

RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3269 700M

Report Number: SYBH(R)01599774EB-1

FCC ID: QISRRU3269700M

IC: 6369A-RRU3269700M

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

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 recognition number for the test site located in Shenzhen is 97456.
 - The recognition number for the test site located in Shanghai is 684868.
 - The recognition number for the test site located in Chengdu is 216797.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements.
 - The recognition number for the test site located in Shenzhen is 6369A, which contains 6369A-1 (3m chamber in G2), 6369A-2 (3m chamber in K3) and 6369A-3 (10m chamber in K3).
 - The recognition numbers for the test site located in Shanghai is 6369D, which contains 6369D-1 (3m chamber) and 6369D-2 (10m chamber).
 - The recognition number for the test site located in Chengdu is 6369E-1.
5. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. The test report is only valid for the test samples.
8. 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: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
 Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Remote Radio Unit
Product Model: RRU3269 700M

Date of Receipt Sample: 2014-10-30
Start Date of Test: 2014-11-12
End Date of Test: 2014-11-19

Test Result: Pass

Approved by Senior Engineer:	2014-12-03	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2014-12-03	Li Guo	<i>Li Guo</i>
	Date	Name	Signature



Modification Record

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



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
2.1	MBS 700 MHz Lower Band (698-746 MHz)	7
2.2	MBS 700 MHz Upper Band (746-806 MHz)	11
3	Description of the Equipment under Test (EUT)	17
3.1	General Description	17
3.2	EUT Identity	17
3.3	Technical Specification	18
4	General Test Conditions / Configurations	20
4.1	Test Modes	20
4.2	EUT Configurations	21
4.3	Test Environments	22
4.4	Test Setups	23
4.5	Test Conditions	25
5	Main Test Instruments	27
6	Measurement Uncertainty	28



1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2 (10-1-13 Edition)
47 CFR FCC Part 27 (10-1-13 Edition)

IC RSS-Gen (Issue 3, December 2010)
IC RSS-130 (Issue 1, October 2013)

Test Method: FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

1.2 Test Location

Test Location 1 (TL1): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Test Location 2 (TL2): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.2222, Xin Jinqiao Road, Pudong New Area, Shanghai, 201206, P.R.C

Test Location 3 (TL3): Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: No.1899 Xiyuan Avenue, Hi-tech Western District, Chengdu, 611731, P.R.C

1.3 Test Environment Condition

Temperature: 15 to 30 °C (Ambient)
Relative Humidity: 20 to 85 % (Ambient)
Atmospheric Pressure: Not applicable

2 Test Summary

2.1 MBS 700 MHz Lower Band (698-746 MHz)

2.1.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	§2.1046, §27.50(c)	RSS-Gen,§4.8; RSS-130,§4.4	FCC	Fixed Station / Base Station	<ul style="list-style-type: none"> Average ERP Power ≤ 1000 W (for EBW ≤ 1 MHz). Average ERP PD ≤ 1000 W/MHz (for EBW > 1 MHz). 	Annex A	Pass	TL1
				Control Station / Mobile Station	Average ERP Power ≤ 30 W.			
				Portable Station	Average ERP Power ≤ 3 W.			
			IC	Fixed Station / Base Station	<ul style="list-style-type: none"> 716-746MHz (block D, E, A+, B+, C+): Average EIRP Power ≤ 1640 W (for ChBW ≤ 1 MHz). 716-746MHz (block D,E,A+,B+,C+): Average EIRP PD ≤ 1640 W/MHz (for ChBW > 1 MHz). PAPR ≤ 13 dB@0.1%. 			
				Mobile Station / Fixed Subscriber Station - outdoor	<ul style="list-style-type: none"> 698-716MHz (block A-, B-, C-): Average EIRP Power ≤ 50 W. PAPR ≤ 13 dB@0.1%. 			
				Portable Station / Fixed Subscriber Station - indoor	<ul style="list-style-type: none"> 698-716MHz (block A-, B-, C-): Average EIRP Power ≤ 5 W. PAPR ≤ 13 dB@0.1%. 			



