



# RF Test Report

**Product Name: Remote Radio Unit**

**Product Model: RRU3256**

**Report Number: SYBH(R)01388518EB-1**

**FCC ID: QISRRU3256-2500**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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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.
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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:** RRU3256  
**Version:** DBS3900 LTE TDD V100R006

**Date of Receipt Sample:** 2014-06-17  
**Start Date of Test:** 2014-06-19  
**End Date of Test:** 2014-07-07

**Test Result:** Pass

<b>Approved by Senior Engineer:</b>	2014-07-10	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

<b>Prepared by:</b>	2014-07-10	Liang Changguan	<i>Liang Changguan</i>
	Date	Name	Signature



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### 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)

### 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

### 1.3 Test Environment Condition

Temperature: 20 to 25 °C (Ambient)  
Relative Humidity: 45 to 75 % (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 $6 \text{ MHz}$ .	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"> <li>● EIRP Power <math>\leq 40 \text{ W}</math>.</li> <li>● Peak Conducted Power <math>\leq 2 \text{ W}</math>.</li> </ul>			
Bandwidth	§2.1049, §27.53(m)	RSS-Gen,§4.6	FCC	<ul style="list-style-type: none"> <li>● OBW: No limit.</li> <li>● EBW (-26 dBc): No limit.</li> </ul>		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>(EBW is -26 dBc EBW)</p>	Annex C	Pass	TL1
				Mobile Station	<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	<p>Channel Edge -13 dBm/1%*OBW -13 dBm/1%*OBW 1 MHz 1 MHz</p>			
				Mobile Subscriber Station	<p>Channel Edge -13 dBm -13 dBm 4.5 MHz 1 MHz 1 MHz 4.5 MHz RBW = 1 MHz RBW ≥ 1%*OBW RBW ≥ 1%*OBW RBW = 1 MHz</p>			
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	<p>Channel Edge -13 dBm/1 MHz -13 dBm/1 MHz 9 kHz 1 MHz 1 MHz 10<sup>th</sup> harmonics</p>	Annex D	Pass	TL1



Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict	Test Location						
			<table border="1"> <tr> <td>Mobile Station</td> <td> </td> </tr> <tr> <td>IC Base Station / Non-Mobile Subscriber Station</td> <td> </td> </tr> <tr> <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	TL1						
Frequency Stability	§2.1055, §27.54	RSS-Gen,§4.7; RSS-199,§4.3	FCC <ul style="list-style-type: none"> <li>● Test method: Fundamental emissions (Fc_meas) within the authorized bands of operation.</li> <li>● Test conditions: (1) NV, -30°C/.../+50°C step=+10°C. (2) NT,</li> </ul>	Annex F	Pass	TL1						



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



Automatic Transmit Power Control	§27.5(a)	RSS-195,§5.1	Mobile, portable and fixed subscriber equipment shall employ automatic transmit power control when operating so that the equipment shall operate with minimum power necessary for successful communication.	See technical specification description.	Comply
Prohibition on External Vehicle Mounted Antennas.	§27.5(a)	--- (SRSP-516)	The use of external vehicle-mounted antennas for mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band is prohibited.	Fixed and/or integrated antenna used. See technical specification description.	Comply
Fixed Subscriber Equipment Power Class	---	RSS-195,§2.3	High Power Fixed Subscriber Equipment: Average EIRP PD > 2 W/5 MHz. Low Power Fixed Subscriber Equipment: Average EIRP PD ≤ 2 W/5 MHz.	<input type="checkbox"/> High Power Class <input type="checkbox"/> Low Power Class	---



### 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 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
WD5MPSRH290	Ver. B	Transmission and receiver cell
WD5BPHP42X0	Ver. A	DC Power supply
WD5BPHA4290	Ver. A	Power Amplifier Unit

##### 3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Baseband Processing board	LBBPD4-021HPL 10D2000	HUAWEI	Manufactured Board, BBU3900, WD22LBBPD4, LTE Baseband Processing and Interface Unit, 1*1
Main Processing board	UMPT-020DBB10 C600	HUAWEI	HERT BBU, WD22UMPTs, Universal Main Processing & Transmission unit with 4E1 and 2FE/GE interface, 1*1



