

RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3252

Report Number: SYBH(R)00810858EB-1

FCC ID: QISRRU3252B41

IC ID: 6369A-RRU3252

Reliability Laboratory of Huawei Technologies Co., Ltd.

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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 recognition numbers of test site are 6369A-1 and 6369A-3.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-2364, G-415, C-2583, and T-256, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
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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: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Remote Radio Unit
Product Model: RRU3252
Version: V321R001

Date of Receipt Sample: 2012-12-21
Start Date of Test: 2012-12-24
End Date of Test: 2013-01-08

Test Result: Pass

Approved by Senior Engineer:	2013-01-17	Zhang Xinghai	 <i>Zhang Xing Hai</i>
	Date	Name	Signature

Prepared by:	2013-01-17	Liang Changguan	<i>Liang Changguan</i>
	Date	Name	Signature



Modification Record

No.	Last Report No.	Modification Description
1	---	First report.



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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 02 (10-1-11 Edition)
47 CFR FCC Part 27 (10-1-11 Edition)
IC RSS-Gen (Issue 3, December 2010)
IC RSS-199 (Issue 1, January 2010)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v01
FCC KDB 662911 D01 Multiple Transmitter Output v01

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature: 20 to 25 °C
Ambient Relative Humidity: 45 to 65 %
Atmospheric Pressure: Not applicable

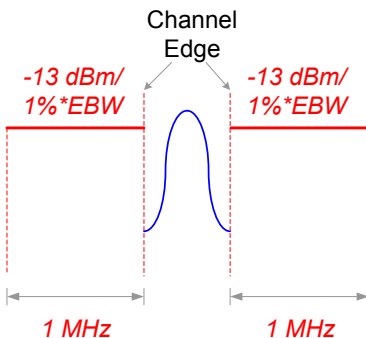
2 Test Summary

2.1 BRS&EBS Band (2496-2690 MHz)

2.1.1 Non-measurement Technical Requirements

Description	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE)
Modulation Characteristics	§2.1047	RSS-199, §4.1	Digital modulation.	See technical specification description.	Comply
Channel Bandwidth	---	RSS-199, §4.2	ChBW ≥ 1 MHz.	See technical specification description.	Comply
NOTE: For the verdict, the "N/A" denotes "not applicable".					

2.1.2 Base Station

Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
RF Power Output	§2.1046, §27.50(h)	RSS-Gen, §4.8; RSS-199, §4.4	FCC: EIRP ≤ 33 dBW + 10 lg(X/Y) dBW + 10 lg(360/beamwidth) dBW. IC: EIRP ≤ 33.3 W/100 kHz.	Appendix A	Pass
Bandwidth	§2.1049,	RSS-Gen, §4.6	OBW: No limit.	Appendix B	Pass
Band Edges Compliance	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2	FCC:  IC:	Appendix C	Pass



Test Item	FCC Rule No.	IC Rule No.	Requirements	Test Result	Verdict (NOTE 2)
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2		Appendix D	Pass
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5		Appendix E	Pass
Frequency Stability	§2.1055, §27.54	RSS-Gen, §4.7; RSS-199, §4.3	Within authorized bands of operation/frequency block.	Appendix F	Pass
Receiver Spurious Emissions (NOTE 1)	---	RSS-Gen, §4.10; RSS-Gen, §6; RSS-199, §4.6	Radiated limit: RSS-Gen, §6.1 field strength limit. Conducted limit: ≤ -57 dBm/120 kHz (CISPR-QP), from 30 MHz to 1000 MHz, and ≤ -53 dBm/1 MHz (AV), from 1 GHz to 3 rd harmonics.	Appendix G	Pass
Photos of Test Setups	---	---	---	Appendix H	---
NOTE 1: For Receiver Spurious Emissions, If the receiver has a detachable antenna of known impedance, antenna conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method is recommended. The antenna conducted test shall be performed with the antenna disconnected and the receiver antenna terminals connected to a measuring instrument having equal impedance to that specified for the antenna. NOTE 2: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					