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
Bandwidth	§2.1049	RSS-Gen,§4.6	FCC <ul style="list-style-type: none"> ● OBW: No limit. ● EBW: No limit. 	Annex B	Pass	TL1
			IC <ul style="list-style-type: none"> ● OBW: No limit. 			
Band Edges Compliance	§2.1051, §27.53(g)	RSS-Gen,§4.9; RSS-130,§4.6	≤ -13 dBm/30 kHz, in 100 kHz bands immediately outside and adjacent to the frequency blocks.	Annex C	Pass	TL1
Spurious Emission at Antenna Terminals	§2.1051, §27.53(g)	RSS-Gen,§4.9; RSS-130,§4.6	≤ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Annex D	Pass	TL1
Field Strength of Spurious Radiation	§2.1053, §27.53(g)	RSS-Gen,§4.9; RSS-130,§4.6	≤ -13 dBm/100 kHz.	Annex E	Pass	TL3
Frequency Stability	§2.1055, §27.54	RSS-Gen,§4.7; RSS-130,§4.3	FCC <ul style="list-style-type: none"> ● Test method: Fundamental emissions (Fc_meas) within the authorized bands of operation. ● Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV. 	Annex F	Pass	TL1
			IC <ul style="list-style-type: none"> ● Step 1: f(offset): no limit. ● Step 2: fL – f(offset) > Operating Band Left Edge, fH + f(offset) < Operating Band Right Edge. 			

Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			<ul style="list-style-type: none"> ● Test conditions for Step 1: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. ● Test conditions for Step 2: NTV. 			
Receiver Spurious Emissions (Note 1, 2)	---	RSS-Gen,§4.10; RSS-Gen,§6	<ul style="list-style-type: none"> ● 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 3rd harmonics. 	Annex G	---	---
<p>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.</p> <p>Note 2: According to IC NOTICE 2012-DRS0126, only radio communication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to IC requirements. All other receivers are excluded from any IC certification, testing, labelling and reporting requirements.</p>						

2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§27.5(c)	RSS-130,§4.2	698-746 MHz:	See technical specification description.	Comply



Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict																								
			<table border="1"> <thead> <tr> <th>Block</th> <th>Total Spectrum</th> <th>Lower Sub-band</th> <th>Upper Sub-band</th> </tr> </thead> <tbody> <tr> <td>Paired Block A</td> <td>12 MHz</td> <td>698-704 MHz</td> <td>728-734 MHz</td> </tr> <tr> <td>Paired Block B</td> <td>12 MHz</td> <td>704-710 MHz</td> <td>734-740 MHz</td> </tr> <tr> <td>Paired Block C</td> <td>12 MHz</td> <td>710-716 MHz</td> <td>740-746 MHz</td> </tr> <tr> <td>Unpaired Block D</td> <td>6 MHz</td> <td>716-722 MHz</td> <td>-</td> </tr> <tr> <td>Unpaired Block E</td> <td>6 MHz</td> <td>722-728 MHz</td> <td>-</td> </tr> </tbody> </table>	Block	Total Spectrum	Lower Sub-band	Upper Sub-band	Paired Block A	12 MHz	698-704 MHz	728-734 MHz	Paired Block B	12 MHz	704-710 MHz	734-740 MHz	Paired Block C	12 MHz	710-716 MHz	740-746 MHz	Unpaired Block D	6 MHz	716-722 MHz	-	Unpaired Block E	6 MHz	722-728 MHz	-		
Block	Total Spectrum	Lower Sub-band	Upper Sub-band																										
Paired Block A	12 MHz	698-704 MHz	728-734 MHz																										
Paired Block B	12 MHz	704-710 MHz	734-740 MHz																										
Paired Block C	12 MHz	710-716 MHz	740-746 MHz																										
Unpaired Block D	6 MHz	716-722 MHz	-																										
Unpaired Block E	6 MHz	722-728 MHz	-																										
Modulation Characteristics	§2.1047	RSS-130,§4.1	Digital modulation.	See technical specification description.	Comply																								
Equipment with Multiple Antennas	---	RSS-130,§4.5	Multiple Antennas EIRP: (1) Correlated transmission: Aggregate power + Gmax + 10 log10 N; (2) Uncorrelated transmission: Aggregate power + Gmax.	Considered during "Transmitter Output Power" test.	Comply																								

