

RF Test Report

Product Name: Distributed Base Station Remote Radio Unit

Product Model: RRU3201

Report Number: SYBH(R)002012012EB-1

FCC ID: QISRRU3201-2600M

IC ID: 6369A-RRU3201

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: Distributed Base Station Remote Radio Unit
Product Model: RRU3201
Version: V200R013

Date of Receipt Sample: 2011-12-16
Start Date of Test: 2011-12-22
End Date of Test: 2011-12-29

Test Result: Pass

Approved by Senior Engineer:	2012-01-04	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2012-01-04	Zhang Weimin	<i>Zhang Weimin</i>
	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	RF Channels under Test	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 (10-1-10 Edition)
47 CFR FCC Part 27, Subpart C (10-1-10 Edition)
IC RSS-Gen (Issue 3, December 2010)
IC RSS-199 (Issue 1, January 2010)

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 22 °C
Ambient Relative Humidity: 30 to 64 %
Atmospheric Pressure: Not applicable

2 Test Summary

Test Case	FCC Part No.	Requirements	Result
BRS&EBS Band			
Transmitter Output Power	2.1046 & 27.50(h)(1)	EIRP not exceed 33 dBW + 10 lg(X/Y) dBW	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(m)(2) & 27.53(m)(6)	Below -13 dBm/1%*EBW, in 1 MHz range (from band/block edge)	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(m)(2) & 27.53(m)(6)	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 10 th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(m)(2) & 27.53(m)(6)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

Test Case	IC Standard No.	Requirements	Result
BRS Band			
Transmitter Output Power	RSS-Gen, §4.8; RSS-199, §4.4	EIRP not exceed 33.3 Watts in any 100 kHz segment	Pass
Modulation Characteristics	RSS-199, §4.1	Digital modulation	Pass
Occupied Bandwidth	RSS-Gen, §4.6; RSS-199, §4.2	(Not specified) The channel bandwidth shall be ≥ 1 MHz.	Pass
Band Edges Compliance	RSS-Gen, §4.9; RSS-199, §4.5	Below -13 dBm/1%*OBW, in 1 MHz range (from channel edge)	Pass
Spurious Emission at Antenna Terminals	RSS-Gen, §4.9; RSS-199, §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/1 MHz, 30 MHz to 5 th harmonics	Pass
Field Strength of Spurious Radiation	RSS-Gen, §4.9; RSS-199, §4.5	Below -13 dBm/1 MHz	Pass
Frequency Stability	RSS-Gen, §4.7; RSS-199, §4.3	Stay within the authorized frequency block	Pass
Receiver Spurious Emissions (Conducted)	RSS-Gen, §4.10; RSS-Gen, §6; RSS-199, §4.6	Below -57 dBm/120 kHz (CISPR-QP), 30MHz to 1000 MHz Below -53 dBm/1 MHz (AV), 1 GHz to 3 th harmonics	Pass

3 Description of the Equipment under Test (EUT)

3.1 General Description

HUAWEI Base Station DBS3900 LTE is a distributed eNodeB with 3GPP LTE FDD protocols. The eDBS3900 LTE supports CPRI interfaces and contains BBU and RRU two parts:

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

RRU3201 (Band 7) is the outdoor radio remote unit. It can be mounted close to the antenna on a metal pole or a wall.

For RRU3201 (Band 7), the downlink frequency is 2620 MHz – 2640 MHz and the uplink frequency is 2500 MHz – 2520 MHz.

RRU3201 (Band 7) has a highly integrated structure. The components of RRU3201 are describes as follows:

1. Power supply: leads the external -48 VDC power to supply power for RRU3201.
2. Duplexer: multiplexes RX signals and RX 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: amplifiers received signals to avoid loss of signals.]
4. Power amplifier: amplifiers 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.

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
RRU3201	V100R001	Distributed Base Station Remote Radio Unit

3.2.2 Sub-Assembly

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

3.3 Technical Description

3.3.1 Supported Frequency Range

Characteristics	Description
Downlink	2620 to 2640 MHz
Uplink	2500 to 2520 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	1
TX Output Power (per Antenna Port)	40 W
Channel Spacing(s) / Bandwidth(s)	LTE system: 5 MHz, 10 MHz, 15 MHz, 20 MHz
Designation of Emissions	LTE system: 4M47D9W, 8M92D9W, 13M4D9W, 17M8D9W

3.3.3 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: $\approx$ -48 V DC Voltage Range: $\approx$ -38.4 V to -57 V

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 1.2	LTE system, 3GPP TS 36.141, clause 6.1.1, E-TM 1.2

4.2 RF Channels under Test

TX / RX	Carrier Conf. (NOTE)	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TX	5M(40W)	2622.5 MHz(2775)	2630 MHz(2850)	2637.5 MHz(2925)
	10M(40W)	2625 MHz(2800)	2630 MHz(2850)	2635 MHz(2900)
	15M(40W)	2627.5 MHz(2825)	2630 MHz(2850)	2632.5 MHz(2875)
	20M(40W)	2630 MHz(2850)	= B	= B
RX	5M(40W)	2502.5 MHz(20775)	2510 MHz(20850)	2517.5 MHz(20925)
	20M(40W)	2510 MHz(20850)	= B	= B
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	---

