



RF Test Report

Product Name: Remote Radio Unit

Product Model: RRU3268

Report Number: SYBH(R)01357970EB-1

FCC ID: QISRRU3268

IC: 6369A-RRU3268

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
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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.
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 for the test site located in Shenzhen is 97456, and the recognition numbers for the test site located in Shanghai is 684868.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers are 6369A-1 for the 3m chamber test site located at G2 building, 6369A-2 for the 3m chamber test site located at K3 building and 6369A-3 for the 10m chamber test site located at K3 building in Shenzhen; the recognition numbers are 6369D-1 for the 3m chamber test site and 6369D-2 for the 10m chamber test site located in Shanghai.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers for the test site No.1 located at G2 building in Shenzhen are R-3892, G-415, C-4361, and T-1348, and the accreditation numbers for the test site No.2 located at K3 building in Shenzhen are R-3760, G-485, C-4210 and T-1237.
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: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
 Bantian, Longgang District, Shenzhen, 518129, P.R.C
Product Name: Remote Radio Unit
Product Model: RRU3268

Date of Receipt Sample: 2014-05-21
Start Date of Test: 2014-05-21
End Date of Test: 2014-06-05

Test Result: Pass

Approved by Senior Engineer:	2014-06-10	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

Prepared by:	2014-06-10	Li Guo	<i>Li Guo</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 2 (10-1-13 Edition)
47 CFR FCC Part 27 (10-1-13 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 v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v01r02 (if applicable)
FCC KDB 662911 D02 MIMO with Cross-Polarized Antennas v01 (if applicable)

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 BRS&EBS Band (2496/2500-2690 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(h)	RSS-Gen,§4.8; RSS-199,§4.4	FCC	Base Station	EIRP Power $\leq 33 \text{ dBW} + 10 \lg(X/Y) \text{ dBW} + 10 \lg(360/\text{beamwidth}) \text{ dBW}$, where $X=\text{ChBW}(\text{MHz})$, $Y=5.5$ or 6 MHz .	Annex A	Pass	TL1
				Mobile Subscriber Station	EIRP Power $\leq 2 \text{ W}$.			
				Subscriber Station	Conducted Power $\leq 2 \text{ W}$.			
			IC	Base Station	EIRP PD $\leq 33.3 \text{ W}/100 \text{ kHz}$.			
				Mobile Subscriber Station	Peak EIRP Power $\leq 2 \text{ W}$.			
				Other Subscriber Station	<ul style="list-style-type: none"> ● EIRP Power $\leq 40 \text{ W}$. ● Peak Conducted Power $\leq 2 \text{ W}$. 			
Bandwidth	§2.1049, §27.53(m)	RSS-Gen,§4.6	FCC	<ul style="list-style-type: none"> ● OBW: No limit. ● EBW (-26 dBc): No limit. 		Annex B	Pass	TL1
			IC	OBW: No limit.				



Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location	
Band Edges Compliance	§2.1051, §27.53(m)	RSS-Gen, §4.9; RSS-199, §4.5; RSS-199, §4.2	FCC	Base Station / Fixed Subscriber Station	<p>Channel Edge</p> <p>-13 dBm/1%*EBW</p> <p>-13 dBm/1%*EBW</p> <p>1 MHz</p> <p>1 MHz</p> <p>(EBW is -26 dBc EBW)</p>	Annex C	Pass	TL1
				Mobile Station	<p>Channel Edge</p> <p>-13 dBm</p> <p>-13 dBm</p> <p>4.5 MHz 1 MHz 1 MHz 4.5 MHz</p> <p>RBW = 1 MHz RBW ≥ 1%*EBW RBW ≥ 1%*EBW RBW = 1 MHz</p> <p>(EBW is -26 dBc EBW)</p>			



Test Item	FCC Rule	IC Rule	Requirements		Test Result	Verdict	Test Location	
			IC	Base Station / Non-Mobile Subscriber Station				
				Mobile Subscriber Station				
Spurious Emission at Antenna Terminals	§2.1051, §27.53(m)	RSS-Gen,§4.9; RSS-199,§4.5; RSS-199, §4.2	FCC	Base Station / Fixed Subscriber Station		Annex D	Pass	TL1