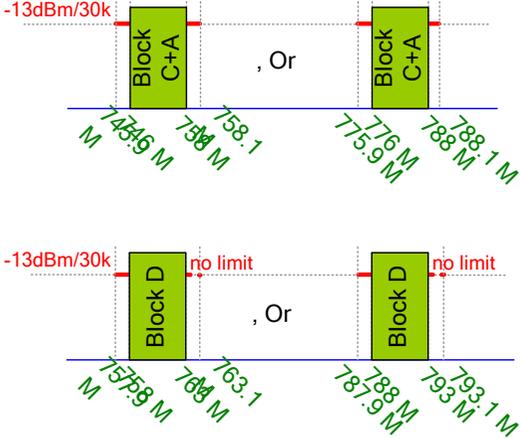
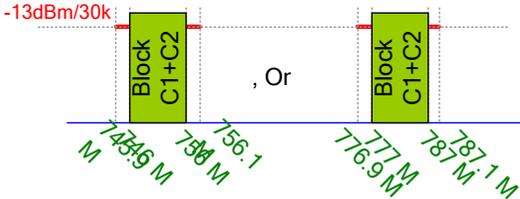


2.2 MBS 700 MHz Upper Band (746-806 MHz)

2.2.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements			Test Result	Verdict	Test Location
Transmitter Output Power	§2.1046, §27.50(b)	RSS-Gen,§4.8; RSS-130,§4.4	FCC	Fixed Station / Base Station	<ul style="list-style-type: none"> 746-757MHz, 758-763MHz, 776-787MHz and 788-793MHz (block C-, D-, C+, D+): Average ERP Power ≤ 1000 W (for EBW ≤ 1 MHz). 746-757MHz, 758-763MHz, 776-787MHz and 788-793MHz (block C-, D-, C+, D+): Average ERP PD ≤ 1000 W/MHz (for EBW > 1 MHz). 	Annex A	Pass	TL1
				Control Station / Mobile Station	746-757MHz, 758-763MHz, and 776-793MHz (block C-, D-, C+&A+&D+): Average ERP Power ≤ 30 W.			
				Portable Station	746-757MHz, 758-763MHz, and 776-793MHz (block C-, D-, C+&A+&D+): Average ERP Power ≤ 3 W.			
			IC	Fixed Station / Base Station	<ul style="list-style-type: none"> 746-756MHz (block C1-&C2-): Average EIRP Power ≤ 1640 W (for ChBW ≤ 1 MHz). 746-756MHz (block C1-&C2-): Average EIRP PD ≤ 1640 W/MHz (for ChBW > 1 MHz). PAPR ≤ 13 dB@0.1%. 			
			Mobile Station /	<ul style="list-style-type: none"> 777-787MHz (block C1+&C2+): 				



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			Fixed Subscriber Station - outdoor Average EIRP Power ≤ 50 W. ● PAPR ≤ 13 dB@0.1%. Portable Station / Fixed Subscriber Station - indoor Average EIRP Power ≤ 5 W. ● PAPR ≤ 13 dB@0.1%.			
Bandwidth	§2.1049	RSS-Gen,§4.6	FCC ● OBW: No limit. ● EBW: No limit. IC OBW: No limit.	Annex B	Pass	TL1
Band Edges Compliance	§2.1051, §27.53(c), §27.53(d), §27.53(f)	RSS-Gen,§4.9; RSS-130,§4.6	FCC  IC 	Annex C	Pass	TL1