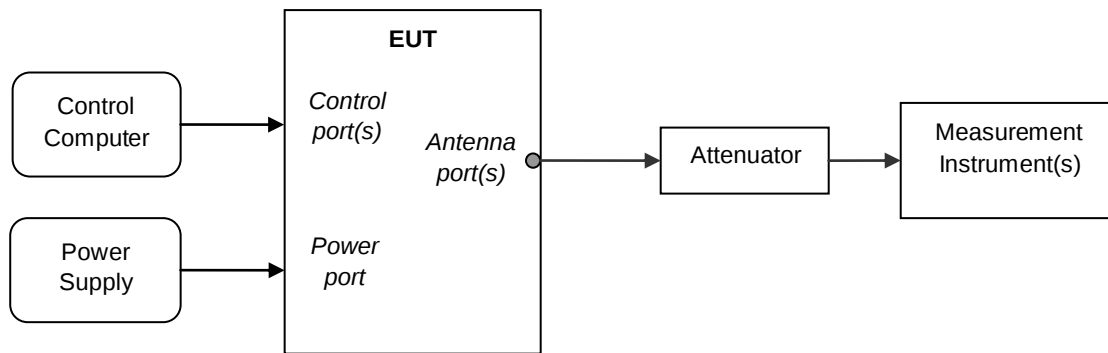
4.4 Test Setups

NOTE: See Appendix I for practical Test Setup Photos.