### 3.3 Technical Specification

Characteristics	Description
Radio System Type	Single Radio <input type="checkbox"/> GSM Access <input type="checkbox"/> UMTS Technology <input checked="" type="checkbox"/> LTE (Single-RAT): <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 type="checkbox"/> Fixed Station <input type="checkbox"/> Mobile Station <input type="checkbox"/> Portable Station #3 <input type="checkbox"/> Indoor Station <input type="checkbox"/> Outdoor Station
Supported Frequency Range	Transmission 2496 to 2690 MHz (TX): Receiving (RX): 2496 to 2690 MHz
TX and RX Antenna Ports	TX & RX port: 4 TX-only port: 0 RX-only port: 0
Multiple Carrier Supported	4
Maximum RF Bandwidth	80MHz
TX Output Power	Max. 30 W (per antenna port) Max. 120 W (four 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 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	LTE system: Base-band: QPSK, 16QAM, 64QAM Carrier: OFDM/OFDMA



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.)	LTE system: 5M00D9W, 10M0D9W, 20M0D9W
Power Supply	Power Supply Type: <ul style="list-style-type: none"> <li><input type="checkbox"/> External AC mains,</li> <li><input checked="" type="checkbox"/> External DC mains,</li> <li><input type="checkbox"/> AC/DC Adapter,</li> <li><input type="checkbox"/> Powered over Ethernet (PoE)</li> </ul> Nominal Voltage, Input to EUT: -48 VDC Voltage Range, Input to EUT: -36 to -60 VDC
Antenna Assembles	Antenna Type: <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> External</li> <li><input type="checkbox"/> Integrated</li> </ul> Smart Antenna: <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> MIMO</li> <li><input type="checkbox"/> Non MIMO</li> </ul> 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, QPSK modulation
LTE/TM3.1	LTE system, 3GPP TS 36.141 clause 6.1.1, E-TM 3.1, 64QAM modulation



## 4.2 EUT Configurations

### 4.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, <ul style="list-style-type: none"> <li>All TX tests are ONLY performed at the main TX antenna port (e.g. TRXA, TXA or similar) of the EUT, and</li> <li>All RX tests are ONLY performed at the main RX antenna port (e.g. TRXA, RXB or similar) of the EUT.</li> </ul>
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]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
1	B	1*L(20W)	2498.5; 2501; 2506	5,10,20	43	LTE/TM1.1
2		2* L (20W)	2501&2508.5; 2501&2516; 2506&2518.5; 2506&2526	10&5; 10&20; 20&5; 20&20	41.2&38.3; 38.3&41.2; 42&36; 40&40	LTE/TM1.1
3		3* L (30W)	2506&2526&2546; 2501&2516&2536	20&20&20; 10&20&20	40&40&40; 37.8&40.8&40.8	LTE/TM1.1
4		4* L (30W)	2501&2516&2536& 2551	10&20&20 &10	37&40&40&37	LTE/TM1.1
5		4* L (29.6W)	2506&2526&2546& 2566	20&20&20 &20	38.7& 38.7& 38.7& 38.7	LTE/TM1.1
6	M	1* L (20W)	2593;2593;2593	5,10,20	43	LTE/TM1.1;TM3.1
7		2* L (20W)	2588&2595.5; 2588&2603; 2583&2595.5; 2583&2603	10&5; 10&20; 20&5; 20&20	41.2&38.3; 38.3&41.2; 42&36; 40&40	LTE/TM1.1
8		3* L (30W)	2573&2593&2613;2 640&2660&2680	20&20&20; 10&20&20	40&40&40; 37.8&40.8&40.8	LTE/TM1.1



EUT Conf.	RF Ch.	Carrier Conf. Description	TX Freq. [MHz]	Ch. BW [MHz]	Power Level [dBm]	Test Mode
9		4* L (30W)	2568&2583&2603&2618	10&20&20&10	37&40&40&37	LTE/TM1.1
10		4* L (29.6W)	2563&2583&2603&2685	20&20&20&20	38.7& 38.7&38.7& 38.7	LTE/TM1.1
11	T	1* L (20W)	2687.5,2685,2680	5,10,20	43	LTE/TM1.1
12		2* L (20W)	2680&2687.5; 2665&2680; 2675&2687.5; 2660&2680	10&5; 10&20; 20&5; 20&20	41.2&38.3; 38.3&41.2; 42&36; 40&40	LTE/TM1.1
13		3* L (30W)	2640&2660&2680;2 645&2660&2680	20&20&20; 10&20&20	40&40&40; 37.8&40.8&40.8	LTE/TM1.1
14		4* L (30W)	2635&2650&2670& 2685	10&20&20 &10	37&40&40&37	LTE/TM1.1
15		4* L (29.6W)	2620&2640&2660& 2680	20&20&20 &20	38.7& 38.7& 38.7& 38.7	LTE/TM1.1