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location	
Spurious Emission at Antenna Terminals	§2.1051, §27.53(c), §27.53(d), §27.53(f)	RSS-Gen, §4.9; RSS-130, §4.6	FCC Fixed Station / Base Station	<p>(1559-1610 EIRP: TX with antenna)</p>	Annex D	Pass	TL1
			Mobile Station / Portable Station	<p>(1559-1610 EIRP: TX with antenna)</p>			



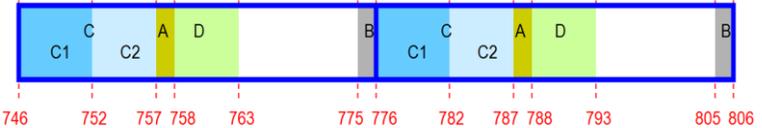
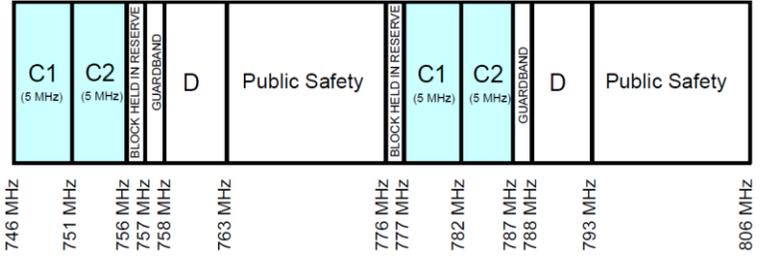
Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location	
			IC Fixed Station / Base Station (1559-1610 EIRP: TX with antenna)				
			Mobile Station / Portable Station (1559-1610 EIRP: TX with antenna)				
Field Strength of Spurious Radiation	§2.1051, §27.53(c), §27.53(d), §27.53(f)	RSS-Gen, §4.9; RSS-130, §4.6	≤ -13 dBm/100 kHz.	Annex E	Pass	TL3	
Frequency Stability	§2.1055, §27.54	RSS-Gen, §4.7; RSS-130, §4.3	FCC	<ul style="list-style-type: none"> ● Test method: Fundamental emissions (Fc_meas) within the authorized bands of operation. ● Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT, ±15%*NV. 	Annex F	Pass	TL1
			IC	<ul style="list-style-type: none"> ● Step 1: f(offset): no limit. ● Step 2: fL – f(offset) > Operating Band Left Edge, fH + f(offset) < Operating Band Right Edge. 			

Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			<ul style="list-style-type: none"> ● Test conditions for Step 1: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. ● Test conditions for Step 2: NTV. 			
Receiver Spurious Emissions (Note 1, 2)	---	RSS-Gen,§4.10; RSS-Gen,§6	<ul style="list-style-type: none"> ● 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 3rd harmonics. 	Annex G	Pass, ---	TL1, ---
<p>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.</p> <p>Note 2: According to IC NOTICE 2012-DRS0126, only radio communication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to IC requirements. All other receivers are excluded from any IC certification, testing, labelling and reporting requirements.</p>						

2.2.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§27.5(b),	RSS-130,§4.2	FCC 746-763 MHz, and 776-793 MHz:	See technical	Comply



Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
	§27.2(b)		 <p>(Block B - can not employ a cellular system architecture)</p>	specification description.	
		IC	<p>746-756 MHz, and 777-787 MHz:</p> 		
Modulation Characteristics	§2.1047	RSS-130,§4.1	Digital modulation.	See technical specification description.	Comply
Equipment with Multiple Antennas	---	RSS-130,§4.5	Multiple Antennas EIRP: (1) Correlated transmission: Aggregate power + Gmax + 10 log10 N; (2) Uncorrelated transmission: Aggregate power + Gmax.	Considered during "Transmitter Output Power" test.	Comply



