-05
End Date of Test:	2014-05-12

Test Result: Pass

Approved by Senior Engineer:	2014-05-14	Zhang Xinghai	Zhang Xing hai
	Date	Name	Signature

Prepared by:	2014-05-14	Liang Changguan	Liang Changguan
	Date	Name	Signature

Modification Record

No.	Last Report No.	Modification Description
---	---	---

CONTENT

1 General Information 6
1.1 Applied Standard 6
1.2 Test Location 6
1.3 Test Environment Condition 6
2 Test Summary 7
3 Description of the Equipment under Test (EUT) 8
3.1 General Description 8
3.2 EUT Identity 8
3.3 Technical Description 9
4 General Test Conditions / Configurations 10
4.1 Test Modes 10
4.2 Test Configurations 10
4.3 Test Environments 10
4.4 Test Setups 11
4.5 Test Conditions 13
5 Test Results 15
6 Main Test Instruments 16
7 Measurement Uncertainty 17

1 General Information

1.1 Applied Standard

Applied Rules:	47 CFR FCC Part 2, Subpart J (10-1-13 Edition)
	47 CFR FCC Part 90, Subpart z (10-1-13 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 25 °C
Ambient Relative Humidity:	45 to 65 %
Atmospheric Pressure:	Not applicable

2 Test Summary

Test Case	FCC Part No.	Requirements	Result
3650~3675MHz Band			
Transmitter Output Power	2.1046 & 90.1321(a)	EIRP Power ≤ 25 W/25 MHz. Peak EIRP PD ≤ 1 W/1 MHz	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Emissions Mask	2.1047&2.1051 &90.210	Emissions Mask B (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB. (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB. (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.	Pass
Band Edges Compliance	2.1051 & 90.1323	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 90.1323	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 1000 MHz Below -13 dBm/1MHz, 1000 MHz to 10th harmonics	Pass
Field Strength of Spurious Radiation	2.1051 & 90.1323	Below -13 dBm/1MHz	Pass
Frequency Stability	2.1055	(Not specified)	Pass

3 Description of the Equipment under Test (EUT)

3.1 General Description

The DBS3900 TDLTE, a future-oriented E-UTRAN Node B (eNodeB) product launched by Huawei, is a distributed eNodeB supporting TDD LTE. The DBS3900 TDLTE fully exploits Huawei platform resources and uses a variety of technologies.

The Remote Radio Unit (RRU) is the remote radio unit of the DBS3900 TDLTE It implements conversion between baseband signals, IF signals, and RF signals, demodulates the received radio signals, and modulates the signals to be transmitted, and amplifies the transmit power of the signals.

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
WD5BKHX41A	Ver.D	Transmission and reciver cell
WD5BKHX41X	Ver.A	DC Power suuply
WD5BKHX41A0	Ver.A	Power Amplifier Unit

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
BBU	BBU3900	Huawei	Base band Units

3.3 Technical Description

Characteristics	Description	
System Type	☐ GSM, ☐ UMTS, ☒ LTE, ☐ CDMA, ☐ WiMAX	
Supported Frequency Range	Transmission (TX):	3650 MHz to 3675 MHz
	Receiving (RX):	3650 MHz to 3675 MHz
TX and RX Antenna Ports	4* TRX (SISO and MIMO)	
Multiple Carrier Supported	1	
TX Output Power (EIRP)	Max.15.85W (42dBm)	
Channel Bandwidth	LTE system:	20 MHz
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	LTE system:	20M0D9W
Power Supply Type	☐ External AC mains, ☒ External DC mains, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE)	
Rated Input Voltage (Input to EUT)	Nominal: -48 VDC Range: -36 to -57 VDC	

4 General Test Conditions / Configurations

4.1 Test Modes

Test Mode	Test Modes Description
E-TM 1.1	LTE system: 3GPP TS 36.141, clause 6.1.1, E-TM 1.1
E-TM 3.1	LTE system: 3GPP TS 36.141, clause 6.1.1, E-TM 3.1

4.2 Test Configurations

TX / RX	Carrier Conf. (NOTE)	RF Channel	
		Bottom (B)	Top (T)
TX	1L	3660 MHz	3665 MHz
NOTE:	For the Carrier Configurations, the “n*TxxxM(yyyW)” denotes the n * multiple carriers of the radio system type T (G - GSM system, U - UMTS system, L - LTE system, C - CDMA system, W - WiMAX system), for which the channel bandwidth of each carrier is xxx MHz (applicable for T supporting various channel bandwidths) and the power level of each carrier is yyy Watts. While the combinations of several “n*TxxxM(yyyW)”s denotes the carrier configurations of the MSR (multiple standard radio) system.		