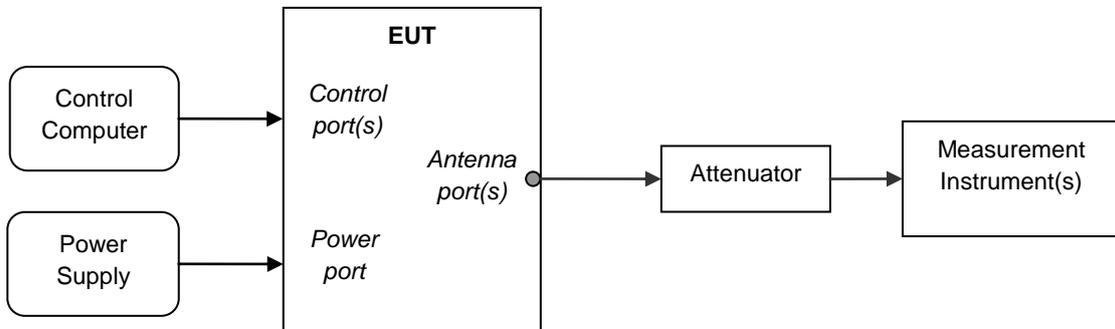


### 4.3 Test Environments

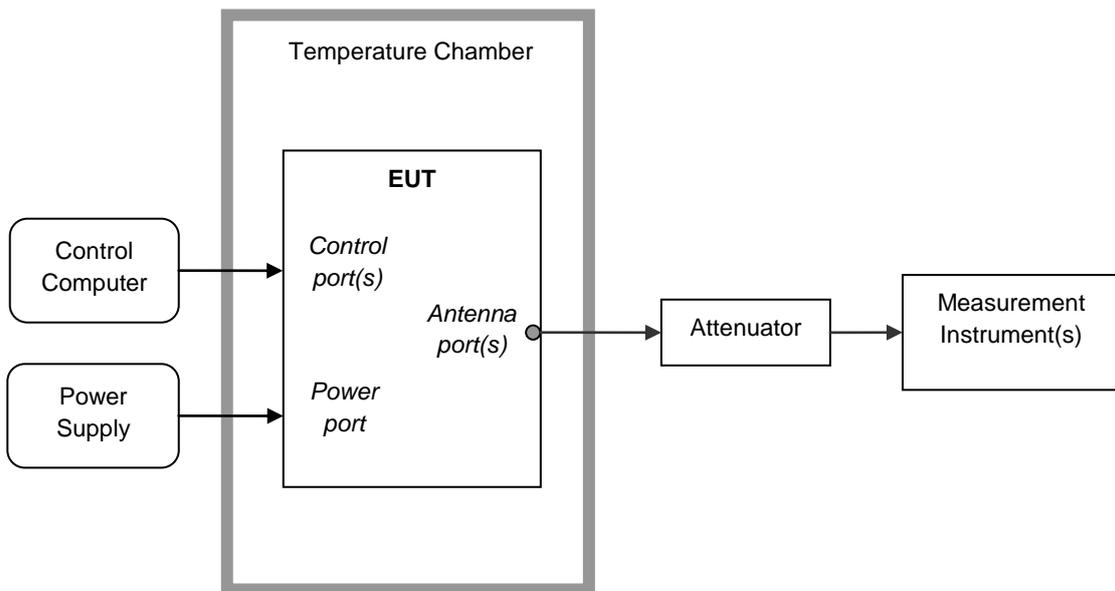
Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
Ambient Climate	Ambient	---	Ambient
Rated Voltage	---	-48 VDC	---