3 Description of the Equipment under Test (EUT)

3.1 General Description

The DBS3900 TDLTE, a future-oriented E-UTRAN NodeB (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 RRU3252 is a type of radio remote unit. 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	Description
WD5BPHX42X0	RF Signal transmission
WD5BPHP42X0	DC Power Supply
WD5BPHA4190	Power Amplification of 2.5G
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3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
BBU3900	BBU3900	Huawei	Baseband Unit
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3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio Access ☐ GSM Technology ☐ UMTS (Single-RAT): ☒ LTE ☐ CDMA ☐ WiMAX Multi-Standard Radio ☐ GSM & UMTS (MSR): ☐ GSM & LTE ☐ GSM & UMTS & LTE ☐ WiMAX & LTE ☐ CDMA & LTE
Equipment Type	☒ Base Station, ☐ Subscriber Station, ☐ Fixed Station, ☐ Mobile Station, ☐ Portable Station
Supported Frequency Range	Transmission (TX): 2496 to 2690 MHz for FCC certification 2500 to 2690 MHz for IC certification Receiving (RX): 2496 to 2690 MHz for FCC certification 2500 to 2690 MHz for IC certification
TX and RX Antenna Ports	TX & RX port: 4 TX-only port: 0 RX-only port: 0
Multiple Carrier Supported	3
Maximum RF Bandwidth	40 MHz
TX Output Power	Max. 20 W (per antenna port) Max. 80 W (four antenna ports)
Supported Channel Bandwidth	GSM system: ☐ 200 kHz UMTS system: ☐ 5 MHz LTE system: ☐ 1.4 MHz, ☐ 3 MHz, ☒ 5 MHz, ☒ 10 MHz, ☐ 15 MHz, ☒ 20 MHz CDMA system: ☐ 1.23 MHz, ☐ 1.25 MHz WiMAX system: ☐ 5 MHz, ☐ 7 MHz, ☐ 10 MHz
Modulation Type	LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA
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: 5M00D9W, 10M0D9W, 20M0D9W
Power Supply	Power Supply Type: ☐ External AC mains, ☒ External DC mains,



Characteristics	Description
	☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE) Nominal Voltage, -48 VDC Input to EUT: Voltage Range, -36 to -57 VDC Input to EUT:
Antenna Assemblies	Antenna Type: ☒ External ☐ Integrated Smart Antenna: ☒ MIMO ☐ Non MIMO Antenna Gain: 18 dBi (per antenna port, max.) Remark: When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above, and if exceed, the combination of the practical output power and the practical antenna gain should NOT exceed the required ERP/EIRP limit.



4 General Test Conditions / Configurations

4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
LTE/TM1.1	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.1
LTE/TM1.2	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 1.2

4.2 EUT Configurations

4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, - All TX tests are ONLY performed at the main TX antenna port (e.g. TRXA, TXA or similar) of the EUT, and - All RX tests are ONLY performed at the main RX antenna port (e.g. TRXA, RXB or similar) 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.

4.2.2 Customized Configurations

NOTE: For the carrier configurations, the description of “n*TxxxM(yyyW)@zzz” 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, at the antenna port zzz (if specified). While the combinations of several “n*TxxxM(yyyW)@zzz”s denotes the carrier configurations of the MSR system.

EUT Conf.	RF Ch.	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1	B1(FCC)	1L(2.5W)	2498.5	2498.5	5	34	TM1.1
2	B2(IC)	1L(2.5W)	2502.5	2502.5	5	34	TM1.1
3	M	1L(2.5W)	2593	2593	5	34	TM1.1
4	T	1L(2.5W)	2687.5	2687.5	5	34	TM1.1
5	B1(FCC)	1L(5W)	2501	2501	10	37	TM1.1
6	B2(IC)	1L(5W)	2505	2505	10	37	TM1.1
7	M	1L(5W)	2593	2593	10	37	TM1.1
8	T	1L(5W)	2685	2685	10	37	TM1.1
9	B1(FCC)	1L(10W)	2506	2506	20	40	TM1.1
10	B2(IC)	1L(10W)	2510	2510	20	40	TM1.1
11	M	1L(10W)	2593	2593	20	40	TM1.1
12	T	1L(10W)	2680	2680	20	40	TM1.1
13	B1(FCC)	2L(6.7W+13.3W)	2501+2516	2501+2516	10+20	38.2+41.2	TM1.1
14	B2(IC)	2L(6.7W+13.3W)	2505+2520	2505+2520	10+20	38.2+41.2	TM1.1
15	M	2L(6.7W+13.3W)	2583+2598	2583+2598	10+20	38.2+41.2	TM1.1
16	T	2L(6.7W+13.3W)	2665+2680	2665+2680	10+20	38.2+41.2	TM1.1
17	B1(FCC)	2L(16W+4W)	2506+2518.5	2506+2518.5	20+5	42+36	TM1.1