3 Description of the Equipment under Test (EUT)

3.1 General Description

The RRU3269 700M is an outdoor remote radio unit. It is the RF part of a distributed base station, powered by a power cabinet, and can be located near the antenna. The RRU3269 700M performs modulation, demodulation, data processing, and combination and division of baseband signals and RF 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
WD5ALRXCSGT	VER.A	MARP RRU,WD5ALRXCSGT,Transceiver Board

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
LMPTb	--	huawei	LTE Main Processing & Transmission Unit
LBBPb	--	huawei	LTE baseband Processing Unit



3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio <input type="checkbox"/> GSM Access Technology <input type="checkbox"/> UMTS (Single-RAT): <input checked="" type="checkbox"/> LTE <input type="checkbox"/> CDMA <input type="checkbox"/> WiMAX Multi-Standard <input type="checkbox"/> GSM & UMTS Radio <input type="checkbox"/> GSM & LTE (MSR): <input type="checkbox"/> GSM & UMTS & LTE <input type="checkbox"/> WiMAX & LTE <input type="checkbox"/> CDMA & LTE
Equipment Type	#1 <input checked="" type="checkbox"/> Base Station <input type="checkbox"/> CPE (Customer Premises Equipment) Station <input type="checkbox"/> Subscriber Station (User Equipment) #2 <input checked="" type="checkbox"/> Fixed Station <input type="checkbox"/> Mobile Station <input type="checkbox"/> Portable Station #3 <input type="checkbox"/> Indoor Station <input checked="" type="checkbox"/> Outdoor Station
Supported Frequency Range	Transmission (TX): 718 to 728 MHz & 746 to 756 MHz Receiving (RX): --
TX and RX Antenna Ports	TX & RX port: 0 TX-only port: 2 RX-only port: 0
Multiple Carrier Supported	single carrier: 40 W (5MHz), 60 W (10MHz) 2 carriers: 30 W (5MHz) & 30 W (5MHz) 30 W (5MHz) & 30 W (10MHz) 20 W (5MHz) & 40 W (10MHz) 30 W (10MHz) & 30 W (10MHz)
Maximum RF Bandwidth	B29: 10 MHz B13: 10 MHz
TX Output Power	Max. 60 W (per antenna port) Max. 120 W (two antenna ports)
Supported Channel Bandwidth	GSM system: <input type="checkbox"/> 200 kHz UMTS system: <input type="checkbox"/> 5 MHz LTE system: <input type="checkbox"/> 1.4 MHz, <input type="checkbox"/> 3 MHz, <input checked="" type="checkbox"/> 5 MHz, <input checked="" type="checkbox"/> 10 MHz, <input type="checkbox"/> 15 MHz, <input type="checkbox"/> 20 MHz CDMA system: <input type="checkbox"/> 1.23 MHz, <input type="checkbox"/> 1.25 MHz WiMAX system: <input type="checkbox"/> 5 MHz, <input type="checkbox"/> 7 MHz, <input type="checkbox"/> 10 MHz
Modulation Type	GSM system: --