## 4.4 Test Setups

### 4.4.1 Test Setup 1



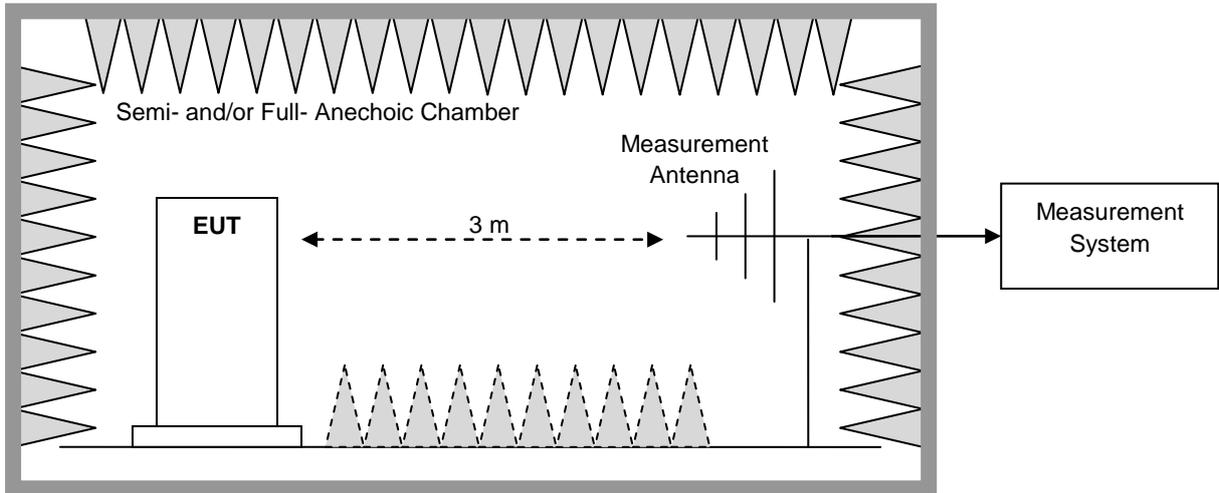
### 4.4.2 Test Setup 2



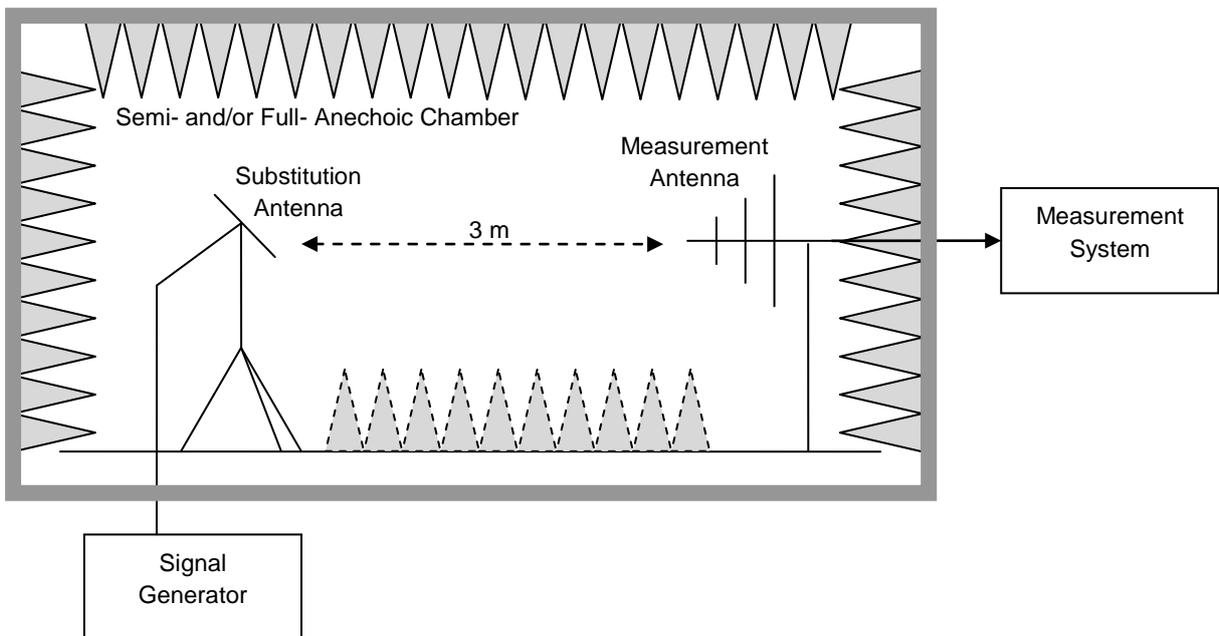
### 4.4.3 Test Setup 3

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.	EUT Conf. 1 to EUT Conf. 15
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1, EUT Conf. 6, EUT Conf. 11
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1, EUT Conf. 4, EUT Conf. 5, EUT Conf.11, EUT Conf.14, EUT Conf.15,
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 1
		EUT Conf.	EUT Conf. 1, EUT Conf. 4, EUT Conf. 5, EUT Conf. 6, EUT Conf. 9, EUT Conf. 10, EUT Conf.11, EUT Conf.14, EUT Conf.15,
Field Strength of Spurious Radiation		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Seup 3
		EUT Conf.	EUT Conf. 9 (the worst configure)  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 Setup	Test Seup 2
		EUT Conf.	EUT Conf. 6.  NOTE: A representative EUT Conf. was selected since the un-modulation carrier configuration was required by the standards/rules.



## 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	2015-05-12
Temperature Chamber	ESPEC	EW0470S	12113066	2014-12-25
Test Setup 3				
3m Semi Anechoic Chamber	S+M	---	---	---
EMI Test receiver	R&S	ESU40	100144	2014-12-23
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	2014-09-13
Horn Antenna	R&S	HF906	359287/006	2014-09-14



## 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