EUT Conf.	RF Ch.	Carrier Conf. Description	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
18	B2(IC)	2L(16W+ 4W)	2510+2522.5	2510+2522.5	20+5	42+36	TM1.1
19	M	2L(16W+ 4W)	2590.5+2603	2590.5+2603	20+5	42+36	TM1.1
20	T	2L(16W+ 4W)	2675+2687.5	2675+2687.5	20+5	42+36	TM1.1
21	B1(FCC)	2L(10W+10W)	2506+2526	2506+2526	20+20	40+40	TM1.1
22	B2(IC)	2L(10W+10W)	2510+2530	2510+2530	20+20	40+40	TM1.1
23	M	2L(10W+10W)	2583+2603	2583+2603	20+20	40+40	TM1.1
24	T	2L(10W+10W)	2660+2680	2660+2680	20+20	40+40	TM1.1
25	B1(FCC)	3L(5W+5W+10W)	2501+2511+2526	2501+2511+2526	10+10+20	37+37+40	TM1.1
26	B2(IC)	3L(5W+5W+10W)	2505+2515+2530	2505+2515+2530	10+10+20	37+37+40	TM1.1
27	M	3L(5W+5W+10W)	2578+2588+2603	2578+2588+2603	10+10+20	37+37+40	TM1.1
28	T	3L(5W+5W+10W)	2555+2665+2680	2555+2665+2680	10+10+20	37+37+40	TM1.1