Characteristics	Description
	UMTS system: -- LTE system: Base-band: QPSK, 16QAM,64QAM Carrier: OFDM/OFDMA CDMA system: -- WiMAX system: --
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.)	GSM system: -- UMTS system: -- LTE system: 4M51D9W, 9M00D9W CDMA system: -- WiMAX system: --
Power Supply	Power Supply Type: <ul style="list-style-type: none"> <input type="checkbox"/> External AC mains, <input checked="" type="checkbox"/> External DC mains, <input type="checkbox"/> AC/DC Adapter, <input type="checkbox"/> Powered over Ethernet (PoE) Nominal Voltage, Input to EUT: -48 VDC Voltage Range, Input to EUT: -36 to -57 VDC
Antenna Assembles	Antenna Type: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> External <input type="checkbox"/> Integrated Smart Antenna: <ul style="list-style-type: none"> <input type="checkbox"/> MIMO <input checked="" type="checkbox"/> Non MIMO Antenna Gain: 17 dBi (per antenna port, max.) Remark: When the EUT is put into service, the practical maximum antenna gain may 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, <ul style="list-style-type: none"> 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
B29_1L_5M_B	B	1*L(40W)	720.5	--	5	46	TM1.1
B29_1L_5M_T	T	1*L(40W)	725.5	--	5	46	TM1.1
B13_1L_5M_B	B	1*L(40W)	748.5	--	5	46	TM1.1
B13_1L_5M_T	T	1*L(40W)	753.5	--	5	46	TM1.1
B29_1L_10M_M	M	1*L(60W)	723.0	--	10	47.8	TM1.1
B13_1L_10M_M	M	1*L(60W)	751.0	--	10	47.8	TM1.1
B29_2L_5M_M	M	2*L(30W)	720.5, 725.5	--	5, 5	44.8, 44.8	TM1.1
B13_2L_5M_M	M	2*L(30W)	748.5, 753.5	--	5, 5	44.8, 44.8	TM1.1
2L_5M+5M_M	M	2*L(30W)	720.5, 753.5	--	5, 5	44.8, 44.8	TM1.1
2L_5M+10M_M	M	2*L(30W)	720.5, 751.0	--	5, 10	44.8, 44.8	TM1.1
2L_5M+10M_M_1	M	1*L(20W) & 1*L(40W)	720.5, 751.0	--	5, 10	43.0, 46.0	TM1.1
2L_10M+10M_M	M	2*L(30W)	723.0, 751.0	--	10, 10	44.8, 44.8	TM1.1