4.3 Test Environments

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

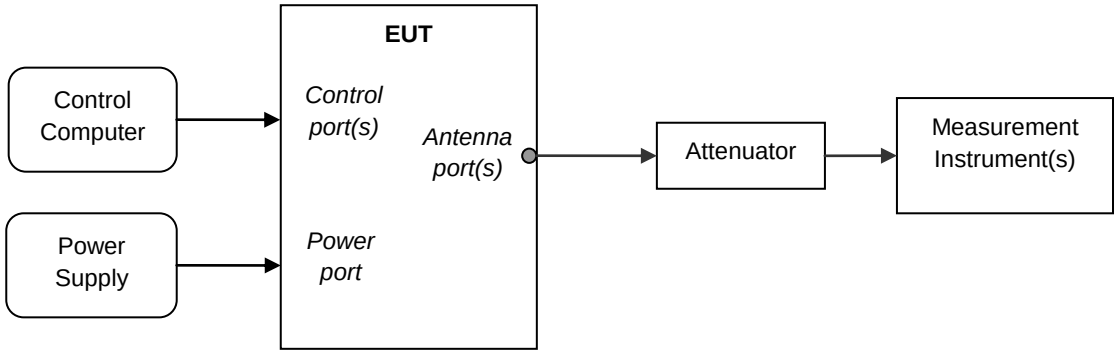
4.4 Test Setups

NOTE: See Appendix I for practical Test Setup Photos.