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location									
			<table border="1"> <tr> <td></td> <td>Mobile Station</td> <td> </td> </tr> <tr> <td>IC</td> <td>Base Station / Non-Mobile Subscriber Station</td> <td> </td> </tr> <tr> <td></td> <td>Mobile Subscriber Station</td> <td> </td> </tr> </table>		Mobile Station		IC	Base Station / Non-Mobile Subscriber Station			Mobile Subscriber Station				
	Mobile Station														
IC	Base Station / Non-Mobile Subscriber Station														
	Mobile Subscriber Station														
Field Strength of Spurious Radiation	§2.1053, §27.53(m)	RSS-Gen,§4.9; RSS-199,§4.5	≤ -13 dBm/1 MHz.	Annex E	Pass	TL2									
Frequency Stability	§2.1055, §27.54	RSS-Gen,§4.7; RSS-199,§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, 	Annex F	Pass	TL1									



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location
			<ul style="list-style-type: none"> ±15%*NV. 			
			IC <ul style="list-style-type: none"> Test method: Fundamental emissions (Fc_meas) within the operating frequency band. Test conditions: (1) NV, -30°C/+20°C/+50°C. (2) +20°C, ±15%*NV. 			
Receiver Spurious Emissions	---	IC NOTICE 2012-DRS0126	---	Annex G	---	---

2.1.2 Non-measurement Technical Requirements

Description	FCC Rule	IC Rule	Requirements	Test Result	Verdict
Frequency Plan	§27.5(i)	RSS-199,§2.2	FCC 2496-2690 MHz.	See technical specification description.	Comply
			IC 2500-2690 MHz.		
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



3 Description of the Equipment under Test (EUT)

3.1 General Description

The RRU3268 is an outdoor remote radio unit. It is the radio frequency (RF) part of a distributed base station and can be located near antennas. The RRU3268 can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal data.

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
WD5DLRX870	VER.D	Transceiver Board for RRU3268

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
LMPT	LMPTc	HUAWEI	HERT BBU, WD22LMPT1, LTE Main Processing & Transmission Unit C(2*FE/GE RJ-45 or 2*FE/GE SFP), With M12M GPS Card



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): 2620 to 2690 MHz Receiving (RX): 2500 to 2570 MHz
TX and RX Antenna Ports	TX & RX port: 2 TX-only port: 0 RX-only port: 0
Multiple Carrier Supported	2(MAX)
Maximum RF Bandwidth	50 MHz
TX Output Power	Max. 40 W (per antenna port) Max. 80 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 checked="" type="checkbox"/> 15 MHz, <input checked="" 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: Not applicable UMTS system: Not applicable LTE system: Base-band: QPSK, 16QAM,64QAM Carrier: OFDM/OFDMA CDMA system: Not applicable WiMAX system: Not applicable



Characteristics	Description
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: Not applicable UMTS system: Not applicable LTE system: 4M51D9W, 9M00D9W, 13M5D9W, 18M0D9W CDMA system: Not applicable WiMAX system: Not applicable
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: 11 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

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
1L_5M_B	B	1*L(40W)	2622.5	2502.5	5	46	TM1.1
1L_5M_M	M	1*L(40W)	2655	2535	5	46	TM1.1
1L_5M_T	T	1*L(40W)	2687.5	2567.5	5	46	TM1.1
1L_10M_B	B	1*L(40W)	2625	2505	10	46	TM1.1
1L_10M_M	M	1*L(40W)	2655	2535	10	46	TM1.1
1L_10M_T	T	1*L(40W)	2685	2565	10	46	TM1.1
1L_15M_B	B	1*L(40W)	2627.5	2507.5	15	46	TM1.1
1L_15M_M	M	1*L(40W)	2655	2535	15	46	TM1.1
1L_15M_T	T	1*L(40W)	2682.5	2562.5	15	46	TM1.1
1L_20M_B	B	1*L(40W)	2630	2510	20	46	TM1.1
1L_20M_M	M	1*L(40W)	2655	2535	20	46	TM1.1
1L_20M_T	T	1*L(40W)	2680	2560	20	46	TM1.1
2L_5M_B	B	2*L(20W)	2622.5, 2667.5	2502.5, 2547.5	5, 5	43, 43	TM1.1
2L_5M_T	T	2*L(20W)	2642.5, 2687.5	2522.5, 2567.5	5, 5	43, 43	TM1.1