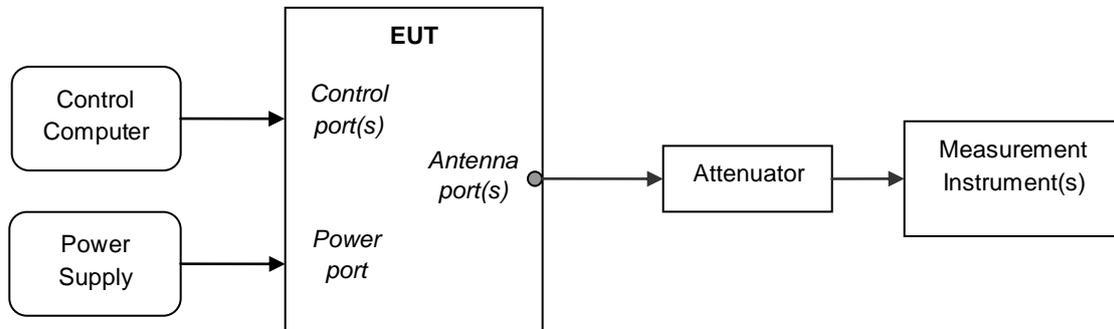


4.3 Test Environments

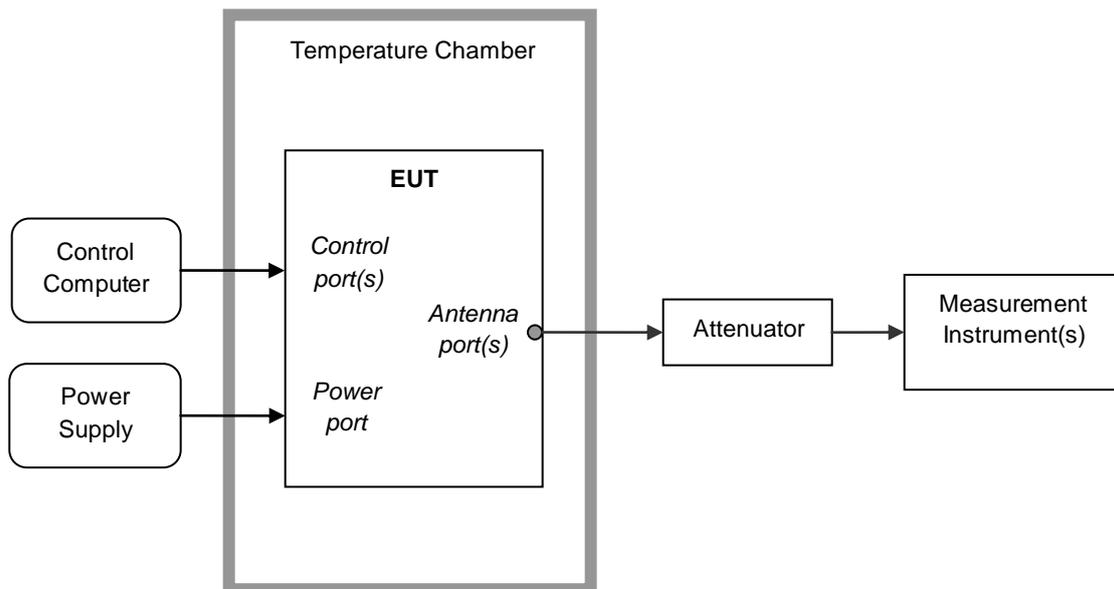
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