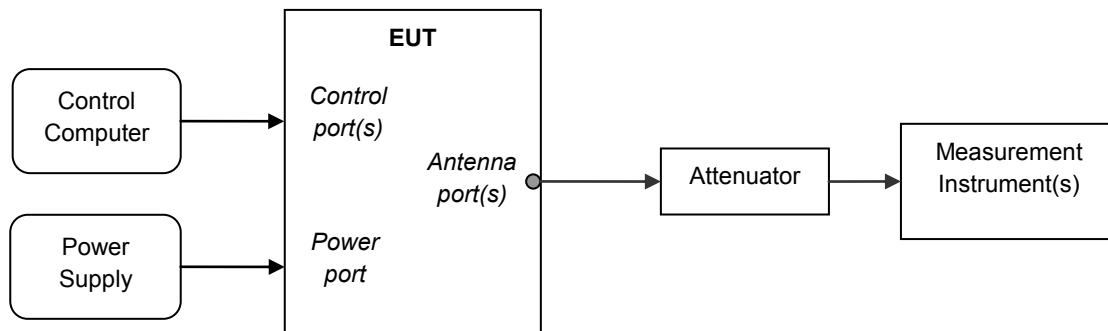


4.3 Test Environments

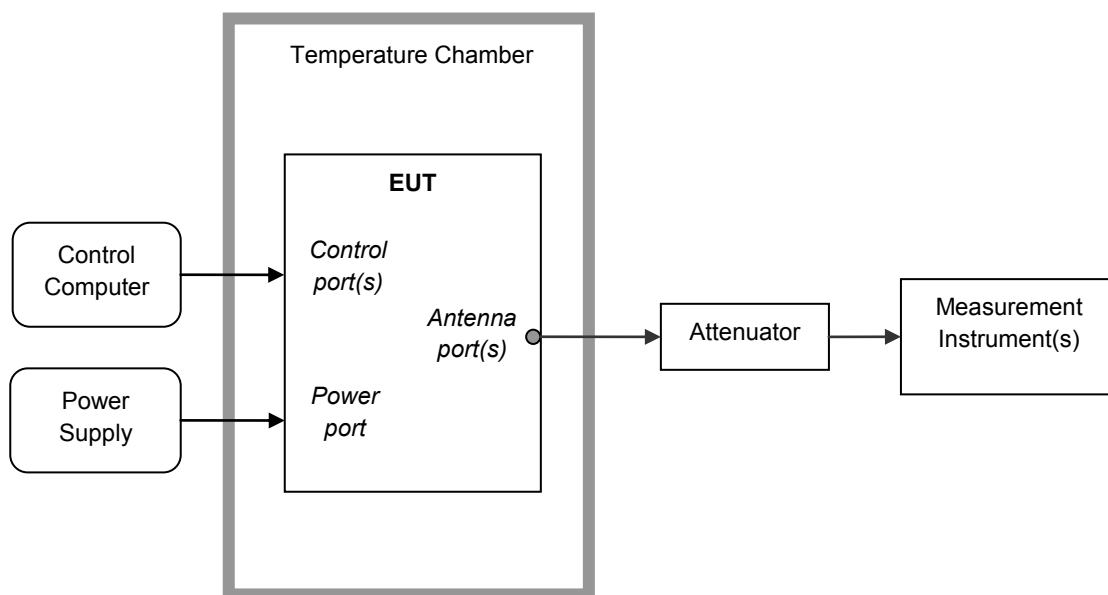
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