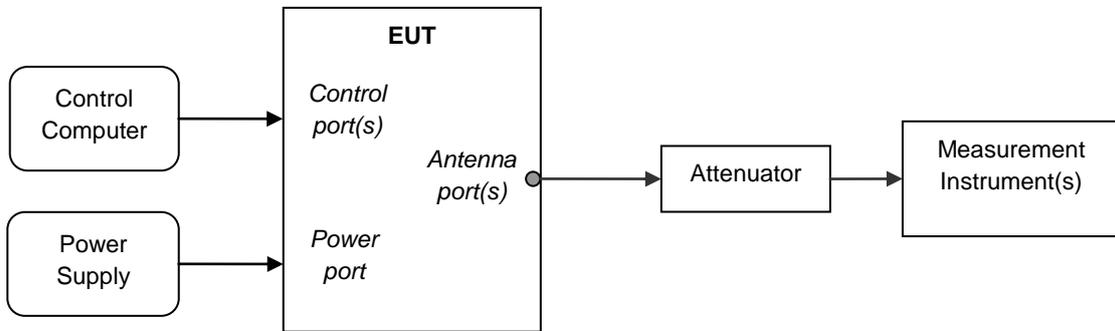


4.3 Test Environments

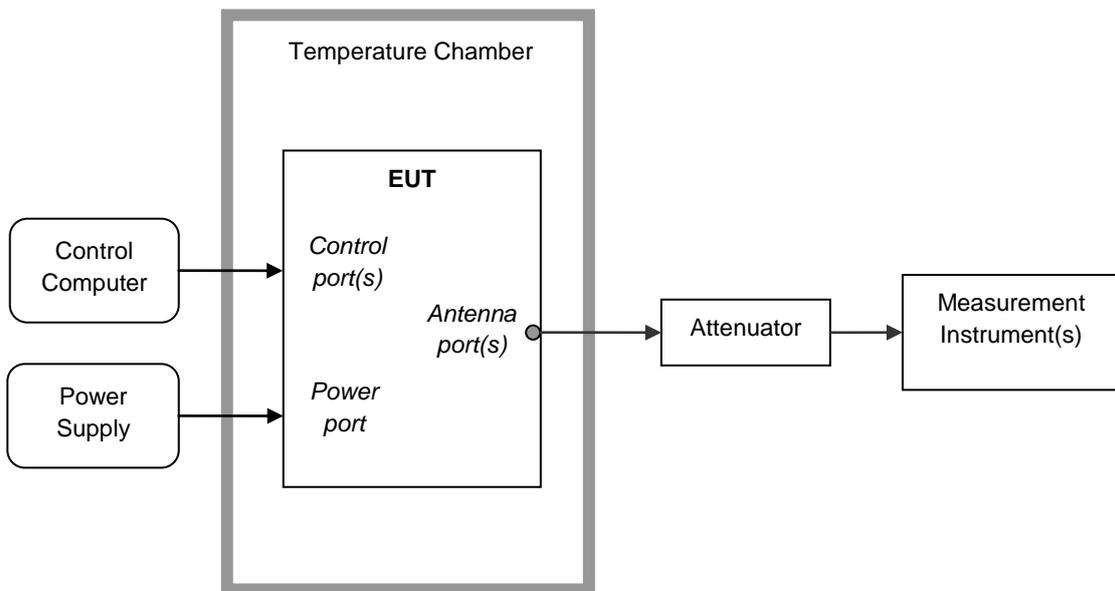
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