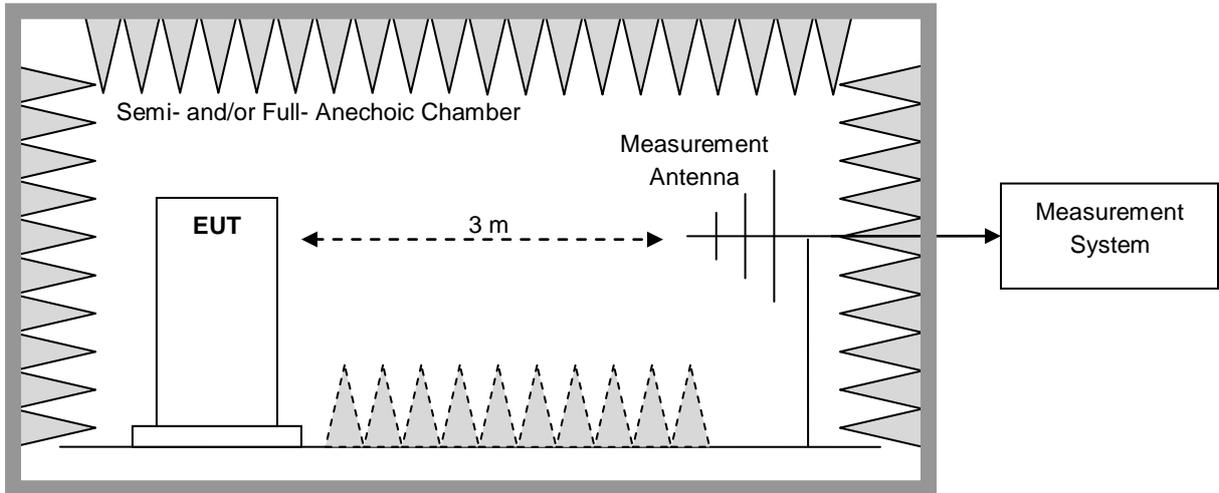
4.4.2 Test Setup 2



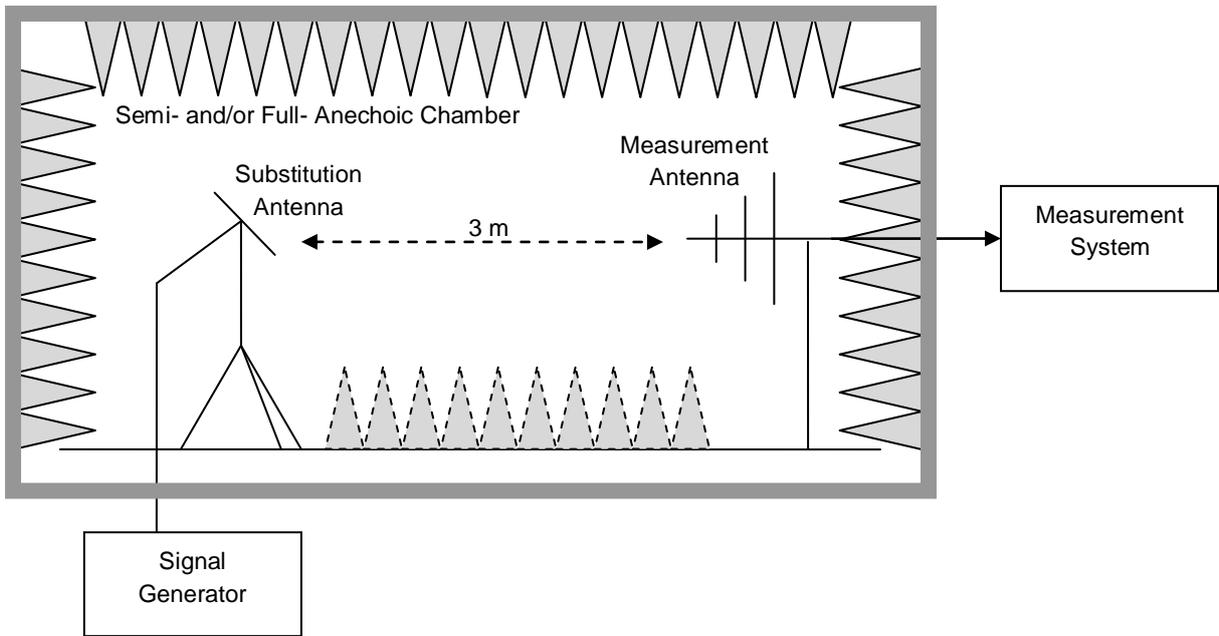
4.4.3 Test Setup 3

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	Channel Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M, B29_2L_5M_M, B13_2L_5M_M, 2L_5M+5M_M, 2L_5M+10M_M, 2L_5M+10M_M_1, 2L_10M+10M_M,
	Power Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M,
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M,
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M,
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M,
Band Edges Compliance	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 1	
	EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M, B29_2L_5M_M, B13_2L_5M_M, 2L_5M+5M_M, 2L_10M+10M_M,	
Spurious Emission at Antenna Terminals	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 1	
	EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M, B29_2L_5M_M, B13_2L_5M_M, 2L_5M+5M_M, 2L_10M+10M_M,	
Field Strength of Spurious Radiation	Test Env.	Ambient Climate & Rated Voltage	
	Test Setup	Test Seup 3	
	EUT Conf.	B29_2L_5M_M NOTE: If applicable, the EUT Conf. that has maximum power	



Test Case		Test Conditions	
			density (based on the equivalent power level) is selected.
Frequency Stability	Frequency Error	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.	B29_1L_5M_T NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules.
	Frequency Range (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 2
		EUT Conf.	B29_1L_5M_B, B29_1L_5M_T, B13_1L_5M_B, B13_1L_5M_T, B29_1L_10M_M, B13_1L_10M_M,
Receiver Spurious Emissions		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	--



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	R&S	FSQ40	100025	2015-10-27
Spectrum Analyzer	Agilent	N9020A	MY51240619	2015-02-18
Climate Chamber	ESPEC	EW0470S	12113066	2015-10-20
Test Setup 3				
EMI test receiver	Agilent	N9038A	MY52260169	2014-12-01
Spectrum analyser	Agilent	N9010A	MY52220816	2015-03-17
Bilog antenna	TESEQ	CBL 6112B	35238	2015-12-01
Horn antenna	SWARZBECK	BBHA 9120D	1077	2015-12-01

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
Transmitter Output Power	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