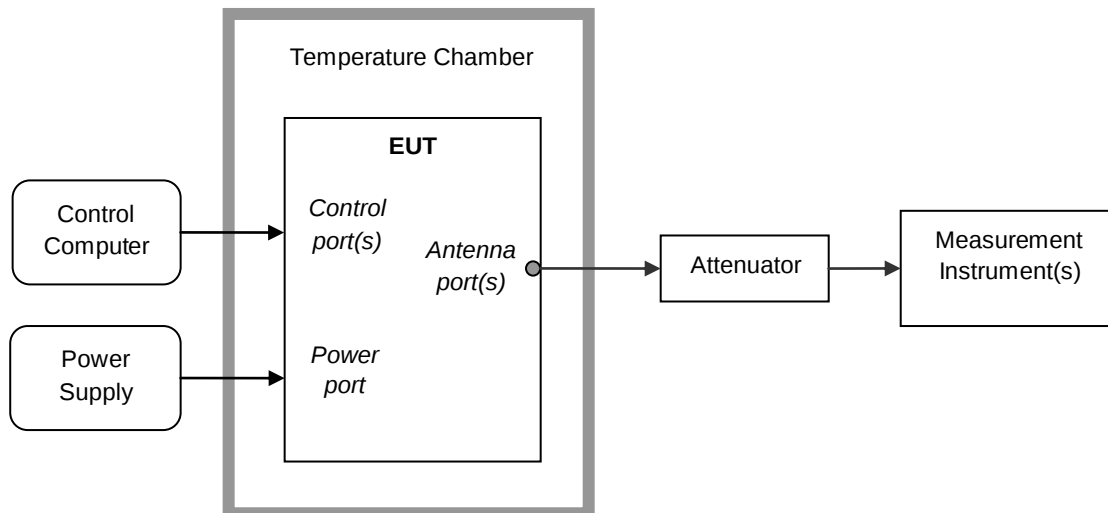
4.4.1 General Test Setup Configurations

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



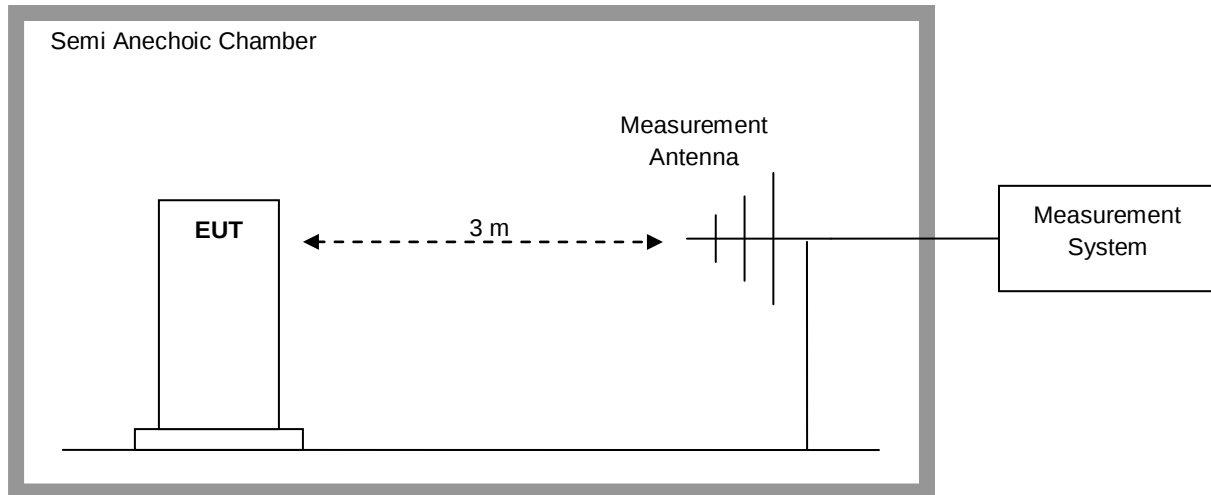
4.4.3 Test Setup 2



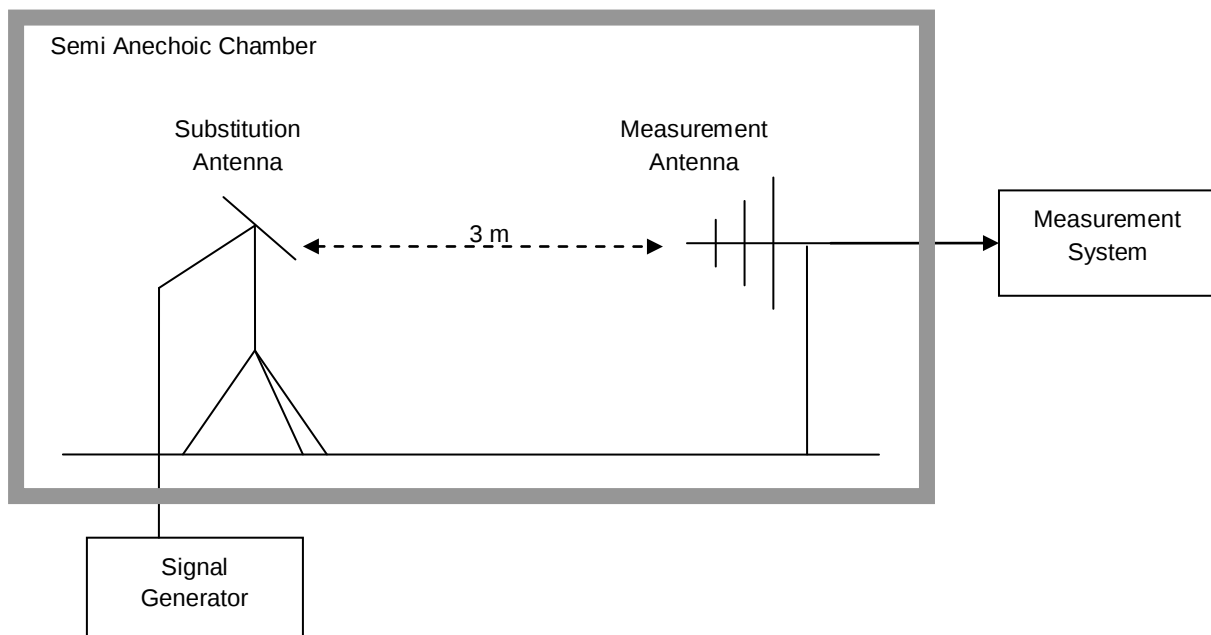
4.4.4 Test Setup 3

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.	5M(40W), 10M(40W), 15M(40W), 20M(40W)
	RF Channels (TX)	B, M, T
	Test Mode	E-TM 1.1
Modulation Characteristics	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	5M(40W)
	RF Channels (TX)	M
	Test Mode	E-TM 1.1
Occupied Bandwidth	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	5M(40W), 10M(40W), 15M(40W), 20M(40W)
	RF Channels (TX)	B, M, T
	Test Mode	E-TM 1.1
Band Edges Compliance	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 1
	Carrier Conf.	5M(40W), 20M(40W)
	RF Channels (TX)	FCC requirements: B, T IC requirements: B, M, T
	Test Mode	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.	5M(40W), 20M(40W)
	RF Channels (TX)	B, T
	Test Mode	E-TM 1.1
Field Strength of Spurious Radiation	Test Configuration	Ambient Climate & Rated Voltage
	Test Setup	Test Seup 3
	Carrier Conf.	5M(40W)
	RF Channels (TX)	M
	Test Mode	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.	20M(40W)
	RF Channels (TX)	M
	Test Mode	E-TM 1.1 NOTE: An arbitrary test mode is selected as a representative



Test Case	Test Conditions	
		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.	5M(40W), 20M(40W)
	RF Channels (TX/RX)	M
	Test Mode	E-TM 1.1



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	2012-10-19
Spectrum Analyzer	Agilent	E4440A	MY49420179	2012-05-12
Temperature Chamber	ESPEC	EW2465	05175004	2012-07-25
Power Supply	KIKUSUI	PVS 100-28	FG000012	2012-10-14
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	---
EMI Test receiver	R&S	ESU	100144	2012-05-12
Broadband Antenna	SCHAFFNER	CBL6112D	25221	2012-04-08
Horn Antenna	R&S	HF906	359287/005	2012-05-07



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