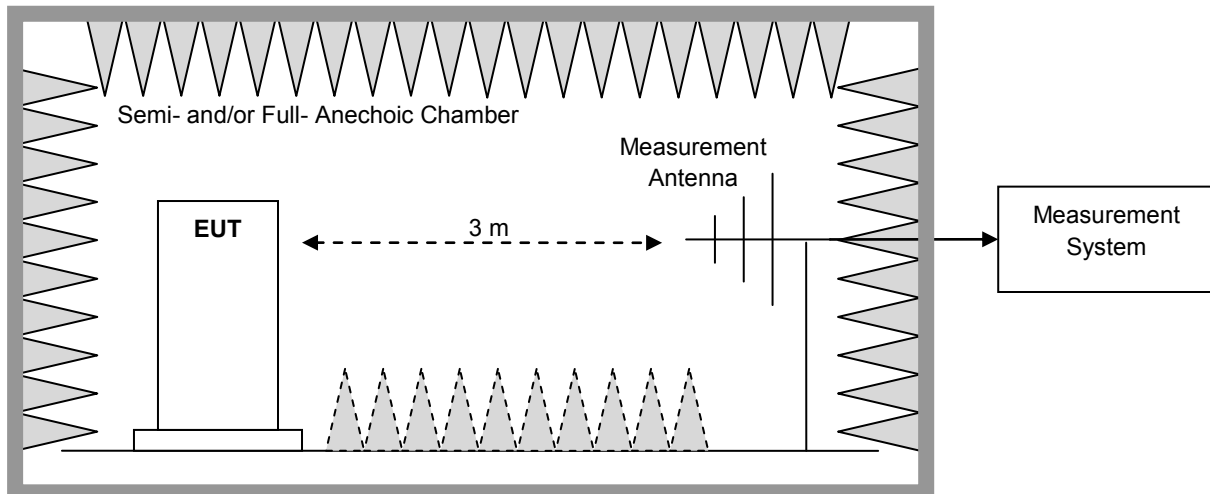
4.4.2 Test Setup 2



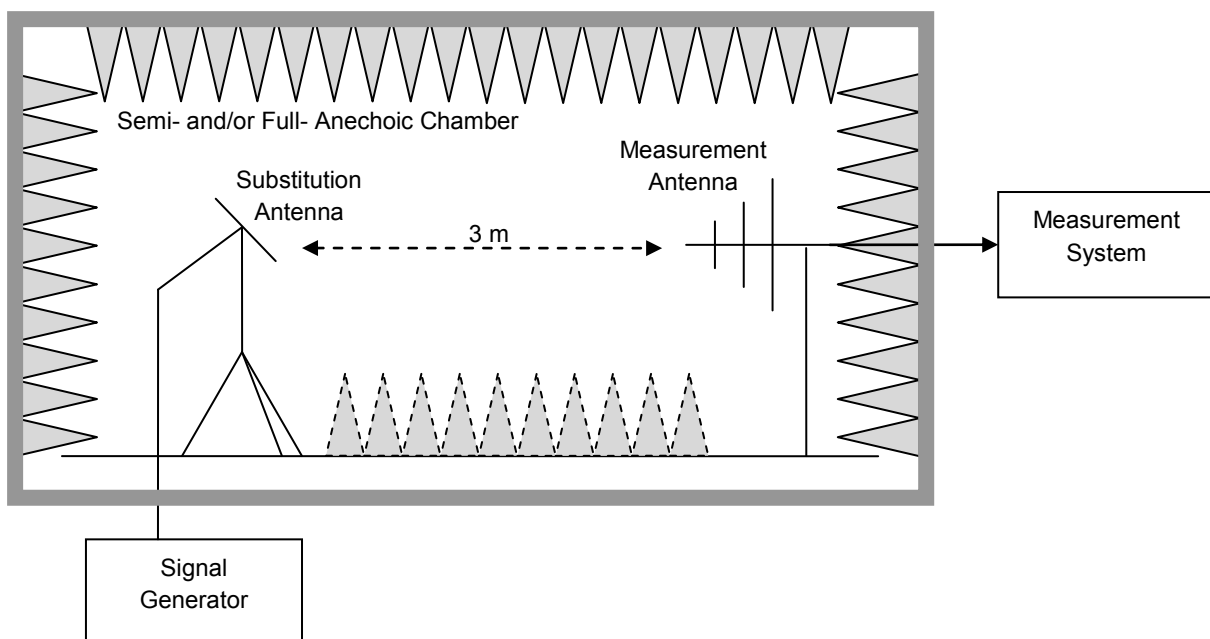
4.4.3 Test Setup 3

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

4.4.3.1 Step 1: Pre-test



4.4.3.2 Step 2: Substitution method to verify the maximum ERP



4.5 Test Conditions

Test Case		Test Conditions	
Transmitter Output Power	Average Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1 to EUT Conf. 28
	Average Power, Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 2&3&4&6&7&8&10&11&12&26&27&28
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1 to EUT Conf. 12
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1&2&4&5&6&8&9&10&12&13&14&16&17&18&20&21&22&24&25&26&28
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1 to EUT Conf. 12 and EUT Conf. 25 to EUT Conf. 28
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	EUT Conf. 11(Worst Conf.) NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.
Frequency Stability		Test Env.	(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
		EUT Conf.	EUT Conf. 3& EUT Conf. 11 NOTE: A representative EUT configuration was selected since the un-modulation carrier configuration was required by the standards/rules.
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 3& EUT Conf. 11



5 Main Test Instruments

NOTE: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
Test Setup 1 & 2				
Spectrum Analyzer	Agilent	N9030A	MY49431033	2013-05-03
Signal Generator	Agilent	E8257D	MY49281095	2013-09-02
Temperature Chamber	ACS	CH1500C	11006	2013-03-27
Power Supply	Chroma	62012P-80-60	62012PD01403	2013-10-16
Test Setup 3				
EMI Test receiver	R&S	ESU26	100329	2013-11-26
EMI test receiver	R&S	ESU40	100144	2013-05-13
Bilog antenna	TESEQ	CBL6112D	30994	2014-3-23
Bilog antenna	TESEQ	CBL6112D	30995	2014-3-23
Horn antenna	R&S	HF907	100175	2014-4-20
Horn antenna	R&S	HF906	359287/005	2014-3-23



6 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
RF Power Output	Power [dBm]	U = 0.39 dB
Bandwidth	Magnitude [%]	U = 0.2%
Band Edge Compliance	Disturbance Power [dBm]	U = 2.0 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	U = 2.0 dB
Field Strength of Spurious Radiation	ERP [dBm]	For 3 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz) For 10 m Chamber: U = 4.6 dB (30 MHz to 1GHz) U = 3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy [ppm]	U = 0.21 ppm

END