4.4 Test Setups

4.4.1 Test Setup 1



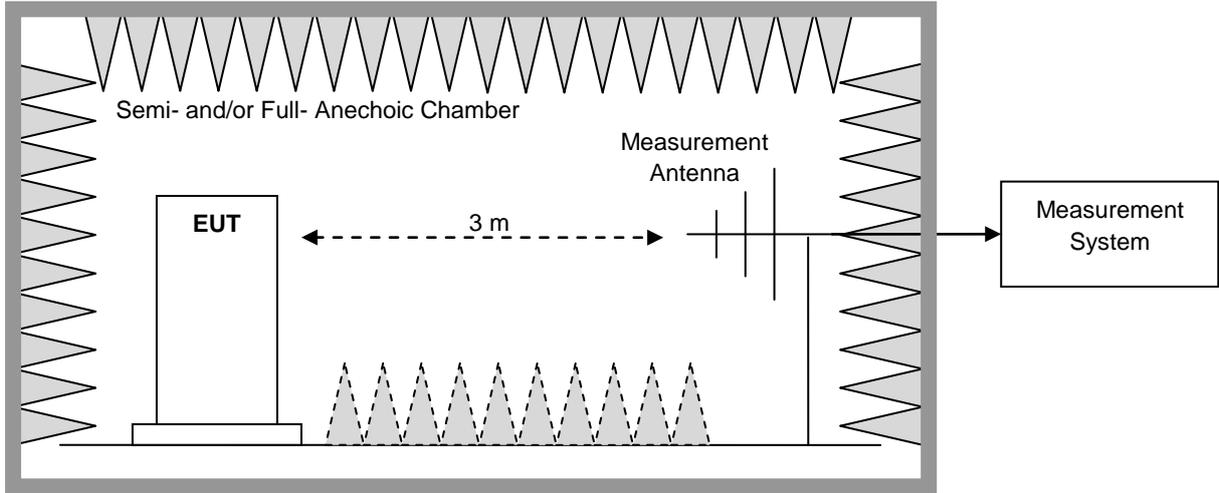
4.4.2 Test Setup 2



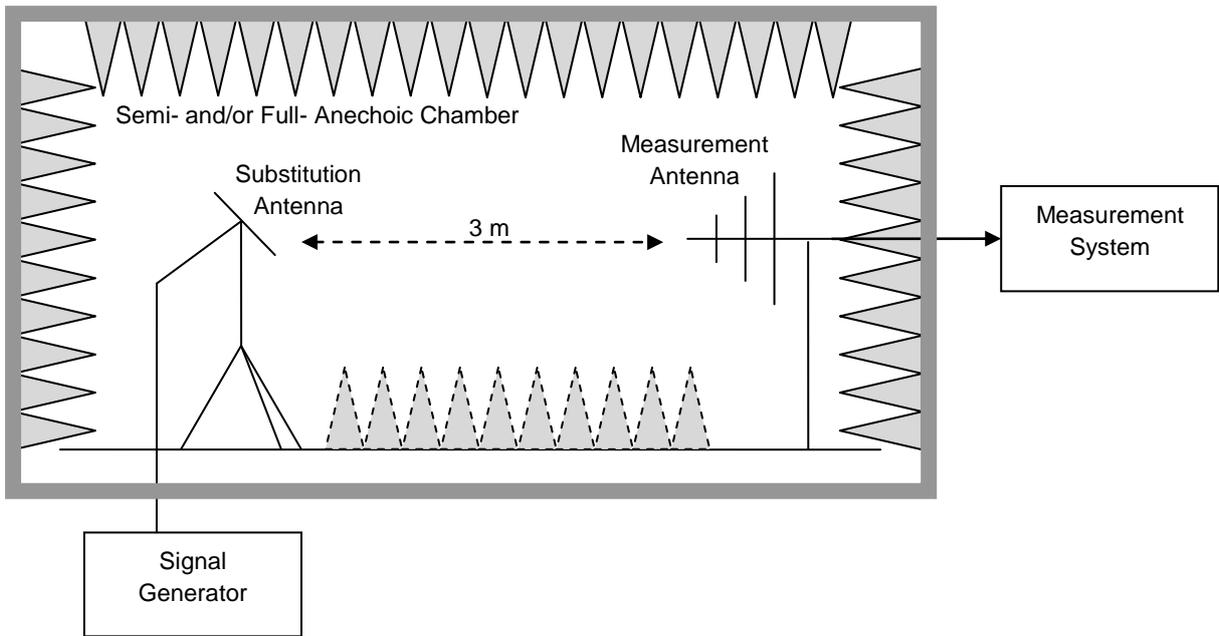
4.4.3 Test Setup 3

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.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_10M_B, 1L_10M_M, 1L_10M_T, 1L_15M_B, 1L_15M_M, 1L_15M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T, 2L_5M_B, 2L_5M_T
	Power Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T
	Peak-to-Average Ratio (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_10M_B, 1L_10M_M, 1L_10M_T, 1L_15M_B, 1L_15M_M, 1L_15M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_10M_B, 1L_10M_M, 1L_10M_T, 1L_15M_B, 1L_15M_M, 1L_15M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_T, 1L_20M_B, 1L_20M_T, 2L_5M_B, 2L_5M_T
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	1L_5M_B, 1L_5M_M, 1L_5M_T, 1L_20M_B, 1L_20M_M, 1L_20M_T, 2L_5M_B, 2L_5M_T
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	1L_5M_M NOTE: If applicable, the EUT Conf. that has maximum power 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 Case		Test Conditions	
		Test Setup	Test Seup 2
		EUT Conf.	1L_5M_M 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.	--	
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	2014-11-26
Spectrum Analyzer	Agilent	N9020A	MY51240619	2015-02-18
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-25
Test Setup 3				
EMI test receiver	R&S	ESU40	100303/040	2015-01-12
Bilog antenna	Schaffner	VULB9163	9163-480	2015-05-10
Horn antenna	R&S	BBHA 9120	9120D-878	2015-03-20



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