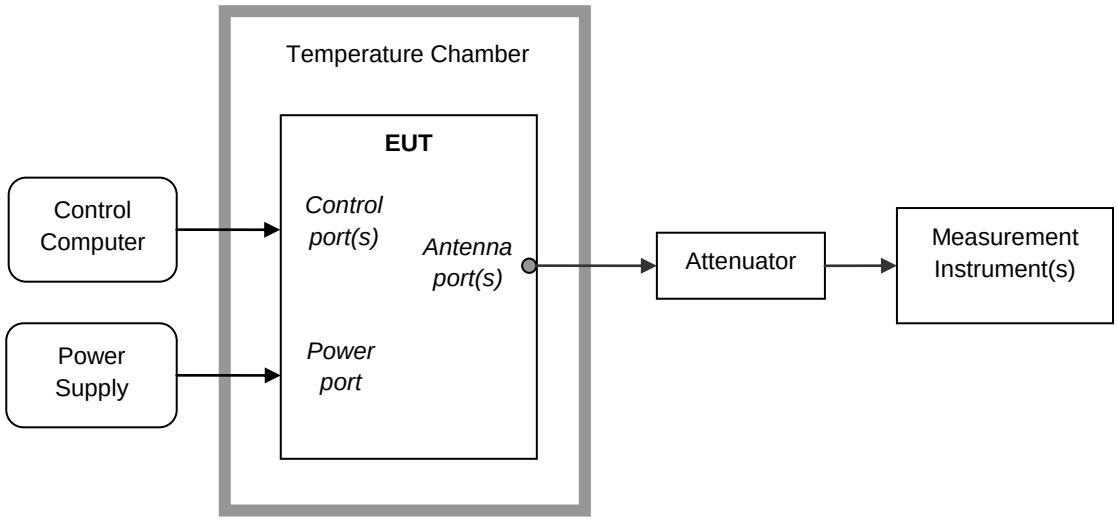
4.4.1 General Test Setup Configurations

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



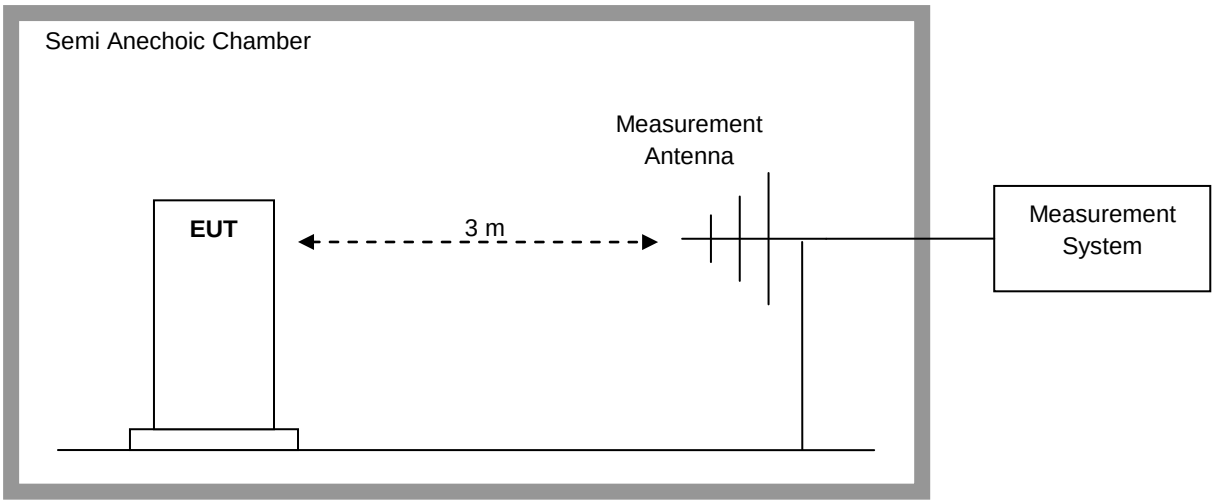
4.4.3 Test Setup 2



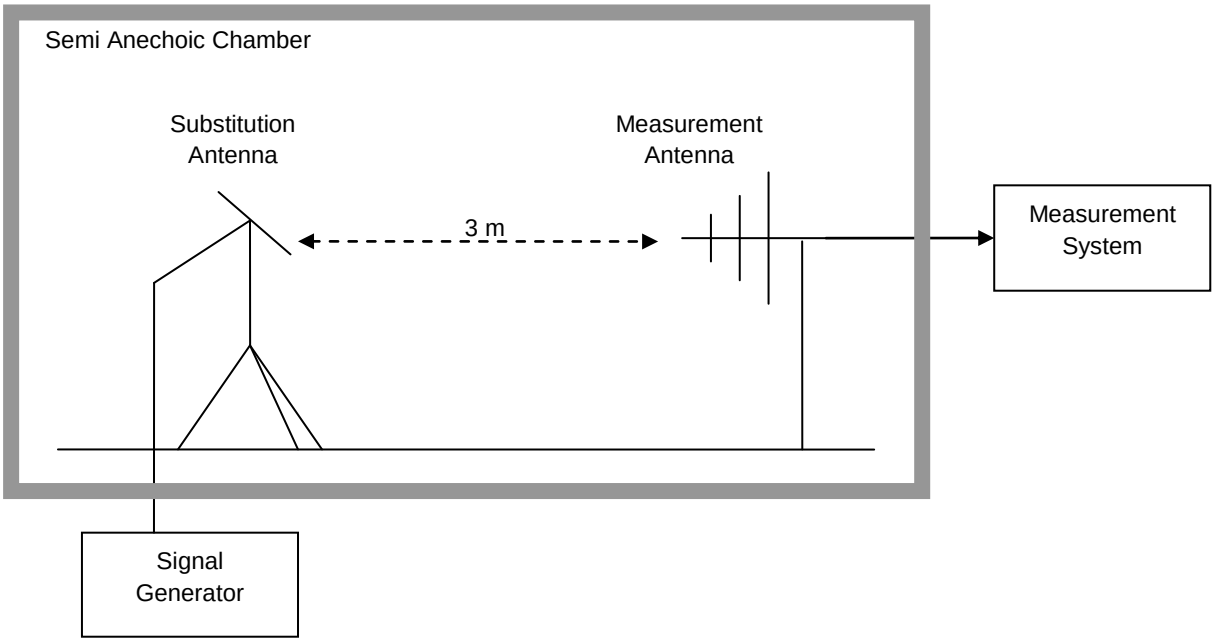
4.4.4 Test Setup 3

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.	1
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM3.1 NOTE: An arbitrary test mode is selected to demonstrate compliance.
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Emission Mask	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM1.1
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	1
	RF Channels (TX)	T
	Test Mode	TM1.1
Frequency Stability	Test Configuration	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage;

Test Case	Test Conditions	
		(2) 85%, 100% and 115% of Rated Voltage at Ambient Climate.
	Test Setup	Test Seup 2
	Carrier Conf.	1
	RF Channels (TX)	B, T
	Test Mode	TM3.1 NOTE: An arbitrary test mode is selected as a representative since the un-modulation carrier configuration is required by the standards/rules.

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	Emission Mask	Appendix D
5	Band Edges Compliance	Appendix E
6	Spurious Emission at Antenna Terminals	Appendix F
7	Field Strength of Spurious Radiation	Appendix G
8	Frequency Stability	Appendix H
9	Test Setup photo	Appendix I

6 Main Test Instruments

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	Agilent	E4440A	MY49420179	2014-08-30
Spectrum Analyzer	Agilent	N9030A	MY49431033	2014-05-19
Spectrum Analyzer	R&S	FSV40	100960	2014-06-27
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-26
Test Setup 3				
Log Antenna	SCHAFFNER	CBL 6112B	2941	2014-09-13
Horn Antenna	R&S	HF906	359287/006	2014-09-14
EMI receiver	R&S	ESU40	100144	2014-12-23

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